NATURAL HERITAGE INFORMATION CENTRE

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Black Oak woodland, one of the conservation targets of the Great Lakes Conservation Blueprint.

Transferring Conservation Science to Practitioners

On November 14, 2005 the Natural Heritage Information Centre celebrated the successful completion of a four year partnership project with the Nature Conservancy of Canada (NCC). The Great Lakes Conservation Blueprint for Biodiversity provides a shared vision of a network of natural areas that are critical to sustaining biodiversity in the Great Lakes region. The final reports are now available in electronic form on the NHIC website (http://nhic.mnr.gov.on.ca/projects/conservation_blueprint/blueprint_main.cfm) and the digital data together with descriptive metadata are available through Land Information Ontario Warehouse (http://www.lio.gov.on.ca). Visit the NHIC website for more information.

In order to realize the full potential of the Great Lakes Conservation Blueprint for Biodiversity, we have to transfer this tool to those individuals, organizations and agencies who work with the Ministry of Natural Resources (MNR) and NCC to conserve Ontario's natural heritage.

MNR and NCC are committed to communicating the Blueprint results and training conservation practitioners in the use of Blueprint products. The first step towards successful information and technology transfer is to understand the business requirements of the target audience. The second step is to explain in clear terms how these tools can improve the delivery of target audience programs. The third is to allow the target audience to bring the tools into their work environment and 'kick the tires'. The last step towards successful information and technology transfer is to support your product while allowing for product evolution.

Working with conservation partners to track Ontario's biodiversity

In the end, the best measure of successful information and technology transfer is not how many practitioners are using the tools which have been developed for them, but how these tools have improved the way practitioners do their business.

So let's take the Great Lakes Conservation Blueprint for Biodiversity through the first two steps towards successful information and technology transfer in relation to the shared challenges and opportunities identified in Ontario's Biodiversity Strategy (OBS).

In scanning the business requirements (objectives) of the OBS, the Great Lakes Conservation Blueprint for Biodiversity can support:

- Promotion of private land stewardship
- Integration of biodiversity values into land use planning
- Prevention of further biodiversity losses
- Improved understanding of biodiversity
- Review of legislation, regulation, policy, planning and program implementation

How might the Great Lakes Conservation Blueprint for Biodiversity support these OBS objectives by improving the delivery of strategic program actions identified in the OBS?

Promoting Stewardship

The Blueprint identifies the highest priority areas for terrestrial and aquatic biodiversity at the ecodistrict and tertiary watershed level. For the first time, conservation practitioners can easily identify the best places to ensure biological representation, diversity, function and irreplacibility of terrestrial and aquatic biodiversity values. Would you like to know where the highest scoring headwater systems are within a watershed? Could you use this knowledge to focus your conservation program delivery towards strategic landscape/watershed targets? Could this information help private landowners to appreciate how important their properties are to conservation at the landscape or watershed level? Could we focus our incentives programs towards properties that are providing the most significant ecological services?

Biodiversity and Land Use Planning

The Blueprint in its simplest form really represents a values map for terrestrial and aquatic biodiversity. This is a values map that we have never really had before in such a comprehensive, consistent and scientifically defensible fashion across such a large geographic area. Biodiversity conservation values could support:

- the development of a protected areas system
- the Natural Spaces network
- a natural heritage system of core areas and connecting corridors
- regional and municipal planning
- integrating Conservation Authority programs across watershed boundaries

Prevention of Further Loss

The Blueprint is a complete ecological assessment indicating where the best target (stewardship priority) areas for biodiversity conservation occur across the Great Lakes region of Ontario. Social and economic factors have not been incorporated into the Blueprint analysis but we know and understand that choices involving these factors need to be made. Could the identification of the best ecological sites for sustaining biodiversity help prevent their destruction? Could we incorporate some of these sites in our network of protected areas?

Improving our Understanding

The Blueprint represents the first comprehensive assessment of terrestrial and aquatic biodiversity across Ontario's Great Lakes region. The Blueprint was supported by a multidisciplinary team of conservation science professionals and Blueprint products have been widely reviewed by the conservation science community. The Blueprint utilized over 40 separate geographic information layers to develop terrestrial and aquatic ecological systems for conservation analysis. Using current Geographic Information System (GIS) processing technologies and accepted conservation planning methodology, the Blueprint reflects our current landscape/watershed understanding of terrestrial and aquatic biodiversity conservation values in Ontario. The Conservation Blueprint could help to establish benchmarks for the State of Ontario's Biodiversity Report.

Reviews

The Blueprint was developed using a conservation planning gap analysis methodology where coarse-filter ecological systems and fine-filter biodiversity occurrences were used to analyse the existing conservation achievements in Ontario against the highest scoring target

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The Conservation Blueprint identified aquatic conservation targets for Lake Superior, such as Shesheeb Bay.

areas for biodiversity conservation. In order to develop the aquatic portion of the Blueprint, an aquatic ecological system classification was developed. Using the aquatic ecological system classification, aquatic values are presented as a seamless layer across the Great Lakes watershed for lake, stream, wetland and Great Lakes coastal features in Ontario.

Information Transfer

Presentations on the Blueprint results have been made to many audiences and a technical workshop was hosted by the NCC on January 18, 2006. The NHIC and the NCC will continue our efforts to communicate the usefulness of Blueprint products, but there is one essential ingredient for effective transfer and application of these tools: receptive, creative and capable conservation practitioners.

So pick up the phone, check out the web site listed above, ask some questions and see for yourself whether these information products can help you with your conservation efforts.

Jim Mackenzie

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Goulais Bay north of Sault Ste. Marie has the most extensive coastal meadow marshes on Lake Superior.

Plant Communities of Ontario: Upper Great Lakes Coastal Meadow Marshes

While the calcareous coastal meadow marshes of the lower Great Lakes have been documented to some extent (e.g. Charlton and Hilts 1988, Bakowsky 1995), the coastal meadow marshes of the upper Great Lakes are comparatively less well known, although recently studied in the southern portion of their range (Jalava et al. 2005) . This article provides background information on this habitat, based on published information and fieldwork conducted by NHIC staff.

