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Transformation brings new staff to the NHIC

As a result of the Ministry of Natural Resources's (MNR) transformation of Science and Information Resources Division, the Natural Heritage and Information Centre (NHIC) has been fortunate to pick up four key staff from the former Southern Science and Information Section.

David Bradley joins the NHIC and brings his experiences and skills as an Ecological Land Classification (ELC) Botanist to our team. David has helped to sample and analyze 1,144 research plots in site regions 6E and 7E and over 5,000 Vegetation Sampling Protocol (VSP) vegetation plots. Since coming to the NHIC, David has been busy upgrading the bryophyte herbarium and contributing to the bryophyte database. This year, David will be collecting and identifying mosses and liverworts from across Ontario while he continues to support the VSP in southern Ontario.

Danijela Puric-Mladenovic joins the NHIC and brings her Associate Professor status with the University of Toronto, Faculty of Forestry. Danijela developed the Vegetation Sampling Protocol for southern Ontario and her work is focused on green systems (natural heritage systems) design and planning; application of conservation and landscape planning to settled landscapes; spatial and vegetation analysis; predictive modeling and mapping of present, past, and future vegetation and species distributions; developing broad-scale sampling and vegetation inventory and monitoring protocols; and research related to urban forestry and urban forest planning. This year, Danijela will be supporting natural heritage inventory and monitoring with VSP in the Lake Simcoe watershed and providing science support for natural heritage system planning across Ontario.

Dawn Burke joins the NHIC from her home base in London, Ontario as our new Carolinian Ecologist. NHIC newsletter aficionados may remember Dawn from our spring 1999 Volume 5 edition, when the NHIC was six years old. Dawn is currently on leave from the MNR and we all hope to have her back in her position and working with her NHIC colleagues in the not too distant future. Best wishes Dawn.

David Tellier has also joined the NHIC from the former Southern Science and Information Section where he was working on natural heritage system analysis. David is continuing to use and develop his GIS analysis and system planning skills as an NHIC Biodiversity Information Biologist.

All of us at the NHIC are pleased to welcome these new colleagues, and we look forward to many excellent adventures together.

Jim Mackenzie

Contents

Using the Vegetation Sampling Protocol (VSP) to monitor natural cover in the Lake Simcoe watershed

Natural cover on settled landscapes across Ontario has been shaped by centuries of human and environmental influences. For decades now, natural resource management and conservation have relied on relatively simple vegetation metrics such as percent natural cover, patch size, and shape to guide planning and policy. In order to understand the ecological impact of large-scale vegetation changes over time and across landscapes, standard measures of composition and structure need to be captured and reported. The composition and structure of natural vegetation, with its many known direct and indirect impacts on ecological function and processes, is key to our understanding of ecological sustainability and accounting of environmental goods and services.

It is expected that population increase, land development, invasive species, and climate change pressures will put additional stresses on already altered natural heritage and vegetation across Ontario's landscapes. As a result, there is a growing need to preserve and improve the state of the natural vegetation: restoring it where it is underrepresented and/or ecologically impaired. Incorporating specific vegetation targets into integrated landscape planning, conservation, and the use of adaptive management practices need to become the norm to ensure biodiversity protection and a steady flow of ecological goods and services. The strength and success of these efforts also depend on the amount, health, and quality of the existing natural vegetation. A sufficient amount of diverse and healthy natural cover is a cost effective, long-term solution to sustain landscapes and improve and maintain many ecological functions and processes.

Similar to the rest of southern Ontario, the existing natural vegetation of the Lake Simcoe watershed is critical for maintaining ecosystem functions and processes, and is exposed to many biotic, abiotic, and anthropogenic stresses. For example, invasive plants change forest structure and composition by taking over native habitats and suppressing natural vegetation and regeneration. Land development, urbanization, and habitat fragmentation are some of the direct human pressures that also have an impact on vegetation condition. In addition, natural cover is vulnerable to climate change and its direct (drought, late spring or early fall frosts, ice rain) and indirect (e.g. stressed vegetation is more susceptible to insects and pathogens) impacts. By using quantitative measures to monitor vegetation it is possible to define when and where these impacts are occurring, and determine if they are caused by local or large-scale effects (e.g. climate change), and to what extent, and how they impact other ecological functions and processes in the watershed.

Past and current natural cover monitoring efforts have been opportunistic, program specific, localized and often not extensive enough to support landscape-scale applications and policy needs. As a result of this, and due to different anthropogenic and environmental pressures on natural cover, a multipurpose, integrative and landscape-scale vegetation monitoring approach is needed in the Lake Simcoe watershed and other settled areas in Ontario. Monitoring is also important for establishing a baseline condition, enabling state of the resources reporting across different scales, and measuring the effectiveness of the program and policy across local site and landscape scales.

Among the land development related policies in Ontario such as the *Provincial Policy Statement*, *Oak Ridges Moraine Conservation Plan*, *Niagara Escarpment Plan*, *Greenbelt Plan* and *The Lake Simcoe Protection Plan* (LSPP), the LSPP is unique in its monitoring requirements. Policy 6.50-M of the LSPP explicitly requires the establishment of a natural-cover monitoring program for the watershed. In addition, the LSPP is the first plan that clearly identifies *"Achieve(ing) a minimum 40 percent high quality natural vegetative cover in the watershed"* as a target. The requirement for high quality implies that mapping areas of natural cover isn't enough, and that it is necessary to have information on vegetation composition and structure, and to know the existing and desired state of natural cover.

The LSPP policy requirements provide an opportunity to establish, for the first time in Ontario, a natural-cover monitoring program across a landscape. As a result, in the Lake Simcoe watershed, vegetation cover, composition, and structure will be captured with landscape and site-level monitoring efforts. When a sufficient number of site-level observations become available, it will be possible to correlate site and landscape monitoring data (spatial information such as woodland mapping and remote sensing). This will enable extrapolating and mapping of site-level information across the entire watershed. Site-level monitoring for the Lake Simcoe watershed will be accomplished using a network of Vegetation Sampling

Protocol (VSP) geo-referenced plots that span the entire area. The Ministry of Natural Resources, Science and Research Branch is developing and spearheading this VSP monitoring application, in partnership with the Faculty of Forestry, University of Toronto. This includes conducting a research project to pilot VSP, developing a working definition of high-quality natural cover, developing a natural-cover sampling strategy, defining a sampling design that informs a network of unbiased plots, and testing the sampling design on the ground. VSP was first piloted in the watershed in 2011. This pilot demonstrated, both in the field and analytically, that the collected data can be used to meet diverse requirements of the LSPP as well as other vegetation management applications. The pilot project derived and tested a set of monitoring criteria that were readily obtainable from field information and were incorporated into the Lake Simcoe Monitoring Strategy. The VSP pilot information sampling also enabled planning for a strategic terrestrial monitoring design across the watershed. The sampling design for the watershed, based on systematic stratified sampling, is driven by the LSPP monitoring criteria and will be tested and implemented in two areas of the watershed during the summer of 2014 (Figure 1).

