



Severn Sound

Environmental Association

WETLAND EVALUATION OF TINY BOG WETLAND COMPLEX - TOWNSHIP OF TINY



May 2017

**WETLAND EVALUATION OF
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- TOWNSHIP OF TINY**

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**Prepared for
THE TOWNSHIP OF TINY,
THE ONTARIO MINISTRY OF NATURAL
RESOURCES AND FORESTRY
and
HURONIA COMMUNITY FOUNDATION**

**by
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FOREWORD

This document reports on the findings of the Wetland Evaluation of Tiny Bog, conducted during 2012 and 2013 by the Severn Sound Environmental Association (SSEA) for the Township of Tiny and the Ontario Ministry of Natural Resources and Forestry.

The evaluation was conducted using the standards set out in the Ontario Wetland Evaluation System, Southern Manual, 3rd edition, version 3.2 (2013). The Tiny Bog wetland evaluation has been reviewed by the Ontario Ministry of Natural Resources and Forestry (MNRF), Midhurst District, and the wetland's significance was confirmed by the MNRF in January 2017.

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Panorama of Tiny Bog

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I am indebted to Bob Bowles and Margaret Killing for their considerable assistance with this wetland evaluation. Bob's natural history knowledge is very valuable for projects of this nature. In addition to his direct involvement with field surveys, Bob's checklists of wildlife in Simcoe County were used as the basis for the species lists in this report. As a volunteer with a background in botany, Margaret contributed significantly to the project. She assisted with field work and data collection, and maintained and updated the plant species list for the project.

Severn Sound Environmental Association staff provided support and professional expertise throughout the project. In particular, the support of Keith Sherman, Lex McPhail, and Gail Marchildon was essential to the preparation of this wetland evaluation. Thank you also to Carl Lesperance, Melissa Carruthers, Jordan Hook, Steven Holden, and Daelin Verkindt for field support and assisting with data collection, and to Paula Madill and Aisha Chiandet for assistance with water samples.

Severn Sound Environmental Association is grateful to the Township of Tiny and Huronia Community Foundation for providing funding to support this project.

The project team would like to thank Ontario Ministry of Natural Resources and Forestry (OMNRF) staff for their assistance with the evaluation. We received background information, field support and expertise from Kate Gee (Resource Management Technician) and Graham Findlay (Management Biologist) at the Midhurst District OMNRF office. Steve Varga (Management Biologist) at the Aurora District OMNRF office provided information related to true bogs and nutrient-poor fens.

Special thanks to Ray Millar, Mayor of the Township of Tiny when the evaluation work was undertaken, and Township staff Doug Luker (CAO/Clerk) and Sue Walton (Deputy Clerk), for providing municipal information and assistance.

We are grateful to Earl Dertinger (Forestry/Recreation Technician) and the County of Simcoe Forestry Department for allowing access to the Wildman Tract of County Forest, and for providing background information.

Landowner support was important to this project. We would like to thank the private landowners in the Tiny Bog area that kindly allowed us to access their properties for the purpose of conducting the wetland evaluation. Many of these landowners provided useful information on wildlife species utilizing the wetland.

All photographs in this report were taken by staff from the SSEA unless otherwise noted.

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1. INTRODUCTION

1.1 Background

Tiny Bog is located in the Township of Tiny, southwest of Wyevale (Figure 1). The County of Simcoe owns approximately 51% of the wetland area, and the remainder is under private ownership.

A wetland evaluation was conducted in 1984 by the Ontario Ministry of Natural Resources, and Tiny Bog was evaluated as a Class 7 Wetland. In 1993, changes were made to the Southern Ontario Wetland Evaluation System, however, no updates were made to the Tiny Bog evaluation at that time.

1.2 Purpose

The purpose of this project was to conduct field work, and prepare and submit a revised evaluation and mapping for Tiny Bog, upgraded to the current standards of the Ontario Wetland Evaluation System in effect at the time of evaluation (i.e., 3rd edition, version 3.2, 2013).

1.3 Study Team

The Severn Sound Environmental Association (SSEA) undertook the wetland evaluation, funded by the Township of Tiny and Huronia Community Foundation, with support from the Ontario Ministry of Natural Resources and Forestry (OMNRF). The Township of Tiny provided background information, and OMNRF provided direction and technical advice during the project.

The primary investigators for the field component of the evaluation were: Michelle Hudolin (SSEA Wetlands & Habitat Biologist), and contractor Bob Bowles. Margaret Killing (volunteer), Carl Lesperance (SSEA co-op student), Melissa Carruthers (SSEA Field Technician), Jordan Hook and Steven Holden (SSEA Water Stewardship Technicians), Daelin Verkindt (SSEA Water Technician), and Kate Gee (OMNRF) assisted with field investigations and data collection during 2012 and 2013. Keith Sherman (SSEA Executive Director) provided guidance, input and assistance throughout the project; Gail Marchildon (SSEA Office Manager) provided administrative support; Geographic Information System (GIS) support was provided by Lex McPhail (SSEA GIS/Applications Specialist); Paula Madill (SSEA Ecosystem Technologist) and Aisha Chiandet (SSEA Water Scientist) provided assistance with water sampling and data analysis.

