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Renewable Energy Section, OMNR

NHIC Data Used To Inform Wind Power Planning

Working in partnership with MNR's Renewable Energy Section (RES) the NHIC is working on a project that will help inform planning decisions for potential wind power development sites in Ontario.

To make better informed decisions with respect to wind power development, a variety of values should be considered along with wind power potential, including the protection of rare species and ecological communities. This project aims to enhance NHIC data holdings for those values potentially affected by wind power developments, resulting in improved data interpretation and planning. By identify-

ing important biodiversity values early in the planning process, consideration can be given to the protection of these values by directing development away from sites that intersect with the locations of rare species and communities.

The Process

As many NHIC partners within our conservation community of practice will know, we recently converted all of our data over to a new information management system called Biotics (see Sorrill 2005). Within Biotics, we have the ability to maintain rare species and ecological community observations as polygons rather than storing them as points as we have done in the past. Current users of our data will know that observations of a given species or community are grouped together by proximity to form

**Working with conservation partners
to track Ontario's biodiversity**

what are called Element Occurrences (EOs) - an area of land and/or water on/in which an element (e.g. species or ecological community) is or was present. The conversion from points to polygons involved buffering the points by their spatial accuracy (10m, 100m, 1000m or 10,000m) resulting in the creation of circular polygons in Biotics.

Although these circular polygons are much more useful than the original points (since they represent an area of concern rather than just a single point), many of them can be spatially refined to better represent the true area that needs to be considered in conservation and land-use planning. By examining the details of the original observation and/or aspects of the species biology, NHIC biologists are able to alter the polygon to better reflect where the species is or may be. For example, clipping out open water portions of a polygonal EO representation for a terrestrial species is one of the more simple refinements possible, based upon the biology of the species. Such refinements may be very time consuming, but through the support of partners such as the RES we are able to direct time and resources at refining and enhancing data associated with partner priorities such as wind power planning. The enhanced observations and resulting EOs reflect geospatial locations much more precisely, allow for easier data interpretation, and support improved conservation practices. A simplified, hypothetical example of EO refinement is given in the diagram below. Figure 1A illustrates four unrefined EOs intersecting with a hypothetical proposed wind power site. Figure 1B depicts the same site after refinement has taken place. After refinement, the EO boundaries better reflect where the species was observed and often result in major reductions in locational uncertainty, resulting in better information for planning decisions. For example, consideration will need to be given for all of the EOs that still fall within the proposed development. The rare plant that falls completely outside of the proposed development, however, will likely not be affected by the development but its location may need to be considered with respect to access roads, power transmission lines, etc. On the other hand,

even though the refined boundaries of the bat hibernaculum fall completely outside of the proposed development, due to the nature of bat biology (i.e. they disperse from, and return to, their hibernaculum), consideration will still need to be given to this EO.

The first step in this project was to intersect sites in the wind power atlas (including a 5km buffer around each site) with existing polygonal observations, resulting in a total of 5,000 observations of 492 species and ecological communities. NHIC and RES staff then prioritized the list of 492 species to determine which species would benefit most from spatial enhancement of the observations and resulting EOs in Biotics with respect to potential wind power sites. Top priority was assigned to bat and bird species with particular emphasis on species at risk (SAR) as the results of recent research suggests that wind power turbines may have some negative effects on these groups (EC-CWS 2005, Kerns and Kerlinger 2004). Several plant species were also given high priority when they were SAR and/or highly globally (G1-G3) or provincially (S1-S2) ranked and associated with habitats where wind power developments are most likely (i.e. open habitats).

Preliminary results have yielded enhanced datasets for target species, applicable to a wide range of conservation planning applications. Some SAR bird species, such as American White Pelican have had their entire provincial dataset updated, while for other species, large portions of their datasets have been enhanced. In lesser known groups, such as bats, hibernacula data have been extracted from MNR's Natural Resource Values and Information System (NRVIS) as well as from a database of mining features from the Ministry of Northern Development and Mines and have been incorporated into Biotics. It is expected that by the end of the fiscal year we will have made enhancements to over 500 observations and their associated EOs of nearly 40 priority species.

Additional Science and Information Support

NHIC is also involved with RES and Wildlife Section in identifying science and information gaps related to wind power planning and development. Specifically, NHIC participated in MNR's Wind Power

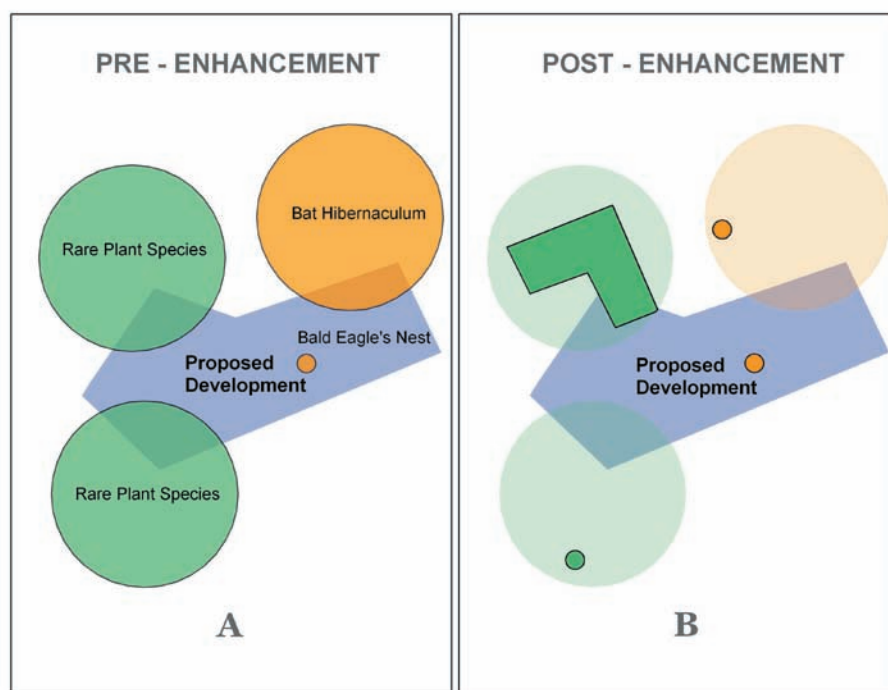


Figure 1: A simplified, hypothetical scenario illustrating; a) unrefined polygonal data in proximity to a proposed development, and b) the resulting refined data following enhancement.

Environmental Sensitivity Data Workshop in early 2006 to identify current sources of wildlife information and information gaps. NHIC has contributed to the review of a forthcoming bat and wind power background document that describes bat ecology and reviews potential impacts to bats and their habitats, and will also be participating in developing a wind power-bat guidance document.

Summary and Looking Forward

The enhancements made to EOs through this project will help to identify important biodiversity values associated with proposed wind power developments. This information and other related research will also assist in the development and revision of the bird and bat guidance documents designed to assist in the review of wind power development proposals. Improved information to help identify potentially sensitive areas will assist MNR Districts and proponents in the selection of appropriate sites for wind power facilities to ensure that biodiversity values are considered.

Directed data enhancement projects such as this have come a long way in recent years, and provide many benefits to project partners as well as the broader conservation community. In our new polygonal environment, spatial data enhancements represent added value to the NHIC's data holdings to better inform planning decisions related to the conservation of Ontario's biodiversity. With the support of conservation partners such as RES, the NHIC hopes to continue to refine and enhance its data holdings for land-use planning and conservation applications across the province. Collaborative projects with other partners are also under way (see the following Parks Canada Agency article) and the NHIC is interested in discussing similar opportunities with existing and potential NHIC partners in order to enhance biodiversity information in the province of Ontario. 🌿

Colin D. Jones & Simon Dodsworth

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C.D. Jones - NHI C Archive

There is concern that bats (such as this Red Bat) may be impacted by wind turbines.