These meadow marshes develop on flat to gently sloping expanses of wet, infertile acidic sand, overlying igneous and metamorphic bedrock. They tend to accumulate in bays, where offshore currents become slowed and the suspended sands settle, or rivermouths which empty sandy sediments into the deeper lake waters.

In Ontario, northern or acidic coastal meadow marshes occur from Port Severn in southeastern Georgian Bay northward along the shores and islands of Georgian Bay, the North Channel and St. Mary's River. They also occur along the easterm shores of Lake Superior, although they certainly decrease in extent and frequency along the northern and western shores.. The distribution and extent of meadow marshes in Lake Superior may be related in part to sediments transported by longshore currents, which move north and eastward from Pukaskwa National Park, and southward from Batchawana Bay (Beletsky et al. 1999).

In southeastern Georgian Bay, in the vicinity of the Paleozoic contact and areas of calcareous glacial drift, these meadows tend to differ in that their flora is richer, with more calcicolous (growing or living in soil rich in lime) affinities. It is likely that the Georgian Bay meadows receive some deposits of calcareous sand, since Lake Huron currents flow through the channels between Manitoulin Island and the Bruce Peninsula, then move north, east and west within the Georgian Bay basin. Currents also flow northward into the North Channel at the western end of Manitoulin Island (Beletsky et al. 1999).

Some of the best-developed and most extensive sites include the meadow marshes on the deltaic islands at the mouth of the Mississagi River on the North Channel, and the wet beaches both north and east of Sault Ste. Marie, along the shores of Goulais Bay and Lake George (which is a bay along the St. Mary River where it meets the North Channel) respectively. Meadow marshes are more prevalent in shoreline bays and spits along the shores of Georgian Bay, and also occur with some frequency along protected bays and spits on the mainland of the

North Channel. Meadow marshes become rarer on the shores of Lake Superior, where they occur primarily along the northern and eastern shores of the lake.

Coastal meadow marshes are usually situated in the interface between the shallow lake waters and sandy beach ridges, with their extent often determined by the sharpness of the vertical gradient. Where the gradient is low, they are often more extensive.

Meadow marshes are dynamic environments. Since they can experience fluctuating lake levels of as much as 1-2 m between years (Great Lakes Commission 1986), their size and extent can change on an annual basis, increasing in extent during low water years, and shrinking during periods of high water. Additionally, high water years kill woody plants which become established in low water years, which is a factor in maintaining the open conditions. In addition to fluctuating water levels, meadow marshes are also subjected to wave energy from these large lakes. This washes away organic accumulations, and deposits new layers of sand. Although impacted by this deposition, these coastal meadow marshes contain extremely dense seedbanks, in places more than 10^4 m^{-2}, which is an order of magnitude higher than densities reported from prairie marshes. These seedbanks allow the vegetation to replace itself during low water periods (Keddy and Reznicek 1986).

Ice-push or scour is another factor maintaining open conditions. As the ice melts in the spring and open water appears, large masses of floating ice can be moved by both ordinary and storm winds, which can run aground and scrape the shores of these meadow marshes (Scott 1926).

This high-energy environment may account for the relative paucity of Atlantic Coastal Plain plant species along the southeastern Georgian Bay shoreline. Many of the shorelines of inland lakes adjacent to the Georgian Bay coast support numerous plant species whose range is disjunct from their primary range along the Atlantic Coast. These species depend on fluctuating water levels to maintain periodic open sandy shorelines, and during low water years, sprout abundantly from newly exposed seedbanks. They flower, and set seed again, waiting until the next low water year before they can sprout again (Keddy and Reznicek 1982, Reznicek 1994). It may be that the shore-

Table 1. Characteristic plant species of coastal meadow marshes

SCIENTIFIC NAME	COMMON NAME	GEORGIAN BAY - NORTH CHANNEL	LAKE SUPERIOR
Agalinis paupercula	Small-flowered Agalinis	X	X
Agrostis scabra	Tufted Hairgrass	X	X
Aster lanceolatus	Lance-leaved Aster	X	X
Aster puniceus	Purple-stemmed Aster	X	X
Aster umbellatus	Flat-topped White Aster	X	X
Bidens cernua	Nodding Beggar's-ticks	X	X
Bidens discoidea	Small Beggar's-ticks	X	
Bidens frondosa	Devil's Beggar's-ticks	X	X
Calamagrostis canadensis	Canada Bluejoint	X	X
Carex echinata	Prickly Sedge	X	X
Carex hystericina	Porcupine Sedge	X	
Carex lasiocarpa	Wiry Sedge	X	X
Carex lenticularis	Lenticular Sedge	X	X
Carex lurida	Bottle-brush Sedge	X	
Carex scoparia	Broom Sedge	X	
Carex viridula	Greenish Sedge	X	X
Cladium mariscoides	Twig-rush	X	X
Cyperus bipartitus	Umbrella Sedge	X	
Drosera intermedia	Spathulate-leaved Sundew	X	X
Dulichium arundinaceum	Threesquare	X	X
Eleocharis acicularis	Needle Spike-rush	X	
Eleocharis elliptica	Elliptic Spike-rush	X	X
Eleocharis olivacea	Bright-green Spike-rush	X	
Eleocharis pauciflora	Few-flowered Spike-rush	X	
Eleocharis smallii	Small's Spike-rush	X	X
Eriocaulon aquaticum	Pipewort	X	X
Eupatorium maculatum	Spotted Joe-Pye-Weed	X	X

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Shallow pool with Inverted Bladderwort, Goulais Bay coastal meadow marshes.