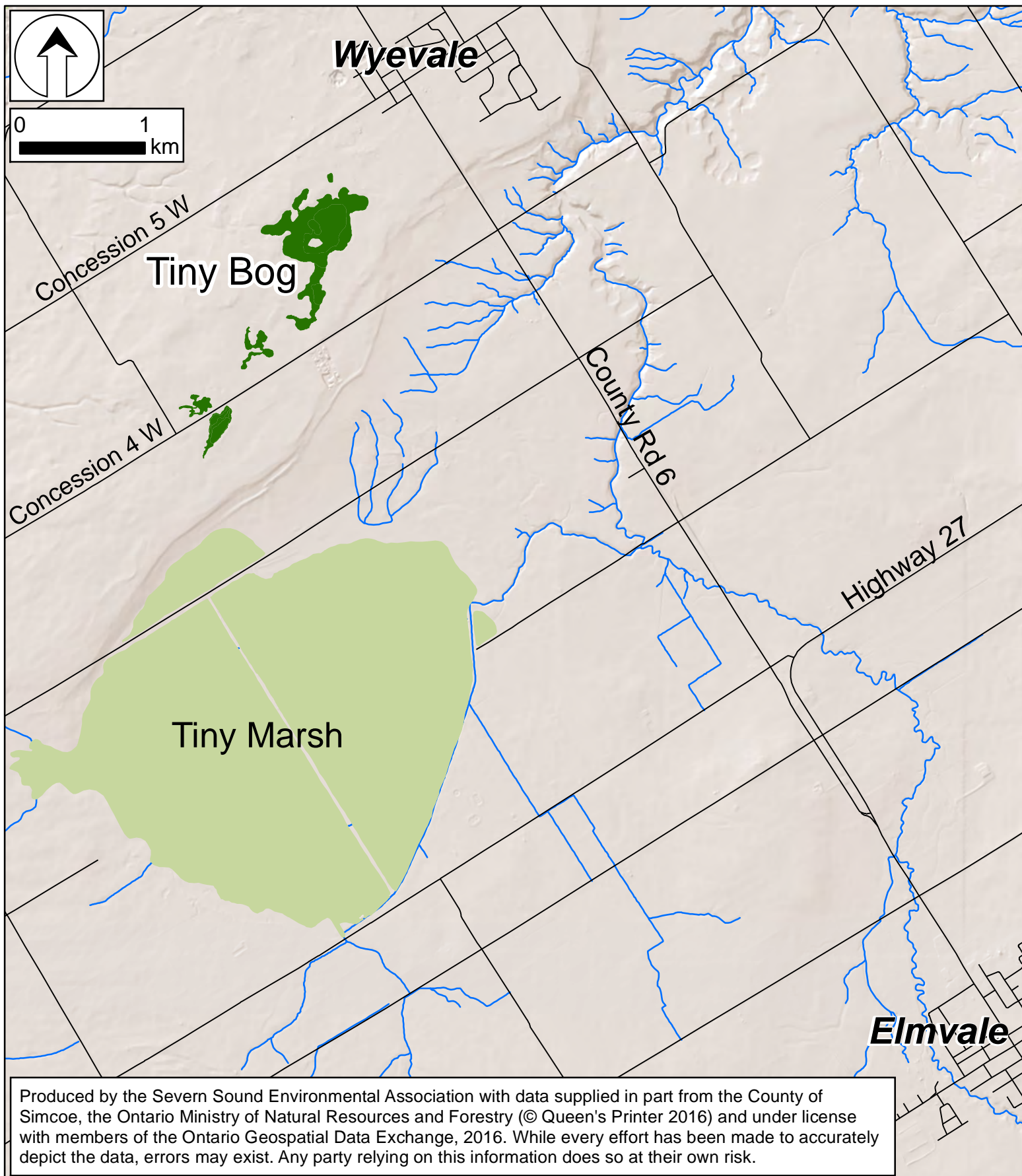


Figure 1: Location of Tiny Bog

1.4 Fieldwork and Data Collection

Field investigations were undertaken in summer/fall of 2012, and spring/summer of 2013, to assess features in Tiny Bog, map and describe vegetation communities, and collect information on species utilizing the wetland. The spring, summer and early fall of 2012 were drier than average, with warmer than average temperatures in the fall; field work was conducted on June 21, July 16, July 26, July 31, August 16, August 20, August 30, September 12, September 19, and October 4, 2012. The spring of 2013 was wetter than average, and slightly warmer than average in May; field work was conducted on April 21, May 19, June 12, and July 5, 2013. During field visits, the field crew compiled a list of plant species observed, and recorded incidental observations of wildlife species. Soils were sampled with a hand auger to determine general soil types present in the wetland, to a maximum depth of 120 cm.

Access was not granted to all parcels of land within the study area, therefore some information was not directly obtainable from field observations. In these cases, existing information and aerial photograph interpretation was used to determine the wetland boundary and describe the wetland communities. If an opportunity arises in the future to access these lands, the vegetation communities and wetland evaluation record should be updated accordingly.

2. WETLAND EVALUATION

A map of the wetland communities in the wetland complex was produced (Figure 2). The communities are divided into wetland types (F=fen, S=swamp, M=marsh), and each community has been given an alpha-numeric identifier according to the evaluation system protocol.

Under the 3rd Edition Ontario Wetland Evaluation System Southern Manual (version 3.2), a wetland evaluation is scored in four main categories: Biological, Social, Hydrological, and Special Features components. The Biological section assesses ecological and biological values of the wetland. The Social component evaluates the uses that wetlands provide to people (e.g., recreational opportunities and natural resources such as timber and fur bearing mammals). The Hydrological category evaluates factors such as flood attenuation and water quality improvement. The Special Features component allows attributes such as significant wildlife habitat and rare species to be evaluated. The Extra Information section of the evaluation provides an opportunity for reporting additional information that does not receive points toward the evaluation score, such as the presence of invasive species or other notable species such as Osprey (*Pandion haliaetus*). It should be noted that a wetland evaluation is not a complete inventory of biological or physical features.

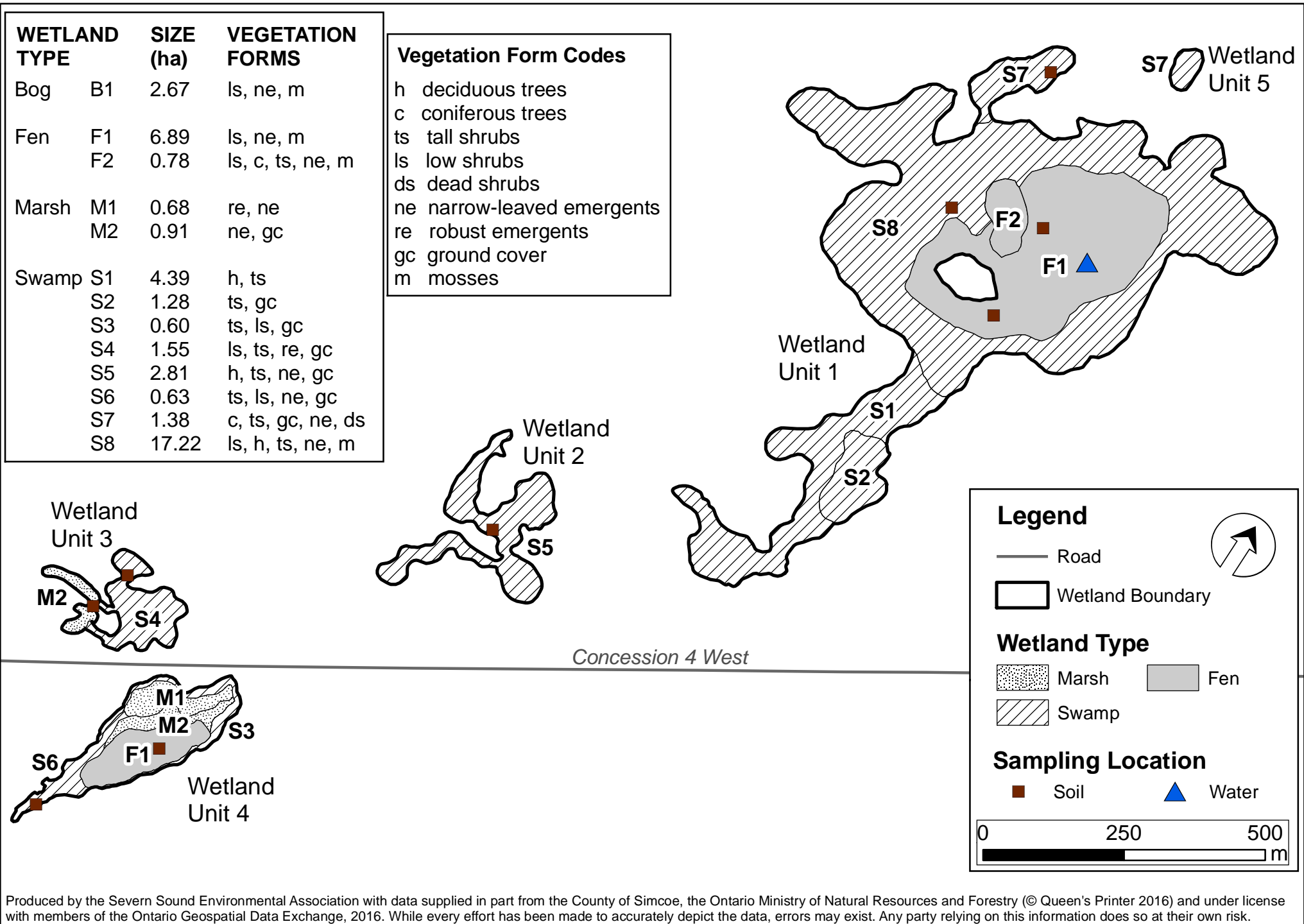


Figure 2: Tiny Bog Wetland Habitat

Points are awarded for each category, based on the evaluation system protocol. The sum of the points from all categories results in the final score for the wetland or wetland complex, and represents the status of the wetland at the time of the study. Each of the four components can score a maximum of 250 points, and thus a wetland or wetland complex can score a maximum of 1000 points. Wetlands that receive a total score of 600 points (or greater), or score 200 points (or greater) in either the Biological or Special Features scoring components, are categorized as Provincially Significant Wetlands.