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Parks Canada Agency, NHIC and NatureServe Canada Collaboration

In 2004-2005, the Natural Heritage Information Centre (NHIC), NatureServe Canada and the Parks Canada Agency (PCA) collaborated to conduct a data mining project to improve the collective knowledge of species at risk (SAR) occurrences intersecting PCA's Ontario sites and their Greater Park Ecosystems. Since this project, the NHIC upgraded its data management system from MS Access to NatureServe's Biotics 4, an advanced geographic information systems (GIS)-based software for managing biodiversity information. Perhaps

the greatest benefit of Biotics is its capability to maintain element occurrences (EOs) as polygonal shapes, allowing for better data interpretation and analysis. Polygonal data also provides the NHIC the opportunity to further refine EOs for better geospatial representation, making it more practical for a wide variety of conservation and recovery planning applications (see previous wind power article). It was therefore recognized by the PCA that they could build on the 2004-2005 data mining project and refine/enhance polygonal SAR EOs.

In 2006, the PCA approached the NHIC and NatureServe Canada to further enhance NHIC's SAR polygonal data intersecting 8 PCA sites in Ontario (Bruce Peninsula and Fathom Five, Georgian Bay Islands, Point Pelee, Pukaskwa and St. Lawrence Islands National Parks, as well as Rideau Canal and Trent-Severn Waterway National Historic Sites). The overall objective of this project was to ensure that PCA SAR EOs were updated, verified, and refined. With close to 60,000 observations in the NHIC's database, of which roughly 6,000 or 10% intersect one of Ontario's National Parks or National Historic Canals, short-term, as well as longer-term goals needed to be established. A species priority list was identified by the individual sites to NHIC biologists for data entry, refinement and verifica-

tion, as well as digitising rare ecological community boundaries.

This collaboration between the PCA, NatureServe Canada and the NHIC has brought about the enhancement of a number of SAR element occurrence and observational data intersecting the 8 PCA sites. The enhanced data is more complete, accurate, and precise, and greatly improves the PCA's ability to make sound decisions around SAR management and understanding of critical habitat. The results of this project lays the foundation for continued partnership development between all three parties, and the further enhancement of biodiversity information in Ontario. 🌿

Cathy A. Darevic

Ontario Wild Species 2005... a Sneak Peak!

As mentioned in past NHIC newsletters, Ontario contributes to the general status assessment of wild species in Canada as part of the province's commitment under the Accord for the Protection of Species at Risk in Canada (1996). The general status assessment of wild species in Canada is reported on every 5 years, whereby the ranks assigned at the provincial/territorial level are rolled up to the national level and presented in the Wild Species report series (www.wildspecies.ca), with two national reports to date (in 2000 and 2005).

In 2007 the NHIC will be releasing Ontario Wild Species 2005, presenting the general status of Ontario's species and reasons for any changes in status for those species that were re-assessed

from 2000. We thought we would give our readers a sneak preview of some of the highlights from the up-coming report.

General status information is presented in ten general status rank categories: Extinct, Extirpated, At Risk, May Be At Risk, Sensitive, Secure, Undetermined, Not Assessed, Exotic and Accidental. Species taxonomic groups assessed in 2005 include: mammals, birds, reptiles, amphibians, fishes, crayfishes, tiger beetles, dragonflies, butterflies and freshwater mussels. Of these groups, birds have the highest proportion of 'Secure' species (81%), while freshwater mussels and reptiles are tied for having the lowest proportion of 'Secure' species (32%). Reptiles have the highest proportion of 'At Risk' species (43%), followed by freshwater mussels (20%) and amphibians (19%). Amphibians have the highest proportion of Extirpated species (8%), while birds and fishes are the only taxa groups with extinct species. Vascular plants have the highest proportion of 'Exotic' species (33%).

The report also shows that many of the re-assessed species that changed rank, did so due to more information coming to light, rather than any increasing or decreasing risk (see Table 1).

Birds, with 9 species, and fishes, with 1 species, were the only two taxa that showed changes in rank due to increasing risk. All of the taxa groups had at least some species change rank due to a detailed assessment being completed by COSEWIC resulting in an official status listing by that body. The majority of re-assessed species in Ontario did not change rank.

The Wild Species Ontario 2005 report is expected to support the Ontario Biodiversity

Strategy by providing species level conservation status information as part of the State of Ontario's Biodiversity report. 🌿

Tanya M. Taylor & Michael J. Oldham

Ontario's Great Lakes Island Biodiversity

In the Great Lakes, over 30,000 islands form the world's largest collection of freshwater islands. Some of these islands can be characterized by their unique communities, such as alvars, dunes, tallgrass prairies and savannahs. These islands are of global significance and contain significant biodiversity values including endemic species, rare habitats and critical biological functions. The majority of these islands occur in Ontario and provide key nesting areas for colonial waterbirds, stop-over sites for migratory landbirds and habitat for Great Lakes fishes.

Current understanding of Great Lakes islands has been limited generally to isolated individual or island group studies. For example, Manitoulin Island and Pelee Island are larger islands that have been well documented, but there are more remote and less settled islands that we know little about.

The NHIC and the Nature Conservancy of Canada (NCC), with funding from the Canada-Ontario Agreement Respecting the Great Lakes Ecosystem, Ontario Parks and the Great Lakes Program of the U.S. Environmental Protection Agency, worked together to classify and assess Ontario's Great Lakes islands to enhance our understanding of the biodiversity of Ontario's islands and to identify and prioritize the conservation needs of significant Great Lakes islands. This partnership represents the first time a comprehensive biodiversity analysis has been completed for Ontario's Great Lakes islands, and compliments work being done in the United States for the remainder of the Great Lakes islands. This analysis is directly contributing to the creation of a robust, enduring bi-national framework to ensure long-term island conservation in the Great Lakes basin.

Table 1. Summary of 'reasons for change' in General Status ranks of taxa that were re-assessed in 2005 from 2000. Note: for vascular plants only 140 species were re-assessed, the rest of the species in this taxa group are new assessments as of 2005.

Reason for Change	Amphibians	Birds	Butterflies	Fishes	Mammals	Reptiles	Vascular Plants	Subtotals
Increasing Risk		9		1				10
Detailed Assessment	2	4	2	1	3	8	3	23
Information		42	12	9	7	1		71
Criteria Application		35						35
New Species to Ontario	1	5	1					7
Taxonomic Change		2	1	2	2			7
New Rank Category	2	2		5			1	10
(No Change)	21	378	150	136	69	19	136	909
Subtotals	26	477	166	154	81	28	140	1072

Using a science-based, multi-disciplinary approach, the NHIC and NCC completed an island classification system, conducted a biodiversity analysis, identified those islands currently under protection, conducted a threats analysis for islands and identified priority island areas for conservation. This analysis will assist in the development of conservation recommendations for Ontario's Great Lakes islands.

Coastal Environments

In Ontario, the Great Lakes system was divided into six regions related to their geography: Lake Superior, North Channel and Georgian Bay, Lake Huron, Lake St. Clair, Lake Erie and Lake Ontario. The regions are further subdivided into 33 coastal environments. These coastal environments are based on shore-zone sediment transport systems which are generally influenced by relief and geology, coastal zone characteristics (shore-zone character and beach character), fetch, wave exposure and ice, sediment availability and transport (Owens 1979). Islands were analyzed within a particular coastal environment. Coastal environments were chosen for the project to provide manageable units for the analysis since the scale of a coastal environment can be compared to the scale of an ecodistrict, which is used to stratify MNR's parks and protected areas planning.

Islands and Island Complexes

An island was characterized as any land mass (natural or anthropogenic) within the Great Lakes or connecting channels that is surrounded by an aquatic ecosystem. Therefore, a particular island can be connected to the mainland or part of a reef depending on water levels. An island complex is a group of islands within a coastal environment that function as a larger collective entity because of their proximity. Each island in an island complex was given an island-specific value, however groups of islands are linked to each other by ecological functions or species movements.