SCIENTIFIC NAME	COMMON NAME	GEORGIAN BAY - NORTH CHANNEL	LAKE SUPERIOR
Eupatorium perfoliatum	Boneset	X	X
Euthamia graminifolia	Grassl-leaved Goldenrod	X	X
Fimbristylus autumnalis	Low Fimbristylus	X	
Hypericum canadense	Canadian St. John's-wort	X	X
Hypericum ellipticum	Elliptic-leaved St. John's-wort	X	X
Hypericum kalmianum	Kalm's St. John's-wort	X	
Iris versicolor	Blue Flag	X	X
Juncus balticus	Baltic Rush	X	X
Juncus brevicaudatus	Short-tailed Rush	X	X
Juncus canadensis	Canada Rush	X	X
Juncus dudleyi	Dudley's Rush	X	X
Juncus effusus	Soft Rush	X	X
Juncus filiformis	Thread Rush	X	X
Juncus nodosus	Knotted Rush	X	X
Juncus pelocarpus	Mud Rush	X	X
Lobelia cardinalis	Cardinal Flower	X	
Lobelia kalmii	Kalm's lobelia	X	X
Lycopodiella inundata	Bog Clubmoss	X	X
Lycopus americanus	American Water-horehound	X	X
Lycopus uniflora	Northern Water-horehound	X	X
Mentha arvensis	Field Mint	X	X
Muhlenbergia uniflora	One-flowered Satin Grass	X	X
Myrica gale	Sweet Gale	X	X
Panicum lindheimeri	Lindheimer's Panic-grass	X	
Polygonum pensylvanicum	Pennsylvania Smartweed	X	
Polygonum sagittatum	Arrow-leaved Tearthumb	X	
Potentilla anserina	Silverweed	X	X
Potentilla norvegica	Norway Cinquefoil	X	X
Ranunculus flammula	Creeping Spearwort	X	X
Rhynchospora capitellata	Small-headed Beak-rush	X	
Rhynchospora fusca	Brown Beak-rush	X	X
Sagittaria cristata	Grass-like Arrowhead	X	
Schoenoplectus acutus	Hard-stemmed Bulrush	X	X
Schoenoplectus pungens	Common Three-square	X	X
Schoenoplectus smithii	Smith's Club-rush	X	
Schoenoplectus torreyi	Torrey's Bulrush	X	X
Sisyrinchium montanum	Blue-eyed Grass	X	X
Spartina pectinata	Prairie Sloughgrass	X	
Spiranthes cernua	Nodding Ladie's-tresses	X	X
Thelypteris palustris	Marsh Fern	X	
Triglochin maritimum	Seaside Arrow-grass	X	X
Triglochin palustris	Lesser Arrow-grass		X
Utricularia cornuta	Horned Bladderwort	X	X
Utricularia resupinata	Inverted Bladderwort	X	X
Viola lanceolata	Lance-leaved Violet	X	X
Xyris difformis	Yellow-eyed Grass	X	

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Inverted Bladderwort (*Utricularia resupinata*), an uncommon carnivorous plant of coastal meadow marshes.

line wave energy is too high in southeastern Georgian Bay for Atlantic Coastal Plain species seed banks to persist (W. Crins, Ontario Parks, pers. comm.).

Vegetation and Floristics

A list of the plants which are characteristic of the coastal meadow marshes of the Upper Great Lakes is presented in Table 1. The table distinguishes species present in the Georgian Bay, North Channel basin, from those present in Lake Superior coastal meadow marshes. While the marshes in these two basins are not that different floristically, those in Georgian Bay tend to be more species-rich than those in Lake Superior. This may be due to a variety of factors, including temperature, growing season, pH (M.J. Oldham, pers. comm.), as well as post-glacial plant migrations.

Although Table 1 was compiled from qualitative field surveys, widespread, ubiquitous species (e.g., Field Horsetail (*Equisetum arvense*), Tall Goldenrod (*Solidago altissima*)), found in a variety of habitats in addition to coastal meadow marshes have been subjectively excluded, as have similarly, widespread wetland species such as Swamp Milkweed (*Asclepias incarnata*) and Water Parsnip (*Sium suave*)

As can be seen from the list, the flora is dominated by graminoids, particularly members

of the sedge (Cyperaceae) and rush (Juncaceae) families. Prominent sedge genera include *Carex*, *Eleocharis*, and *Schoenoplectus*., while *Juncus* is a well-represented genus in the rush family.

The dominant species vary from site to site, and can change through time within a site, due to the variable conditions they experience, such as fluctuating water levels, storm events, and sediment deposition. The more common dominants include Common Three-square (*Schoenoplectus pungens*), Twig-rush (*Cladium mariscoides*), Canada Bluejoint (*Calamagrostis canadensis*), Greenish Sedge (*Carex viridula*), Elliptic Spikerush (*Eleocharis elliptica*), Baltic Rush (*Juncus balticus*), Mud Rush (*J. pelocarpus*), and Canadian St. John's-wort (*Hypericum canadense*).

Some of the more interesting and distinctive sedges found in these coastal meadow marshes include Umbrella Sedge (*Cyperus bipartitus*), Low Fimbristylis (*Fimbristylis autumnalis*), Small-headed Beak-rush (*Rhynchospora capitellata*) and Brown Beak-rush (*R. fusca*).

A number of uncommon grass species are also present in these habitats, including One-flowered Satin Grass (*Muhlenbergia uniflora*) and Prairie Slough-grass (*Spartina pectinata*), which often forms extensive sterile clones on drier backshore portions of the meadow marshes.

There are also a number of carnivorous plant species which occur in these acid, infertile and water-logged environments. By capturing and digesting microscopic invertebrate prey, species such as Spathulate-leaved Sundew (*Drosera intermedia*), Horned Bladderwort (*Utricularia cornuta*) and Inverted Bladderwort (*U. resupinata*) are able to augment their nutrient intake.

A number of provincially rare species occur in these coastal meadow marshes. Globally, Stiff Yellow Flax (*Linum medium* var. *medium*, G5T3T4 S3) occurs almost entirely within Ontario, where it occurs almost exclusively in the coastal meadow marshes of southeastern Georgian Bay. Crested Arrowhead (*Sagittaria cristata*, G4? S3), Bedstraw (*Galium brevipes*, G4? S2?), Smith's Club-rush (*Schoenoplectus smithii*, G5 S3), Yellow-eyed Grass (*Xyris difformis*, G5 S3?) are other provincially rare species also found in this part of Georgian Bay and/or the North Channel.