Wetlands that receive a total score of less than 600 total points and score less than 200 points in each of the Biological and Special Features scoring components are categorized as Non-provincially Significant Wetlands, and are often designated Locally Significant Wetlands by municipalities. The significant findings of the field work for the Tiny Bog evaluation are outlined below.

2.1 Biological Component

The Tiny Bog wetland complex contains three distinct wetland types: fen, swamp and marsh. Five individual wetland units make up the 41.79 hectare Tiny Bog (Figure 2); overall, the wetland is dominated by swamp (72%), with fen habitat (24%), and marsh (4%) making up the remainder. Nutrient-poor fen habitat (Figure 3) is present on the interior of wetland unit 1; nutrient-rich fen habitat (Figure 4) surrounds the poor fen, and includes species such as Pitcher Plant (*Sarracenia purpurea*) (Figure 5) and Round-leaved Sundew (*Drosera rotundifolia*) (Figure 6). Swamp habitat in the wetland consists of deciduous swamp (Figure 7), coniferous swamp, low shrub swamp, and tall shrub swamp (Figure 8).



Figure 3: Nutrient-poor Fen Habitat



Figure 4: Nutrient-rich Fen Habitat



Figure 5: Pitcher Plant
(*Sarracenia purpurea*)



Figure 6: Round-leaved Sundew
(*Drosera rotundifolia*)



Figure 7: Deciduous Swamp Habitat



Figure 8: Tall Shrub Swamp Habitat

The habitat and topography surrounding Tiny Bog is a diverse mixture of row crops, pasture, deciduous, coniferous and mixed forest, fence rows with cover, and hilly terrain. In addition, Tiny Bog is located within approximately 700 m of Tiny Marsh Provincially Significant Wetland. Habitat variety adjacent to wetlands and connectivity to other natural areas is valuable from a biological perspective, because high ecological diversity typically supports a large number of species of plants and animals, and landscape connectivity allows animals to move between areas of high habitat importance.

2.2 Social Component

The field crew noted the presence of a number of potential resources in Tiny Bog that contribute to the scoring for the social component of the evaluation, including timber and wildlife species. The field crew directly observed or found evidence (e.g., scat, tracks, browse) of several economically valuable wildlife species in the wetland, including: Beaver (*Castor canadensis*) (Figure 9), Raccoon (*Procyon lotor*), and Red Squirrel (*Tamiasciurus hudsonicus*). In addition, other furbearers were reported by local residents and in the 1984 wetland evaluation file, including: Muskrat (*Ondatra zibethicus*), Mink (*Mustela vison*), Fox (*Vulpes vulpes*), and Coyote (*Canis latrans*), which also contribute to the social score for the wetland.



Figure 9: Evidence of Beaver (*Castor canadensis*)

Tiny Bog is located approximately 0.5 km southwest of the settlement of Wyevale, and approximately 8 km northwest of Elmvale. A portion of the Tiny Bog wetland complex (51%) lies on Simcoe County Forest property, and the remainder is in private ownership. Although there are trails throughout the County Forest, there are no maintained facilities such as boardwalks. The wetland has occasionally been used for hunting by residents, but there are no known visits to the wetland by educational groups.

The field crew observed damage from all-terrain vehicles in several locations; use of some trails has impacted the wetland by destroying plants and altering the natural drainage (Figure 10).



Figure 10: All-terrain Vehicle Damage

2.3 Hydrological Component

There is moderate to extensive lagg development in wetland unit 1 of Tiny Bog. A lagg is a moat of open water that forms around the perimeter of some wetlands, and provides evidence of groundwater discharge. In addition, Tiny Bog is located within 10 km of the aquifer that supplies groundwater to the community of Wyevale. These factors contribute to a moderately high score for groundwater discharge. The Tiny Bog wetland complex also scores high for groundwater and soil recharge potential, due to the surrounding soil type (sand), and because most of the wetland does not have a surface water outlet.

Approximately 79% of the Tiny Bog wetland complex is isolated, meaning it has no surface water outflow. As a result, Tiny Bog receives a relatively high score for flood attenuation in the catchment area. Most of the land in the wetland's catchment is forested or naturally vegetated, thus Tiny Bog receives a relatively low score for short term water quality improvement. However, more than 50% of the wetland is covered with organic soils (Figure 11), and consequently, Tiny Bog scores the maximum points for long-term nutrient trap and carbon sink.



Figure 11: Organic Soils in Poor Fen Community

2.4 Special Features Component

Special features attributes include rare species and important wildlife habitats. During field visits to Tiny Bog, the field crew recorded 130 plant species (Appendix A), and 141 wildlife species, including birds, mammals, amphibians, reptiles, butterflies, dragonflies, damselflies, and other invertebrates (Appendix B) in the wetland and adjacent uplands.

Long Sedge (*Carex folliculata*), a provincially rare plant species, was documented in Tiny Bog during 2012 field investigations, and therefore receives points as a Provincially Significant plant.

The field crew documented 53 species of birds in the wetland during field visits, including breeding birds, summer residents and migrants.

Two Provincially Significant bird species were documented in wetland habitat during 2012 field visits, and thus receive points as Provincially Significant animals. An Olive-sided Flycatcher (*Contopus cooperi*) was observed feeding and perching in the wetland, and breeding calls of Wood Thrush (*Hylocichla mustelina*) were heard during nesting season in suitable wetland habitat. One additional provincial Species At Risk, the *Special Concern* Eastern Wood-Pewee (*Contopus virens*), was documented as a resident species in the uplands adjacent to the wetland.

A male Bobolink (*Dolichonyx oryzivorus*) was observed perching in a tree in the wetland in spring 2013, however since it was not seen feeding in the wetland or heard establishing territory by singing, it was assumed to be passing through rather than a resident, and was not assigned additional points as a Provincially Significant animal.

Evidence of breeding in the wetland was documented for several bird species:

- Mallard (*Anas platyrhynchos*) - broken eggshells in the wetland
- Virginia Rail (*Rallus limicola*) - nest with five eggs (Figure 12)
- Sandhill Crane (*Grus canadensis*) – pair observed on territory during the 2013 breeding season, in suitable habitat, on multiple visits. This species is considered a Regionally Significant Breeding Bird under the Ontario Wetland Evaluation System, and accordingly receives points as a Regionally Significant Species.



Figure 12: Virginia Rail (*Rallus limicola*) Nest with Five Eggs

Other birds documented in the wetland included: American Bittern (*Botaurus lentiginosus*), Osprey (*Pandion haliaetus*), and Magnolia Warbler (*Dendroica magnolia*), among many others (Appendix B). A large flock of mixed blackbirds, including Red-winged Blackbird (*Agelaius phoeniceus*) and Common Grackle (*Quiscalus quiscula*), was observed using the wetland in fall.

Twenty-three additional bird species were documented outside the wetland boundaries, including: Hermit Thrush (*Catharus guttatus*), Pine Warbler (*Dendroica pinus*), Mourning Warbler (*Oporornis philadelphia*), Indigo Bunting (*Passerina cyanea*), Scarlet Tanager (*Piranga olivacea*), and Barred Owl (*Strix varia*).

Six species of amphibians and three species of reptiles were observed in the wetland during field visits: American Toad (*Bufo americanus*), Gray Treefrog (*Hyla versicolor*), Spring Peeper (*Pseudacris crucifer*), Wood Frog (*Rana sylvatica*) (Figure 13), Northern Leopard Frog (*Rana pipiens*), Green Frog (*Rana clamitans melanota*), Midland Painted Turtle (*Chrysemys picta marginata*), Eastern Garter Snake (*Thamnophis sirtalis sirtalis*), and Northern Water Snake (*Nerodia sipedon sipedon*).