The Analysis

Islands and islands complexes were scored based on a suite of scoring criteria to determine their associated conservation value and were then assigned a total biodiversity score. These scoring criteria included an islands biological diversity (including species, communities, ecological systems and ecosystem functions), physical diversity (shape complexity, geological diversity, shoreline diversity), size (in comparison to other islands within the coastal environment) and distinctiveness (a similarity index to compare islands throughout the coastal environment to provide a measure of which are representative and which are unique).

Islands and islands complexes were also scored based on a suite of threats. Potential threats included boat launches, anchorage sites, residential development, lighthouses, building density, invasive species and pits and quarries. More indirect threats included road density, distance to mining claims and the percentage of the island that is developed for agriculture.

The proportion of protected areas, conservation lands and other natural heritage designated areas, including those areas recognized as top-scoring aquatic and terrestrial sites for the Great Lakes Conservation Blueprint for Biodiversity, were compiled for each island and island com-

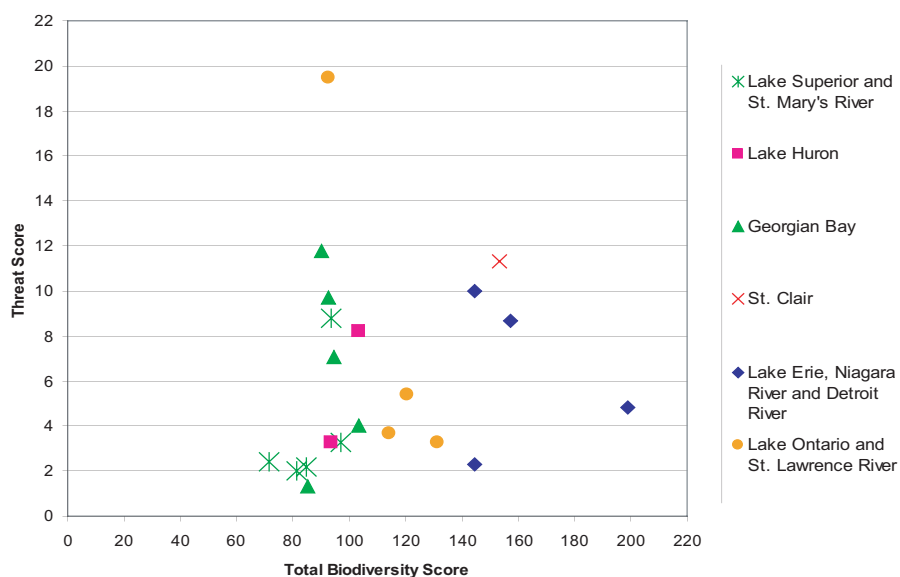
plex. Although this information did not directly contribute to the biodiversity and threat scores, it provides further insight and identified potential conservation gaps and needs.

Analyzing islands and island complexes with respect to their total biodiversity score, threats score and protection gap analysis allowed us to determine the highest scoring islands for each coastal environment as potential priority areas for conservation.

Some Results

Ontario's Great Lakes islands contain an abundance of globally and provincially significant biodiversity values that vary across the basin. There is also a wide range in threat scores across the islands within and among the coastal environments. The analysis can be used to compare island information and scores on multiple scales, including across lake basins, between coastal environments and amongst individual islands and island complexes.

Figure 1 below displays the mean total biodiversity score and mean threat score of islands for coastal environments across the Great Lakes basin. Note that some coastal environments are grouped together due to the small number of islands and the similarity of islands in a biodi-





Harbour Island (left), Clapperton Island (right) and Vankoughnet Island (top), North Channel, Lake Huron.

versity context in some adjacent coastal environments. As displayed in the figure, Lake Erie, Niagara River and Detroit River coastal environments have the highest overall total biodiversity scores in Ontario's Great Lakes basin. The most threatened coastal environment is St. Lawrence River.

The results of the analysis can be interpreted at a variety of scales. For example, coastal environments within a lake basin can be compared amongst each other. The analysis demonstrates that for the Lake Ontario basin and St. Lawrence River, the north coast and southwest Prince Edward Peninsula coastal environment (approximately west of Oshawa to the southern shores of Long Point on Prince Edward County) has the highest mean total biodiversity score within the Lake Ontario basin. However, Lake Ontario's 'northeast coast' coastal environment (approximately from Prince Edward Bay to Rockport) has the largest range of total biodiversity scores and contains some of the highest scoring islands for the Lake Ontario basin. With regards to threats in this basin, the St. Lawrence River coastal environment has the highest mean threat score within the Great Lakes, however the Lake Ontario's northeast coast coastal environment also has a large range of threat scores within several islands having very significant

threats associated with them.

The analysis also confirms the importance of several islands, such as Manitoulin Island and Pelee Island, which are already well known for their biodiversity. Other islands that had high biodiversity scores but are not as well known are Great La Cloche Island in the North Channel, Patterson Island in Georgian Bay and Pie Island in northwestern Lake Superior.

In addition to assigning priority to islands based on total biodiversity score, key attributes that are unique to islands were also specifically addressed, such as habitat for colonial nesting waterbirds. For example, the Wallis Rocks island complex is a critical area for nesting waterbirds despite having a lower total biodiversity score.

Applications and Next Steps

The conservation action of an island, or any natural area, should address a combination of the biodiversity values of the area, the threats to those values, and the current conservation status to determine the urgency of conservation action. This partnership project will result in a strategic step towards ensuring long-term conservation of priority island areas in Ontario, including prioritizing islands for increased protection and/or

land acquisition. Our contribution to Great Lakes island biodiversity will also better inform the biodiversity significance of American islands in a Great Lakes basin context. The results from this partnership will integrate and present information that can be used as a guide to help individuals and groups focus their site conservation efforts.

A comprehensive report of our findings in Ontario will be released in 2007, as will the binational Great Lakes islands assessment report. 🌿

Bonnie L. Henson

References

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LaMP-based Biodiversity Conservation Strategy for Lake Ontario

In 1987, the Canadian and United States governments made a commitment, as part of the Great Lakes Water Quality Agreement, to develop a Lakewide Management Plan (LaMP) for each of the five Great Lakes. The LaMP-based Biodiversity Conservation Strategy for Lake Ontario will build upon the progress of the Lake Ontario LaMP. To date, the LaMP has focused on the chemical integrity of the lake, with noteworthy success, with much less emphasis on strategies to address the physical and biological integrity.

The biological health of Lake Ontario continues to decline, with evidence of continuing pollution in coastal wetlands and waters, impacted fish populations and non-native and invasive species introduction. Unlike achievements in the lake's chemical integrity, conservation efforts in Canada and the United States are not integrated within and between political and jurisdictional boundaries.

The LaMP-based Biodiversity Conservation Strategy for Lake Ontario is being coordinated by The Nature Conservancy and Nature Conservancy of Canada with a core project team and steering committee composed of key representatives from the NHIC (Bonnie Henson and Jim Mackenzie), Conservation Ontario, Environment Canada, Fisheries and Oceans Canada, Parks Canada, Cornell University, New York State Department of Environmental Conservation, New York State Department of State, US Army Corps of Engineers, US Environmental Protection Agency and the State University of New York in Brockport.

The objective of this project is to develop bi-national strategies for conserving and restoring the biological diversity of Lake Ontario, including its coastal habitats, pelagic and benthic zones, tributaries, and connecting channels. Since the focus of this project is to foster bi-national action to address threats to the biota of Lake Ontario, the scope for recommended conservation actions will include the watersheds of tributaries to the extent that they affect the biodiversity of the lake.