Status

Using conservation ranking criteria developed by NatureServe (which is standardized across the Americas), Upper Great Lakes Coastal Meadow Marshes are considered to be an **S4** vegetation type, in terms of provincial conservation concern. That is, they are considered to be **Apparently Secure** —Uncommon but not rare; some cause for long-term concern due to declines or other factors.

Threats

This vegetation may be negatively affected by human shoreline development, including residential and commercial development and inappropriate recreational vehicle use such as ATV traffic. While no systematic surveys of invasive plant species have been undertaken in these marshes, surveys conducted by NHIC staff have not detected any significant impacts on this vegetation by invasive plant species such as Purple Loosestrife (*Lythrum salicaria*). Similarly, recent extensive surveys along the Georgian Bay coast have also found low percentages of introduced species in this habitat (Jalava et al. 2005). However patches of the aggressive invasive species Common Rush (*Phragmites communis*) have been observed in a few coastal meadow marshes in the extreme southeastern portion of the bay near Honey Harbour, where the area is fairly disturbed by high boat traffic and dense cottaging (R. Jones, pers. comm.).

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D. A. Sutherland - NHIC Archives

Lance-leaved Violet (*Viola lanceolata*), commonly found in coastal meadow marshes.

D. A. Sutherland - NHIC Archive

Small-flowered Agalinis (*Agalinis paupercula*), a characteristic species of coastal meadow marshes.

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NHIC to Track Rare Disjunct Arctic-alpine Plants

One of the distinct floristic elements of the Great Lakes basin is its arctic-alpine species. As the name suggests, arctic-alpine plants are generally distributed in cold, high latitude and high elevation regions, though some of them also occur around the shores of the Great Lakes, primarily Lake Superior. These arctic-alpine plants are thought to have persisted since the time of glacial retreat about 11,000 years ago. As the ice-sheet retreated the Lake Superior region was dominated by vegetation of an arctic-subarctic nature. When the climate continued to warm up, these arctic-subarctic species disappeared from the region except in a few places with specialized microclimates and habitats. These colder than normal habitats (cliffs, rocky Lake Superior shores, and canyons) have allowed populations of arctic-alpine plants to persist for millenia, isolated often by hundreds of kilometres from populations elsewhere in the principal portions of their range.

Populations of arctic-alpine plants on the shores of Lake Superior have long been of interest to phytogeographers, ecologists, geologists and others concerned with patterns of glacial retreat, climate change, and vegetation history. These plant populations can provide clues to possible post-glacial migration pathways and to past patterns of vegetation in areas of tundra along ice-margins (Given and Soper 1981). Aggregations of arctic-alpine plants may indicate local microclimates quite different from the general climate of the region and are of interest to scientists studying global warming. Arctic-alpine plant populations are also of interest from a conservation perspective and fortunately some Lake Superior populations occur in parks and reserves such as Pukaskwa National Park, Lake Superior and Sleeping Giant Provincial Parks, and the Lake Superior National Marine Conservation Area. Some disjunct (widely separated from their core range) populations of arctic-alpine plant species occurring near the shores of the Great Lakes probably differ genetically from populations of the same species in their core range, giving the disjunct populations even higher biodiversity conservation value.

In Ontario most of our arctic-alpine plant species occur in the Hudson Bay Lowlands adjacent to Hudson and James Bays. Those which also have disjunct populations on the Great Lakes are often much more common in the Hudson Bay Lowlands, therefore these plants have not been previously tracked by NHIC, despite the fact that Great Lakes populations are of high conservation concern. This is because NHIC subnational ranks (Sranks), on which tracking is usually determined, are based on conservation concern province-wide. To address this situation, starting in 2006, NHIC will be partially tracking a number of disjunct arctic-alpine plant species. These species will be tracked only in the Great Lakes basin portion of their ranges and not in the Hudson Bay Lowlands where they are more common and less threatened. To qualify for partial tracking by NHIC these plants must:

- have a major disjunction in their distribution (generally at least 400 km) between the Great Lakes populations and those further north in Ontario;
- have disjunct populations in a different ecoregion than the core portion of the Ontario range;
- be rare throughout the Great Lakes portion of their distribution (i.e. in Ontario and other Great Lakes jurisdictions);
- generally have fewer than 20 known extant populations in the Ontario portion of their Great Lakes range; and not be already tracked by NHIC due to rarity throughout their Ontario distribution.

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Entire-leaved Mountain-avens (*Dryas integrifolia*) on the Slate Islands, Lake Superior.

A list of 16 arctic-alpine plant species meeting these criteria (Table 1) has been developed and Element Occurrence information is being gathered for populations of these species in the Great Lakes basin. The list of suitable species was adapted primarily from the list of disjunct plant targets used for the Terrestrial Conservation Blueprint project (Henson *et al.* 2005), with input from several knowledgeable field botanists. The degree of range disjunction was determined by consulting a variety of published and unpublished distribution maps on file at the NHIC. Given and Soper (1981) identified 48 vascular plant species which they consider to comprise the arctic-alpine

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Russett Sedge *(Carex saxatilis)* in the Hudson Bay Lowlands.

TABLE 1. Disjunct arctic-alpine species to be partially tracked in Ontario.