Figure 13: Wood Frog (*Rana sylvatica*)

Mammals were observed directly and/or were identified by the presence of tracks, scat, and browse. Four mammal species were identified in the wetland during field work, including Beaver, Raccoon, Red Squirrel and White-tailed Deer (*Odocoileus virginianus*).

Twenty-seven species of dragonflies and damselflies were documented in Tiny Bog wetland during field investigations. Dragonfly and damselfly species observed during field investigations included: Canada Darner (*Aeshna canadensis*) (Figure 14), Sedge Sprite (*Nehalinnia irene*), Racket-tailed Emerald (*Dorocordulia libera*), Shadow Darner (*Aeshna umbrosa umbrosa*). Four species uncommon in Simcoe County were present in the wetland: Sweetflag Spreadwing (*Lestes forcipatus*), Springtime Darner (*Basiaeschna janata*), Spiny Baskettail (*Epitheca spinigera*), and Frosted Whiteface (*Leucorrhinia frigida*). One additional dragonfly species, Lake Darner (*Aeshna eremita*) was observed outside the wetland boundaries.



Figure 14: Canada Darner (*Aeshna canadensis*)

Eleven species of butterflies were identified in the wetland during 2012 and 2013, including Eyed Brown (*Satyrodes eurydice*), Common Wood Nymph (*Cercyonis pegala*), Juvenal's Duskywing (*Erynnis juvenalis*), and Common Buckeye (*Junonia coenia*), a rare species in Simcoe County. Eight additional species were observed outside the wetland boundaries during field visits.

Tiny Bog contains fen communities, which are relatively rare in this part of the province. As a result, Tiny Bog scores the maximum points for rarity of wetland type.

2.5 Extra Information

Non-native, invasive species are of concern in many wetlands, including Tiny Bog. The non-native, invasive shrub Glossy Buckthorn (*Rhamnus frangula*) was observed in several locations in Tiny Bog, both in the understory and as taller shrubs. This species will likely continue to spread through the wetland over time and eventually begin to out-compete native species for habitat, reducing overall plant diversity in the wetland.

In the uplands adjacent to Tiny Bog, other non-native, invasive species were observed in the Simcoe County Forest tract at one of the access points. Several invasive garden species were present in this area, including Yellow Archangel (*Lamium galeobdolon*) (Figure 15), Forget-me-not (*Myosotis sylvatica*), and Periwinkle (*Vinca minor*). These species likely originate from garden waste being dumped in the forest, and now pose a serious threat to native species.



Figure 15: Invasive, Non-native Yellow Archangel (*Lamium galeobdolon*)

The SSEA took water samples from the fen habitat (Figure 2) on September 19, 2012 (Figures 16 and 17), and from the same area on June 12, 2013. The samples were analyzed at the Ministry of Environment (MOE) Dorset Environmental Science Centre using MOE's standard analytical techniques. The results of the samples are provided in Table 1; additional details on bog water chemistry are provided in Appendix C.

Table 1: Tiny Bog Wetland Evaluation – Water Sample Results

Parameter	Sample Result*	
	19-Sep-2012	12-Jun-2013
pH	3.7	4.18
Conductivity (uS/cm)	75	34
Alkalinity (Gran)	-11.0	-3.68
Total Alkalinity	n/a	0
Calcium	n/a	0.876
Magnesium	n/a	0.29
Sodium	n/a	0.314
Potassium	n/a	0.813
Sulphate	2.5	0.108
Chloride	0.11	0.238
Dissolved Organic Carbon	83.4	n/a
Silica	1.4	n/a
Total Phosphorus	0.180	n/a
Total Ammonia	0.124	n/a
Total Nitrate	0.032	n/a
Total Kjeldahl N	2.77	n/a
Colour (TCU)	1016	356

* results in mg/L unless otherwise indicated



Figure 16: Collecting Water Samples in Tiny Bog



Figure 17: Tiny Bog Water Samples (September 2012)

2.6 Evaluation Score

The total score for Tiny Bog is 622, making it a Provincially Significant Wetland. Tiny Bog scores 98 in the Biological component, 70 in the Social component, 204 in the Hydrological component, and 250 in the Special Features component. The Data and Scoring Record is on file with the OMNRF Midhurst District.

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Appendix A Plants of Tiny Bog

Observed during 2012 and 2013 Wetland Evaluation field work

Genus	Species	Common Name	Additional Notes
<i>Abies</i>	<i>balsamea</i>	Balsam Fir	
<i>Acer</i>	<i>rubrum</i>	Red Maple	
<i>Acer</i>	<i>saccharum ssp. saccharum</i>	Sugar Maple	outside wetland boundaries
<i>Acer</i>	<i>spicatum</i>	Mountain Maple	outside wetland boundaries
<i>Alisma</i>	<i>plantago-aquatica</i>	Common Water-plantain	
<i>Alliaria</i>	<i>petiolata</i>	Garlic Mustard	invasive species; outside wetland boundaries
<i>Alnus</i>	<i>incana ssp rugosa</i>	Speckled Alder	
<i>Andromeda</i>	<i>polifolia ssp. glaucophylla</i>	Bog-rosemary	
<i>Aralia</i>	<i>nudicaulis</i>	Wild Sarsaparilla	outside wetland boundaries
<i>Aronia</i>	<i>melanocarpa</i>	Black Chokeberry	
<i>Asclepias</i>	<i>incarnata ssp. incarnata</i>	Swamp Milkweed	
<i>Betula</i>	<i>alleghaniensis</i>	Yellow Birch	outside wetland boundaries
<i>Betula</i>	<i>papyrifera</i>	White Birch	outside wetland boundaries
<i>Bidens</i>	<i>cernua</i>	Nodding Beggarticks	
<i>Bidens</i>	<i>frondosa</i>	Devil's Beggarticks	
<i>Brasenia</i>	<i>schreberi</i>	Water Shield	
<i>Calamagrostis</i>	<i>canadensis</i>	Canada Blue-Joint	
<i>Carex</i>	<i>blanda</i>	Woodland Sedge	outside wetland boundaries
<i>Carex</i>	<i>comosa</i>	Bristly Sedge	
<i>Carex</i>	<i>crinita</i>	Fringed Sedge	
<i>Carex</i>	<i>folliculata</i>	Long Sedge	Provincially Rare Plant
<i>Carex</i>	<i>lupulina</i>	Hop Sedge	

Genus	Species	Common Name	Additional Notes
<i>Carex</i>	<i>oligosperma</i>	Few-seeded Sedge	
<i>Carex</i>	<i>pseudo-cyperus</i>	Cypress-like Sedge	
<i>Carex</i>	<i>retrorsa</i>	Retorse Sedge	
<i>Carex</i>	<i>schweinitzii</i>	Sedge	
<i>Carex</i>	<i>spicata</i>	Sedge	introduced species
<i>Carex</i>	<i>tuckermanii</i>	Tuckerman's Sedge	
<i>Carex</i>	<i>vulpinoidea</i>	Fox Tail Sedge	outside wetland boundaries
<i>Cephalanthus</i>	<i>occidentalis</i>	Buttonbush	
<i>Chamaedaphne</i>	<i>calyculata</i>	Leatherleaf	
<i>Chimaphila</i>	<i>umbellata</i> ssp. <i>cisatlantica</i>	Pipsissewa	outside wetland boundaries
<i>Cicuta</i>	<i>bulbifera</i>	Bulb-bearing Water-hemlock	
<i>Cornus</i>	<i>amomum</i> ssp. <i>obliqua</i>	Silky Dogwood	
<i>Cornus</i>	<i>stolonifera</i>	Red-osier Dogwood	
<i>Drosera</i>	<i>rotundifolia</i>	Round-leaved Sundew	
<i>Dulichium</i>	<i>arundinaceum</i>	Reed-like Three-way Sedge	
<i>Eleocharis</i>	<i>erythropoda</i>	Creeping Spike-rush	
<i>Eleocharis</i>	<i>obtusa</i>	Blunt Spike Rush	
<i>Epilobium</i>	<i>ciliatum</i> ssp. <i>glandulosum</i>	Sticky Willow-herb	outside wetland boundaries
<i>Eriophorum</i>	<i>vaginatum</i> ssp. <i>spissum</i>	Hare's Tail Cotton Grass	
<i>Eriophorum</i>	<i>viridi-carinatum</i>	Thin-leaved Cotton-grass	
<i>Erythronium</i>	<i>americanum</i>	Trout Lily/Yellow Adder's Tongue	outside wetland boundaries
<i>Eupatorium</i>	<i>maculatum</i>	Spotted Joe-pye-weed	outside wetland boundaries
<i>Eupatorium</i>	<i>perfoliatum</i>	Boneset	outside wetland boundaries
<i>Fagus</i>	<i>grandifolia</i>	American Beech	outside wetland boundaries
<i>Fraxinus</i>	<i>americana</i>	White Ash	outside wetland boundaries
<i>Fraxinus</i>	<i>pennsylvanica</i>	Red Ash	
<i>Galium</i>	<i>triflorum</i>	Fragrant Bedstraw	outside wetland boundaries