A series of three workshops provide the framework for consulting with Canadian and U.S. government and non-government organizations natural resource experts and managers, scientists and other key stakeholders. NHIC representatives at these workshops included Jim Mackenzie, Bonnie Henson and Mike McMurtry. The first workshop this past summer identified biodiversity targets to serve as focal points to discuss priority actions to reduce the threats to native species and ecological systems of Lake Ontario. The eight targets identified were: offshore pelagic systems, benthic offshore systems, native migratory fishes, islands, near-shore zone, coastal wetlands, coastal terrestrial systems, and rivers, estuaries, and connecting channels. The group participants also focused on identifying key ecological attributes critical to the long-term persistence of these targets.

Preceding this workshop, target mapping was completed, and a viability assessment was performed for each target and key ecological attribute, using scientific literature and input

from workshop participants to better understand the condition of these key attributes. Each attribute was also assigned indicators and an associated indicator rating scale that were proposed to measure the status of the attribute.

The second workshop this past fall identified critical threats to the long-term viability of the targets, conducted critical threat ratings for each target and discussed the overall threat ratings for Lake Ontario. The threats and their associated ratings for each target have been refined over the preceding months. Situation analyses behind each major threat were also developed by determining indirect threats and opportunities, along with potential strategic actions.

A draft document has also been created to summarize previous Lake Ontario plans at a variety of scales, including lakewide plans and local watershed plans that have been prepared by federal and provincial/state agencies and conservation authorities. These plans will provide a background of knowledge to complement each workshop and help define actions and strategies.

The third workshop, to be held in the spring of 2007, will complete the development of priority bi-national strategies to address critical threats and attribute these strategies with

as much geographic specificity as possible. Discussions will also involve how to monitor the impact of these strategies through the existing and future monitoring programs of agencies and non-government organizations in both Canada and the United States. 🌿

Bonnie L. Henson

Rare Plant Communities of Ontario: Chinquapin Oak - Little Bluestem - Big Bluestem Shallow Soil Savannah

Introduction

Previous NHIC newsletter articles have reviewed provincially rare savannah vegetation in northwestern Ontario, dominated by Bur Oak (*Quercus macrocarpa*) and developed on shallow soils over bedrock (Bakowsky 1995, 1999a), as well as oak savannahs in southern Ontario which occur on deeper soils (Bakowsky 1999b). In this article, another savannah type, which occurs on shallow soils over limestone bedrock in southern Ontario, is examined. While related



Chinquapin Oak (*Quercus muehlenbergii*) shallow soil savannah, Stone Road, Pelee Island.

to alvar savannahs, the soils in this vegetation type are deeper than those found on alvars (generally greater than 15 cm in depth) and with Chinquapin Oak (*Quercus muehlenbergii*) as one of the diagnostic canopy species.

The *Quercus muehlenbergii* Woodland Alliance encompasses a range of open woodland plant communities where Chinquapin Oak is a characteristic, and often dominant tree. An alliance refers to a higher level floristic unit of vegetation, comprised of finer-level plant associations which share similar dominant/characteristic species and physiognomy. These communities occur on dry to very dry sites, on shallow soils over calcareous bedrock. They occur throughout eastern North America, from Ontario south to Arkansas and Alabama, and from Kansas east to Virginia and Maryland (NatureServe 2005).

In southern Ontario, Chinquapin Oak savannahs are known from at least two locations, Stone Road Alvar on Pelee Island in Lake Erie, and along the rim of the Niagara Gorge downstream from Niagara Falls.

Vegetation and Floristics

Stone Road Alvar, also known as Stone Road Prairie and Stone Road Savannah (Oldham, 1983), located in the southeastern corner of



Little Bluestem grassland understory in Chinquapin Oak savannah in Niagara Gorge rim.



Chinquapin Oak (*Quercus muehlenbergii*).

Pelee Island, is well known for its distinctive vegetation, and high concentration of provincially rare species. The site has shallow soils over limestone bedrock, which is exposed in some areas. Vegetation is variable, and includes a matrix of savannah mixed with shrubby grassland. In the savannah areas, the dominant trees are open-grown Chinquapin Oak, Hackberry (*Celtis occidentalis*), Shagbark Hickory (*Carya ovata*) and Eastern Red Cedar (*Juniperus virginiana*). In lower-lying areas, where water pools in the spring, Swamp White Oak (*Quercus bicolor*) and Green Ash (*Fraxinus pennsylvanica*) predominate (Bakowsky et al., unpublished data). Tree ring studies indicate that the oldest trees present are Chinquapin Oak, some of which are over 125 years in age. Other species are much younger, including Green Ash and Red Cedar, which are only around 40 years old at most, indicating recent establishment (Kirk 1994).

The site appears to have been grazed in the past, as the understory vegetation is largely dominated by introduced or weedy species, including especially Canada Bluegrass (*Poa compressa*) and Kentucky Bluegrass (*P. pratensis*), which together contribute from 30-65% cover throughout. Other common herbaceous species include Wild Strawberry (*Fragaria virginiana*), Cleavers (*Galium aparine*), Gray-headed Coneflower

(*Ratibida pinnata*), Woolly Sedge (*Carex pellita*), and Short's Aster (*Symphyotrichum shortii*). Shrubs form a prominent layer, comprised largely of Drummond's Dogwood (*Cornus drummondii*), Prickly Ash (*Xanthoxylum americanum*), Gray Dogwood (*C. foemina* ssp. *racemosa*) and Fragrant Sumac (*Rhus aromatica*) (Bakowsky et al., unpublished data).

However, there is a small patch of apparently intact grassland present, which may be representative of the original vegetation at Stone Road Alvar. Tree species associated with this patch include Chinquapin Oak, Shagbark Hickory, and Ironwood (*Ostrya virginiana*). It is dominated by Kentucky Bluegrass, Big Bluestem (*Andropogon gerardii*), Canada Bluegrass, Gray-headed Coneflower and Wild Strawberry. Other prairie species present include Nodding Onion (*Allium cernuum*), Purple Milkweed (*Asclepias purpurascens*), Woodland Sunflower (*Helianthus divaricatus*) and Wild Bergamot (*Monarda fistulosa*). A list of native plant species occurring within this patch is presented in Table 1, with provincially rare species highlighted in bold.

A second occurrence of Chinquapin Oak savannah was encountered by NHIC staff while conducting fieldwork in the Niagara Gorge and nearby environs in the summer of 2006.

TABLE 1. Native Vascular Plants from Chinquapin Oak Shallow Soil Savannahs in Ontario