SCIENTIFIC NAME	COMMON NAME	GRANK	SRANK
Anemone parviflora	Small-flowered Anemone	G5	S5
Astragalus alpinus	Alpine Milk-vetch	G5	S5
Carex glacialis	Alpine Sedge	G5	S5
Carex saxatilis	Russett Sedge	G5	S5
Carex scirpoidea ssp. scirpoidea	Single-spike Sedge	G5T5	S5
Castilleja septentrionalis	Northern Indian-paintbrush	G5	S5
Cerastium alpinum	Alpine Mouse-ear Chickweed	G5?	S4
Draba aurea	Golden Draba	G5	S5
Dryas integrifolia	Entire-leaved Mountain-avens	G5	S5
Poa alpina	Alpine Bluegrass	G5	S4
Pyrola grandiflora	Arctic Wintergreen	G5	S4
Saxifraga tricuspidata	Three-toothed Saxifrage	G4G5	S5
Solidago multiradiata	Alpine Goldenrod	G5	S5
Tanacetum bipinnatum ssp. huronense	Lake HuronTansy	G5T4T5	S4
Taraxacum ceratophorum	Horned Dandelion	G5	S5
Tofieldia pusilla	Scotch False Asphodel	G5	S5

element of the flora of Lake Superior; a few others have been added since that time. Of the 48 species identified by Given and Soper, 6 do not occur in the Ontario portion of the Lake Superior basin, 7 are already tracked by NHIC because they are of conservation concern throughout their Ontario ranges, 17 are more continuously distributed between the Great Lakes basin and Hudson Bay Lowlands (i.e. not sufficiently disjunct), and 20 have more than 20 populations in the Great Lakes portion of their Ontario range (i.e. not sufficiently rare); note that some species are in more than one category.

Michael J. Oldham

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Rocky Lake Superior shoreline, habitat for arctic-alpine disjunct plant populations.

2005 Species At Risk Field Survey Highlights

In 2005, the Natural Heritage Information Centre (NHIC) received provincial Species At Risk (SAR) funding which helped to facilitate field surveys in all three MNR administrative regions. In Southern Region, field surveys focused on three listed SAR, Broad Beech Fern (*Phegopteris hexagonoptera*), Green Dragon (*Arisaema dracontium*), and False Hop Sedge (*Carex lupuliformis*).

The national and provincial statuses of the first two species are currently being re-assessed by the Committee On the Status of Endangered Wildlife In Canada (COSEWIC) and Committee On the Status of Species At Risk in Ontario (COSSARO). These two plants both have relatively large numbers of Element Occurrences (EOs) in Ontario (70 for Broad Beech Fern and 85 for Green Dragon), some of which were not visited during preparation of the update COSEWIC status reports.The 2005 field surveys were a continuation of similar surveys in 2004 to try and update EO information for these two species. NHIC Botany Intern, Regina Varrin (accompanied by NHIC summer student, Christie MacIsaac, on one trip), MNR field staff in Aylmer District (Kate McIntyre, Ron Gould, Al Woodliffe, Deb Jacobs, Heather Fleming, Heather Davis) and Upper Thames River Conservation Authority staff (Cathy Quinlan, Karen Wilkie), visited 19 Broad Beech Fern and 12 Green Dragon sites where the species had been historically documented. Broad Beech was found at 6 of 19 sites visited (32%) while Green Dragon was found at 8 of 12 sites visited (67%). This information will be very valuable in reassessing the SAR status of these two plants.

Fieldwork on the nationally and provincially Endangered False Hop Sedge focussed on characterizing the population size, habitat, and threats at the five known Ontario sites, as well as searching suitable habitat for additional populations. As part of the preparation of a national recovery plan for the species, fieldwork was done in collaboration with botanists in Quebec, where False Hop Sedge also occurs. In mid-July, NHIC botanist, Mike Oldham, participated in field surveys in Alymer District to attempt to relocate the five possibly extant Ontario False

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False Hop Sedge monitoring at London.

Hop Sedge sites, some of which had not been visited in a decade or more (a sixth Ontario site has not been documented for more than a century and is presumed extirpated). Also assisting with these surveys were biologists from Alymer District (Kate McIntyre, Al Woodliffe), the City of London (Bonnie Bergsma) and Quebec's Montreal Biodome (Nadia Cavallin, Nicole Lavoie).

False Hop Sedge was successfully relocated at four of the five sites visited. A small population in Essex County, last seen in 1985, was not found. At the Essex location, an introduced beetle, Emerald Ash Borer, has killed about 50% of the ash trees, which has significantly impacted the site, although it is not known if this tree mortality has contributed to the apparent loss of False Hop Sedge. An unexpected highlight of the surveys was the discovery of a second Canadian population of Short's Sedge (*Carex shortiana*) in Elgin County.

False Hop Sedge surveys resumed in mid-August, involving Mike Oldham, Kate McIntyre, Ron Gould, Nadia Cavallin, Nicole Lavoie, and Jacques Labrecque (Quebec Conservation Data Centre). August fieldwork focused on surveying potentially suitable sites (modelled on soils, vegetation, hydrology, and proximity to known sites). Thirteen candidate sites were surveyed over a three-day period, with a new False Hop Sedge population being found at one of them. Additional highlights included new sites for several other SAR and NHIC-tracked species: Pumpkin Ash (*Fraxinus profunda*; S3), Small-flowered Groove-bur (*Agrimonia parviflora*; S3), Swan's Sedge (*Carex swanii*; S3), Nottoway Brome Grass (*Bromus nottowayanus*; S1?), Butternut (*Juglans cinerea*; S3?; COSEWIC and MNR Endangered), Yellow False Foxglove (*Aureolaria flava*; S3), James' Sedge (*Carex jamesii*; S3), Broad-leaved Puccoon (*Lithospermum latifolium*; S3), Winged Monkey-flower (*Mimulus alatus*; S2; new county record), Red-rooted Cyperus (*Cyperus erythrorhizos*; S3), Green Dragon (*Arisaema dracontium*; S3, COSEWIC and MNR Special Concern), Beak-grass (*Diarrhena obovata*; S1; third Canadian record), and Mocha Emerald dragonfly (*Somatochlora linearis*; S1; new county record).