Genus	Species	Common Name	Additional Notes
<i>Gaultheria</i>	<i>procumbens</i>	Wintergreen	outside wetland boundaries
<i>Gaylussacia</i>	<i>baccata</i>	Black Huckleberry	
<i>Geum</i>	<i>rivale</i>	Water Avens	
<i>Glyceria</i>	<i>grandis</i>	Tall Manna Grass	
<i>Glyceria</i>	<i>striata</i>	Fowl Meadow or Manna Grass	outside wetland boundaries
<i>Gymnocarpium</i>	<i>dryopteris</i>	Oak Fern	outside wetland boundaries
<i>Hypericum</i>	<i>mutilum ssp. mutilum</i>	Dwarf St. John's-wort	
<i>Ilex</i>	<i>verticillata</i>	Winterberry	
<i>Impatiens</i>	<i>capensis</i>	Spotted Touch-me-not	outside wetland boundaries
<i>Iris</i>	<i>versicolor</i>	Large Blue-flag	
<i>Juncus</i>	<i>brevicaudatus</i>	Narrow-Panicle Rush	
<i>Juncus</i>	<i>canadensis</i>	Canada Rush	
<i>Juncus</i>	<i>effusus ssp. solutus</i>	Soft or Bog Rush	
<i>Kalmia</i>	<i>polifolia</i>	Bog-laurel	
<i>Lamiastrum</i>	<i>galeobdolon</i>	Yellow Archangel	invasive species; outside wetland boundaries
<i>Laportea</i>	<i>canadensis</i>	Wood Nettle	outside wetland boundaries
<i>Larix</i>	<i>laricina</i>	Tamarack/American Larch	
<i>Leersia</i>	<i>oryzoides</i>	Rice Cut Grass	
<i>Linnaea</i>	<i>borealis spp longifolia</i>	Twinflower	outside wetland boundaries
<i>Lycopus</i>	<i>americanus</i>	Cut-leaved Water-horehound	
<i>Lysimachia</i>	<i>ciliata</i>	Fringed Loosestrife	
<i>Maianthemum</i>	<i>canadense</i>	Canada Mayflower	outside wetland boundaries
<i>Maianthemum</i>	<i>trifolium</i>	Three-leaved Solomon's-Seal	
<i>Matteuccia</i>	<i>struthiopteris</i>	Ostrich Fern	
<i>Medeola</i>	<i>virginiana</i>	Indian Cucumber-root	outside wetland boundaries
<i>Mentha</i>	<i>arvensis ssp. borealis</i>	Wild Mint	

Genus	Species	Common Name	Additional Notes
<i>Menyanthes</i>	<i>trifoliata</i>	Three-leaved Buckbean	
<i>Mimulus</i>	<i>ringens</i>	Square-stemmed Monkey-flower	
<i>Mitchella</i>	<i>repens</i>	Partridge-berry	outside wetland boundaries
<i>Myosotis</i>	<i>sylvatica</i>	Forget-me-not	invasive species; outside wetland boundaries
<i>Nemopanthus</i>	<i>mucronatus</i>	Mountain Holly	
<i>Onoclea</i>	<i>sensibilis</i>	Sensitive Fern	
<i>Oryzopsis</i>	<i>asperifolia</i>	Mountain Rice Grass	outside wetland boundaries
<i>Osmunda</i>	<i>cinnamomea</i>	Cinnamon Fern	
<i>Osmunda</i>	<i>regalis</i>	Royal Fern	
<i>Physalis</i>	<i>heterophylla</i>	Clammy Ground Cherry	outside wetland boundaries
<i>Pinus</i>	<i>resinosa</i>	Red Pine	outside wetland boundaries
<i>Pinus</i>	<i>strobus</i>	Eastern White Pine	outside wetland boundaries
<i>Polygonum</i>	<i>amphibium</i>	Water Smartweed	
<i>Polygonum</i>	<i>hydropiperoides</i>	Mild Waterpepper	
<i>Polygonum</i>	<i>persicaria</i>	Lady's-thumb	introduced species
<i>Populus</i>	<i>tremuloides</i>	Trembling Aspen	outside wetland boundaries
<i>Potentilla</i>	<i>palustris</i>	Marsh Cinquefoil	
<i>Prunus</i>	<i>serotina</i>	Wild Black Cherry	outside wetland boundaries
<i>Pteridium</i>	<i>aquilinum</i>	Eastern Bracken-fern	outside wetland boundaries
<i>Quercus</i>	<i>rubra</i>	Red Oak	outside wetland boundaries
<i>Rhamnus</i>	<i>alnifolia</i>	Alder-leaved Buckthorn	
<i>Rhamnus</i>	<i>frangula</i>	Glossy Buckthorn	introduced species
<i>Rhus</i>	<i>radicans ssp. rydbergii</i>	Rydberg's Poison-ivy	outside wetland boundaries
<i>Rosa</i>	<i>palustris</i>	Swamp Rose	
<i>Rubus</i>	<i>flagellaris</i>	Prickly Dewberry	outside wetland boundaries
<i>Rubus</i>	<i>occidentalis</i>	Thimbleberry/Black Raspberry	outside wetland boundaries

Genus	Species	Common Name	Additional Notes
<i>Sagittaria</i>	<i>latifolia</i>	Broad-leaved Arrowhead	
<i>Salix</i>	<i>petiolaris</i>	Slender Willow	
<i>Sambucus</i>	<i>canadensis</i>	Common Elderberry	outside wetland boundaries
<i>Sarracenia</i>	<i>purpurea</i>	Pitcher Plant	
<i>Scirpus</i>	<i>cyperinus</i>	Wool-grass	
<i>Scirpus</i>	<i>validus</i>	Softstem Bulrush	
<i>Smilax</i>	<i>herbacea</i>	Carrion Flower	outside wetland boundaries
<i>Solanum</i>	<i>dulcamara</i>	Climbing Nightshade	introduced species
<i>Sparganium</i>	<i>americanum</i>	American Bur-reed	
<i>Spiraea</i>	<i>alba</i>	Narrow-leaved Meadowsweet	
<i>Taxus</i>	<i>canadensis</i>	Canadian Yew	outside wetland boundaries
<i>Thelypteris</i>	<i>noveboracensis</i>	New York Fern	
<i>Thelypteris</i>	<i>palustris</i> var. <i>pubescens</i>	Marsh Fern	
<i>Thuja</i>	<i>occidentalis</i>	N. White Cedar	
<i>Triadenum</i>	<i>fraseri</i>	Marsh St. John's-wort	
<i>Trillium</i>	<i>erectum</i>	Purple Trillium/Wake-robin	outside wetland boundaries
<i>Trillium</i>	<i>grandiflorum</i>	White Trillium	outside wetland boundaries
<i>Tsuga</i>	<i>canadensis</i>	Eastern Hemlock	outside wetland boundaries
<i>Typha</i>	<i>angustifolia</i>	Narrow-leaved Cattail	
<i>Typha</i>	<i>latifolia</i>	Broad-leaved or Common Cattail	
<i>Utricularia</i>	<i>vulgaris</i>	Greater Bladderwort	
<i>Vaccinium</i>	<i>angustifolium</i>	Lowbush Blueberry	
<i>Vaccinium</i>	<i>corymbosum</i>	Highbush Blueberry	
<i>Vaccinium</i>	<i>myrtilloides</i>	Velvet-leaf Blueberry	
<i>Viburnum</i>	<i>lentago</i>	Nannyberry	
<i>Vinca</i>	<i>minor</i>	Common Periwinkle	invasive species; outside wetland boundaries