Scientific Name	Common Name	Niagara Gorge	Pelee Island
<i>Acer saccharum</i> ssp. <i>nigrum</i>	Black Maple	X	
<i>Achillea millefolium</i>	Wild Yarrow		X
<i>Allium cernuum</i>	Nodding Onion		X
<i>Amelanchier</i> sp.	Serviceberry		X
<i>Amelanchier humilis</i>	Serviceberry	X	X
<i>Andropogon gerardii</i>	Big Bluestem	X	X
<i>Anemone virginiana</i>	Woodland Anemone		X
<i>Antennaria parlinii</i> ssp. <i>fallax</i>	Field Pussytoes	X	
<i>Apocynum androsaemifolium</i>	Spreading Dogbane	X	X
<i>Asclepias purpurascens</i>	Purple Milkweed		X
<i>Asclepias tuberosa</i>	Butterfly Weed	X	
<i>Blephilia ciliata</i>	Downy Wood-mint		X
<i>Carex crawei</i>	Crawe's Sedge	X	X
<i>Carex pensylvanica</i>	Pennsylvania Sedge	X	
<i>Carex retroflexa</i>	Reflexed Sedge	X	
<i>Carya glabra</i>	Pignut Hickory	X	
<i>Carya ovata</i>	Shagbark Hickory	X	X
<i>Celtis occidentalis</i>	Hackberry	X	X
<i>Cerastium nutans</i>	Nodding Chickweed		X
<i>Comandra umbellata</i>	Bastard Toadflax	X	X
<i>Cornus drummondii</i>	Drummond's Dogwood		X
<i>Cornus foemina</i> ssp. <i>racemosa</i>	Gray Dogwood	X	
<i>Danthonia compressa</i>	Flattened Wild Oat Grass	X	
<i>Danthonia spicata</i>	Poverty Grass	X	
<i>Fragaria virginiana</i>	Wild Strawberry	X	X
<i>Fraxinus americana</i>	White Ash	X	X
<i>Galium boreale</i>	Northern Bedstraw	X	X
<i>Helianthus divaricatus</i>	Woodland Sunflower		X
<i>Heuchera americana</i>	Alum-root		X
<i>Juniperus virginiana</i>	Eastern Red Juniper	X	X
<i>Lespedeza intermedia</i>	Intermediate Bush-clover	X	
<i>Maianthemum stellatum</i>	Starry False Solomon's-seal	X	X
<i>Monarda fistulosa</i>	Wild Bergamot	X	X
<i>Ostrya virginiana</i>	Ironwood	X	X
<i>Packera paupercula</i>	Balsam Ragwort		X
<i>Penstemon hirsutus</i>	Hairy Beardtongue	X	
<i>Poa compressa</i>	Canada Bluegrass	X	X
<i>Poa pratensis</i>	Kentucky Bluegrass	X	X
<i>Polygala senega</i>	Seneca Snakeroot	X	
<i>Quercus alba</i>	White Oak	X	
<i>Quercus muehlenbergii</i>	Chinquapin Oak	X	X
<i>Quercus velutina</i>	Black Oak	X	
<i>Ratibida pinnata</i>	Gray-headed Coneflower		X
<i>Rhus aromatica</i>	Fragrant Sumac	X	X
<i>Rhus typhina</i>	Staghorn Sumac	X	X
<i>Rosa carolina</i>	Pasture Rose	X	X
<i>Rubus occidentalis</i>	Black Raspberry		X
<i>Schizachyrium scoparium</i>	Little Bluestem	X	
<i>Smilax lasioneura</i>	Carrion-flower		X
<i>Solidago altissima</i>	Late Goldenrod		X
<i>Solidago canadensis</i>	Canada Goldenrod		X
<i>Solidago juncea</i>	Early Goldenrod	X	
<i>Solidago ptarmicoides</i>	Upland White Aster	X	
<i>Sorghastrum nutans</i>	Indian Grass	X	
<i>Sporobolus asper</i>	Rough Dropseed	X	
<i>Sporobolus neglectus</i>	Neglected Dropseed	X	
<i>Symphoricarpos albus</i>	White Snowberry	X	
<i>Symphyotrichum laeve</i>	Smooth Aster	X	
<i>Symphyotrichum novae-angliae</i>	New England Aster		X
<i>Symphyotrichum oolentangiense</i>	Sky-blue Aster	X	
<i>Symphyotrichum pilosum</i>	Hairy Aster	X	X
<i>Symphyotrichum shortii</i>	Short's Aster		X
<i>Symphyotrichum urophyllum</i>	Arrow-leaved Aster		X
<i>Tilia americana</i>	Basswood	X	X
<i>Viburnum rafinesquianum</i>	Downy Arrow-wood		X
<i>Vitis aestivalis</i>	Summer Grape	X	X
<i>Xanthoxylum americanum</i>	Prickly Ash		X

This vegetation has been previously described by several sources (McIntosh and Catling 1979, Varga and Kor 1993 and Riley et al. 1996). Five patches were found in total, in a narrow band along the rim of the gorge downstream from Niagara Falls. The Niagara Parkway also parallels the gorge in this area, and open grown oaks and hickories occur for several kilometres along this road, in places where semi-natural vegetation has been left alone (much of it is lined with manicured grounds and gardens). These trees occupy a band several hundred metres in width, suggesting this vegetation was originally fairly extensive along the edge of the Niagara Gorge, the extent of which was mapped as such by Varga in his unpublished pre-European settlement savannah mapping for the Regional Municipality of Niagara (S. Varga, NHIC Archives).

Here, they occur on shallow soils over limestone bedrock, and are dominated by open grown Chinquapin Oak, White Oak (*Q. alba*) and Black Oak (*Q. velutina*). Pignut Hickory (*Carya glabra*) and Shagbark Hickory are also present. The openings between the trees are dominated by an understory of prairie species. Near the edge of the gorge along the cliff rim, where soils are shallowest, the herbaceous layer is dominated by Little Bluestem (*Schizachyrium scoparium*) and Rough Dropseed (*Sporobolus asper*) with some areas of exposed bedrock closest to the rim of the gorge. Soils become progressively deeper further away from the cliff, and Little Bluestem becomes mixed with Big Bluestem and occasionally Indian Grass (*Sorghastrum nutans*), as well as a greater diversity of forb species. Other prairie or woodland species present are Butterfly Weed (*Asclepias tuberosa*), Hairy Beardtongue (*Penstemon hirsutus*), Sky-blue Aster (*Symphyotrichum oolentangiense*), Smooth Aster (*S. laeve*), Fragrant Sumac, Intermediate Tick-trefoil (*Lespedeza intermedia*), Seneca Snakeroot (*Polygala senega*), and Wild Bergamot (Table 1).

Chinquapin Oak savannahs are related to other savannahs found further north in Ontario, particularly along the Trent River, which are also on shallow soils over limestone bedrock, but dominated by Bur Oak (*Q. macrocarpa*), along



Mixed Little Bluestem - Big Bluestem understory with Butterfly Weed, Niagara Gorge rim.

with Shagbark Hickory. These were identified by Catling and Catling (1993), and referred to as limestone woodlands. Shrubs are prominent in the understory, including Gray Dogwood, Snowberry (*Symphoricarpos albus*) and Fragrant Sumac. Prairie grasses are absent, instead, sedges form the dominant graminoid presence, including Hay Sedge (*Carex siccata*) and Pennsylvania Sedge (*C. pensylvanica*). Historically, this vegetation was more widespread along the Trent River, and fire was likely more frequent (Catling and Catling 1993). Prairie grasses may have originally occurred in this vegetation, and their current absence may be due to increased shade and lack of fire, which historically created more open conditions.

Prairie species in these Bur Oak limestone savannahs include Thimbleweed (*Anemone cylindrica*), New Jersey Tea (*Ceanothus americanus*), Robin's Plantain (*Erigeron pulchellus*), Woodland Sunflower, Pale-leaved Wood Sunflower (*Helianthus strumosus*), Wild Bergamot, Hairy Beardtongue, Seneca Snakeroot, Prairie Cinquefoil (*Potentilla arguta*) and Yellow Pimpernel (*Taenidia integerrima*) (Catling and Catling 1993). The authors also noted that this type of savannah represents a connection between deeper soiled savannahs and Bur Oak alvar savannahs.

Status

Chinquapin Oak – Little Bluestem – Big Bluestem Shallow Soil Savannahs were likely never very extensive in southern Ontario, and their current extent represents but a fraction of their limited historical extent. With only 2 known locations, and low areal extent, they have been assigned a conservation rank of S1 in Ontario, which indicates that they are critically imperilled provincially.

Threats

The greatest threat to this vegetation type at the Niagara Gorge is encroachment by woody species, including invasive species such as Common Buckthorn (*Rhamnus cathartica*). At Stone Road, introduced species are also a problem, in addition to shrub encroachment. Careful management, including the controlled use of fire, needs to be continued to restore this vegetation. ♀

Wasył D. Bakowsky

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Niagara Glen Species At Risk Vascular Plant Inventory

Using federal Habitat Stewardship Program (HSP) funding, the Natural Heritage Information Centre is partnering with the Niagara Parks Commission (NPC) and Guelph District Ministry of Natural Resources (MNR) to conduct an inventory of the Niagara Glen and nearby NPC properties. This inventory is focused on herbaceous Species at Risk (SAR) and is designed to complement earlier inventories by Guelph District MNR staff which focused on SAR animals and trees.