For more information about the Lake Simcoe natural-cover monitoring project and VSP, contact Dr. Danijela Puric-Mladenovic.

Dr. Danijela Puric-Mladenovic

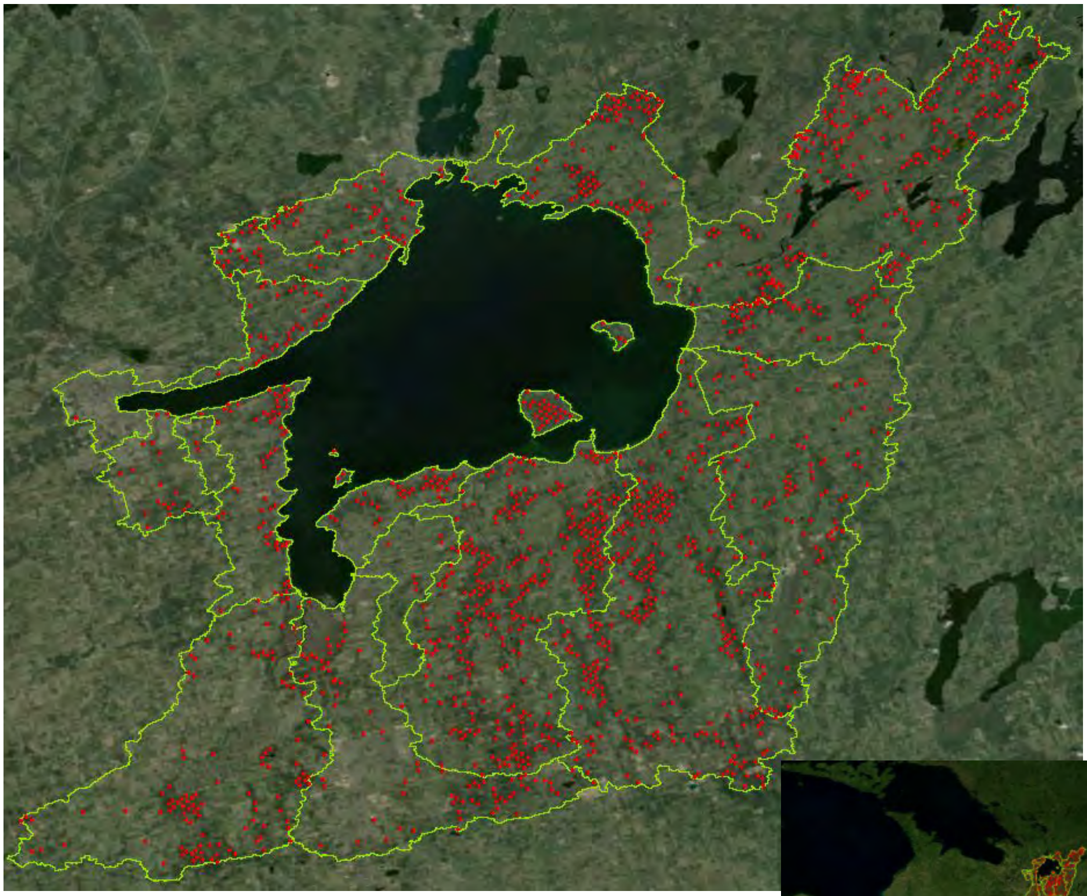

Figure 1. The red dots indicate the proposed sampling design for the Lake Simcoe watershed. Sampling will take place in four subwatersheds (green lines) and on the Georgina islands this summer. This research is being done by the Faculty of Forestry, University of Toronto and MNR.

Bryophyte research at the NHIC

What is a bryophyte?

Bryophytes are very small plants (usually less than 3 cm tall) and are generally found on rocks, a wide variety of soils, or growing on the bark of trees. They are distinguished from the usually larger vascular plants by two important characteristics:

1. Chromosome complement
   Vascular plants during their normal life cycle have two sets of chromosomes (diploid). Unlike the vascular plants, the small leafy moss plants that we are familiar with only have one set of chromosomes (haploid).
2. Water absorption
   Vascular plants take up water through their root system and transport it to the stems, leaves, and flowers through specialized conduits (xylem). Bryophytes lack these specialized transportation structures and usually absorb water directly through their cell walls. The term bryophyte comes from the Greek bryo=swell, and phyton=plant. This is in reference to a mosses ability to soak up water directly from its surrounding environment.

Since the majority of bryophytes do not have an ability to move water internally throughout the plant, they prefer to grow in cool moist sites. The greatest diversity of bryophytes are found in moist or cool humid sites, such as shaded coniferous swamps, creek banks, shorelines, bogs, or open wet fens. However, there are a number of species such as the shy bristle moss (*Orthotrichum strangulatum*) that are found in relatively dry, open rocky areas.

Studies of cell structure and molecular biology, show that bryophytes have emerged from three separate evolutionary lineages. They are classified as mosses (phylum Bryophyta), liverworts (phylum Marchantiophyta), or hornworts (phylum Anthocerotophyta). Of the three phyla, the greatest species diversity is found in the mosses, with up to 15,000 species, worldwide.

How many bryophytes are there in Ontario?

The NHIC's bryophyte list consists of 725 entries for Ontario. This includes 703 species, four subspecies, and 18 varieties that are classified into 83 families. Three hundred and thirty-two species are currently classified as S1, S2, S3 species, and are tracked by the NHIC.

You can download the bryophyte species list (mosses, liverworts, and hornworts) from our webpage: http://www.mnr.gov.on.ca/en/Business/NHIC/2ColumnSubPage/STDU_138223.html

The most common moss families are the Amblystegiaceae (51 Ontario species), Pottiaceae (47 Ontario species), and Sphagnaceae (36 Ontario species). The most common liverwort family is the Jungermanniaceae with 50 Ontario species. Hornworts are the smallest group within the bryophytes and consist of only two families, the Notothyladaceae and Anthocerotaceae, which contributes just four species to the Ontario flora.

