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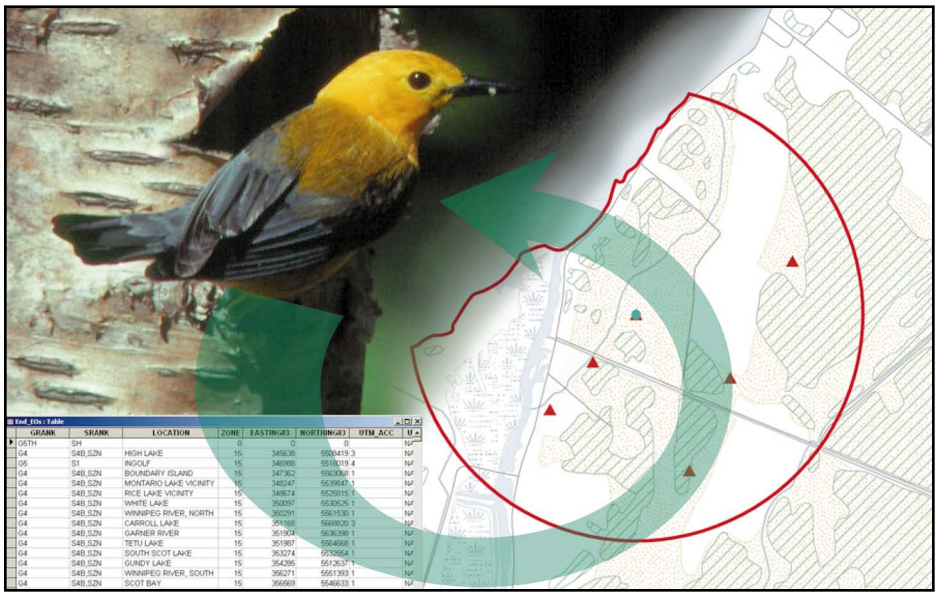

Prothonatary Warbler : A. Woodliffe - OMNR

Biotics software provides advanced data integration allowing for more accurate spatial representation of Ontario's rare species, communities and natural areas.

NHIC Adopts Biotics Software

Eleven years ago when the Natural Heritage Information Centre (NHIC) was created, a database called the Biological and Conservation Data System (BCD) was used to maintain information on Ontario's natural heritage. This same standard database was used by most other provincial and state conservation data centres within the hemisphere at the time. BCD did not easily support the growing technology of GIS, nor the sharing of information with outside clients. NHIC quickly found the need to develop beyond what BCD supported at the time, and created the current NHIC database system using Microsoft Access. Most of the same standards that BCD implemented were used in order to be able to continue sharing data with the rest of the hemisphere-wide network called NatureServe. By the late 1990s, a number of developments made it desirable to upgrade the database, including: increased user demand on the database, the need for better compatibility with other corporate Oracle databases to enable easier sharing of information, and most importantly, the need to pinpoint exact boundaries of populations and communities using polygons instead of points.

The Growth of Biotics

Over the years, BCD developed within the NatureServe network; first by using an ESRI Arcview front-end to provide the functionality of a GIS system that could be queried spatially, then most recently by moving the back-end database to Oracle, a robust database management system. The combined spatial database system is now called Biotics. This developed while NHIC was evaluating its own systems

with the intent of moving to an Oracle database as well. After evaluating several options for upgrading the NHIC databases, it was decided that there were greater benefits in adopting the new NatureServe standard, Biotics.

By the middle of 2005, NHIC will have moved our data from our custom Microsoft Access databases into a new installation of Biotics. This move will only directly affect NHIC and some Species at Risk staff. Later stages will have broader impacts as NHIC continues to upgrade all the systems used to collect, maintain and distribute information. As technology changes, and as more partners work collaboratively with NHIC to support biodiversity in Ontario, our systems will need to adapt to accomodate changing business requirements and client needs.

Features of Biotics

Spatial

Biotics fully supports polygonal boundaries for element occurrences (EOs) and their source features (field observations and specimen labels). It provides the ability to bring in spatial features and incorporate them into existing EOs or create new EOs. Traditionally, many EO observations have been stored as points (e.g. I found species X at this spot on the landscape). Some observations work well as points, but others would be better served if they could be stored as shapes on the landscape that display the real spatial extent of the observation (e.g. by drawing a shape on a basemap showing the dimensions of a plant population, the feeding area for a mammal, or the outline of a plant community). Exact boundaries are frequently needed for planning, and Biotics' spatial capabilities can help NHIC produce these.

Collaborative projects will help NHIC produce more accurate polygonal boundaries for Ontario's EOs. Currently, this includes the SAR QA/QC project with MNR's Species at Risk Program to improve the spatial boundaries of SAR EOs, a Southern Ontario Land Resource Information System (SOLRIS) project to digitize vegetation communities, and Parks Canada projects to improve our knowledge of EOs within National Parks.

Robust database

The non-spatial (tabular) side of Biotics uses an Oracle database. Oracle is a feature-rich, professional database management system used by

Protecting Ontario's Biota: Your Species Field Notes

Question: How do you help protect the very species you have searched for and found when you've been out looking at the natural features around us, and gain a little bit of immortality at the same time?

Answer: Make a note, even a short one, of exactly where you found it, any important details (population size, etc.) and make sure that there is a permanent record somewhere that you found it.

This has been done for field observations innumerable times over the years. In some cases these sightings were given longevity as the notes attached to specimens stored in permanent collections. There are some specimens in Ontario herbaria dating from before the 19th century that today can help us understand where species populations were at one time and might still persist. There are atlases developed over decades past (based on both specimen and expert observations) that map out where species populations are in the province. Ontario has a rich history of documenting our flora and fauna, both through government and non-government organization effort, and also, in large part, through individual volunteer effort. What we know about our flora and fauna today is due to the efforts of the observers and collectors who have maintained the information about populations in field notes, specimens, and now in the more easily accessed digital databases that have developed over the past three decades.

As a result of all these efforts, there are populations whose details have been known for over 100 years. For most populations, we don't know all the details necessary to have tracked their change over time both numerically and spatially, but back then who would have anticipated that:

- people someday would be faced with the challenge of defining exactly where a species population is, using technologies such as GPS to pinpoint them within metres rather than by the nearest town. Even the use of detailed topographic maps was not always as widespread within the conservation community as it is now.
- individual populations would need to be protected from various factors that threaten their existence within this province.
- species populations would be tracked closely as possible indicators of changes in our environment.
- governments and non-government organizations would use the viability of species populations as part of their criteria for conserving Ontario's significant natural heritage areas.
- information about the rarity of a species within the province would be shared internationally in order to determine global status.

Today, there are a number of venues for reporting rare species sightings, including ongoing atlassing efforts such as the Ontario Breeding Bird Atlas, park naturalists, local MNR district offices, and the Rare Species Reporting Form on the NHIC website. One goal of the NHIC is for information from all of these sources to be able to be combined and presented as comprehensively as possible to those with a need-to-know for conservation of the species. There will always be parts of the province where species will persist undetected, but where they have been found and documented, NHIC collects or links to that information in order to provide as complete a picture as possible of rare species occurrences for Ontario. The main NHIC databases, currently upgrading to Biotics, are a critical tool for maintaining that information.

Peter J. Sorrill

the Ministry of Natural Resources for corporate databases. Using Oracle will result in a more stable database that can grow as NHIC grows, and provide NHIC with a variety of options for sharing data both within MNR and with outside clients.

Standards

The data stored within Biotics can be shared beyond Ontario, built upon standards used across the entire NatureServe network. This critical data sharing has been possible between data centres for the past 25 years though Ontario, through the NHIC, has only been part of the network for the past 11 years, since it was established in 1993.

Data from Biotics will be shared with our partners and to the general public through other evolving standards such as the Darwin Core and Access to Biological Collection Data (ABCD) specimen standards supported by the Global Biodiversity Information Facility (GBIF).

Easier data exchanges, easier partnerships

Tools built into Biotics provide for easy exchanges with NatureServe main office, between data centres, or with partners that have their own Biotics installation such as Parks Canada. Additionally, by moving our database to a corporate Oracle server, NHIC will be better able to share data directly with partners. The Biotics database will provide a stable platform on which to build the tools that are necessary for critical data exchanges through the NHIC website, the Natural Resources Values Information System (NRVIS) and Ontario Land Information Warehouse (OLIW).

As a final note, there are currently 49 Biotics-based data centres throughout the hemisphere. New solutions developed to resolve changing biological needs and issues at either NatureServe or the individual data centers could potentially be adopted by any other Biotics-based installation. NHIC participation in the development of the next generation of Biotics will also help ensure it continues to reflect the needs of the Ontario biodiversity conservation community.

Peter J. Sorrill

C.D. Jones - NHIC Archive

Female Broad-tailed Shadowdragon collected from rapids along the Petawawa River, Algonquin Provincial Park, on 2 August 2004 .

Shadowdragons in the Dark: Another New Dragonfly for Ontario

Mature dragonfly larvae leave the water and emerge from their larval skins called exuviae. These papery skins are tough, lasting for a few months at least, and have the same shape as the larvae. They can often be identified to species and therefore provide a record, wherever they are found, of what kinds of dragonflies live in a particular place. In June 2003, we found some puzzling dragonfly exuviae on shoreline rocks along the Missinaibi River in Missinaibi River Provincial Park, Cochrane District, and on the remnant abutments of a bridge in a bouldery, spring-fed pool beside the Petawawa River in Renfrew County, Ontario. The exuviae clearly belonged to a remarkable dusk-flying group of dragonflies, the genus *Neurocordulia*, but differed slightly from the only known Ontario species (*N. yamaskanensis*, the Stygian Shadowdragon). Based on the size, shape, colour, and dorsal spines on the shed larval skins, it was suspected that they belonged to *Neurocordulia michaeli*, the Broad-tailed Shadowdragon, which was recently discovered in New Brunswick and described as a new species in 2000 (Brunelle 2000). Until 2003 it had only been found in Maine and New Brunswick.

Because most dragonflies are much more readily identified as adults rather than as larvae, in June 2004 we attempted to get conclusive evidence of the occurrence of Broad-tailed Shadowdragon in Ontario by collecting live larvae and raising them through to adulthood or by collecting adults. Adult shadowdragons are rarely seen because they fly only at dusk. A rather cool swim in early June produced three of the puzzling larvae collected from beneath submerged boulders in the pool beside the Petawawa River, but would they emerge in captivity? Within a day in a rearing cage we had three adult Broad-tailed Shadowdragons. During a second visit to the Missinaibi River site, this time at dusk, several adult Broad-tailed Shadowdragons were caught, of about 100 seen flying over the rocky rapids.