The Niagara Glen and nearby parkland along the Niagara River have long been known for significant concentrations of rare species, including more than two dozen listed SAR. Botanists have been visiting the Niagara Gorge for more than a century and have documented more than 100 provincially significant plant species along the Canadian side of the Niagara River. However over the past century a variety of human-caused impacts such as development, invasive exotic species, hydrological changes, trampling, pollution, and habitat loss have eliminated many of the rare plants historically known from the area.



Significant natural habitat remains in sections of the Niagara Gorge where steep slopes have made development difficult.

NHIC biologists focused on the Niagara Glen and Whirlpool areas during 2006 fieldwork and documented over 20 provincially tracked vascular plant species. Unfortunately, of the 26 listed SAR known from the Niagara River area only five were located in 2006 (see table); most of the remaining species are probably locally extirpated.

Among the most exciting discoveries from 2006 include the first records of Reflexed Sedge (*Carex retroflexa*; S1) and Flat-stemmed Oatgrass (*Danthonia compressa*; S2) from the Canadian side of the Niagara River and the documentation of populations of Black Cohosh (*Cimicifuga racemosa*; S1), White Wood Aster (*Eurybia divaricata*; S2), American Water-willow (*Justicia americana*; S1), Violet Bush-clover (*Lespedeza violacea*; S1), Slender Satin Grass (*Muhlenbergia tenuiflora*; S2), Few-fruited Sedge (*Carex oligocarpa*; S2), Sedge (*Carex albicans* var. *albicans*; S2), and Deerberry (*Vaccinium stamineum*; S1).

NHIC staff are currently working on a report for the NPC summarizing the results of 2006 fieldwork and are also updating the Element Occurrence records and polygonal mapping of rare plant species along the Niagara River. 🌿

Michael J. Oldham



NHIC fieldwork in 2006 documented a new site for the nationally Threatened White Wood Aster.



The Niagara Gorge is one of the few places in Ontario where Black Cohosh grows.

Species at Risk Vascular Plants Reported from the Canadian Side of the Niagara River.

SCIENTIFIC NAME	COMMON NAME	COSEWIC	MNR	2006	Notes
<i>Arisaema dracontium</i>	Green Dragon	SC	SC	no	Confirmed in the area as recently as 2002.
<i>Asplenium scolopendrium</i> <i>var. americanum</i>	American Hart's-tongue Fern	SC	SC	no	Historic records only. Probably introduced to the Naigara Glen.
<i>Betula lenta</i>	Cherry Birch	END		no	Unconfirmed records from the Niagara River.
<i>Castanea dentata</i>	American Chestnut	END	END-NR	no	Formerly common, now probably extirpated due to Chestnut Blight.
<i>Chimaphila maculata</i>	Spotted Wintergreen	END	END-R	no	Old records only.
<i>Eurybia divaricata</i>	White Wood Aster	THR	THR	yes	New site discovered near Niagara-on-the-Lake.
<i>Frasera carolinensis</i>	American Columbo	END	SC	no	Historic records only.
<i>Gentiana alba</i>	White Prairie Gentian	END	END-NR	no	Known from an unconfirmed old literature report.
<i>Gymnocladus dioicus</i>	Kentucky Coffee Tree	THR	THR	no	Records from the Niagara River area are probably based on planted trees.
<i>Hibiscus moscheutos</i>	Swamp Rose Mallow	SC	SC	no	Recorded from the area as recently as 2002.
<i>Hydrastis canadensis</i>	Golden Seal	THR	THR	no	Known from old literature reports.
<i>Justicia americana</i>	American Water-willow	THR	THR	yes	Documented from a single site in 2006.
<i>Lespedeza virginica</i>	Slender Bush-clover	END	END-R	no	Known from an unconfirmed old literature report.
<i>Magnolia acuminata</i>	Cucumber-tree	END	END-R	no	Perhaps extirpated along the Niagara River, though known nearby.
<i>Morus rubra</i>	Red Mulberry	END	END-R	yes	Still survives at several sites along the Niagara River, although recent mortality observed at one location.
<i>Panax quinquefolius</i>	American Ginseng	END	END-NR	no	Historic records only.
<i>Phegopteris hexagonoptera</i>	Broad Beech Fern	SC	SC	no	Historic records only.
<i>Polygala incarnata</i>	Pink Milkwort	END	END-R	no	Known from an unconfirmed old literature report.
<i>Ptelea trifoliata</i>	Hop-tree	THR	THR	yes	Plants found near the Niagara River in 2006 may have been planted.
<i>Quercus shumardii</i>	Shumard Oak	SC	SC	no	Observed elsewhere in Niagara R.M. in 2006, though not along the Niagara River.
<i>Smilax rotundifolia</i>	Square-stemmed Greenbrier	THR	THR	no	Documented near the Niagara River as recently as 2003.
<i>Symphytotrichum praealtum</i>	Willow Aster	THR	THR	no	Observed as recently as 1997 near Niagara-on-the-Lake.
<i>Symphytotrichum prenanthoides</i>	Crooked-stemmed Aster	THR	THR	no	Known in the area from old literature reports only.
<i>Trillium flexipes</i>	Bent Trillium	END	END-R	no	No confirmed reports since 1950.
<i>Vaccinium stamineum</i>	Deerberry	THR	THR	yes	Single small population documented in 2006.



The spring-blooming Flowering Dogwood grows at several sites along the Niagara River.



Violet Bush-clover was rediscovered along the Niagara River in 2006.



A single population of the nationally Threatened American Water-willow was documented along the Niagara River in 2006.

Ecodistrict 6E-9 Natural Heritage Assessment

This past summer Wasyl Bakowsky and Mike McMurtry assisted Will Kershaw, Acting Southern Region Natural Heritage Specialist, and other MNR partners (Peterborough District, Southern Science and Information Section, Ontario Parks) to re-evaluate priority sites for conservation in Ecodistrict 6E-9. The last evaluation of life science sites, in what was then called Site District 6E-9, was completed in 1984 (Lindsay 1984). The term “site district” was coined by Angus Hills in the late 1950s (e.g. Hills 1959), and has now been replaced in usage in MNR with the term “ecodistrict” (Crins and Uhlig 2000), which better reflects the physiographic and geological factors that go into the delineation of these ecological units. With the geomatics tools and digital data now available and the anticipated increasing pressure in the ecodistrict for commercial and residential development and aggregate extraction, the timing was right to update the report. Ecodistrict 6E-9 is characterized by limestone bedrock overlain by a thin layer of glacial till. In parts of the ecodistrict, there is enough soil to permit agricultural activities, primarily pasturing and hay production. There is a high interspersed of lakes and other aquatic features that provide a diversity of habitats. This ecodistrict contains most of the alvars in central and eastern Ontario, for example those on the Carden and Napanee Plains and points in between, including Buckhorn, Warsaw, Crowe River and Marmora Areas. Alvars support a unique array of species that can survive the extreme conditions from flooding in the spring to extreme heat and dryness in summer.

Wasyl and Mike contributed several days in the field to examine the condition of known life science sites in the ecodistrict and to look for as-yet unidentified alvars using surficial geology mapping combined with roadside surveys. While there are similarities with the alvars of the Bruce Peninsula and Manitoulin Island, the alvars of central and eastern Ontario are distinctly different. The accompanying photograph shows one of several new alvars that were discovered this past summer in the Havelock and Madoc areas.



Shrub alvar south of Madoc in Ecodistrict 6E-9.