Two new liverworts, large greasewort (*Aneura maxima*), and great mountain flapwort (*Harpanthus flotovianus*) were collected for the first time in 2013. Jane Devlin collected *Harpanthus flotovianus* in the Cochrane District, and Linda Ley collected *Aneura maxima* in Frontenac County.

How are bryophytes ranked and tracked by the NHIC?

The NHIC uses provincial (or subnational) conservation status ranks to determine conservation priorities for bryophyte species. The most important factors considered in assigning provincial ranks are the total number of known sites in Ontario, and the degree to which they are potentially or actively threatened with destruction. Other criteria include population size, trends of provincial occurrences, and the ability of the taxon to persist at a site.

The numbers in the following table were generated from the bryophyte species list on the NHIC website.

Provincial ranking of Ontario's bryophytes

S_Rank	Definition	Tracked	Number of taxa
S1	critically imperiled	tracked	136
S2	imperiled	tracked	86
S3	vulnerable	tracked	110
S4	apparently secure	not tracked	78
S5	secure	not tracked	197
SH	possibly extirpated	tracked	12
SX	presumed extirpated	tracked	2
SU	unrankable (insufficient information)	not tracked	33
SNA	not applicable (not suitable for conservation activities)	not tracked	9
SNR	unranked (status not yet assessed)	not tracked	19

The exact number of element occurrences is not known for all species, so some have a S1S2, S2S3, S3S4, or S4S5 ranking.

See *Oldham, M.J. and Sam Brinker, 2009, Rare Vascular Plants of Ontario* for a more complete explanation of subnational species ranks.

Do bryophytes form important plant communities?

Bryophytes act as pioneer plant species when colonizing newly exposed rocky substrates. In a similar manner to the lichens, they help to break down the underlying rock layers on which they grow. Over time there is a buildup of decaying plant material and soil particles that form a thin veneer of soil on top of otherwise dry barren substrates. This thin layer of soil provides a microhabitat that can be used by insects and many other microorganisms. Eventually some of the larger vascular plants use these thin soils and grow on previously uninhabitable rocky substrates.

Along the edges of many creeks and ponds, bryophytes aid in stabilizing bank slopes. Their presence reduces the amount of soil erosion and helps to store water that is used by many microorganisms during the drier periods of the year.

The sphagnum mosses are one of the most ecologically important genera of bryophytes. Open or treed bog communities can sit on very thick accumulations of decaying sphagnum, and develop into unique natural habitats. A number of vascular plants such as few-seeded sedge (*Carex oligosperma*), tussock cottongrass (*Eriophorum vaginatum ssp. spissum*) and small cranberry (*Vaccinium oxycoccos*) are often associated with these more acidic biological communities.

Does the NHIC have a bryophyte reference collection?

Over the years Mike Oldham has processed and catalogued many bryophyte specimens for the NHIC. Most of these have been deposited in Ottawa, at the Canadian Museum of Nature Herbarium (CANM). Fortunately for the NHIC, many specimens are also housed in a small bryophyte collection located in Peterborough. There are currently over 350 verified bryophyte specimens in this collection, and new specimens will be added in an effort to obtain a reference collection for all of Ontario's bryophytes.

How has the NHIC contributed to bryophyte awareness?

For the past five years, Mike Oldham, Sam Brinker, Mike McMurtry, Charles Latremouille and others, have collected over 1,000 bryophyte specimens in northern Ontario as part of the provincial Far North project. Their work has greatly enhanced our understanding of the distribution and status of bryophytes in Kenora and Cochrane districts. Highlights include collections of greater broom moss (*Dicranum majus*), S1; Heim's pottia (*Hennediella heimii*), S1; spring hook moss (*Warnstorfia pseudostraminea*), S1; and liverworts such as Taylor's flapwort (*Mylia taylorii*), S1; and monster pawwort (*Chandonanthus setiformis*), S1.

David J. Bradley

Citizen scientists contribute valuable information to the NHIC

Citizen scientists contribute valuable information to the NHIC's conservation and research activities and to conservation planning, land stewardship, and ecological research activities across the province.

Citizen scientists send many reports of their observations of species of conservation concern, plant communities, and wildlife concentration areas to the NHIC. Check out the four *Citizen Science Spotlights* in this newsletter for examples. NHIC staff review these reports and enter them in the official provincial record. Resource managers, policy makers, and planners use the provincial record to make informed decisions and help conserve Ontario's biodiversity. Scientists use the provincial record for a variety of research; their findings help us better understand Ontario's native species and ecosystems.

The NHIC also uses data from citizen science initiatives such as eBird to identify target areas for field surveys. This winter the NHIC used eBird data to identify locations for raptor surveys. For details, read the article in this edition called *NHIC Focuses on Wildlife Concentration Areas*.

The NHIC is also involved in several atlas-type citizen science projects like the Atlas of Ontario Odonata, Annual Odonata Counts, Christmas Bird Counts, Frogwatch Ontario, Marsh Monitoring Program, Migratory Dragonfly Partnership, North American Butterfly Association Butterfly Counts, Ontario Butterfly Atlas, Ontario Reptile and Amphibian Atlas, Ontario Turtle Tally, and Project Feederwatch. The information citizen scientists contribute to these projects is vital to conserving Ontario's biodiversity. For example, Project Feederwatch and Christmas Bird Counts contribute to the long-term monitoring of North American bird populations. Groups like the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) and the Committee on the Status of Species at Risk in Ontario (COSSARO) use trend data from these projects in species status assessments. All the projects listed above share data with the NHIC, and NHIC staff enter these data in the official provincial record.

Thanks everyone. Keep sending in those observations!

Martina Furrer

Need information?

Did you know the NHIC has dedicated staff members who respond to requests for data and information on species of conservation concern, plant communities, wildlife concentration areas, and natural areas in Ontario?

We encourage you to contact us if you:

- have questions about the data sets available via our website
- had a Biodiversity Explorer user account and need detailed data
- would like to apply for access to detailed NHIC data
- would like to register for data sensitivity training
- need help with species identifications, or
- are doing research and would like to access our collections or reference library

We also appreciate receiving your observations of species of conservation concern, plant communities, or wildlife concentration areas. Use either our online reporting forms or the observation reporting spreadsheet (http://www.mnr.gov.on.ca/en/Business/NHIC/2ColumnSubPage/STDU_138227.html), and email us your data. We also welcome natural areas reports.