Genus	Species	Common Name	Additional Notes
<i>Viola</i>	<i>pubescens</i>	Downy Yellow Violet	outside wetland boundaries
<i>Viola</i>	<i>sororia</i>	Woolly Blue Violet	outside wetland boundaries
<i>Woodwardia</i>	<i>virginica</i>	Virginia Chain Fern	

Appendix B
Fauna of Tiny Bog
Recorded During 2012 and 2013 Wetland Evaluation Field Work

Common Name	Scientific Name	Notes
Birds		
American Bittern	<i>Botaurus lentiginosus</i>	
Turkey Vulture	<i>Cathartes aura</i>	
Canada Goose	<i>Branta canadensis</i>	
Wood Duck	<i>Aix sponsa</i>	
Mallard	<i>Anas platyrhynchos</i>	confirmed breeding in wetland (nest with broken eggshells)
Osprey	<i>Pandion haliaetus</i>	
Northern Harrier	<i>Circus cyaneus</i>	
Sharp-shinned Hawk	<i>Accipiter striatus</i>	
Red-shouldered Hawk	<i>Buteo lineatus</i>	
Broad-winged Hawk	<i>Buteo platypterus</i>	outside wetland boundaries
Red-tailed Hawk	<i>Buteo jamaicensis</i>	
Ruffed Grouse	<i>Bonasa umbellus</i>	outside wetland boundaries
Wild Turkey	<i>Meleagris gallopavo</i>	
Virginia Rail	<i>Rallus limicola</i>	confirmed breeding in wetland (nest with five eggs)
Sandhill Crane	<i>Grus canadensis</i>	Regionally Significant Breeding Bird (probable breeding observation: pair on territory in suitable habitat & season)
American Woodcock	<i>Scolopax minor</i>	outside wetland boundaries
Mourning Dove	<i>Zenaida macroura</i>	outside wetland boundaries
Barred Owl	<i>Strix varia</i>	outside wetland boundaries
Ruby-throated Hummingbird	<i>Archilochus colubris</i>	

Common Name	Scientific Name	Notes
Belted Kingfisher	<i>Ceryle alcyon</i>	
Yellow-bellied Sapsucker	<i>Sphyrapicus varius</i>	confirmed breeding in wetland (feeding young)
Downy Woodpecker	<i>Picoides pubescens</i>	outside wetland boundaries
Hairy Woodpecker	<i>Picoides villosus</i>	
Northern Flicker	<i>Colaptes auratus</i>	
Pileated Woodpecker	<i>Dryocopus pileatus</i>	
Olive-sided Flycatcher	<i>Contopus cooperi</i>	Provincial Species At Risk (Special Concern); observed feeding in wetland
Eastern Wood-Pewee	<i>Contopus virens</i>	Provincial/Federal Species At Risk (Special Concern); outside wetland boundaries
Alder Flycatcher	<i>Empidonax alnorum</i>	
Least Flycatcher	<i>Empidonax minimus</i>	
Eastern Phoebe	<i>Sayornis phoebe</i>	outside wetland boundaries
Great Crested Flycatcher	<i>Myiarchus crinitus</i>	
Eastern Kingbird	<i>Tyrannus tyrannus</i>	
Red-eyed Vireo	<i>Vireo olivaceus</i>	
Blue Jay	<i>Cyanocitta cristata</i>	
American Crow	<i>Corvus brachyrhynchos</i>	
Black-capped Chickadee	<i>Poecile atricapillus</i>	
Red-breasted Nuthatch	<i>Sitta canadensis</i>	
White-breasted Nuthatch	<i>Sitta carolinensis</i>	
Brown Creeper	<i>Certhia americana</i>	
Winter Wren	<i>Troglodytes troglodytes</i>	
Golden-crowned Kinglet	<i>Regulus satrapa</i>	outside wetland boundaries
Ruby-crowned Kinglet	<i>Regulus calendula</i>	
Veery	<i>Catharus fuscescens</i>	outside wetland boundaries
Hermit Thrush	<i>Catharus guttatus</i>	outside wetland boundaries

Common Name	Scientific Name	Notes
Wood Thrush	<i>Hylocichla mustelina</i>	Federal Species At Risk (Threatened), Provincial Species At Risk (Special Concern); on territory in wetland habitat
American Robin	<i>Turdus migratorius</i>	
Gray Catbird	<i>Dumetella carolinensis</i>	
European Starling	<i>Sturnus vulgaris</i>	
Cedar Waxwing	<i>Bombycilla cedrorum</i>	
Nashville Warbler	<i>Vermivora ruficapilla</i>	
Yellow Warbler	<i>Dendroica petechia</i>	
Chestnut-sided Warbler	<i>Dendroica pensylvanica</i>	outside wetland boundaries
Magnolia Warbler	<i>Dendroica magnolia</i>	
Black-throated Blue Warbler	<i>Dendroica caerulescens</i>	outside wetland boundaries
Yellow-rumped Warbler	<i>Dendroica coronata</i>	outside wetland boundaries
Black-throated Green Warbler	<i>Dendroica virens</i>	outside wetland boundaries
Blackburnian Warbler	<i>Dendroica fusca</i>	outside wetland boundaries
Pine Warbler	<i>Dendroica pinus</i>	outside wetland boundaries
Palm Warbler	<i>Dendroica palmarum</i>	outside wetland boundaries
Black-and-White Warbler	<i>Mniotilta varia</i>	outside wetland boundaries
American Redstart	<i>Setophaga ruticilla</i>	outside wetland boundaries
Ovenbird	<i>Seiurus aurocapillus</i>	
Northern Waterthrush	<i>Seiurus noveboracensis</i>	
Mourning Warbler	<i>Oporornis philadelphia</i>	outside wetland boundaries
Common Yellowthroat	<i>Geothlypis trichas</i>	
Scarlet Tanager	<i>Piranga olivacea</i>	outside wetland boundaries
Chipping Sparrow	<i>Spizella passerina</i>	
Song Sparrow	<i>Melospiza melodia</i>	
Swamp Sparrow	<i>Melospiza georgiana</i>	
Rose-breasted Grosbeak	<i>Pheucticus ludovicianus</i>	