These alvars are typically comprised of the herbs Poverty Oat Grass (*Danthonia spicata*), Wild Bergamot (*Monarda fistulosa*), Linear-leaved Panic Grass (*Panicum linearifolium*), Wild Basil (*Clinopodium vulgare*), Slender Wheatgrass (*Elymus trachycaulus*), Kalm's Brome Grass (*Bromus kalmii*), Early Goldenrod (*Solidago juncea*), Hairy Beard-tongue (*Penstemon hirsutus*), Thimbleweed (*Anemone cylindrica*), Seneca-snakeroot (*Polygala senega*), as well as mosses. The shrub layer includes Common Juniper (*Juniperus communis*), Smooth Sumac (*Rhus glabra*), Grey Dogwood (*Cornus racemosa*), Downy Arrowwood (*Viburnum rafinesquianum*), both Ontario species of New Jersey Tea (*Ceanothus americanus*, *C. herbaceus*) and Snowberry (*Symphoricarpos alba*). Bur Oak (*Quercus macrocarpa*), White Pine (*Pinus strobus*) and White Cedar (*Thuja occidentalis*) occur within the alvar community and at the edge of openings. Larger alvars elsewhere in the ecodistrict support many rare and at-risk species including Loggerhead Shrike (*Lanius ludvicianus* G4S2B Endangered), Juniper Sedge (*Carex juniperorum* G2S1 Endangered), Northern Dropseed (*Sporobolus heterolepis* G5S3), and many others. See the publication *Alvars of Ontario* (Brownell and Riley 2000) for more detailed information on these interesting communities.

The quality and representative value of such sites as Bend Bay Valley, Cameron Ranch, Indian Point Provincial Park and Warsaw Caves were also confirmed through fieldwork. New sites that were identified will be described in a forthcoming report.

Ontario Parks and the Southern Science and Information Section assisted with compiling digital data layers and performing an analysis of the gaps between existing protected areas and representative and rare features on the landscape. NHIC contributed data on occurrences of tracked species and communities. Reconnaissance fieldwork was helpful in evaluating the results of the gap analysis and in ground-truthing geology and land-cover information. While the latest technology is being employed in the analysis, the primary criteria are unchanged from 1984 – representation, condition, diversity, ecological function and special features – and the end result will be a summary outlining each landform/vegetation combination and the best examples on the landscape, just as in the 1984 report. 🌿

Michael J. McMurtry

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Managing Biodiversity Information at Multiple Scales

The concept of biological diversity, or biodiversity, encompasses multiple levels of biological organization: genes, species, populations, communities, ecosystems and landscapes (Wilson 1992, Secretariat for the Convention on Biological Diversity 1992, Poiani et al. 2000). All of these levels contribute to the complexity and function of nature as we experience it. The Natural Heritage Information Centre was structured, at its inception, to allow compilation and reporting on biodiversity information at most of these levels and to make the information available for conservation purposes. The genetic level was not explicitly covered, probably because less information was available on the conservation of genetic diversity, and no standard methodology was available through the NatureServe network (then the Association of Biodiversity Information) to capture the genetic attributes of wild populations.

These levels of biological organization, from gene to species to ecosystem, generally correspond to increasing spatial scales, from the local to intermediate to landscape or watershed scale. But even species and subspecies can operate at the landscape scale, for example, wide-ranging mammals such as the Woodland Caribou (*Rangifer tarandus caribou*) and Wolverine (*Gulo gulo*).

Occurrences of species and plant communities and wildlife concentration areas (such as bat hibernacula) are all managed as element occurrences in the NHIC Biotics database. Element occurrences are built on individual observations, or source features, as they are termed in the NatureServe methodology. An element occurrence is defined as an area of land or water on or in which an element (e.g. species or ecological community) is or was present. An element occurrence must have practical conservation value for the element; for example it could be essential to a complete a portion of the life cycle of the species. Plant community occurrences are classified, ranked and assessed in much the same way as species occurrences. The NHIC is working with ecologists from other jurisdictions

to develop a standard classification system, or at least a cross-walk between systems, that is applicable no matter where you are. Natural areas data are managed in a separate but linked database in Biotics. This software can accommodate both tabular and spatial data on species, communities and natural areas. Data standards are more highly developed for species and communities than for larger spatial units, as the mandate for managing natural areas varies greatly between jurisdictions. For example, the NHIC maintains data on the representative features of natural areas in Ontario, but this information is not collected across the network of conservation data centres. The NHIC also maintains, in our resource centre, hard copy reports and maps on the characteristics and distribution of species, plant communities and natural areas in Ontario.

The main purpose for the existence of the NHIC and other conservation data centres is to inform effective conservation actions. Conservation actions can be effective and appropriate at a variety of spatial scales and levels of biological organization, depending on the issue being addressed. Actions to allow the recovery of an endangered species must consider the



This Tufted Hairgrass – Canada Bluegrass – Philadelphia Panic Grass Alvar Grassland community (G2G3?S2S3) at the Cameron Ranch, Carden Alvar, illustrates how the NHIC manages information at multiple scales. The community itself is tracked and it supports a number of provincially rare species, including species at risk, which are also tracked. Ecodistrict 6E-9, which contains this site, is the subject of a re-assessment of priority sites for conservation (see previous article).

specialized habitat requirements of the species, the localities where the species is found and the factors that are limiting the species. When threats to the species, such as invasive species, operate over a wide spatial area, even actions for individual species with a limited range must consider threats over a broad area. An approach that focuses on an entire ecological community or ecosystem can be a more effective means of addressing the needs of multiples species at risk, for example in tallgrass prairies or dune systems.

Conservation planning can take advantage of both fine and coarse scale data to determine priority areas on the landscape (Poiani et al. 2000). It has become the accepted practice in conservation planning to first consider coarse scale features, such as landform/vegetation units, in identifying priority areas for conservation, and then to supplement these targets based on additional fine-scale data, such as rare species locations or habitats (Groves et al. 2000). The Great Lakes Conservation Blueprint for Biodiversity is an example of a conservation planning project in Ontario that considered both coarse- and fine-filter targets (Henson et al 2005, Wichert et al. 2005). The framework for the coarse filter analysis was provided by landform/vegetation units in the terrestrial Blueprint and by aquatic ecosystem units in the aquatic Blueprint. Fine filter targets included occurrences of rare, at-risk, disjunct, endemic and declining species as well as rare and high quality examples of vegetation communities.

For landscape-scale issues like habitat fragmentation, loss of natural areas and resource use there is no substitute for data at the landscape level - data on the spatial extent of natural areas as well as their characteristics such as condition, features represented, landforms, ecological functions and special features.

The NHIC welcomes information on the biodiversity in Ontario at all spatial scales. Perhaps in the future we will maintain data on the genetic composition of species as well as their life history and habitat requirements. There is now an international initiative called the Consortium for the Barcode of Life whose goal is to generate a bar code or genetic sequencing

of a standard portion of the genome of all of the biological taxa in the world (see for example the Canadian Barcode of Life website at <http://www.bolnet.ca/>). The next time you are weighing what actions will be most beneficial to achieve a conservation goal, consider the spatial scale of the issue and the corresponding scale of data that will best inform your actions. 🌱

Michael J. McMurtry

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Four-leaved Milkweed (*Asclepias quadrifolia*) Rediscovered in Canada

While visiting his family in Belleville, Ontario, Sean Blaney, botanist with the Atlantic Canada Conservation Data Centre, went for a walk with his father, John Blaney, in a wooded area in Prince Edward County and discovered a population of Four-leaved Milkweed (*Asclepias quadrifolia*). Four-leaved Milkweed was ranked SH (historic) in Ontario by the NHIC, since the last confirmed provincial report was in 1956 in the Niagara area. There are several historic Ontario records, mostly along the Niagara River (Whirlpool, Niagara Falls, and near Queenston). Despite a considerable amount of inventory work in the



Four-leaved Milkweed in Prince Edward County; first Canadian record since 1956.

last few decades in the Niagara area, including NHIC fieldwork in 2006, there are no recent records of Four-leaved Milkweed. The only previous record from southeastern Ontario is based on a specimen collected by John Macoun in 1868 from the "Bay of Quinte". Due to Sean's discovery, Four-leaved Milkweed has been re-ranked from SH to S1 in the province.