Contact us at NHICrequests@ontario.ca or 705.755.2159.

Martina Furrer

Natural Heritage inventories in the Ring of Fire

In 2013, for the fifth consecutive year, MNR biologists from several different work units participated in natural heritage fieldwork in support of the Far North Land Use Planning Initiative. Sam Brinker and Mike McMurtry of the NHIC participated in separate field crews with Alex Howard and Shannon Page of the Biodiversity and Monitoring unit in Timmins, and Eric Snyder and Chris Lewis with the Species at Risk Branch. Two members of the Nibinamik community, Leo Oskineegish and Micah Wapoose, assisted us in the field as well, each for a day. Our capable helicopter pilots were Bruce Winn and Brock Yaskovitch. While he didn't accompany us in the field, Dean Phoenix played an important role in project planning, coordination, and ensuring a high standard of safety.

The work was based out of the small communities of Nibinamik from June 22 to July 2, and Marten Falls from July 16 to 25 (see Figure 1). These communities are only accessible by air, water, or winter road. They are located within the "Ring of Fire", an area that has been identified as having mineral mining potential and so could be strongly impacted by development of these resources. Fourteen study sites were visited including:

- Attawapiskat River Provincial Park (ARPP)
- Attawapiskat Upriver (ATUP)
- Ghost Lake (GHLA)
- Glacial Scours (GLSC)
- Gneiss Rapids (GNRA)
- Jobes Creek (JOCR)
- Kaneesose Lake (KALA)
- Missisa Lake (MILA)
- Mistassin Lake (MSLA)
- Pipestone River Provincial Park (PRPP)
- Troutfly Lake Ice Contact (TLIC)
- Wabigoon Lake (WALA)
- Wunnimmin Lake (WULA)
- Upper Ekwan River (UERI)

Each of these sites was within helicopter range (about 150 km) of the communities and located in the northern and eastern portions of the Ontario Shield ecozone, and in the southern portions of the Hudson Bay Lowlands ecozone (refer to Figure 1). This article presents some preliminary findings from 2013 fieldwork. Most study sites visited were previously identified as candidate nature reserves by Riley (1981) or Cowell (2008), although a few additional stops were made to investigate features that looked interesting from the air. These sites are representative of the major types of landforms and vegetation in the region and were found to be quite undisturbed, except for the presence of the occasional campsite or, in one case, a nearby winter road. Fens, bogs, conifer forest, conifer swamp, and mixed forest are widespread in the study area.

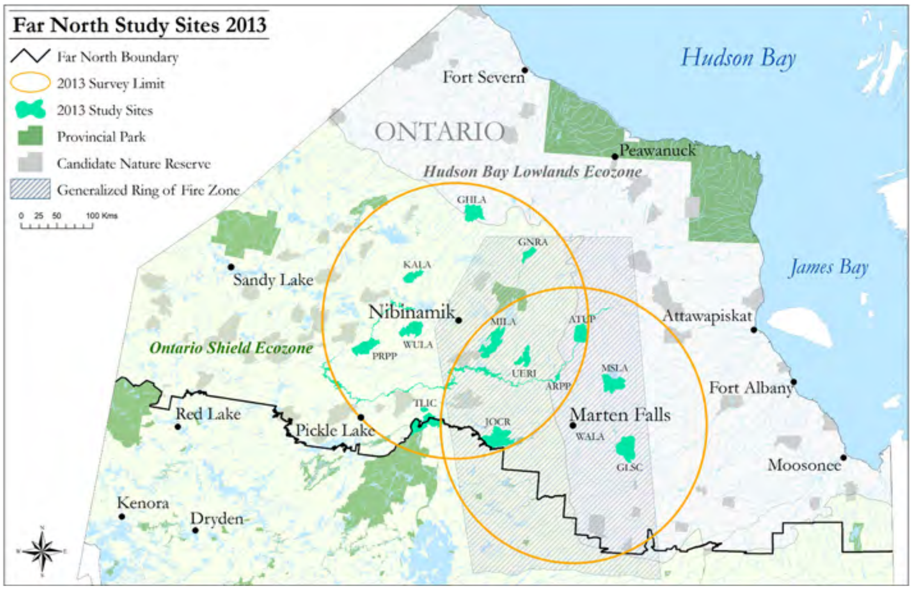

Figure 1. Far North 2013 study sites. Sites codes are explained in the accompanying article.

Major water features include the Albany, Attawapiskat, Pipestone, and Winisk rivers, and lakes Attawapiskat, Ghost, Missisa, Winisk, and Wunnummin. Often the richest areas of biodiversity were the ecotones between terrestrial and aquatic environments, such as the riparian areas of rivers and streams.

Identification and databasing of most vascular plants, lichens, mosses, and some invertebrates collected has been completed except for the more difficult groups that have been submitted to various experts for identification or confirmation of identification.

Six provincially tracked vascular plants were documented (see Table 1) from six study sites. Of particular note was the discovery of quill spike-rush (*Eleocharis nitida*) (S2S3), the first documented occurrence of this tiny species in the Hudson Bay Lowlands, and one of the few locations not associated with reclaimed aggregate pits or seepage zones in ditches near Lake Superior. The diminutive bog adder's-mouth (*Hammarbya paludosa*, formerly named *Malaxis paludosa*) (S1), which had not been observed in Ontario's Far North since Baldwin first reported it in 1961, was rediscovered at the same site some 50 years later. Other observations of provincially-tracked species included new occurrences of Nyman's cuckooflower (*Cardamine nymanii*), ryegrass sedge (*Carex loliacea*), mat muhly (*Muhlenbergia richardsonis*), and rough-fruited fairybells (*Prosartes trachycarpa*). We anticipate that our observations will fill in or extend distributions for more common plants as well. Our observation of russett sedge (*Carex saxatilis*), for example, is one of very few records outside the Hudson Bay Lowlands.

So far, 12 provincially tracked bryophytes (four mosses and eight liverworts) have been identified (Table 1) and the list is not yet complete. Lizard crystalwort (*Riccia bifurca*) (S1) from Pipestone River Provincial Park, is only the second record for Ontario. The rock moss, *Racomitrium microcarpon*, was documented several hundred kilometres north of the nearest published record (Ireland and Ley 1992).