In mid-June 2005, NHIC biologists Wasyl Bakowsky and Mike Oldham participated in field surveys in MNR's Northeast Region. On this trip fieldwork was concentrated on sites which are candidate hydroelectric power generation sites in order to gather life science data which will assist with planning decisions. Sites on the Wanapitei, Kapuskasing, Mattagami, and Poplar Rapids Rivers were visited with staff from MNR's Sudbury (Bruce Basso) and Kapuskasing (Dave Barbour, Justin Beadow) District offices. Highlights from this fieldwork included new or updated records of five NHIC-tracked dragonflies (not including several hundred shed larval skin [exuviae] collections not yet identified) and eight tracked plants. A new site was documented for Broad-tailed Shadowdragon (*Neurocordulia michaeli*; G2 S2) on the Kapuskasing River and the most northerly provincial population of Clinton's Clubrush (*Trichophorum clintonii*; S2) was discovered on the Mattagami River at Smoky Falls.

In early September 2005 Wasyl and Mike visited additional sites in Northeast Region

M. J. Oldham - NHIC Archive

False Hop Sedge *(Carex lupuliformis)* at London.

W. D. Bakowsky - NHIC Archive

Small-flowered Woolly Bean (*Strophostyles leiosperma*) on the Winnipeg River.

and continued westward to Northwest Region. In Northeast Region, High Falls on the White Otter River was visited with Rick Schedewitz and Jennifer Good from the MNR Manitouwadge Area Office. A new population of Slender Spikerush (*Eleocharis nitida*; S2) was discovered at this site as were three provincially rare dragonflies (*Boyeria grafiana, Ophiogomphus colubrinus, Stylurus scudderi*). With Jim Trottier of MNR's Blind River office, the spectacular Raven Lake Gorge in Little White River Provincial Park was visited to gather life science data.

In Kenora District, NHIC biologists teamed up with MNR district staff to conduct surveys on Shoal Lake and the Winnipeg River. Wasyl and Mike also gave a presentation to Kenora District staff on the work of the NHIC and the results of their fieldwork in the Lake of the Woods area. With assistance from Lori Skitt, a day was spent on Shoal Lake surveying shoreline prairie remnants. On Shoal Lake, new populations of 18 provincially tracked plants were documented including: Fragile Prickly-pear (*Opuntia fragilis*; S3), False Tarragon (*Artemisia dracunculus*; S1), Pasque-flower (*Anemone patens*; S1), Smith's Wheatgrass (*Elymus smithii*; S1), Western Heath Aster (*Symphyotrichum ericoides* ssp. *pansus*; S1), Prairie Sagebrush (*Artemisia frigida*; S2S3), and Rocky Mountain Sedge (*Carex saximontana*; S2). The following day on the Winnipeg River with Bruce Ranta, new populations of 11 provincially rare plants were documented, including the trip highlight, Small-flowered Woolly Bean (*Strophostyles leiosperma*). Although known no closer to Canada than central North Dakota and central Minnesota, the high quality undisturbed habitat remote from human habitation or disturbance and almost exclusively native associates suggest that Small-flowered Woolly Bean is a native addition to the Canadian flora!

NHIC would like to thank the many MNR District and Area staff who provided logistical support for SAR fieldwork and who accompanied NHIC staff in the field.

Michael J. Oldham & Wasyl D. Bakowsky

Rare Plant Field Surveys on Long Point

The Long Point peninsula on the north shore of Lake Erie is one of the most significant natural areas remaining in southern Ontario. Fortunately most of this site is protected through a variety of federal (e.g. Long Pont and Big Creek National Wildlife Areas), provincial (Long Point Provincial Park), and private conservation group ownership (e.g. Long Point Company, Bird Studies Canada, Nature Conservancy of Canada). In partnership with the Canadian Wildlife Service, which manages the two National Wildlife Areas, NHIC has participated in botanical field surveys on Long Point in each of the past two summers. The purpose of the field surveys was to relocate rare plant populations known from Long Point and gather precise co-ordinates (using GPS), population size/health information, and to document changes in the flora from previous surveys.

NHIC botanist, Mike Oldham, and University of Michigan botanist, Anton Reznicek, plus graduate student Jess Peirson, participated in field surveys on Long Point in August 2004 and late May/early June 2005, with assistance from Paul Ashley and Jeff Robinson of the Canadian Wildlife Service. During five field days, 133 georeferenced records were gathered, of 25 different rare species. These included records of eight tracked animal species (2 birds, 1 amphibian, 3 reptiles, and 2 dragonflies) and

M. J. Oldham - NHIC Archive

Dunes and wet meadows at Long Point.

17 tracked plant species. Seven species listed by COSEWIC or MNR as Species At Risk were documented. Plant highlights included relocating all three rare plants known in Canada only from Long Point: Horsetail Spikerush (*Eleocharis equisetoides*; COSEWIC and MNR Endangered), Winged Sedge (*Carex alata*), and Black-margined Sedge (*Carex nigromarginata*). Animal highlights included a new dragonfly species for Long Point (Falls 1995). Spatterdock Darner (*Rhionaeschna* (formerly *Aeshna*) *mutata*) was collected near Gravelly Bay. This is a globally rare (G3G4) insect known in Ontario only from four sites (one historic) in two counties (Essex and Brant). No Ontario records have been reported during the past five years of the Ontario Odonata summary project and this is the first record for Norfolk County and Long Point.

Although the flora of Long Point has been well studied (Reznicek and Catling 1989), 28 additions to the flora were documented, consisting of 20 new native plants and eight new exotic plants. Some of these additions to the flora are probably the result of lower White-tailed Deer numbers on the Point which has allowed deer-suppressed species to rebound. Common spring woodland plants like White Trillium (*Trillium grandiflorum*), Early Meadowrue (*Thalictrum dioicum*), Solomon's-seal (*Polygonatum biflorum*), and Maidenhair Fern (*Adiantum pedatum*), all of which were new to the Long Point flora, are starting to recolonize the Long Point woodlands. Another notable element related to deer control on the point is the recovery of the shrub component. We found four new native shrubs (Service-berry [*Amelanchier spicata*], Running Strawberry-bush [*Euonymus obovata*], Swamp Dewberry [*Rubus hispidus*], and Highbush Cranberry [*Viburnum trilobum*]) plus five shrubs not documented since 1951 – Smooth Serviceberry (*Amelanchier laevis*), Winterberry (*Ilex verticillata*), Partridge-berry (*Mitchella repens*), Flowering Raspberry (*Rubus odoratus*), and Heart-leaved Willow (*Salix cordata*).