Common Name	Scientific Name	Notes
Indigo Bunting	<i>Passerina cyanea</i>	outside wetland boundaries
Bobolink	<i>Dolichonyx oryzivorus</i>	Provincial Species At Risk (Threatened); male observed perching in tree in fen
Red-winged Blackbird	<i>Agelaius phoeniceus</i>	
Common Grackle	<i>Quiscalus quiscula</i>	
Purple Finch	<i>Carpodacus purpureus</i>	
American Goldfinch	<i>Carduelis tristis</i>	
Amphibians		
American Toad	<i>Bufo americanus</i>	
Tetraploid Gray Treefrog	<i>Hyla versicolor</i>	
Spring Peeper	<i>Pseudacris crucifer</i>	
Wood Frog	<i>Rana sylvatica</i>	
Northern Leopard Frog	<i>Rana pipiens</i>	
Green Frog	<i>Rana clamitans melanota</i>	
Reptiles		
Midland Painted Turtle	<i>Chrysemys picta marginata</i>	
Eastern Garter Snake	<i>Thamnophis sirtalis sirtalis</i>	
Northern Water Snake	<i>Nerodia sipedon sipedon</i>	
Dragonflies & Damselflies		
Spotted Spreadwing	<i>Lestes congener</i>	
Common Spreadwing (disjunctus)	<i>Lestes disjunctus disjunctus</i>	
Sweetflag Spreadwing	<i>Lestes forcipatus</i>	uncommon in Simcoe County
Bluet species	<i>Enallagma spp.</i>	
Marsh Bluet	<i>Enallagma ebrium</i>	
Eastern Forktail	<i>Ischnura verticalis</i>	
Sedge Sprite	<i>Nehalinnia irene</i>	
Canada Darner	<i>Aeshna canadensis</i>	
Lake Darner	<i>Aeshna eremita</i>	observed outside wetland boundaries

Common Name	Scientific Name	Notes
Black-tipped Darner	<i>Aeshna tuberculifera</i>	
Shadow Darner (Common Paddletail)	<i>Aeshna umbrosa umbrosa</i>	
Common Green Darner	<i>Anax junius</i>	
Springtime Darner	<i>Basiaeschna janata</i>	uncommon in Simcoe County
Racket-tailed Emerald	<i>Dorocordulia libera</i>	
Beaverpond Baskettail	<i>Epithea canis</i>	
Common Baskettail	<i>Epithea cynosura</i>	
Spiny Baskettail	<i>Epithea spinigera</i>	uncommon in Simcoe County
Calico Pennant	<i>Celithemis elisa</i>	
Frosted Whiteface	<i>Leucorrhinia frigida</i>	uncommon in Simcoe County
Dot-tailed Whiteface	<i>Leucorrhinia intacta</i>	
Chalk-fronted Skimmer	<i>Ladona (Libellula) julia</i>	
Widow Skimmer	<i>Libellula luctuosa</i>	
Common Whitetail	<i>Plathemis (Libellula) lydia</i>	
Twelve-spotted Skimmer	<i>Libellula pulchella</i>	
Four-spotted Skimmer	<i>Libellula quadrimaculata</i>	
Cherry-faced Meadowhawk	<i>Sympetrum internum</i>	
White-faced Meadowhawk	<i>Sympetrum obtrusum</i>	
Autumn/Yellow-legged Meadowhawk	<i>Sympetrum vicinum</i>	
Butterflies		
Canadian Tiger Swallowtail	<i>Papilio canadensis</i>	
Cabbage White	<i>Pieris rapae</i>	
Clouded Sulphur	<i>Colias philodice</i>	
Spring Azure	<i>Celastrina ladon</i>	observed outside wetland boundaries
Question Mark	<i>Polygonia interrogationis</i>	observed outside wetland boundaries
Mourning Cloak	<i>Nymphalis antiopa</i>	
Red Admiral	<i>Vanessa atalanta</i>	
Common Buckeye	<i>Junonia coenia</i>	rare in Simcoe County

Common Name	Scientific Name	Notes
White Admiral	<i>Limenitis arthemis</i>	observed outside wetland boundaries
Eyed Brown	<i>Satyrodes eurydice</i>	
Little Wood Satyr	<i>Megisto cymela</i>	observed outside wetland boundaries
Common Ringlet	<i>Coenonympha tullia</i>	observed outside wetland boundaries
Common Wood Nymph	<i>Cercyonis pegala</i>	
Monarch	<i>Danaus plexippus</i>	'Special Concern' nationally and provincially
Northern Cloudywing	<i>Thorybes pylades</i>	observed outside wetland boundaries
Dreamy Duskywing	<i>Erynnis icelus</i>	observed outside wetland boundaries
Juvenal's Duskywing	<i>Erynnis juvenalis</i>	
European Skipper	<i>Thymelicus lineola</i>	
Hobomok Skipper	<i>Poanes hobomok</i>	observed outside wetland boundaries
Other Invertebrates		
Forage Looper Moth	<i>Caenurgina erechtea</i>	
Eastern Bumblebee	<i>Bombus impatiens</i>	
Mydas Fly	<i>Mydas clavatus</i>	observed outside wetland boundaries
Mammals		
Eastern Cottontail	<i>Sylvilagus floridanus</i>	observed outside wetland boundaries
Eastern Chipmunk	<i>Tamias striatus</i>	observed outside wetland boundaries
Red Squirrel	<i>Tamiasciurus hudsonicus</i>	
Beaver	<i>Castor canadensis</i>	beaver dam, beaver-chewed trees
Raccoon	<i>Procyon lotor</i>	tracks in wetland
White-tailed Deer	<i>Odocoileus virginianus</i>	tracks in wetland

Provincially Significant species include species tracked by the Natural Heritage Information Centre (NHIC) and those having a Provincial Rank of S1, S2, S3, or SH. Provincial Ranks are assigned by NHIC and are reported on the NHIC web-site:

http://nhic.mnr.gov.on.ca/MNR/nhic/species/species_list.cfm

Uncommon and *rare* designations are reported in:

Bowles, R. L. 1998. Butterflies of Simcoe County

Bowles, R. L. 2006. Odonata of Simcoe County (revised).

Appendix C

Tiny Bog Water Chemistry Report

*Prepared by: Keith Sherman
Severn Sound Environmental Association
August 28, 2013*

INTRODUCTION

The chemistry of bog and fen wetlands provides additional evidence that is helpful in separating these two communities in a wetland evaluation. Ombrotrophic bogs, by definition, are dependent almost entirely on atmospheric deposition for their nutrients and minerals. Raised bogs have a centre that is raised slightly above the peatland periphery (Grigal 1991). This elevation results in the bog being isolated from groundwater and runoff so that the only input of water and materials is from the atmosphere (precipitation and dust fall). Fens, on the other hand, receive additional supplies of nutrients and minerals from water percolating through adjacent or underlying mineral soils and are said to be minerotrophic (Mullen et al. 2000). Rich fens are dominated by bicarbonate and calcium, while poor fens are more acidic with bogs having the lowest pH (Zoltai and Vitt 1995). Mullens et al. (2000) sampled a broad range of bogs and fens and indicated that pH and calcium have overlapping distributions between “continental bogs”, “poor fens” and “rich fens”. They concluded that low pH and calcium concentration were associated with ombrotrophic bogs. Mullens et al. (2000) were not able to clearly separate bogs from poor fens on the basis of pH and major ions. Bogs in their data tended to have the lowest pH and major ions.

METHODS

Water samples from three locations in the central area of Tiny Bog Wetland Unit 1 were collected on September 19, 2012. The samples were collected by digging a pit through the peat layer into the soil beneath and allowing the hole to fill with interstitial water. The peat material in the holes was between 30 and 60 cm deep and the interstitial water filled to just below the depth of peat. Field measurements of temperature and pH were made in each hole, and field filtered water (80 u mesh) was collected using a pre-washed bilge pump screened (1 mm mesh) to remove debris. Water was composited into one sample of equal parts from each hole and submitted to the Ministry of Environment (MOE) Dorset Environmental Science Centre for analysis. An additional sample from the same approximate location was collected on June 12, 2013 and submitted to MOE for some additional tests. Analyses were carried out using MOE standard methods.