Additional fieldwork at this site by NHIC botanist, Michael Oldham, and MNR Peterborough District biologists, Todd Norris and Brenda Van Sleuwen, revealed about 100 Four-leaved Milkweed plants in small scattered colonies growing in Shagbark Hickory – Bur Oak woodland. Four other plant species of provincial conservation concern, including two listed Species At Risk, were also documented at the property: American Ginseng (*Panax quinquefolius*), Butternut (*Juglans cinerea*), Few-flowered Sedge (*Carex oligocarpa*), and Bicknell's Sedge (*Carex bicknellii*). 🌿

Michael J. Oldham

Jointed Goatgrass (*Aegilops cylindrica*) - A New and Potentially Invasive Plant in Ontario

During fieldwork in the Niagara Region of southern Ontario this year, a population of

Jointed Goatgrass (*Aegilops cylindrica*) was discovered near Port Colborne by NHIC botanist, Michael Oldham. Although widespread in the United States, particularly in the west, this grass has not been previously reported from Ontario. Jointed Goatgrass is native to western Asia and eastern Europe and has become a major problem weed causing significant economic losses in Winter Wheat (*Triticum aestivum*) growing areas across the continental United States and is considered an invasive of natural habitats in several states. Jointed Goatgrass is closely related to Winter Wheat and is a major problem for this crop due to its similarity to wheat in appearance, seed size, growth pattern and genetics.

From its native range in Eurasia, Jointed Goatgrass has spread and become naturalized in western Europe, Mexico, and the United States. Seeds may have been introduced to North America in contaminated wheat grain shipped from the eastern Mediterranean region in the late 1800's. Widespread dispersal has likely been primarily through the transport of wheat contaminated with Jointed Goatgrass seed. Local dispersal of viable seed may be the result of livestock fed non-processed grain or fodder contaminated with Jointed Goatgrass or by granivorous birds such as pigeons and doves.

Following the discovery of Jointed Goatgrass in Ontario, agencies involved with exotic invasive species were contacted (Canadian Food Inspection Agency, Agriculture and Agri-Food Canada, Ontario Ministry of Agriculture and Food). An Invasive Weed Alert Bulletin has been prepared by the Canadian Food Inspection Agency, and federal, provincial, and local agencies are collaborating to determine follow-up activities, including the monitoring and possible eradication of the known population. 🌿

Michael J. Oldham

Changes to the COSEWIC List of Canadian Species at Risk

At its spring and fall 2006 species assessment meetings the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) added 9 Ontario species to the national list of Species at Risk, removed 3 species, and changed the status of 2 species. The newly added, deleted, or changed Ontario species are listed in table 1 below. 🌿

Michael J. Oldham

TABLE 1. Ontario species evaluated by COSEWIC in 2006.

Common name	Scientific name	Former COSEWIC status	New COSEWIC status
American Columbo	<i>Frasera carolinensis</i>	Special Concern	Endangered
American Eel	<i>Anguilla rostrata</i>	None	Special Concern
Atlantic Salmon (Lake Ontario populations)	<i>Salmo salar</i>	None	Extirpated
Aweme Borer Moth	<i>Papaipema aweme</i>	None	Endangered
Cherry Birch	<i>Betula lenta</i>	None	Endangered
Deepwater Sculpin	<i>Myoxocephalus thompsoni</i>	Threatened	Special Concern
Eastern Persius Duskywing	<i>Erynnis persius persius</i>	None	Endangered
Golden-winged Warbler	<i>Vermivora chrysoptera</i>	None	Threatened
Greenside Darter	<i>Etheostoma blennioides</i>	Special Concern	Not At Risk
Lake Erie Watersnake	<i>Nerodia sipedon insularum</i>	Endangered	Endangered
Lake Sturgeon	<i>Acipenser fulvescens</i>	Endangered / Special Concern	Endangered / Threatened / Special Concern
Louisiana Waterthrush	<i>Seiurus motacilla</i>	Special Concern	Special Concern
Mapleleaf Mussel	<i>Quadrula quadrula</i>	None	Threatened
Rainbow Mussel	<i>Villosa iris</i>	None	Endangered
Red-shouldered Hawk	<i>Buteo lineatus</i>	Special Concern	Not At Risk
River Redhorse	<i>Moxostoma carinatum</i>	Special Concern	Special Concern
Rusty Blackbird	<i>Euphagus carolinus</i>	None	Special Concern
Southern Flying Squirrel	<i>Glaucomys volans</i>	Special Concern	Not At Risk
Western Painted Turtle	<i>Chrysemys picta bellii</i>	None	Not At Risk



Photograph of an herbarium specimen deposited at Agriculture Canada (DAO) documenting the first Ontario record of Jointed Goatgrass.

Trent University Conservation Biology Interns at NHIC

As in previous years, NHIC is partnering with Trent University to provide learning opportunities for Trent students participating in the "Internship in Conservation Biology" program. Students are assigned a Trent faculty advisor and an external advisor and they work on a conservation biology project of interest to the student and advisors. This year Mike McMurtry is assisting Christine Terwissen with her project and Mike Oldham is working with Kristin Norris; Joe Cebek is the Trent faculty advisor for both projects. Christine is identifying criteria that can be used in land-use planning to meet the habitat requirements of selected wildlife species: Scarlet Tanager, Eastern Screech-owl, Northern Flying Squirrel, Black Bear, Fisher, Eastern Hog-nosed Snake and Brook Trout. Kristin is looking at the relationship between different conservation status assessment systems across Canada, in particular the General Status of Wild Species rankings in comparison to NatureServe Conservation Data Centre subnational conservation status ranks. 🌱

Michael J. Oldham & Michael J. McMurtry

Summer Experience Program Assists NHIC

The Summer Experience Program of the Ontario government allowed us to hire two capable and enthusiastic students to assist us with our work this past summer and provided an opportunity for them to see firsthand what working in a conservation data centre is all about. They were Tristan Crawford and Phillip Shaw.

Tristan worked closely with Mike McMurtry and Bonnie Henson on tasks related to natural areas. He entered new information on natural areas into our Biotics database, and organized and labelled files in the resource centre. He took fieldwork in his stride too, helping with an inventory of plants in the Niagara Gorge. He entered descriptive data on Great Lakes islands into a database we share with the Nature Conservancy of Canada (see the article in this issue). Tristan's ukulele playing livened up the campsite after a day of field work.

Phillip was involved in several projects with Mike Oldham including mounting, labelling, and databasing plant specimens for the NHIC herbarium; extracting terrestrial mollusc speci-

mens from leaf litter samples; looking up coordinates for rare plant records; and improving rare plant information in Biotics.

We thank Tristan and Phillip for their contributions to the NHIC and wish them well with their future plans. 🌱

Michael J. McMurtry & Michael J. Oldham

High School Co-op Student at NHIC

Jeff Clancy, a Grade 11 student at Holy Cross Secondary School in Peterborough, is spending afternoons at the NHIC as part of his co-op placement. Jeff has been assisting Rebecca Zeran of the Biodiversity/Habitat Unit and Michael Oldham of the NHIC with a variety of tasks including organizing, scanning, and cataloguing wetland slides; entering information on disjunct arctic-alpine plants in Ontario; photocopying; entering references into Biotics and filing references in the NHIC manual files; and preparing a searchable index of previous NHIC newsletter articles. 🌱

Michael J. Oldham

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