Encouraged by these discoveries we checked other areas in the general vicinity of the Petawawa and Missinaibi River locations to see if Broad-tailed Shadowdragons might be found at additional sites in Ontario. A third population was discovered, based on the collection of an adult at dusk, on the Petawawa River, this time in eastern Algonquin Park. Exuviae which appear to be Broad-tailed Shadowdragon were also collected from a bridge abutment by the Groundhog River, about 95 km east of the Missinaibi River site.

The discovery in 2003 and 2004 of four new

M.J. Oldham - NHIC Archive

Rock Island Rapids on the Missinabi River. Broad-tailed Shadow Dragon adults were flying over rocky pools connected to the main river on 26 June 2004.

M.J. Oldham - NHIC Archive

Spring-fed pool beside the Petawawa River where Broad-tailed Shadowdragon larvae were collected on 25 June 2004.

Ontario sites for Broad-tailed Shadowdragon is quite surprising since the closest known populations are almost 500 km distant in Maine (Brunelle 2000). The Ontario discoveries are also surprising because this species is globally rare (ranked G2 by NatureServe) and known from fewer than 20 sites worldwide. It is very likely that the Broad-tailed Shadowdragon also occurs in Quebec, and perhaps other states and provinces in northeastern North America, but it is easily overlooked.

A more detailed account of the discovery of Broad-tailed Dragonfly in Ontario can be found in the latest issue of "Argia", the news journal of the Dragonfly Society of America (Catling et al. 2004). Specimens documenting the new locations have been deposited in the insect collections of Agriculture and Agri-Food Canada and the Natural Heritage Information Centre. Two of the four known Ontario populations are in provincial parks where the species will be afforded some protection.

Acknowledgements

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Michael J. Oldham, Colin D. Jones, and Paul M. Catling*

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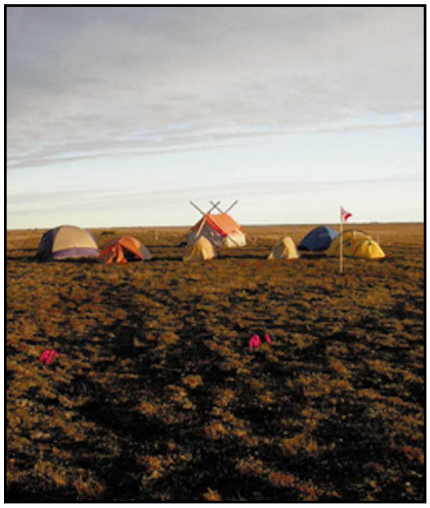
* Dr. Paul Catling is a research scientist with Agriculture and Agri-Food Canada in Ottawa and an avid dragonfly enthusiast. Paul has collaborated with NHIC biologists on a number of research projects.

NHIC Staff Coordinate Atlassing Trip to the Pen Islands

Between June 23rd and July 7th 2004, Don Sutherland and Colin Jones (OMNR/NHIC), Dr. Martyn Obbard (OMNR/Wildlife Research & Development Section), Jon McCracken and Ron Ridout (Bird Studies Canada) and Peter Burke of London, Ontario, atlassed four squares in two 100-kilometre blocks in the vicinity of the Pen Islands on Ontario's Hudson Bay coast.

The Pen Islands, comprised of East Pen Island (actually part of Nunavut) and West Pen Island (not really an island but a spit), are located along the shore of Hudson Bay in Ontario, just a few kilometres east of the Manitoba border at 56° 50' N, 89° 54' W. One of the most remote locations in the province, aside from research on Woodland Caribou and the burgeoning nesting colony of Snow Goose, the Pen Islands had been the subject of few studies by visiting biologists. For that reason the region was identified as a prime target for coverage for the Ontario Breeding Bird Atlas.

Upon our arrival it was clear that spring was very much delayed; the landscape resembled late March or early April in southern Ontario, complete with 1-2m snow drifts to the lee of the larger ridges, leafless birches, willows and tama-



D. A. Sutherland - NHIC Archive

Base Camp, 23 June to 7 July 2004, near Oosteguanako Creek, south of West Pen Island, Kenora District, Ontario.

R. Ridout - BSC

Adult light-phase Parasitic Jaeger near West Pen Island. Parasitic Jaeger is a widespread but local and uncommon breeding species along Ontario's Hudson Bay coast.

racks and strong choruses of both Wood and Boreal Chorus Frogs.

Over the course of our two week stay we easily exceeded the minimum coverage requirements for the blocks, conducting a total of 121 point counts and spending 307 h in the pursuit of breeding evidence and searching for nests. In total, 101 species were observed, with breeding evidence found for 98 of those. Our searches resulted in the discovery of 110 nests of 29 species. Among the many highlights were the discovery and documentation of a Stilt Sandpiper nest and three nests of Hoary Redpoll, both firsts for the province. Other nest highlights included: Ontario's fifth Hudsonian Godwit nest, sixth Parasitic Jaeger nest, seventh Greater Scaup nest, seventh through ninth American Golden-Plover nests and eighth Red-necked Phalarope nest, together with nests of Pacific Loon, Tundra Swan (3), Willow Ptarmigan (2), Least Sandpiper (11), Dunlin (12), American Tree Sparrow (2), Lincoln's Sparrow, White-crowned Sparrow (5), Smith's Longspur (3), Lapland Longspur (1) and Common Redpoll (3). An adult male Wolverine observed near camp on July 1st was an unexpected highlight.

R. Ridout - BSC

Breeding-plumaged male Willow Ptarmigan. This species is a widespread and common permanent resident of the tundra and tundra-taiga transition along Ontario's Hudson and northern James Bay coasts.

On our departure on July 7th, all but the remains of a few drifts had disappeared, the ice was gone from all the lakes and ponds and the pack ice was starting to push away from the coast. The tundra was starting to green up; willows and dwarf birch were starting to flower and leaf out and the Lapland Rosebay was nearing its peak of flowering, turning the ridgetops a rosy-pink.

Donald A. Sutherland

Riverine Alvars and Prairies in Southern Ontario

Open prairie and alvar vegetation communities are fairly well-known vegetation types in southern Ontario. Although these communities occur in a climate which favours the development of forest vegetation, these grasslands are maintained in an open condition by a variety of factors, including droughty soils, vernal pooling, summer droughts, and fire. These conditions prevent the establishment of a significant tree canopy, and favour the persistence of herbaceous ground cover vegetation more tolerant of these disturbances and ecological stresses (Curtis 1959, Catling and Brownell 1995).

It is less well-known that spring flooding has also lead to the establishment of both prairie and alvar vegetation in narrow bands along some rivershores. This vegetation is also influenced by the pH of the substrate, as well as the steepness of the shoreline (Brownell 2003). In some cases they have alvar characteristics, with very shallow soils and exposed limestone pavements, while in other situations the soils may be deeper, and the grasslands are more like prairies. Intermediate situations also occur, where the distinction between the two types is not clear. Not surprisingly, in addition to supporting plants characteristic of prairie and alvar habitats, plants characteristic of Great Lakes and river shorelines may also be present (Table 1). Prairie species are those defined as such in Rodger (1998), while alvar species are those identified in Catling and Brownell (1995).

Although the hydrological regimes, including the extent and duration of flooding (OMNR 2001), of most rivers in southern Ontario have been greatly altered from pre-European settlement times, these processes continue to this day, and help maintain flooding-dependant vegetation communities.

Catling and Brownell (1995) briefly review shoreline alvars in the Great Lakes basin, noting their occurrence at sites in Michigan (Escanaba River), New York (Black River), and the Maitland and Ottawa Rivers in southern Ontario. Brunton (1980, 1982) provides greater detail for some of the Ottawa River sites,

Open Little Bluestem (*Schizachyrium scoparium*) riverine prairie along the Ottawa River, Beckett Island, with scattered Bur Oak (*Quercus macrocarpa*).

and Brownell and Riley (2000) also mention the occurrence of shoreline alvars along the Salmon River.

Narrow bands of shoreline grasslands which appear to be more similar in physiognomy, soil depth and species composition to prairie have been described from the Ausable (Brownell 1984) and Ottawa Rivers (Bakowsky 1998), and have also been observed along the Grand and Madawaska Rivers (Bakowsky unpublished).

Riverine Alvars

Shrubby alvars have been described from Shirley's Bay along the Ottawa River. This site consists of limestone pavement which is flooded in the spring, with cracks and crevices filled with alluvium. It is dominated by shrubs such as Shrubby Cinquefoil (*Potentilla fruticosa*), and characteristic shoreline species such as Ninebark (*Physocarpus opulifolius*) and Kalm's St. John's-wort (*Hypericum kalmianum*). Numerous prairie species are present, including Northern Dropseed (*Sporobolus heterolepis*), Little Bluestem (*Schizachyrium scoparium*), Prairie Cord-grass (*Spartina pectinata*), Big Bluestem (*Andropogon gerardii*), Indian Grass (*Sorghastrum nutans*), Round-headed Bush-clover (*Lespedeza capitata*), Virginia Mountain-mint (*Pycnanthemum virginianum*), Hairy Beardtongue (*Penstemon hirsutus*), Sand Cherry (*Prunus pumila*), and Canada Tick-trefoil (*Desmodium canadense*). Alvar and Great Lakes shoreline species are also present, such as Crawe's Sedge (*Carex crawei*), Flat-stemmed Spikerush (*Eleocharis compressa*), False Pennyroyal (*Trichostema brachiatum*), Wild Chives (*Allium schoenoprasum*), Narrow-leaved Blue-eyed Grass (*Sisyrinchium mucronatum*), Dwarf Skullcap (*Scutellaria parvula*), Flat-topped White Aster (*Solidago ptarmicoides*) and Balsam Ragwort (*Packera paupercula*) (Brunton 1980).

Alvar vegetation occurs along the extensive limestone river flats of the Maitland River upstream from the town of Goderich. Much of the flats consist of exposed limestone pavement, but in places they are dominated by Big Bluestem and Indian Grass. Other prairie species present include Kalm's Brome Grass (*Bromus kalmii*), Switchgrass (*Panicum virgatum*), Little Bluestem, Prairie Cord-grass, Heartleaf Alexanders (*Zizia aptera*), Prairie Loosestrife (*Lysimachia quadriflora*), Death Camass (*Zigadenus elegans*) and Pale-spike Lobelia (*Lobelia spicata*). Shoreline species found here include Crawe's Sedge, Flat-stemmed Spikerush, Birds-eye Primrose (*Primula mistassinica*) and Tuberous Indian-plantain (*Arnoglossum plantagineum*) (Oldham *et al.* 1994). Additional noteworthy plant species are listed in Table 1. This exceptionally diverse site also has associated limestone cliffs which harbour additional rare and disjunct plant species (Oldham *et al.* 1994).