The field measurements of surface or near surface water were taken using a Hanna pH/temperature tester (HP98127) and a Hanna Conductivity tester (HI98303). Three sampling methods were employed: 1. Digging a shallow pit as described above and

measuring pH, conductivity and temperature with the testers (pit sample); 2. Depressing the *Sphagnum* and measuring pH, conductivity and temperature with the testers (standing pool); and 3. Using an existing depression in the wetland and measuring with the testers (surface sample). The distribution of field sampling points was broader than the composite samples collected within the bog. Fifteen sample points were taken in the main wetland area (Wetland Unit 1, Figure 1) and one sample was taken in Wetland Unit 4. Samples from pits (collected during a dry period – September 19, 2012) tended to have slightly lower pH than that of depression samples which were in turn lower than existing depression samples which were collected mostly in the spring of 2013 following precipitation events (June 12, 2013).

TINY BOG SURFACE WATER CHEMISTRY

The laboratory pH was acidic and ranged from 3.7 to 4.2 in the central portion of Wetland Unit 1. The pH remained low to points at the periphery Wetland Unit 1. The range in field pH over this area was 4.0 to 4.6 (Figure 1). Points 12, 13 and 14 were located on the edge of the rich fen community and field pH ranged from 5.5 to 6.8.

Total alkalinity in the central area of Wetland Unit 1 was 0 mg/L indicating that the system was bicarbonate poor. The high dissolved organic carbon concentration of 83.4 mg/L and the high colour of the water (356 to 1016 true colour units) are typical of waters dominated by *Sphagnum* and likely resulted from organic chemicals associated with the plants.

Lab conductivity ranged between 34 and 75 uS/cm with field conductivity ranging between 16 and 40 uS/cm. The major ions (Table 1) were very low compared to other surface waters. Nutrients were higher than other surface waters. Total phosphorus concentration was more than 10 times what is found in Farlain Lake (0.180 mg/L and 0.012 mg/L respectively, SSEA unpublished data). Total ammonia was slightly elevated (0.124 mg/L) and total organic nitrogen was high (2.77 mg/L). The elevated nutrients may result from the interaction of the plants with the precipitation and dust fall.

The chemical characterization of water for Tiny Bog is comparable to bog water analyses reported in the literature (Table 1). Values for pH, alkalinity and conductivity are similar to reported values for other bogs. Major cations in Tiny Bog (Ca, Mg, Na, K) were very low compared with values for other bogs. The water had high dissolved organic carbon and true colour. Based on this comparison and the low pH, conductivity and calcium values found in Tiny Bog, the wetland should be considered a bog.

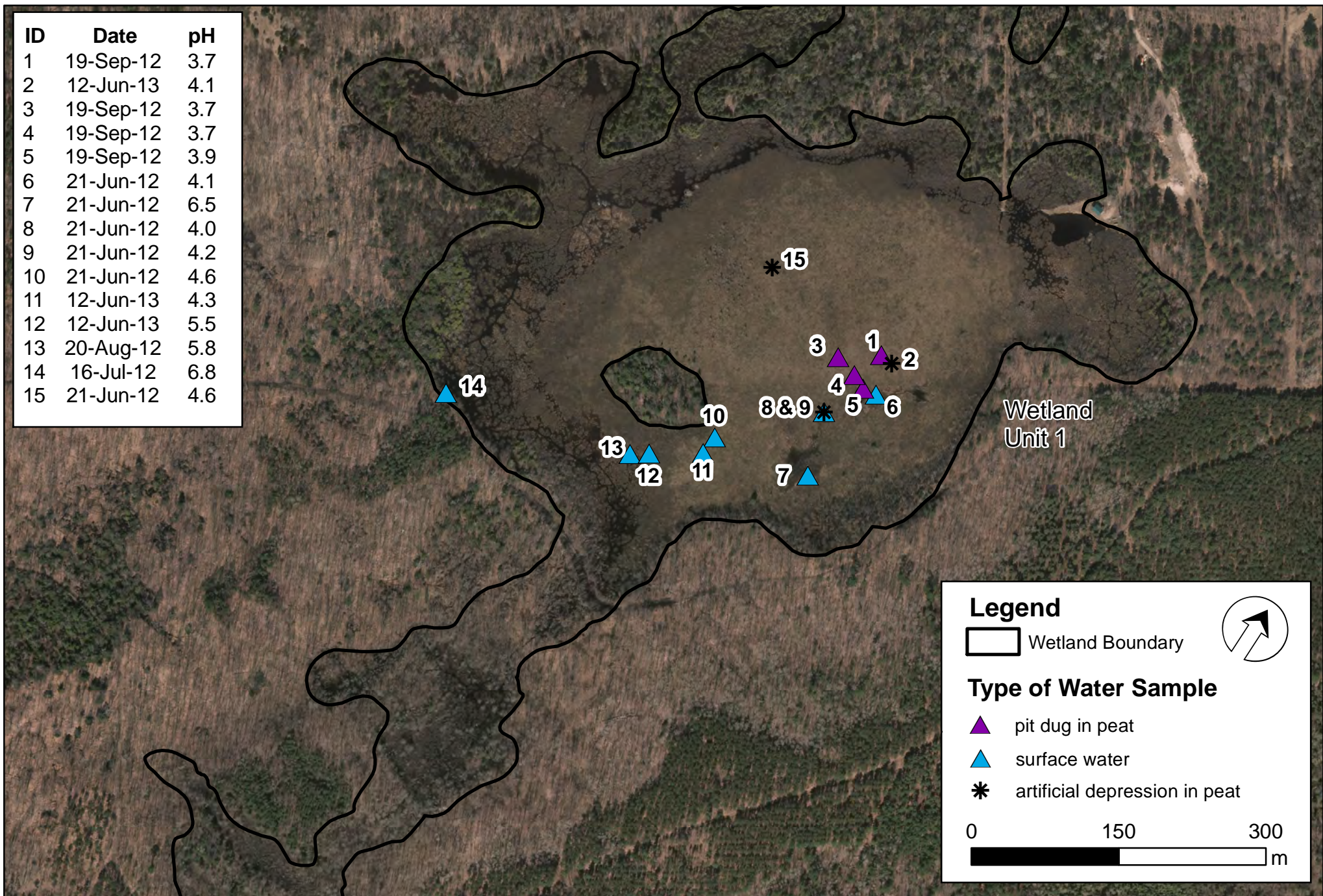


Figure 1: Tiny Bog Wetland - Location of Field pH Samples

Produced by the Severn Sound Environmental Association with data supplied in part from the County of Simcoe, the Ontario Ministry of Natural Resources (© Queen's Printer 2013) and under License with Members of the Ontario Geospatial Data Exchange, 2013.

Table 1: Comparison of chemistry of Tiny Bog with data from other bogs
(results in mg/L unless otherwise indicated)

Parameter	Tiny Bog *		Vitt et al. 1995	Mullen et al. 2000
	19-Sep-12	12-Jun-13		
pH	3.7	4.18	3.96	3.6-4.5
Conductivity (uS/cm)	75	34	39	
Alkalinity (Gran)	-11	-3.68		
Total Alkalinity		0	0	
Calcium		0.876	3.01-4.31	0.10-4.2
Magnesium		0.29	0.72-1.40	0.1-0.36
Sodium		0.314	1.54-1.63	0.04-0.4
Potassium		0.813	0.55-0.78	0.013-1.05
Sulphate	2.5	0.108		
Chloride	0.11	0.238		
Dissolved Organic Carbon	83.4			
Silica	1.4			
Total phosphorus	0.180			
Total ammonia	0.124		0.02	
Total nitrate	0.032		0.03-0.05	
Total Kjeldahl N	2.77			
Colour (TCU)	1016	356		

* results of laboratory tests conducted at Dorset Research Centre

note: 2012 samples for Tiny Bog were a composite of sites #1,#3 and #4; 2013 sample for Tiny Bog was a single sample location #2 (Figure 1).

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