Several of the native additions are quite significant, being rare in southwestern Ontario. The sedge, *Carex ormostachya*, is at its most southerly Ontario location, never having been documented anywhere in Ontario's Carolinian Zone previously. Another sedge, *Carex backii*, is also at its extreme southern limits in the province. Other species new to Long Point typically found further north in the province include Hay-scented Fern (*Dennstaedtia punctilobula*), Sedge (*Carex canescens*), and Pink Pyrola (*Pyrola asarifolia*). Fortunately most of the new exotic species are unlikely to become major problems for the native flora, although a few do have the potential to become invasive on the Point, e.g. Garlic Mustard (*Alliaria petiolata*), Leafy Spurge (*Euphorbia esula*), and honeysuckle (*Lonicera* species). The exotic form of Common Reed (*Phragmites australis* var. *australis*) is increasing rapidly on Long Point and is already impacting rare plant species and their habitats.

Gathering precise locations for rare plant populations on Long Point will help monitor these species over time as the vegetation and flora change in response to a variety of factors such as lake levels, climate, exotic species, and deer numbers.

Michael J. Oldham & Anton A. Reznicek

M. J. Oldham - NHIC Archive

Lower numbers of White-tailed Deer at Long Point are resulting in increased woody plant growth.

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Natural Spaces Program

The Natural Spaces Program, led by the Ministry of Natural Resources, was announced by the Minister of Natural Resources in August of 2005. The Natural Spaces Program is a "voluntary partnership program that will help reduce loss of greenspace in southern Ontario by encouraging landowners to restore and protect natural areas on their properties" (http://www.naturalspaces.mnr.gov.on.ca/index.html). A broad cross-section of MNR partner organizations and stakeholder groups are represented in the Natural Spaces Leadership Alliance, a group that will advise on the development and implementation of the program.

The Natural Spaces Program covers that part of Ontario south of a line between Midland, Peterborough and Ottawa, essentially the area south of the contact line with the Canadian Shield. By coordinating and linking together the protection efforts of individual landowners, the Natural Spaces Program aims to establish a connected natural heritage system across this area of southern Ontario.

Michael McMurtry is participating with other ecologists and planners in the Natural Heritage Systems Working Group of the Natural Spaces Program. This group will advise on strategies and methods for identifying a natural heritage system. The methods and products of two conservation planning projects that the NHIC has participated in, The Big

Picture 2002 (Riley et al. 2003) and the Great Lakes Conservation Blueprint for Biodiversity (Wichert et al. 2005, Henson et al. 2005), will serve as valuable background information in identifying the Natural Spaces natural heritage system.

Michael J. McMurtry

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Mapping Species at Risk with Biotics

Last spring the Natural Heritage Information Centre (NHIC) changed its existing data management system to Biotics, a Geographic Information System (GIS) – based application capable of polygonal data storage. Through this conversion process, all existing point-based natural heritage data was transformed into polygonal representations of the underlying data. Polygonal data provides a variety of enhancements for conservation practitioners. With further refined accuracy, polygonal Element Occurrences (EOs) reflect geospatial locations much more precisely, allow for easier data interpretation, and support improved conservation practices.

Perhaps the greatest benefit of polygonal data is the potential for refinement of EO boundaries based on the best available "on the ground" information. With support from the MNR Species at Risk Unit, the NHIC has undertaken an *Element Occurrence Mapping Project*, aimed at mapping of Species at Risk occurences on the landscape. Working from a priority list of Species at Risk, NHIC biologists performed a data mining exercise, to identify existing and supplementary spatial information at the observation level, for inclusion into EO boundary refinements in Biotics. Where pre-existing spatial data was not available, refinements were made based on the accuracy of the existing record, currency of the report and the biology of the species. This process allows the NHIC to update and refine spatial EO boundaries, perform important quality control checks and further enhance key Species at Risk data holdings. Additionally, as a result of this project NHIC biologists are better able to identify spatial data gaps at the species level, helping to direct field priorities for verification.

The *EO Mapping Project* has given us the opportunity to address the spatial extent of a number of Species at Risk in the province. Looking ahead to the broader scope of rare species in Ontario, undoubtedly the most relevant spatial information will come from local conservation practitioners with in-depth knowledge of the species. As the NHIC evolves into the world of polygonal data, we will continue to rely heavily on our contributors for detailed spatial information concerning Ontario's species and spaces.

Simon Dodsworth

Brian Pfeiffer

Participants at the 2005 Dragonfly Society of the Americas meeting, Arnprior, Ontario.

Two Major Dragonfly Meetings in Ontario

Dragonflies and damselflies (Odonata) are becoming increasingly popular among naturalists and biologists. The NHIC was involved in two major Odonata meetings held in Ontario in 2005 – the annual Dragonfly Society of the Americas (DSA) meeting and the Great Lakes Odonata Meeting (GLOM).

The annual DSA meeting was held from 8-12 July and was co-hosted by the NHIC and Agriculture Canada. Paul Catling (Agriculture Canada), Colin Jones (NHIC) and Brenda Kostiuk (Agriculture Canada) organized the meeting which was held in Arnprior, located along the Ottawa River northwest of Ottawa. This was an extremely well-attended DSA meeting with a total of 118 attendees from 19 states and 3 provinces, including participants from as far away as Texas, Florida, Arizona, Oregon and Washington. Participants included professional and amateur odonatologists, including some of the most prominent dragonfly experts in North America, as well as local naturalists and photographers, and both federal and provincial government biologists. NHIC staff attending the meeting included Colin Jones, Michael Oldham, Simon Dodsworth and Julia Monkman. Local MNR staff (Daryl Coulson and Lauren Trute) and other local naturalists (Chris Michener,

C. D. Jones - NHIC Archive

Male Plains Emerald (*Somatochlora ensigera*) caught near the Spruce Islands Provincial Nature Reserve on July 17, 2005.