Riverine Prairies

Several stretches of riverine prairie are known from the Ausable River, near the town of Arkona. They occur at a number of stretches along a seasonally flooded, slow-flowing section of the Ausable River, on clay with many rocks and boulders. These grasslands are dominated by prairie species such as Big Bluestem, and Riddell's Goldenrod (*Solidago riddellii*), along with mosses, willows (*Salix* spp.), and Sneezeweed (*Helenium autumnale*). Other species include Tuberous Indian-plantain, Giant Sunflower (*Helianthus giganteus*), Swamp Lousewort (*Pedicularis lanceolata*), Riverbank Rye (*Elymus riparius*), Hairy Brome Grass (*Bromus pubescens*) and Common Stiff Sedge (*Carex tetanica*) (Brownell 1984).

Riverine prairie has been observed along the shore and bank of the Grand River in Brantford, where it is dominated by Indian Grass and Big Bluestem. Other common prairie species found here are Canada Tick-trefoil, Wild Bergamot (*Monarda fistulosa*), and Smooth Aster (*Symphyotrichum laeve*) (Bakowsky pers. obs.).

Riverine prairie also occurs along a narrow band along the east shore of Sheffield Long Lake (part of the Salmon River). The Salmon River is one of eastern Ontario's largest rivers, and one of the few whose water regime is not significantly altered by dams, consequently it experiences

W.D. Bakowsky - NHIC Archive

Canada Tick-trefoil (*Desmodium canadense*) is a prairie species found along some riverine prairies.

Table 1. Significant plant species associated with riverine prairies and alvars.

Scientific Name	Common Name	Habitat	GRank	SRank	Ausable	Maitland	Grand	Salmon	Madawaska	Ottawa
Allium canadense	Canada Wild Onion	s	G5	S5	X	X		X		
Allium schoenoprasum var. *sibricum*	Wild Chives	a, gls	G5T5	S4						Xx
Andropogon gerardii	Big Bluestem	p	G5	S4	X	X	X	X		Xx
Aristida dichotoma	Churchmouse Three-awn		G5	S3				X		
Arnoglossum plantagineum	Tuberous Indian-plantain	gls	G4G5	S1	X	X				
Bromus kalmii	Kalm's Brome Grass	a, p	G5	S4		X				Xz
Calamintha arkansana	Wild Calamint	a, gls	G5	S4S5		X				
Carex crawei	Crawe's Sedge	a, gls	G5	S4		X				Xx
Carex tetanica	Common Stiff Sedge	p	G4G5	S3	X	X				
Comandra umbellata	Bastard Toadflax	p	G5	S5			X	X		Xx
Deschampsia cespitosa var. *cespitosa*	Tufted Hairgrass	s	G5	S4S5		X			X	Xz
Desmodium canadense	Canada Tick-trefoil	p	G5	S4			X		X	Xx
Eleocharis compressa	Flat-stemmed Spikerush	a	G4	S4	X	X				
Fimbristylis autumnalis	Slender Fimbristylis	s	G5	S4				X		
Helenium autumnale	Sneezeweed	s	G5	S5	X	X				Xxyz
Hypericum kalmianum	Kalm's St. John's-wort	gls	G4	S4						Xx
Lespedeza capitata	Round-headed Bush-clover	p	G5	S4						Xx
Lobelia spicata	Pale-spike Lobelia	p	G5	S4		X				
Lysimachia quadriflora	Prairie Loosestrife	p	G5?	S4		X				
Monarda fistulosa	Wild Bergamot	p	G5	S5		X	X			
Muhlenbergia richardsonis	Richardson's Muhly	s	G5	S2		X				
Packera paupercula	Balsam Ragwort	a, p	G5	S5		X				Xxz
Panicum rigidulum	Stiff Panic Grass	s	G5	S2S3				X		
Panicum virgatum	Switchgrass	p	G5	S4		X				
Physocarpus opulifolius	Ninebark	s	G5	S5	X	X	X			Xxyz
Polygala senega	Seneca Snakeroot	a,p	G4G5	S4	X					Xxz
Primula mistassinica	Bird's-eye Primrose	gls, p	G5	S4		X				
Prunus pumila	Sand Cherry	a, p	G5	S4?						Xxz
Pycnanthemum virginianum	Virginia Mountain-mint	p	G5	S4					X	
Schizachyrium scoparium	Little Bluestem	a, p	G5	S4		X	X		X	Xxyz
Scutellaria parvula	Dwarf Skullcap	a	G4	S4						Xxz
Sisyrinchium mucronatum	Narrow-leaved Blue-eyed Grass	gls,p	G5	S4S5	X	X				Xx
Solidago ohioensis	Ohio Goldenrod	gls	G4	S4		X				
Solidago ptarmicoides	Flat-topped White Aster	a,p	G5	S5						Xx
Solidago riddellii	Riddell's Goldenrod	p	G5	S3	X					
Sorghastrum nutans	Indian Grass	a,p	G5	S4		X	X			Xxyz
Spartina pectinata	Prairie Cord-grass	p	G5	S4		X		X	X	Xxyz
Sporobolus heterolepis	Northern Dropseed	a,p	G5	S4						Xx
Symphyotrichum laeve	Smooth Aster	p	G5	S5		X				
Trichostema brachiatum	False Pennyroyal	a	G4G5	S4						Xx
Trisetum melicoides	Melica-like Trisetum	s	G4	S4		X				
Zigadenus glaucus	Death Camass	a,p	G5	S4		X				
Zizia aptera	Heartleaf Alexanders	p	G5	S1		X				

Abbreviations: a - alvar, gls - Great Lakes shoreline, p - prairie, s - shoreline, x - Shirleys Bay, y - Norman Rapids, z - Beckett Island

dramatic water level fluctuations of several metres annually (Brownell 2003). It is dominated by Big Bluestem, with associated species including Prairie Cord-grass, Stiff Panic Grass (*Panicum rigidulum*), Churchmouse Three-awn (*Aristida dichotoma*), Boreal Panic Grass (*Panicum boreale*), Wild Garlic (*Allium canadense*), Lance-leaved Aster (*Symphyotrichum lanceolatum*) and Slender Fimbristylis (*Fimbristylis autumnalis*) (Brownell 2003). High-quality shoreline prairie occurs along the eastern shore of Bull Lake in Lennox and Addington County, also a part of the Salmon River system (Brownell pers. comm.).

Strips of prairie occur along the shores of the Madawaska River downstream from Calabogie Lake in Renfrew County. Here, it is dominated by Little Bluestem, although Lenticular Sedge (*Carex lenticularis*) is a secondary dominant. Prairie species which are common here include Virginia Mountain-mint, Canada Tick-trefoil, Prairie Cord-grass, Small Purple-fringe Orchis (*Platanthera psycodes*) and Canada Milkvetch (*Astragalus canadensis*) (Gore and Storrie 1990).

Similar, but more extensive riverine Little Bluestem prairie occurs on the flood-scoured southern shore of Beckett Island, just west of Pembroke along the Ottawa River. Other characteristic prairie species include Kalm's Brome Grass, Canada Tick-trefoil, Seneca Snakeroot (*Polygala senega*), Sand Cherry, Indian Grass, and Prairie Cord-grass. Shoreline species such as Lenticular Sedge, Tufted Hairgrass (*Deschampsia cespitosa* var. *cespitosa*), Sneezeweed and Ninebark are also present. In a few places, the riverine prairie extends beyond the immediate shoreline, and onto the limestone pavement of the tableland. A few scattered, open-grown Bur Oak (*Quercus macrocarpa*) are present, giving the vegetation a savannah-like aspect in places.

Conclusion

The dynamic energy of spring flooding and associated ice scour along some rivershores is partially responsible for the establishment and maintenance of open prairie and alvar vegetation along the scoured banks. As noted by Brownell (2003), riverine features, including prairie and alvar vegetation, are poorly represented within the parks and protected areas system in southern Ontario. They are not widely known yet in Ontario, and likely there are additional examples to be found and reported on. Should anyone encounter these in the field, they are encouraged to report them to the NHIC using the standard Community Field Reporting Form, available on the NHIC website (http://www.mnr.gov.on.ca/MNR/nhic/communities/comm_report.cfm). Paper copies of the forms may be requested from the NHIC.

Wasyl D. Bakowsky

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NHIC Produces Data Summaries on Niagara Escarpment

The NHIC has produced data summaries and Geographic Information Systems (GIS) maps on the biodiversity of the Niagara Escarpment, at the request of Mike Eckersley, Niagara Escarpment Program Advisor, Conservation and Planning Section as part of a cooperative effort between MNR and the Niagara Escarpment Commission. Our Element Occurrence and Natural Areas databases were queried for all natural heritage observations within the geographic boundaries of the Niagara Escarpment Plan and surrounding lands. Simon Dodsworth and Mike McMurtry of the NHIC worked with Mike Eckersley, Catherine Duckworth and Tanya Taylor of Conservation and Planning Section to summarize data on occurrences of tracked species and vegetation communities, as well as produce GIS maps of these occurrences and natural areas such as Areas of Natural and Scientific Interest, Provincial Parks, Conservation Areas and evaluated wetlands. Data from the Ontario Herpetofaunal Atlas were also provided for the Escarpment area. Conservation and Planning Section will be further analyzing this information in their ongoing role to provide advice on the future management and monitoring of Niagara Escarpment lands. They are in the process of compiling information on the full array of species that depend on the Niagara Escarpment, not just those that are provincially rare or at risk. The Ontario Breeding Bird Atlas, the two-volume Ecological Survey of the Niagara Escarpment (Riley et al. 1996) and fish distribution data compliled by the Department of Fisheries and Oceans have been additional sources of valuable information. This information will allow a preliminary analysis of patterns of biodiversity on and adjacent to the Niagara

M. J. McMurtry - NHIC Archive

Hart's-tongue, *Asplenium scolopendrium* var. *americanum*, a golbally-rare fern with most of its distribution on the Niagara Escarpment.