A total of 21 provincially tracked lichens and two lichenicolous fungi (fungi that grow on lichens) have been documented, including several particularly noteworthy collections. The discovery of the lichen, *Normandina acroglypta*, appears to be the first record for North America, and the lichen, *Agonimia tristicula*, appears to be new to Ontario. *Arthopachopsis parmeliarum* and *Lichenoconium pyxidatae* are lichenicolous fungi that appear to be new to Ontario as well.

The provincially tracked bald eagle and golden eagle were observed, the former at several locations including Ghost Lake, where an active nest was observed (one of the most northerly in the province) and the latter only once, while we were in flight over Pipestone River Provincial Park. Observations of non-tracked wildlife species such as moose were noted while flying to and from study sites.

The goal of these inventories is to inform the community-based planning process. The information our teams collected will contribute to check-sheet descriptions of each site visited, including soil and landform types, ecological communities, and the individual plants and animals present. A summary report of the methodology and findings of the project, as well as communications material that can be presented to planners, community members and other decision-makers, will be produced by the Biodiversity and Monitoring Section. A draft report on findings has been provided to Matawa First Nations, which includes Nibinamik and Marten Falls.

This project is a continuing collaboration between the NHIC, the Biodiversity and Monitoring Section, Wildlife Research and Monitoring Section, the Far North Branch, and First Nations communities. We anticipate that studies in 2014, the final year of the project, will be based out of Fort Severn, on the Severn River close to the Hudson Bay coast.

Mike McMurtry, Sam Brinker, Chris Lewis and Eric Snyder

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Table 1. New species to Ontario and North America and species of conservation concern documented during Far North 2013 fieldwork.

Taxon	Scientific name	Common name	S_Rank	Study site
bird	*Haliaeetus leucocephalus*	bald eagle	S4B (Special concern)	GHLA, MSLA, WULA
bird	*Aquila chrysaetos*	golden eagle	S2B	PRPP
vascular plant	*Cardamine nymanii*	Nyman's cuckooflower	S2S3	KALA
vascular plant	*Carex loliacea*	ryegrass sedge	S1S2	UERI
vascular plant	*Eleocharis nitida*	quill spike-rush	S2S3	ATUP
vascular plant	*Hammarbya paludosa*	bog adder's-mouth	S1	WALA
vascular plant	*Muhlenbergia richardsonis*	mat muhly	S3	ARPP
vascular plant	*Prosartes trachycarpa*	rough-fruited fairybells	S1	GLSC
moss	*Pseudocalliergon trifarium*	three-ranked moss	S2	MSLA
moss	*Pseudobryum cinclidioides*	moss	S3	UERI, WULA
moss	*Racomitrium microcarpon*	rock moss	S2	UERI
moss	*Sphagnum cuspidatum*	feathery peat moss	S3	GNRA
liverwort	*Calypogeia sphagnicola*	bog pouchwort	S3	KALA
liverwort	*Cephaloziella hampeana*	liverwort	S3?	UERI
liverwort	*Cladopodiella fluitans*	bog notchwort	S3?	GNRA
liverwort	*Harpanthus drummondii*	Drummond's flatwort	S3?	GLSC
liverwort	*Lophozia ascendens*	liverwort	S3?	TLIC
liverwort	*Lophozia longidens*	liverwort	S3?	UERI
liverwort	*Riccia bifurca*	lizard crystalwort	S1, second record for Ontario	PRPP
liverwort	*Scapania apiculata*	liverwort	S2?	JOCR
lichen	*Agonimia tristicula*	lichen	new to Ontario	ATUP
lichen	*Ahtiana aurescens*	eastern candlewax lichen	S2S3	JOCR
lichen	*Bryoria trichodes ssp. trichodes*	lichen	S3	GNRA, WULA
lichen	*Chaenothecopsis pusiola*	pin lichen	S1S2	ARPP
lichen	*Chaenothecopsis savonica*	pin lichen	S1	UERI
lichen	*Ephebe lanata*	rockshag lichen	S1S2	JOCR
lichen	*Japewia tornoensis*	lichen	S1S2	GNRA, WULA
lichen	*Lepraria jackii*	dust lichen	S1, second Ontario record	TLIC
lichen	*Leptogium rivulare*	flooded jellyskin	S3 (Threatened)	ATUP, ARPP
lichen	*Leptogium teretiusculum*	jellyskin lichen	S1S2	GLSC
lichen	*Lichenomphalia umbellifera*	greenpea mushroom lichen	S1S2	TLIC
lichen	*Normandina acroglypta*	lichen	new to North America	JOCR
lichen	*Pachyphiale fagicola*	lichen	S1	ARPP
lichen	*Pannaria conoplea*	mealy-rimmed shingle lichen	S1S2	ARPP
lichen	*Parmelia fraudans*	shield lichen	S3	UERI
lichen	*Parmelia omphalodes ssp. pinnatifida*	smoky shield lichen	S1, second record for Ontario	UERI
lichen	*Psorula rufonigra*	blue-edged scale lichen	S1S3	TLIC
lichen	*Rhizocarpon oederi*	map lichen	S2S3	JOCR
lichen	*Sarcosagium campestre*	lichen	S1S2	TLIC
lichen	*Sphinctrina anglica*	pin lichen	S3	JOCR
lichen	*Spilonema revertens*	rock hairball lichen	S3	TLIC
lichen	*Stenocybe major*	pin lichen	S2S3	ARPP
lichen	*Usnea longissima*	Methuselah's beard lichen	S2S3	TLIC
lichenicolous fungi	*Arthopachopsis parmeliarum*	lichenicolous fungus	new to Ontario	JOCR
lichenicolous fungi	*Lichenoconium pyxidatae*	lichenicolous fungus	new to Ontario	GLSC

Eric Snyder at Gneiss Rapids study plot Photo: M. McMurtry

Easter candlewax lichen, *Ahtiana aurescens* Photo: C. Lewis

Bog adder's-mouth, *Hammarbya paludosa* Photo: S. Brinker

Albany River near Miminiska Lake Photo: S. Brinker

Boreal chickadee, *Poecile hudsonica* Photo: S. Brinker

A long-horned beetle, *Saperda calcarata* Photo: S. Brinker

Quill spike-rush, *Eleocharis nitida* Photo: S. Brinker

Conservation of Great Lakes arctic-alpine plant communities COA project

One of the significant features of the Lake Superior coastline is its concentration of arctic-alpine plant species. These plant species are typically found much further north, such as in Ontario's Hudson Bay Lowlands, or in the mountains of western North America. Arctic-alpine plant species, in the Lake Superior watershed, grow in cooler than normal microclimates such as bedrock shorelines cooled by the deep waters of the lake (Bakowsky 1998a, Figure 1), north-facing cliffs, and the bottoms of canyons that the sun only warms for a short period each day. These plants are very vulnerable to a warming climate; temperature changes as small as a degree or two could result in declining populations. In recognition of the significance of these disjunct plant populations on Lake Superior, the NHIC tracks 16 arctic-alpine vascular plants in the Great Lakes basin portion of their range, but not further north (in the province) where they are more common (Oldham 2006, Oldham and Brinker 2009).