Escarpment, and will help to identify suitable indicators for monitoring trends in this important ecosystem. MNR and the Niagara Escarpment Commission plan to move forward in the continuing development of a monitoring program for the Escarpment that builds on the Ontario Niagara Escarpment (ONE) Monitoring Program.

Michael J. McMurtry and Simon Dodsworth

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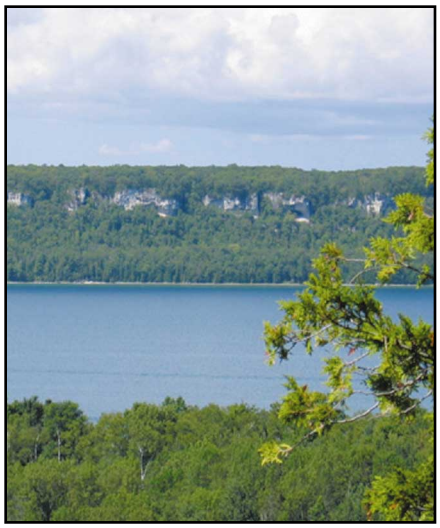

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Hope Bay, Bruce Peninsula, a provincially significant life science Area of Natural and Scientific Interest on the Niagara Escarpment.

S. Dodsworth -NHIC Archive

Handheld databases integrate GIS operations, GPS data capture, and customized data entry.

NHIC Explores Electronic Handheld Technology

During the summer of 2004, NHIC system staff (Sandy Gemmiti and Pete Sorrill) designed and created an electronic hand-held tool and database to collect rare species data in the field. This application, designed on ESRI's ArcPAD software, integrates Geographic Information Systems (GIS), GPS data capture and customized data entry. Customized data entry forms were developed in consultation with NHIC field biologists and aimed to automate data entry for rare species occurrences. Automated data capture and upload, data validation, and simple GIS queries are a few of the many benefits of adapting mobile technology to NHIC field activities. Advanced field testing will commence in the 2005 field season, when application to outside users will be evaluated.

Simon Dodsworth

General Status of Wild Species Update

As a signatory to the *Accord for the Protection of Species at Risk* (1996) Ontario agreed to monitor, assess and report regularly on the status of all wild species in the province. The national General Status of Wild Species project is part of this ongoing commitment to protect Canada's biodiversity. The first national report on the general status of wild species in Canada (see http://www.wildspecies.ca/wildspecies2000/) assessed the provincial, territorial, and national status of all Canadian birds, mammals, reptiles, amphibians, freshwater fishes, butterflies, orchids, and ferns. The second national report, to be produced in 2005, will include re-assessments of the taxonomic groups evaluated in 2000, plus evaluations of several additional groups: marine fishes, crayfish, tiger beetles, dragonflies, freshwater mussels, and all vascular plants.

Canada general status ranks are assigned by the National General Status Working Group based on provincial and territorial general status ranks from across the country. Each province and territory evaluates the status of each species in its jurisdiction based on a set of seven criteria (population size, number of occurrences, geographic distribution, trend in population, trend in distribution, threats to population, threats to habitat). Based primarily on these criteria, species are assigned to one of 8 general status categories (At Risk, May Be At Risk, Sensitive, Secure, Undetermined, Not Assessed, Exotic, or Accidental). Species assigned the general status rank of "At Risk" have been evaluated by COSEWIC (Committee on the Status of Endangered Wildlife in Canada) and found to be nationally Endangered or Threatened. Species categorized as "May Be At Risk" are possible candidates for a detailed status assessment by COSEWIC.

The Natural Heritage Information Centre (NHIC) continues to coordinate the development of Ontario's general status ranks and has ranked the province's crayfish, tiger beetles, dragonflies, freshwater mussels, and vascular plants. Because general status ranks are based on the same criteria which NHIC uses to assign subnational conservation status ranks (Sranks), the NHIC is well suited to assigning general status ranks. For further information on the general status of wild species project, see http://www.wildspecies.ca/.

Michael J. Oldham

Species at Risk Element Occurrence Records Added

To date, 19,245 Element Occurrence (EO) records have been entered into the NHIC database. Last year, thanks to funding from MNR Species at Risk Section, 1,287 new provincially designated species at risk EO records were added to the database, and another 2,073 species at risk EO records were updated with new observations. The graph below (Figure 1) shows the numbers of species at risk EOs created in the NHIC database since its inception.

Christine A. Phair

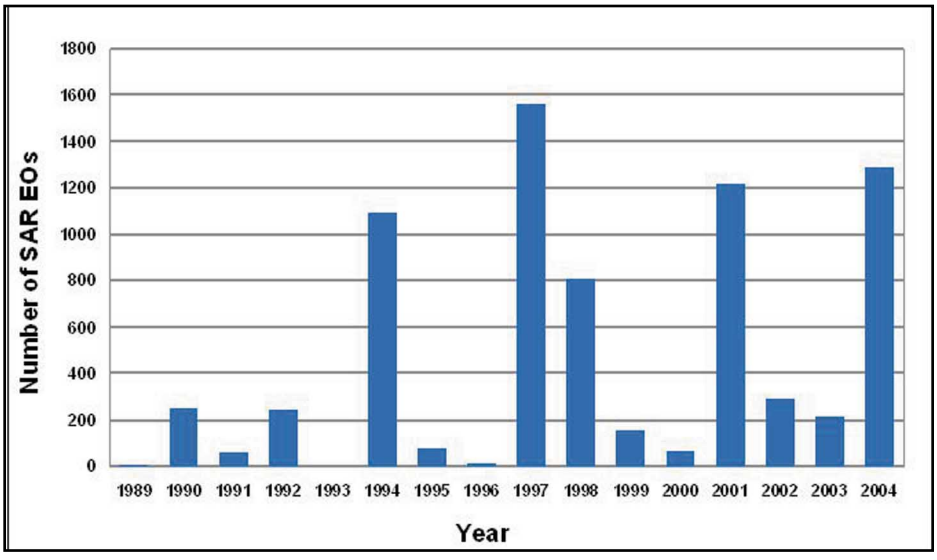


Figure 1: Number of Species at Risk Element Occurrences created by year.

NHIC's Involvement in the Canada-Ontario Agreement Respecting the Great Lakes Basin

Introduction

The NHIC is coordinating two projects for the Canada-Ontario Agreement (COA) respecting the Great Lakes Basin Ecosystem. The projects are entitled "Great Lakes Basin Rare Species Biodiversity Information for Ontario" and "Characterizing Habitat and Ecosystems for Rare Aquatic Species and Communities". More information on COA can be found at http://www.on.ec.gc.ca/coa/.

The NHIC databases currently contain more than 6,500 Element Occurrence records of rare species within the Great Lakes Basin. These data are frequently used to generate status reports and atlases for rare species and natural areas in Ontario as well as for a variety of other conservation initiatives and for land-use planning.

The NHIC relies heavily upon other MNR staff, as well as other governmental and non-governmental agencies and the general public to supply data on the occurrences of rare species within Ontario. The projects described here represent a systematic approach to updating the NHIC databases from an aquatic, watershed-based perspective and the use of existing rare species and communities data in order to characterize and predict additional suitable habitat.

There is a relatively high degree of conservation concern for aquatic species. For example, global declines have been noticed in many groups of aquatic species (e.g. Unionid mussels). These projects promise to not only benefit the NHIC, but also other MNR projects and programs, as well as a variety of NHIC partners interested in aquatic rare species and land-use planning. Planning teams including those involved in LakeWide Management Plans (LaMP), Areas of Concern (AOC), and recovery teams for Species at Risk (SAR) will also benefit from the results of this project.

C.D. Jones - NHIC Archive

Don Sutherland and Peter Burke conducting field surveys for rare dragonfly larvae on the Nottawasaga River.

What do we wish to achieve?

Rare Species Biodiversity Information

1) Enhance and validate Element and Element Occurrence (EO) information for aquatic rare species within each of the tertiary watersheds in the Great Lakes Basin. This involves conducting and coordinating field verification work as well as capturing rare species occurrence data not yet contained within the NHIC databases. Since the beginning of this project in June 2003, 1,119 new EOs have been created and another 1,550 existing EOs have been updated for aquatic species. NHIC staff have surveyed approximately 530 sites for aquatic species during this time.
2) In consultation with species experts we will add more aquatic species (e.g. invertebrates, non-vascular plants) to the NHIC Elements table and attempt to develop subnational conservation ranks (SRanks) for those species that have not yet been ranked (e.g. a variety of aquatic invertebrates).
3) Make the resulting information available to partners and stakeholders such as LaMP and AOC planning teams, Conservation Authorities, and other MNR programs. Rare species maps and lists have been created for each tertiary watershed and are available to NHIC partners. In 2005, we will be working on enhancing the NHIC web-based query, allowing users to query on a greater number of geographic areas (including query by watershed). At the end of the project, standard AOC (Areas of Concern) and watershed-based Rare Aquatic Species Biodiversity Status Reports will be written.
4) Make recommendations on rare species bio-indicators of water quality, especially with respect to macroinvertebrates such as Odonata (dragonflies and damselflies).

Characterizing Habitat for Rare Species and Communities

1) Test for a correlation between the Aquatic Ecological Units (AEU) layer, developed as part of the Great Lakes Conservation Blueprint, and rare species occurrence data in order to attempt to characterize the distribution of rare aquatic species and communities and their habitat within the Great Lakes Basin.
2) Develop a predictive model in order to identify areas across the Great Lakes basin with a high probability for rare aquatic species occurrences.
3) Conduct field surveys of high potential localities in order to test the predictive model.
4) Refinement of model parameters and transfer to LaMP and AOC teams, as well as other conservation planning practitioners.

How can you help?

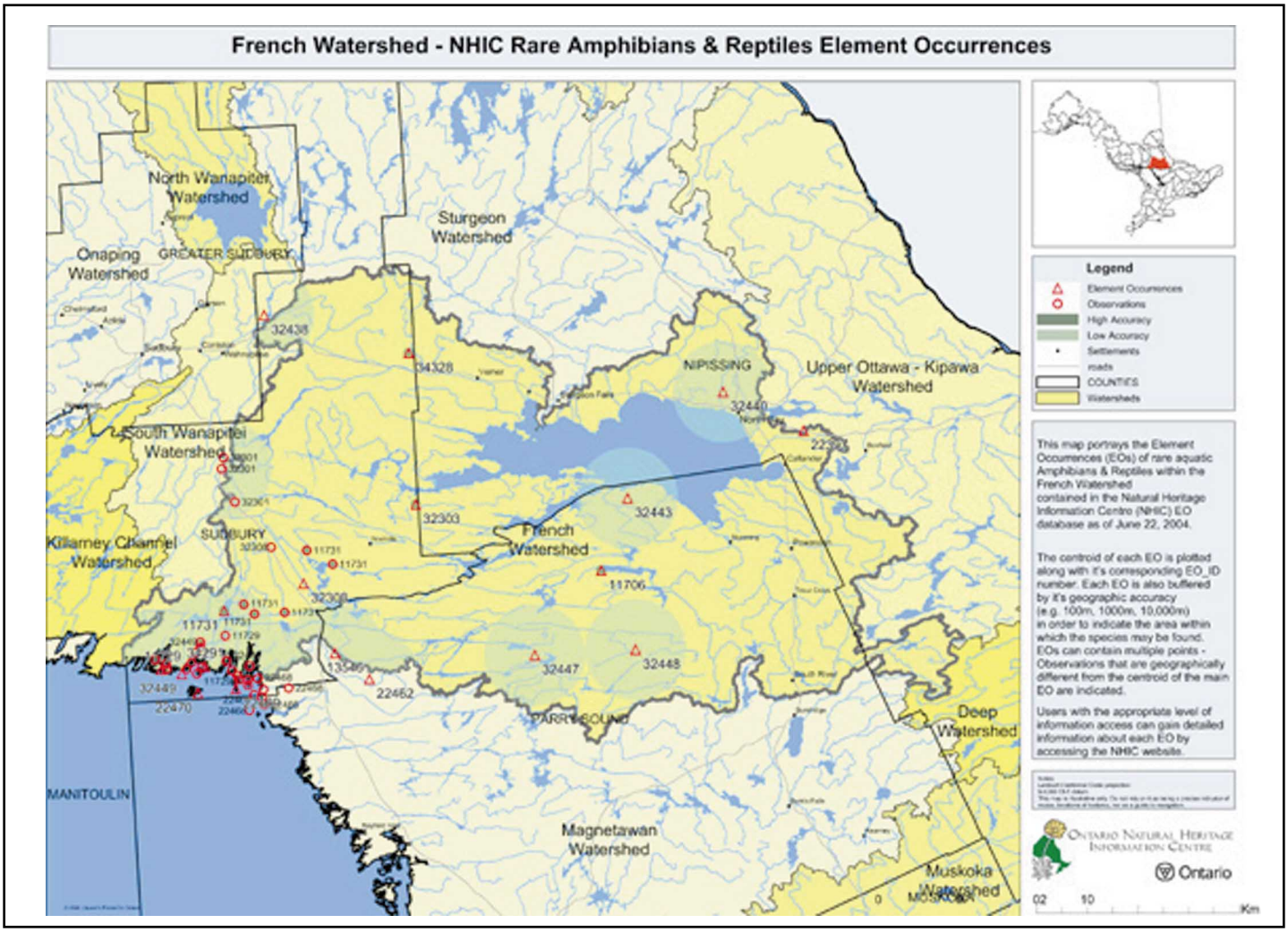
We are consulting with a variety of governmental and non-governmental agencies as well as taxonomic experts and field biologists throughout this project.

We are searching for feedback on and assistance with the following:

1) Creation and review of aquatic species lists not yet assembled by the NHIC (including a variety of invertebrate groups, as well as groups such as algae).
2) Creation and review of conservation status ranks (SRanks) for a variety of aquatic species groups that have not yet been assigned ranks, or for which the ranks have not yet been reviewed by species experts.
3) Provision of data on aquatic rare species occurrences and observations not yet captured in the central NHIC databases.
4) Provision of, or access to, specimens of interest (e.g. Odonata, Emphemeroptera, Plecoptera) from key areas, collected during benthic sampling or other surveys. We plan to engage taxonomic experts to identify a number of specimens in order to capture rare species occurrence data for lesser known species.
5) Identification of specimens from lesser known taxonomic groups (including those obtained in 4) - above) including many invertebrates.
6) If you will be conducting field surveys of your own, you can assist with the updating of existing rare species occurrences. This can be done by consulting the maps and lists produced by the NHIC for this project prior to field surveys to determine if any rare species occur in your area of study (detailed access to our website will be necessary in order to access the detailed information on these occurrences). We will be especially interested in updating Element Occurrence information for records that are over 20 years old (i.e. have had no reported sightings within the past 20 years). We will be developing a list of priority Element Occurrences for our own field surveys in 2005. We will gladly make these lists available to those NHIC partners that have detailed access to our data. For those who do not have detailed access to our data, do not hesitate to contact us in order to learn how you may be able to receive such access.

For more information, or to get involved, contact Colin Jones at the NHIC.

Colin D. Jones



Map depicting the NHIC rare species Element Occurences for reptiles and amphibians in the French River watershed.

M.J. McMurtry - NHIC Archive

Flowerpot Island, Fathom Five National Marine Park.

Project to Update Species at Risk Data for National Parks

Parks Canada, NatureServe Canada and the NHIC are collaborating to improve our knowledge of Species at Risk (SAR) in and near national parks in Ontario. Funding was provided in 2004 to NHIC to collect SAR data from national parks, and to consolidate this with existing NHIC data. Sophie Graine coordinated the project on behalf of the NHIC.

The project involved three stages. The first step was to review and update observations in the NHIC Element Occurrence (EO) database. 1,102 records of rare species were identified as being in or within one kilometre of the parks. These were checked to ensure data quality. Through this process, 487 rare species records were refined, thus improving the accuracy and content of existing records in the EO database. The second step was collecting data from all of the national parks in Ontario: Point Pelee, Bruce Peninsula and Fathom Five, Georgian Bay Islands, Pukaskwa and St. Lawrence Islands National Parks as well as Rideau Canal, Trent-Severn Waterway and Manitou Mounds National Historic Sites. There were excellent sources of SAR data in each park, both in digital and paper format. Prior to this project, these were not easily accessible. Parks Canada staff were extremely helpful in locating pertinent information. In the final step of the project, these data were combined with NHIC holdings, making the information accessible to all users of our database. A final project report has been prepared and the data provided to Parks Canada for incorperation into their own Biotics software. In the future, Parks Canada staff will continue to provide the NHIC with rare species observations, which will then be incorperated into EOs at the NHIC. These EOs will be provided to NatureServe Canada through regular data exchanges, and will in turn be provided back to Parks Canada.

Our knowledge of rare species in national parks has improved considerably as a result of this project. 527 new observations of rare species were entered into the NHIC database. Of these, 92 were new Element Occurrences - there was no previous record of these species at these specific locations in the NHIC database. Information for existing Element Occurrences is now more current and accurate. These records are both on national park land and within 10km of the park boundaries.

By actively seeking out new sources of data and through partnerships such as this one with Parks Canada and NatureServe Canada, NHIC continually updates and improves information holdings on species at risk in Ontario.

Sophia D. Graine

Species at Risk Spotted Turtle Surveys in Muskoka and Parry Sound Districts

The Spotted Turtle (*Clemmys guttata*) is a small turtle recognized by its black carapace irregularly marked with small yellow-orange spots. In May 2004 the Spotted Turtle was designated Endangered in Canada (up-listed from Special Concern) by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) (Ontario status is currently Special Concern). The new COSEWIC designation is based upon population declines, low population density and low levels of fecundity combined with a long-lived life history. Major threats to existing populations are habitat loss, fragmentation, and disturbance, road mortality and collection for the pet trade.

Once a species has been assigned an official status of Endangered or Threatened, the federal Species at Risk Act (SARA) requires that a recovery team be formed and a recovery plan be prepared. For effective recovery planning to be conducted good population information is necessary. In Ontario, Spotted Turtle populations are discontinuously distributed in parts of south-central, southwestern and eastern Ontario and in the region east of Georgian Bay. Many (38%) of the observations for Spotted Turtle in the NHIC database had not been verified in more than 20 years. In order to acquire additional, current population information, the MNR Southern Region Species at Risk program provided funding for NHIC Project Botanist Rosita Jones to survey for Spotted Turtles in the Muskoka - Parry Sound area. Twelve known element occurrence locations and several new sites were surveyed during May and June 2004. Spotted Turtles were observed at two historic sites and at one new location. Twenty-seven observations for Spotted Turtle and 19 observations for other species at risk including Blanding's Turtle (*Emydoidea blandingii*), Five-lined Skink (*Eumeces fasciatus*), Northern Map Turtle (*Graptemys geographica*), Eastern Foxsnake (*Elaphe gloydi*), Stinkpot (*Sternotherus odoratus*) and Eastern Ribbonsnake (*Thamnophis sauritus*) were made during the survey. A report on the survey findings will be provided to the Spotted Turtle recovery team and all observations will be incorporated into the NHIC database.

Rosita A. Jones

R. A. Jones - NHIC Archive

Spotted Turtle (*Clemmys guttata*) found in a small wetland near Georgian Bay.

Species at Risk EO Data Polygon Delineation Project

In a joint project with the MNR Species at Risk program, NHIC is in the process of converting our Element Occurrences (EOs) currently stored as points into polygon shapes that more accurately represent where the species is found on the ground based on the known observations. NHIC's new database, Biotics, will have the ability to edit polygons, and this higher level of precision for defining an occurrence is part of the new standard for maintaining these data within the NatureServe network. The focus initially will be on the 7326 Species at Risk (SAR) EOs. This is a large task, but one that will better enable those planning for SAR to consider them in any development or conservation goals.

Currently, almost all of the NHIC records are in the database as point locations. Many of these were historically created by reading the descriptions of the location then interpreting the location on a topographic map. During the latter part of last century, many collectors had ready access to topographic maps when they were in the field, and could assign map coordinates of the location. In the last decade or so, GPS units have made it possible for field collectors to collect very exact coordinates in the field, and even the boundaries of populations.

With all of the points collected, an "accuracy" field has been added at NHIC to indicate the level of confidence that the record is at that exact coordinate. For example, a record might have coordinates with an accuracy of 100m, indicating that the species was found within 100m of the point given. Inaccuracies could be due to a number of factors, for example:

- uncertainty about where the original collector was (imprecise location description)
- built in limitations due to the scale of maps. For example, a coordinate read off a 1:50,000 NTS map sheet is accurate to within 25 metres at most.
- atmospheric interference that affects a GPS coordinate reading, or an uncorrected coordinate when Selective Availability was running in the 1990s.