With funding from the Canada–Ontario Agreement Respecting the Great Lakes Basin Ecosystem (COA), NHIC biologists have been identifying Lake Superior arctic-alpine plant species and compiling information on the places they grow. In the 1970s, David Given and James Soper of the Canadian Museum of Nature visited sites for arctic-alpine plant species at Lake Superior, and produced an excellent publication on these species and their habitats (Given and Soper 1981). In the mid-1990s, NHIC biologists assisted with surveys for the Lake Superior National Marine Conservation Area, and documented additional areas with significant concentrations of arctic-alpine plants (Bakowsky 1998b, Oldham 2000).

Although vascular plants such as small-flowered anemone (*Anemone parviflora*; Figure 2), entire-leaved mountain avens (*Dryas integrifolia*), alpine mouse-ear chickweed (*Cerastium alpinum*), and three-toothed saxifrage (*Saxifraga tricuspidata*) are among the better known arctic-alpine plants on Lake Superior, there are also less well known bryophytes and lichens that share this distribution pattern and habitat. As well as updating lists of arctic-alpine vascular plants, we are also compiling lists of bryophytes and lichens that may be vulnerable to climate change. In the coming field season, we hope to revisit some of the more significant sites for arctic-alpine plants on Lake Superior, and gather updated information on exactly where they occur and how well they are doing. In this way, the health of these significant plant populations can be monitored over time.

Michael J. Oldham

Figure 1. Great Lakes arctic-alpine basic bedrock shoreline on the Slate Islands, Lake Superior, home to significant concentrations of arctic-alpine plant species. Photo: M.J. Oldham

Figure 2. Small-flowered anemone (*Anemone parviflora*), an arctic-alpine species growing in a Lake Superior rock crevice. Photo: M.J. Oldham

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Liber Ero post-doctoral students mentored at NHIC

The Liber Ero post-doctoral fellowship program seeks to support exceptional early-career scientists to conduct and communicate research that informs applied conservation and management issues relevant to Canada (http://liberero.ca/). Liber Ero students have at least two mentors, an academic mentor, and a mentor in the conservation community; currently the NHIC is providing conservation practitioner mentorship to two Liber Ero post-doctoral students.

Originally from Germany, Dr. Annegret Nicolai completed her PhD in ecophysiology in France and Germany and started her post-doctoral studies at the University of Western Ontario in the lab of Dr. Brent Sinclair in 2012. Her project involves designing thermal landscapes for snail conservation under climate change, and the NHIC's Mike Oldham is acting as a conservation practitioner mentor for her project as is Dr. Mhairi McFarlane of the Nature Conservancy of Canada. In 2013, Annegret and Mike conducted fieldwork on terrestrial gastropods in southwestern Ontario and co-authored a status report on the proud globelet (*Patera pennsylvanica*), a COSEWIC candidate snail species (see article elsewhere in this newsletter).

Dr. Jenny McCune completed her PhD at the University of British Columbia on the long-term history of plant communities on Vancouver Island. She is now starting her post-doctoral studies with Dr. Andrew MacDougall in the Department of Integrative Biology at the University of Guelph. Mike Oldham will be acting as a conservation mentor for Jenny's project as will Dr. Ann Bell of Ontario Nature. Jenny's project involves building habitat suitability models and collaborating with landowners to improve the conservation of rare woodland plants on private lands in southern Ontario. To build species distribution models (SDMs), Jenny will use NHIC element occurrence records in combination with data on topography, climate, geology, soils, land use, or other environmental variables to predict habitat suitability across a landscape. Another component of Jenny's project will be to contact landowners and conduct field surveys to verify the presence of rare plants at new sites predicted by the SDMs. The NHIC's Dr. Danijela Puric-Mladenovic will also be assisting with this project.

Michael J. Oldham

NHIC assists with COSEWIC status reports on rare snail species

There are more than one hundred species of terrestrial gastropods (snails and slugs) in Ontario, many of which are rare and restricted to specialized habitat such as alvars. Currently, no terrestrial snail species are listed at risk in the province. The first land snail status reports to be prepared on Ontario species were written in 2013 on two southwestern Ontario snails, the broad-banded forestsnail (*Allogona profunda*, Figure 1) and the proud globelet (*Patera pennsylvanica*, Figure 2). NHIC biologist Mike Oldham, with co-authors Rob Foster, Alan Harris, and Annegret Nicolai, prepared the two status reports for the Committee on the Status of Endangered Wildlife in Canada (COSEWIC). COSEWIC is expected to assess the status of the two snail species in 2014.

Figure 1. Live broad-banded forestsnails from Fish Point, Pelee Island. Photo: A.G. Harris.

Live broad-banded forestsnails were documented during 2013 fieldwork from Point Pelee National Park, and one site on Pelee Island. Previously documented populations on several other Lake Erie islands and three Ontario mainland sites could not be found. Populations on some of the smaller Lake Erie islands have probably been affected by a dramatic increase in nesting double-crested cormorant populations whose excrement has killed much of the native vegetation and altered the soil chemistry. Other threats to these species include habitat loss and predation from introduced species such as ring-necked pheasants and wild turkeys, which feed on snails.

The proud globelet is known in Canada only from a single wooded area in the Ojibway Prairie Complex of Windsor where Mike Oldham first collected it in 1992. Despite intensive surveys of this woodlot during several 2013 visits no live individuals of this species were found, although several empty shells were collected. The reasons for the apparent decline, and possible disappearance, of proud globelet at this site are not known.

No new populations were discovered for either species during 2013 fieldwork despite searches of more than 65 sites.