The accuracy field combined with the coordinate enables us to create a polygon shape by drawing a circle around the coordinate using the accuracy distance. This area would represent the area on the ground that could possibly contain the observation. Some of these polygons, however, can be modified to better represent where the species can be found on the map. For example:

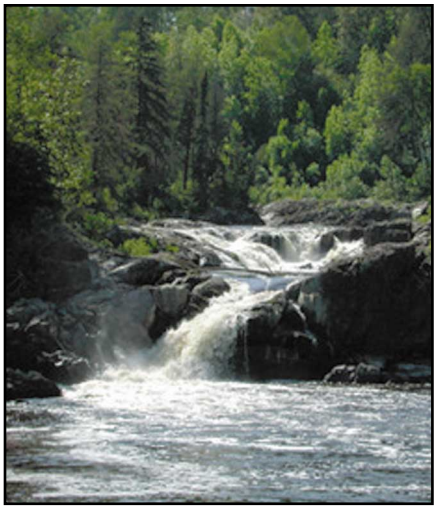
- the description of the location might be better than the accuracy that was assigned to the record. At NHIC, the accuracies we assign to each EO are 1, 10, 100, 1000, and 10000 metres. For example, a coordinate taken off a topographic map that says 20m south of a very small dam would be a 100m accuracy record: the coordinate of the dam is easy to read from the topographic map, and the species is very close by. In this example, the part of the 100m radius polygon that is north of the dam could be removed from the area representing the occurrence.
- during fieldwork, the area where the species is might have been encircled with a GPS, then the boundary downloaded later.
- polygons may have been delineated on an air photo or an OBM by field biologists, but not put into a GIS as polygons at the time.

Ross Ealey and Sophia Graine will be assisting NHIC by checking records for Species at Risk, to best delineate their boundaries, so that users of NHIC data will have the best idea possible of where the species is located.

Peter J. Sorrill

Great Lakes Conservation Blueprint for Biodiversity Nears Completion

The Nature Conservancy of Canada (NCC) and the Natural Heritage Information Centre (NHIC) have recently completed the technical analysis for the Great Lakes Conservation Blueprint for Biodiversity. The goal of the Conservation Blueprint project is to identify key areas of biological diversity in the Great Lakes region. This project compliments a previous assessment completed for the U.S. portion of the Great Lakes basin by The Nature Conservancy (2000). The Conservation Blueprint identifies opportunities on the landscape to conserve key elements of terrestrial and freshwater biodiversity not adequately represented by existing conservation lands and protected areas.



W. D. Bakowsky - NHIC Archive

The aquatic portion of the Conservation Blueprint incorporated stream and other physical data to generate an aquatic land classification.

The Conservation Blueprint includes separate but parallel assessments of aquatic and terrestrial biodiversity. The methodology for these components includes both coarse and fine filter biodiversity assessments. The coarse filter analysis identifies representative and high quality landform/vegetation units for each ecodistrict, in the case of the terrestrial analysis, and aquatic ecosystem units within each tertiary watershed, in the case of the aquatic analysis. A classification of aquatic system units, led by Gordon Wichert and Jim Mackenzie, was undertaken as a basic framework for the aquatic analysis. The fine filter biodiversity analysis captures species and plant communities that are rare, endemic, disjunct or in decline in the Great Lakes basin. The five factors that have traditionally been used to assess protected areas in Ontario were taken into account for the design of the Conservation Blueprint: representation, condition, diversity, special features, and ecological function.

The Conservation Blueprint has allowed us to quantify biodiversity features occurring within existing conservation lands across the Great Lakes basin. Some of the key findings include:

W. D. Bakowsky - NHIC Archive

Fen peatlands are one of the representative ecosystems captured in the Great Lakes Conservation Blueprint.

- Nearly 22% of the highest quality remaining terrestrial ecological systems in southern Ontario occur within provincially significant life science Areas of Natural and Scientific Interest (Figure 1).
- 29% of the highest quality terrestrial ecological systems on the Canadian Shield are within Provincial Parks and Conservation Reserves (Figure 2).
- Freshwater biodiversity elements are, particularly in Southern Ontario, poorly represented by existing protected areas and conservation lands.

Results from the Conservation Blueprint will inform a number of activities of NCC and the MNR, as well as other conservation organizations. An important application for NCC is to provide strategic direction for setting land protection priorities. Approximately 55% of the lands in the Canadian portion of the Great Lakes basin are privately owned; these are the lands that have traditionally been the focus of NCC's land protection programs. NCC has secured more than 44,000 hectares of private lands in Ontario, and retains ownership of 13,000 hectares. Dan Kraus, of NCC's Ontario Region office is already using the Conservation Blueprint results to identify land securement and stewardship priorities, and is sharing the results with local conservation groups. Dan is also working with colleagues at The Nature Conservancy in the U.S. to align the U.S. and Canadian conservation plans in order to build a case for biodiversity conservation across the entire Great Lakes basin.

In MNR and the broader Ontario Public Service, the Conservation Blueprint could support various strategic initiatives on natural resources planning, land use planning and biodiversity. A better understanding of the geography of biodiversity in Ontario can benefit a broad range of conservation practitioners. MNR has identified the conservation of biodiversity as a major new commitment in the recently released strategy document Our Sustainable Future (MNR 2005).

The funding for this four-year project has been shared by the Nature Conservancy of Canada and the Ministry of Natural Resources. NCC received funding from the C.S. Mott Foundation for the aquatic work and from the Richard Ivey Foundation for the terrestrial project.

The project team is currently focussed on summarizing and reporting results, and will make a series of communications products available in the coming months, including technical posters, project reports and maps.

Kara E. Brodribb and Bonnie L. Henson, NCC, and Michael J. McMurtry, NHIC

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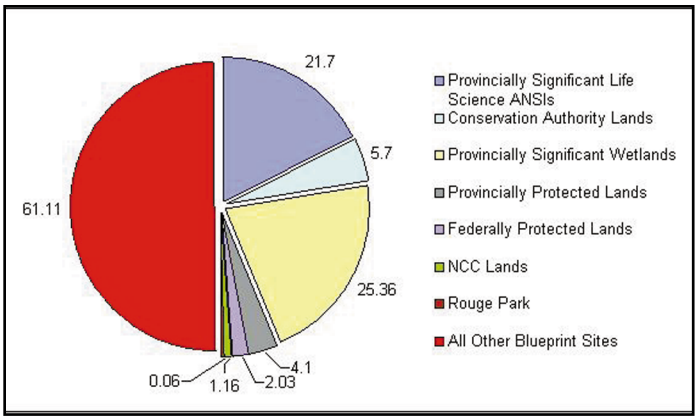


Figure 1: Percentage of high quality terrestrial systems in protected areas, other designated conservation lands and additional portions of the terrestrial Conservation Blueprint portfolio in Southern Ontario (ecoregion 6E and 7E).

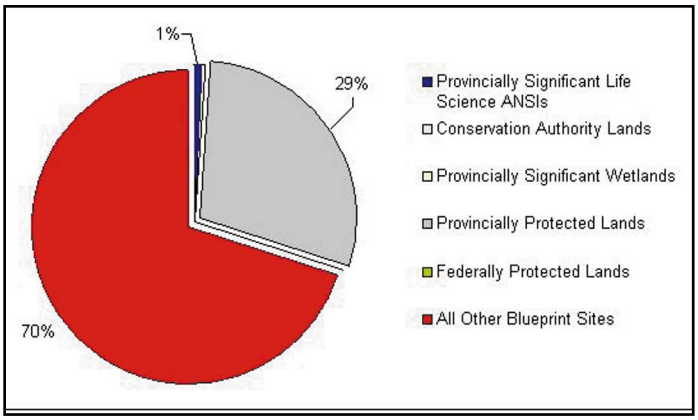


Figure 2: Percentage of high quality terrestrial systems in protected areas, other designated conservation lands and additional portions of the terrestrial Conservation Blueprint on the Canadian Shield (ecoregion 5E and ecodistricts 4E-1, 4E-3, 3E-4, 3W-3, 3W-5 and 4W-2).

A. Wooldliffe - OMNR

Non-vascular plants are a new addition to the SARO list. Spoon-leaved Moss (*Bryoandersonia illecebra*)(Endangered - Not Regulated)is a very distinctive moss that is quite robust and shiny. The leaves are incurved and cylindric, giving the species an almost worm-like appearance.

The New Species at Risk (SARO) List

In April 2004, the Ministry of Natural Resources (MNR) replaced the former Vulnerable, Threatened, Endangered, Extirpated and Extinct Species of Ontario list (VTEEE list) with a new list called the Species at Risk in Ontario (SARO) list (http://www.ontarioparks.com/saro-list.pdf). The new list reflects changes in terminology used to describe the provincial "At Risk" status categories so that they correspond with the terms used at the national level by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC). For example, the status category "Vulnerable" becomes "Special Concern", "Indeterminate" becomes "Data Deficient", "Not In Any Category" becomes "Not at Risk" and "Endangered" is split into the two new status categories "Endangered (Not Regulated)" and "Endangered (Regulated)".

The SARO list also includes the addition of 24 Threatened species, 23 Special Concern species and the assigning of 36 species to the Endangered (Not Regulated) category which are species that are candidates for regulation under Ontario's Endangered Species Act. Each year, new species may be added to or deleted from the SARO list or the status designation may change for species that are already on the list. To incorporate these changes, the SARO list will be updated annually by MNR. These changes will be posted on the Environmental Registry http://www.ene.gov.on.ca/envision/env_reg/ebr/english/index.htm.

The designations assigned to species by the MNR are generally in agreement with COSEWIC. However, there are species that have been assigned a status designation by MNR that differs from the COSEWIC designation because its status may be of greater or lesser concern in Ontario than elsewhere in Canada.

Provincial status designations and the provincial listing of species help to increase awareness of species at risk and underscore the need for immediate action to ensure their continued survival. As well, provincial status designations aid the public, land mangers, planning authorities, government and non-government agencies in making decisions that help to protect and recover species at risk.

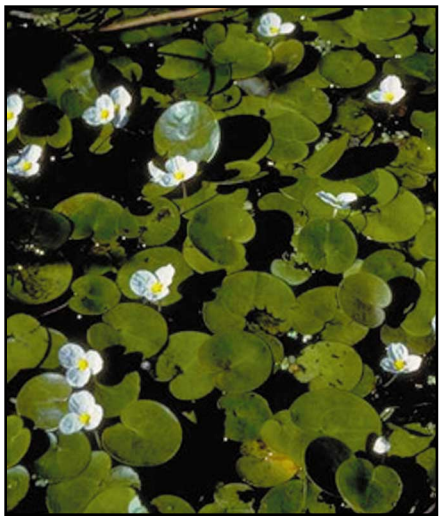
Jacqueline M. Corley and Chris J. Risley, MNR Species at Risk Section

Two Invasive Aquatic Plants: Fanwort and European Frog-bit

It has been proposed that of the thousands of species of exotic flora and fauna introduced into the wild, one in a thousand world-wide will establish in sufficient abundance to become a pest (Williamson and Fitter 1996). Fanwort (*Cabomba caroliniana*) and European Frog-bit (*Hydrocharis morsus-ranae*) are both aquatic plants that have the potential to become serious pests in a wide range of aquatic habitats in Ontario.