Michael J. Oldham

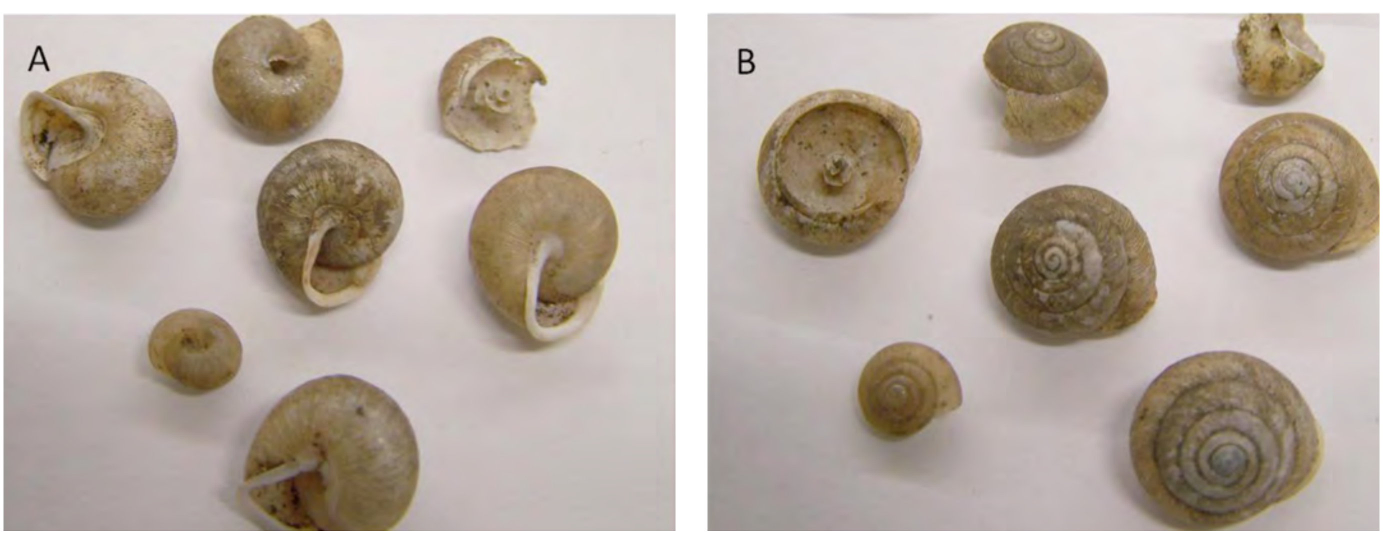

Figure 2. Proud globelet shells from Windsor collected in 1996 by Michael Oldham (specimens at the Canadian Museum of Nature, catalogue number CMNML 096170). A and B present two different views of the same shells. Photos: A. Nicolai.

NHIC fieldwork in Polar Bear Provincial Park

In July 2013, biologist Mike Oldham spent several days conducting fieldwork at Burntpoint Creek Camp in Polar Bear Provincial Park (Figure 1). Burntpoint Creek Camp is an MNR field camp situated on a low beach ridge surrounded by tundra vegetation about three kilometres from the Hudson Bay coast. A variety of studies including work on polar bears, shorebirds, waterfowl, aquatic invertebrates, and plant phenology have been conducted here. The purpose of Mike's visit was to gather information on the flora and fauna of the area, with a particular focus on vascular plants, and to assist with various studies such as goose banding. He also spent several days based in the nearby community of Peawanuck, the headquarters for Polar Bear Provincial Park. In addition to documenting vascular plant species in the Burntpoint Camp and Peawanuck areas, Mike collected specimens of bryophytes, lichens, butterflies, dragonflies, and terrestrial gastropods to help establish species lists for these sites. Volunteer Mary Anne Young, and Julie Belliveau from MNR's Science and Research Branch ably assisted Mike. Ken Abraham, the MNR's Wetlands Wildlife Research Scientist, coordinated the fieldwork.

During fieldwork at Burntpoint Creek Camp and Peawanuck, Mike and his team documented more than 25 species of provincial conservation concern tracked by the NHIC; Mike is preparing checklists of the vascular plants of these two areas. Perhaps the most significant find was the discovery of bear sedge (*Carex ursina*; Figure 2), a plant species not previously reported in Ontario. This small sedge was found near Hudson Bay in moist sand between coastal beach ridges near Burntpoint Creek Camp, and at the Pen Islands near the Manitoba border. Bear sedge was previously known from the Hudson Bay coast in Manitoba and Quebec so its discovery in Ontario was not unexpected. Identification work on the samples collected is still underway and there may be additional interesting discoveries when more of our collections are identified.

Michael J. Oldham

Figure 1. Burntpoint Creek Camp, Polar Bear Provincial Park, looking north with Hudson Bay in the background. Photo: M.J. Oldham

Figure 2. Bear sedge (*Carex ursina*), Polar Bear Provincial Park, a new species for Ontario. Photo: M.J. Oldham

Citizen science spotlight: Short-tailed shrew

In addition to reports of rare species sightings in Ontario, the public often sends us reports of unusual sightings. In this newsletter we highlight a few of these as a matter of curiosity, interest, and learning.

While the short-tailed shrew (*Blarina brevicauda*) is a common mammal in Ontario it has a few interesting traits you may not know about. This mammal has venom! It uses its venomous saliva as a neurotoxin to subdue its prey. It also uses a form of echolocation to find its way around, in addition to using its whiskers and snout. The short-tailed shrew actively hunts for food year-round, feasting on a diet of invertebrates such as snails and insects, and small vertebrates such as mice and voles, and some plant material.

Don't touch!

Tanya Taylor

Short-tailed shrew, *Blarina brevicauda*
Photo: G. Gonthier, CCLicence.

Citizen science spotlight: Mantisfly

Climaciella brunnea is one of four species of mantisfly found in Canada. Although the resemblance to the praying mantis (order Mantodea) is evident, these insects are from the order Neuroptera. This species is thought to be a batesian mimic of the wasp genus *Polistes*, using its colouration as a warning signal to other predators, even though it is relatively harmless. Mantispids are insect predators as adults (including other mantisflies), while larvae are parasitoids of spiders and their eggs.

Robert Craig

Mantisfly, *Climaciella brunnea* Photo: P. Pratt.

NHIC focuses on Wildlife Concentration Areas

Wildlife Concentration Areas (WCAs) are locations that regularly support assemblages of species during critical periods in their life cycles. Such species concentrations may occur seasonally, semi-annually, or annually. They are recurring and take place in distinct, definable areas.

WCAs are key components of Ontario's biodiversity and it is important to identify these locations for effective conservation planning. Examples of provincially tracked wildlife concentration areas include: migratory shorebird and waterfowl concentration areas, colonial waterbird and wading bird breeding sites, raptor winter concentration areas, and bat hibernacula. The NHIC actively gathers information about the locations of these areas, and the species using them.

Over the past year, through contributions from the Canada–Ontario Agreement Respecting the Great Lakes, the NHIC initiated a project aimed at increasing provincial information holdings for WCAs. Through data mining and partnership initiatives the NHIC is currently compiling information on known locations. This information is being used to identify knowledge gaps to inform priority setting for data acquisition and targeted field surveys.

This winter, NHIC staff used eBird data (http://ebird.org) to identify locations of indicator species to locate possible raptor winter concentration areas: species included rough-legged hawk (Figure 1), snowy owl, and short-eared owl. By concentrating on areas containing these species, observations of multiple individuals, and appropriate habitat, NHIC staff were able to target suitable areas for surveying. Through this effort, NHIC staff are beginning to assemble a list of areas of importance for wintering raptors in Ontario. The results of these surveys are still being evaluated, and will be made available when completed.

Looking forward, NHIC staff aim to continue compiling information for all WCAs, and make this information available to conservation planners in Ontario.

To report a Wildlife Concentration Area, visit: http://www.mnr.gov.on.ca/en/Business/NHIC/2ColumnSubPage/STDU_138231.html

Simon Dodsworth

Figure 1. Light morph rough-legged hawk in flight, an indicator species for raptors winter concentration areas. Photo: S. Dodsworth.

Citizen science spotlight: Eastern cicada killer

Sphecius speciosus or the eastern cicada killer is one of the largest North American digger wasps (family Crabronidae). As their name implies, they hunt cicadas provisioning their underground nests with their paralyzed prey. Although their size can be intimidating, they are not aggressive and females rarely sting (males have no stinger). Because of the size of cicadas, female eastern cicada killers either have to find a nearby tree to use as a launching point to fly toward their burrows, or drag their prey if no tree is available. This species is native to Ontario and can often be found in dry, open areas including playgrounds and residential yards from late June, early July, eventually dying off in September or October.

Robert Craig

Eastern cicada killer, *Sphecius speciosus*
Photo: A. Wormington.

Citizen science spotlight: Snowy owl

It's not every year that we are treated to such an abundance of snowy owls (*Bubo scandiacus*) in southern Ontario as we were this past winter (2013–14). This majestic looking bird of prey can raise up to two or three times the usual number of young when prey populations (such as lemmings) are high in its artic breeding range, as they were in 2013. To feed all these hungry mouths, snowy owls stockpile prey around the nest while their eggs are incubating. A photo taken in 2013 by J.F. Therrien (posted on Arctic Raptors Facebook page) shows 70 lemmings and eight voles stockpiled around a nest! Snowy owls are diurnal giving lots of folks a chance to see them as they hunted in open, wind-swept areas across their wintering grounds.

Tanya Taylor

Snowy owl, *Bubo scandiacus* Photo: S. Dodsworth.

Rare plant community digitization at the NHIC

The past year has seen a surge in rare plant community digitization at the Natural Heritage Information Centre, undertaken by Wasyl Bakowsky, Bonnie Henson, and our 2013 Summer Experience Program student Sara Handrigan. Table 1 summarizes what was accomplished this fiscal year.

A total of 278 plant community polygons from the NHIC Biotics database were refined from buffered points to actual detailed community boundaries, based on digital orthophotography, including the Digital Forest Resource Inventory, Southwestern Ontario Orthophoto Project, and Digital Raster Acquisition Project for the east.

Additionally, 785 new polygons were digitized during this period. Data were primarily from waypoints collected in habitats of conservation concern by Michael Oldham and Wasyl Bakowsky as a result of fieldwork in northwestern Ontario beginning in 1995. This formed the basis for digitizing prairies, savannahs, glaciére talus, and cliffs in northwestern Ontario, and arctic-alpine bedrock shorelines along Lake Superior. Freshwater coastal sand dunes throughout Ontario were in part also digitized from waypoints, however, many of the dune polygons were digitized by orthophoto interpretation of the entire Great Lakes coast in Ontario. Almost all the sand beaches were digitized by interpretation as well.

We are currently working on populating the database with Ecological Land Classification (ELC) codes, site names, data sources, etc. Next steps include importing the digital polygon layer into the NHIC's conservation database, Biotics 5. From there it will inform the provincial record in Land Information Ontario.

Wasyl Bakowsky and Bonnie Henson

Table 1. Plant community polygon summary for 2013–14.

Vegetation types	New polygons	Updated biotics polygons	Total polygons
Northwest Ontario Prairie and Savannah	**241**	**18**	**259**
Big Bluestem-Junegrass Dry Rockland Prairie	25	0	25
Bur Oak–Saskatoon Berry Dry Deciduous Woodland Type	5	2	7
Bur Oak Basic Treed Rock Barren Type	198	9	207
Dry Fescue Mixedgrass Prairie Type	4	5	9
Hill's Oak–White Pine–Poplar Acidic Treed Rock Barren Type	4	2	6
Northern Moist–Fresh Bur Oak Tallgrass Savannah	5	0	5
Northwest Ontario Cliff	**41**	**21**	**62**
Basic Open Cliff	40	20	60
Boreal Acidic Sandstone Open Cliff Type	1	1	2
Atlantic Coastal Plain Shallow Marsh Type	**1**	**57**	**58**
Arctic-Alpine	**90**	**90**	**180**
Arctic-Alpine Basic Bedrock Shoreline Type	90	88	178
Glaciére Talus	0	2	2
Freshwater Coastal Dune	**117**	**88**	**222**
American Dune Grass–Beach Pea–Sand Cherry Dune Grassland Type	17	26	60
Cottonwood Dune Savannah Type	17	6	23
Hop-tree Dune Shrubland Type	2	3	5
Juniper Dune Shrubland Type	0	2	2
Little Bluestem–Long-leaved Reed Grass–Great Lakes Wheat Grass Dune Grassland Type	34	37	71
Little Bluestem–Switchgrass–Beachgrass Dune Grassland Type	6	8	14
Red Cedar Dune Savannah Type	40	1	41
Sand Cherry–Wormwood–Canada Wild Rye Shrub Dune Type	0	1	1
Sand Cherry Dune Shrubland Type	1	4	5
Sea Rocket Sand BeachType	**295**	**4**	**299**
Total	**785**	**278**	**1080**

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