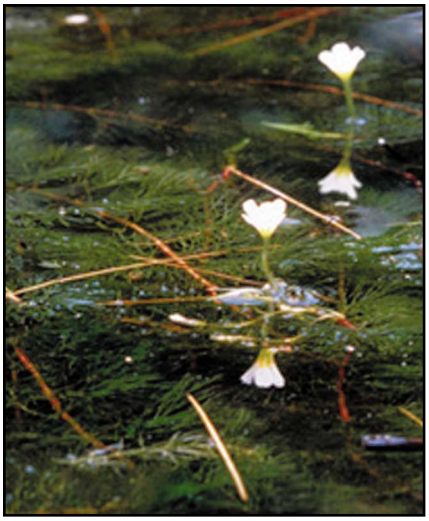
Fanwort is a submersed perennial that produces a dense growth of long, rooted shoots in up to about four metres of water. It can grow under a variety of aquatic conditions. A native to neotropic and southern temperate regions of North and South America, Fanwort was first documented in Ontario in the North River in 1991 and Kasshabog Lake in 1999 (Oldham 1999). The means of introduction is unknown but Fanwort is a popular aquarium plant and it is speculated that it may have been introduced through the dumping of the unwanted contents of an aquarium. Since its discovery, Fanwort has continued to spread in Kasshabog Lake, forming dense stands in previously sparsely vegetated bays. Until recently, Fanwort had not been found in any other lake in Ontario except Kasshabog. In October 2004 a survey of South Lake, a small lake situated downstream from Kasshabog, by Heather Smith of the Ontario Federation of Anglers and Hunters, revealed fairly extensive, well-established colonies of Fanwort. South Lake is hydrologically connected to Round, Belmont and Crowe Lakes which feed into the Trent River, part of the Trent-Severn Waterway.

European Frog-bit is a free-floating aquatic plant that produces rosettes of small water-lily-like leaves that form floating mats of interlocked plants. Intentionally introduced into an artificial pond in Ottawa in 1932, European Frog-bit was subsequently noted to have naturalized in the nearby Rideau Canal in 1939. Frog-bit continued to spread throughout the Rideau Canal system, the lower Ottawa River and the St. Lawrence River. During the late



D. A. Sutherland - NHIC Archive

European Frog-bit (*Hydrocharis morsus-ranae*) (flowering) is among the most aggressive alien invasive aquatic species and is rapidly spreading throughout the lower Great Lakes drainage of Ontario.



D. A. Sutherland - NHIC Archive

Fanwort (*Cabomba caroliniana*) was discovered in 1991 in Kasshabog Lake, in the Kawartha Lakes, and has since spread throughout the lake and into the adjoining North River System.

1970's through the 1980's populations were recorded along parts of the Lake Ontario shoreline and in Lake Erie at Rondeau Provincial Park and Point Pelee National Park (Catling and Porebski 1995). Between 1997 and 2004 Frog-bit was documented in the Trent-Severn and several major interconnected waterways from Trenton to Balsam Lake (D. Sutherland unpublished data). Recently, Frog-bit has also been recorded in small, isolated wetlands in both eastern Ontario and the Georgian Bay area. At some sites Frog-bit now comprises the dominant aquatic vegetation cover in these wetlands (D. Sutherland unpublished data).

Both Fanwort and European Frog-bit reproduce prolifically from small vegetative fragments. While the primary means of dispersal is probably via water current and attachment to boat propellers, it is possible that Frog-bit may also be inadvertently transported to new locations by waterfowl. Chemical and mechanical controls of Fanwort infestations in U.S. lakes have had only limited success in reducing stand density.

The spread of European Frog-bit and Fanwort in Ontario poses a threat to biodiversity in Ontario lakes, streams and wetlands. Competition and over shading by these rapid growing, robust perennials has the potential to cause the decline or displacement of native flora. In autumn, decomposition of the large volume of vegetation produced by both species can result in decreased dissolved oxygen levels which can adversely affect fish and other aquatic organisms. Rare or uncommon species may be especially susceptible to elimination by these species because of the inherent characteristics that cause them to be rare in the first place. In addition to their impact on the Ontario biota, Fanwort and European Frog-bit also threaten economic values and recreational uses of Ontario waterways. For further information on Fanwort, and how you can prevent the spread of this threat to Ontario's biodiversity visit: http://www.invadingspecies.com/Print.cfm?PID=10.

Rosita A. Jones

References

Catling, P.M. and Z.S. Porebski. 1995. The spread and current distribution of European Frog-bit, *Hydrocharis morus-ranae* L., in North America. Canadian Field-Naturalist 109(2): 236-241.

Oldham, M.J. 1999. 1999 Botanical Highlights. Natural Heritage Information Centre (NHIC) Newsletter 5(2): 10-11

Williamson, M. and A. Fitter. 1996. The varying success of invaders. Ecology. 77(6):1661-1666.

NatureServe Develops Invasive Species Assessment Protocol

While the economic threats of invasive exotic species toward agriculture and industry have long been recognized, it is becoming increasingly apparent how devastating these species have become in many native ecosystems. These species impact native biodiversity in many ways, by competing with native flora and fauna for space and food, altering the ecological processes and structures of ecosystems, or through hybridization or predation.

A number of Ontario's species have almost been extirpated in the province due to exotic

W. D. Bakowsky - NHIC Archive

Common Buckthorn (*Rhamnus cathartica*) is an alien invasive species physically displacing the native understory species in southern Ontario forests. It's leaves are retained for longer than those of native shrub species, giving it a competitive advantage over them.

species. First the American Chestnut (*Castanea dentata*), then the American Elm (*Ulmus americana*) were decimated by exotic pathogens. More recently, species such as Flowering Dogwood (*Cornus florida*) and Butternut (*Juglans cinerea*) have experienced similar declines.

In the United States, it is estimated that approximately 15% of exotic species are invasive (U.S. Congress, Office of Technology Assessment 1993). Setting priorities for dealing with these species is important, since land managers and stewards have limited resources available to deal with them.

The NatureServe network has recently established a five year effort in the United States to develop a prioritized list of exotic invasive plant species in order to prioritize control and management of these plants, and guide public education and research. It is planned to extend these methods to exotic fauna in the future.

Toward this goal, NatureServe has developed a widely reviewed and tested scientific protocol for objectively assessing the impact exotic plants have on native biodiversity (http://www.natureserve.org/library/invasiveSpeciesAssessmentProtocol.pdf). This protocol is used to determine the degree of invasiveness of each plant species, which are then assigned an Invasive Rank (I-rank) which reflects this level. Over 330 species have been evaluated to date, and have been posted on the internet for public access (http://www.natureserve.org/getData/dataSets/plantData/irank). To view the actual protocol, detailed I-Ranks developed to date for the U.S., examples of impact assessments, as well as the dataforms and scoresheets used to assess exotic invasiveness, go to the following link: http://www.natureserve.org/getData?plantData.jsp.

Wasyl D. Bakowsky

Reference

U.S. Congress, Office of Technology Assesment. 1993. Harmful Non-Indigenous Species in the United States. OTA-F-565. Washington, DC. U.S. Government Printing Office.

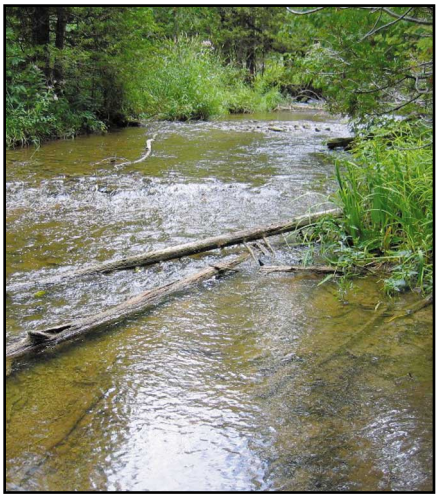
W. D. Bakowsky - NHIC Archive

The Thames River at Komoka Provincial Park.

NHIC Participates in Canadian River Heritage Conference

The Canadian River Heritage Conference is held every four years and highlights conservation issues in rivers across Canada. The 2004 conference in Guelph, held on June 6th -9th, marked the 20th anniversary of the Canadian Heritage Rivers System and will be influential in the future stewardship and wise management of Canadian rivers. Mike McMurtry, Wasyl Bakowsky, Sophia Graine and Gordon Wichert contributed a paper titled "The Natural Heritage of Ontario Rivers" for the session on natural heritage (McMurtry *et al.* 2004). The paper reviewed the role of the NHIC as a repository for natural heritage information in Ontario and the urgency of identifying and protecting aquatic biodiversity. For example, of the 136 native freshwater fish taxa in Ontario, 26 taxa or 19% are recognized as being at risk by the Ontario Ministry of Natural Resources, and a further seven taxa or 5%, are either extinct or extirpated (NHIC element occurrence database). The distribution of species tracked by the NHIC that are associated with rivers was described and three rivers with outstanding biodiversity values - the Grand, Thames and Sydenham - were highlighted. The physical processes shaping habitats in riverine environments were considered and a new classification of aquatic systems created as part of the Conservation Blueprint for Biodiversity project was briefly described. This paper is to be published as part of the conference proceedings.

There were many inspirational speakers at the conference, notably Robert Kennedy Jr., President of the Waterkeeper Alliance; Roberta Jamieson, Elected Chief of Six Nations of the Grand River; Wade Davis, National Geographic Explorer in Residence; and James Raffan, writer and canoeist. Elder spokesmen William Commanda and Kirk Whipper added their experience and wisdom to the proceedings. The conference was hosted by the Grand River



M. J. McMrutry - NHIC Archive

Mad River at Devil's Glen.

Conservation Authority in collaboration with the Canadian Heritage Rivers Board, Ontario Parks, City of Guelph and the University of Guelph. They are to be commended for putting together an exceptional program. Adair Ireland-Smith of Ontario Parks was a co-chair of the conference and the Minister of Natural Resources, David Ramsay, greeted the participants. This conference was an excellent opportunity to communicate the role of the NHIC, highlight the biodiversity values of rivers and to help inform the future management of this important legacy.

Michael J. McMurtry

Reference

McMurtry, M.J., W.D. Bakowsky, S.D. Graine and G.A. Wichert. 2004. The natural heritage of Ontario rivers. Presentation to 2004 Canadian River Heritage Conference, June 6-9, 2004, Guelph, Ont.

M. J. Oldham - NHIC Archive

Midland Painted Tutle (*Chrysemys picta marginata*) has about 14% of its global distribution in Ontario, which is a higher proportion of the global range than any other of the 23 North American juristictions in which it occurs.

Trent University Internships in Conservation Biology

The NHIC is currently hosting two students participating in Trent University's "Internship in Conservation Biology". The course was designed to give students an opportunity to gain work experience in the field of conservation biology. Sue Cowin and Janine McLeod are working on projects related to the conservation of herpetofauna (amphibians and reptiles) in Ontario. Both are being co-supervised by Joe Cebek of Trent University and Michael Oldham at the NHIC.

Sue Cowin is continuing a project initiated by Debra Mohammed (also a Trent University conservation biology intern) three years ago. "Ontario's Conservation Responsibility for Reptiles and Amphibians" used GIS to determine the proportion of species' global ranges that occur within the province. These range proportions, combined with conservation ranks, resulted in an index of responsibility. Sue will be adding assessments of snakes, frogs and toads to the report, which previously included turtles, salamanders and the Five-lined Skink.

Janine McLeod is using the Ontario Herpetofaunal Summary Atlas (see http://www.mnr.gov.on.ca/MNR/nhic/herps/ohs.html) database to assess amphibian and reptile conservation concern by municipality (county or regional municipality) and ecological site district. Janine will be examining the number of records and 10x10km atlas squares for each species in each area. The detectability of each species will also be factored into the degree of conservation concern by considering life history traits, habitat variables and sampling efforts on a species by species basis.

Regina M. Varrin

Prince Edward County herp data files archived at NHIC

In 1979, Jack Christie, Director of the MNR, Glenora Fisheries Research Station, and Tom Huff, Director of the Reptile Breeding Foundation, in Picton, secured funding to hire six summer students to survey the amphibians and reptiles of Prince Edward County. This survey resulted in the gathering of over 300 records from 190 sites in the county. The results of the study were published in 1997 in "Reptiles and Amphibians of Prince Edward County, Ontario", a book written by Peter Christie (son of Jack Christie). For further information and ordering instructions for this book, see http://www.naturalheritagebooks.com.

The original data sheets for the 1979 survey were found last year in the office of recently deceased Jack Christie and were donated to the NHIC by Peter Christie. Copies of the data sheets are also on file at the Canadian Museum of Nature in Ottawa. These data sheets include measurements, descriptions, locations and other information about each of the animals sampled and are an invaluable source of historic data on the amphibians and reptiles of the county. Also donated to the NHIC is a set of topographic maps for the county indicating sites sampled during the study. All records gathered during the 1979 Prince Edward County reptile and amphibian survey have been entered into the Ontario Herpetofaunal Summary (OHS) database and are mapped on the OHS Atlas maps appearing on the NHIC web page (http://www.mnr.gov.on.ca/MNR/nhic/herps/ohs.html). It is thoughtful donations of information like this that makes us all richer in knowledge. Many thanks.

Michael J. Oldham

NHIC a Partner in Northern Ontario Plant Database Project

Although the flora of southern Ontario is reasonably well known with many local checklists and floras, the distribution and status of plants in northern parts of the province is much more poorly known. The Northern Ontario Plant Database (NOPD) project is attempting to compile information on northern Ontario plants and make this information accessible to researchers and the public. The NOPD project began in May 2002 with a grant from the Ontario Living Legacy Trust to Algoma University College, the lead organization. NOPD is a partnership between 19 government, academic, educational, and non-government organizations, including the NHIC, Royal Ontario Museum, Ontario Parks, Lakehead University, Laurentian University, and the Great Lakes Forestry Centre.

The NOPD currently contains over 55,000 searchable records of plant herbarium specimens and sight records from northern Ontario. More than 20,000 records were contributed by the NHIC including specimens housed in the NHIC herbarium. Records in the database can be queried by species and mapped. Information, descriptions, photos, and links can be found for more than 65 plant species, with additional species accounts in preparation. Biographies of botanists who have collected plants in northern Ontario are also provided. To search the Northern Ontario Plant Database visit: http://northernontarioflora.ca/index.cfm.

Michael J. Oldham

NHIC Adopts NatureServe's Benchmark Data Content Standards

NatureServe has developed version 2 of the network's Benchmark Data Content Standards (BDCS). These standards provide guidance to all NatureServe member programs including NHIC. Adherence to these standards will ensure a high level of accuracy, currency and quality to the species data maintained by individual programs across the NatureServe network. These standards play an essential role by demonstrating to our clients and partners that the completeness of our core data is measurable and substantial. Standards provide the basis for partners to use data across different member jurisdictions (e.g. ecoregional projects that straddle different political boundaries) with confidence in the quality of the data.

NHIC additionally benefits by being better able to measure the current status of our data against this international standard, and adjusting our data development and management priorities accordingly.

Finally, the new standards reflect NatureServe's commitment to work with global data portals such as the Global Biodiversity Information Facility (GBIF) so that researchers can discover what data the NatureServe network has to offer, and determine whether NatureServe data would be useful to them.

Peter J. Sorrill

NatureServe Canada and Canada Wildlife Service Join Forces

In August 2004, NatureServe Canada and the Canadian Wildlife Service (CWS) signed a Memorandum of Understanding (MOU) recognizing the mutual interest both participants have in working together toward effective recovery of species at risk, wildlife management, and biodiversity conservation. The rationale for pursuing this arrangement is to leverage the expertise, data, knowledge, and resources of a broad 'community of practice' in order to demonstrably improve conservation in Canada, especially in support of the Accord for the Protection of Species at Risk and the Species at Risk Act. Finally, this MOU is intended to provide a framework for future co-operative efforts that will advance the individual and collective goals of each of the signatories to this arrangement.

Jim Mackenzie

MNR Extends Data Sharing Agreement with NatureServe and NatureServe Canada

In November 2004, the Ministry of Natural Resources renewed its commitment to participating in the national and international exchange of data and information within the Conservation Data Centre network. This Agreement supports the Parties' unique way of contributing to the conservation of the world's biological diversity through: 1) the development and use of biological data standards, methodologies, and tools; 2) the standardized collection of biological data; and 3) the provision and analysis of biological data at local, provincial, territorial, national and international scales.

Jim Mackenzie

BOOK REVIEWS

Dickinson, T., D. Metsger, J. Bull, and R. Dickinson. 2004. **The ROM Field Guide to Wildflowers of Ontario.** Royal Ontario Museum and McLelland & Stewart Ltd., Toronto. 416 pp.

Ontario naturalists and botanists will welcome this new guide to the province's wildflowers. "Wildflowers of Ontario" treats 550 species of common Ontario wildflowers and is illustrated with more than 1,000 colour photographs. Useful features include a simplified key to Ontario species, and distribution maps by ecoregion. The NHIC's extensive files and databases of plant distribution information were used to help prepare the range maps. Copies of this field guide retail for $29.99 and are available in many Ontario bookstores or directly from the publisher at: http://www.mcclelland.com/.

Ernst, C.H., and E.M. Ernst. 2003. **Snakes of the United States and Canada.** Smithsonian Institution Press, Washington, D.C. 668 pp.

This is a companion volume to two books recently published by the Smithsonian Institution on "Salamanders of the United States

and Canada" (Petranka 1998) and "Turtles of the United States and Canada" (Ernst, Lovich and Barbour 1994). All three books are excellent and well-illustrated summaries of information dealing with North American (north of Mexico) reptiles. "Snakes of the United States and Canada" contains taxonomic keys, range maps, an extensive bibliography, and sections for each species covering: recognition, geographic variation, confusing species, karyotype, fossil record, distribution, habitat, behaviour, reproduction, growth and longevity, diet and feeding habits, predators and defense, populations, remarks. This book is the most current and comprehensive reference on North American snakes.

Lam, E. 2004. **Damselflies of the Northeast.** Biodiversity Books, Forest Hills, New York. 96 pp.

Once in a while a landmark field guide is produced. Ed Lam has done just that with his excellent new guide to the adult damselflies of northeastern North America. While many guides have been produced recently for Odonata (dragonflies and damselflies), none have managed to take the advances that have occurred within the realm of bird field guides and adapt them to this group of insects - until now!

The book covers 69 species and subspecies of damselflies and is fully illustrated with more than 300 detailed paintings, drawings and photographs. The text is very well written and the illustrations are nothing short of spectacular! They are so detailed that they have a photographic quality to them.

The guide begins with an introduction to damselflies, followed by nicely written overviews of their life cycle and anatomy, as well as sections on species identification. The bulk of the guide contains the species accounts. These are very well organized and attractively laid out with a full page dedicated to a single species. Each species account contains several illustrations, a general description of the damselfly (complete with measurement ranges in both inches and millimeters) along with notes on its habitat, distribution, status and similar species and a range map.

This guide deserves a place on both the bookshelf and in the field bag of anyone with an interest in damselflies. Amateur naturalists with an interest in learning the damselflies, who have been either intimidated in the past by the technical nature of scientific treatments or frustrated with the lack of sufficient detail in the available field guides, will find that this is the guide they have been waiting for. Experienced entomologists and odonatologists will also find this book to be a wonderful and informative resource.

Further information on this book, including samples of the illustrations and species accounts, and how to order a copy can be found at: http://homepage.mac.com/edlam/book.html. The book sells for US$20.

Parker, S., and M. Munawar (editors). 2001. **Ecology, culture, and conservation of a protected area: Fathom Five National Marine Park, Canada.** Ecovision Monograph Series, Backhuys Publishers, Leiden, The Netherlands. 306 pp.

This book contains chapters by 18 invited authors on a variety of topics relating to Fathom Five National Marine Park, off the northern tip of the Bruce Peninsula in southern Ontario. Included are chapters on geological history, water chemistry and contaminants, aquatic ecosystem health, vascular plants and vegetation communities, fishes, ground beetles, spiders and flies, birds, amphibians and reptiles, mammals, and the ecology of cliffs. Further details, including ordering information can be found at http://www.euronet.nl/users/backhuys/ecol.htm.

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