Christina Lewis and Bob Bracken) provided logistical assistance, especially with the field trips.

The DSA meeting began on Friday evening with an informal social. Saturday was dedicated to the annual DSA business meeting, followed by a variety of excellent and informative presentations on many aspects of dragonfly biology, ecology, scientific research, distribution and conservation. Following dinner on Saturday, our keynote speaker, award-winning naturalist, teacher, photographer and author Michael Runtz, presented a wonderful slide presentation on the "Natural History of the Algonquin Region".

Sunday and Monday were spent visiting a variety of aquatic habitats in the area in search of the region's dragonflies and damselflies. On each day, Paul Catling led half of the group to sites within approximately 20km of Arnprior including both a newly excavated and an older sand quarry with ponds and pools, the Ottawa, Mississippi and Waba Rivers, and the White Lake Fen. Colin Jones led the other half of the group to areas north of Arnprior including Little Lakes near Beachburg, the Ottawa River at Westmeath, the Petawawa River at Highway 17, and several sites along the Barron Canyon Road within Algonquin Provincial Park. The weather on both days was ideal for dragonfly and damselfly activity – although perhaps a little on the hot side for the participants!

Highlights of the field trips included several provincially rare clubtails: Cobra Clubtail (*Gomphus vastus*) and the Elusive Clubtail (*Stylurus notatus*) on the Ottawa River; the Rapids Clubtail (*Gomphus quadricolor*) along the Mississippi River; and the Extra-striped Snaketail (*Ophiogomphus anomalus*) on the Petawawa River. A single Arrowhead Spiketail (*Cordulegaster obliqua*) collected along a small stream near Waba was a new species for Lanark County. One of the biggest highlights for many participants were the evening visits to the Petawawa River to witness the flight of two crepuscular (dusk-flying) species, the Stygian (*Neurocordulia yamaskanensis*) and Broad-tailed Shadowdragons (*N. michaeli*). The Broad-tailed Shadowdragon was only recently found in Ontario (see NHIC Newsletter, Winter 2005, pages 3-4) and has a very restricted range with Maine and New Brunswick being the only other jurisdictions with records of this species. Although difficult to catch in the waning daylight, 100's of shadowdragons were present with many individuals (both males and females) of both the Broad-tailed Shadowdragon as well as the more widespread Stygian Shadowdragon being caught.

Following the main meeting, several participants, under the leadership of Paul Catling and Brenda Kostiuk, embarked on a post-conference trip to Northern Ontario for the next few days. Basing themselves in Kirkland Lake the group spent one day exploring areas to the west of Kirkland Lake and another long day driving well north of Cochrane. During this time they encountered a number of boreal specialities including Subarctic Bluet (*Coenagrion interrogatum*), Zigzag Darner (*Aeshna sitchensis*), Boreal Snaketail (*Ophiogomphus colubrinus*), Lake Emerald (*Somatochlora cingulata*) and Black Meadowhawk *(Sympetrum danae*).

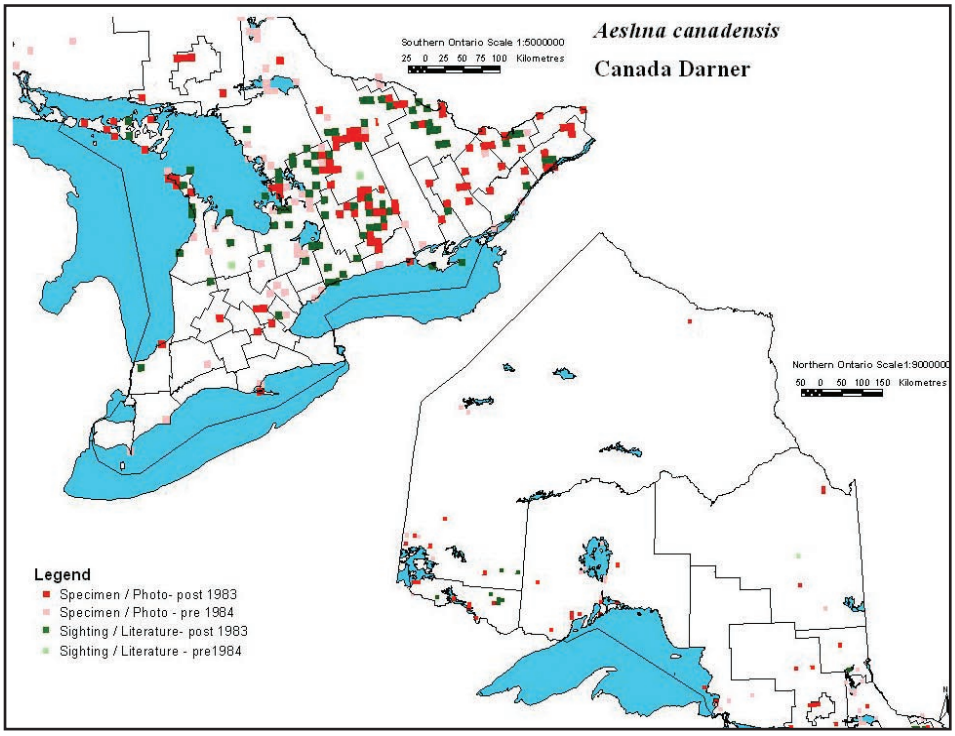
This was the first time that an annual DSA meeting had been held in Ontario and we were very fortunate to have had excellent weather, fantastic attendance, and the support of many local biologists and naturalists that contributed in many ways in order to make this a very successful event. The 2006 DSA meeting is scheduled to take place 9-11 June in the Cave City–Mammoth Cave National Park area of Kentucky.

A little later in July, the 5th annual Great Lakes Odonata Meeting (GLOM) was held at the opposite end of Ontario – based out of Fort Frances, Rainy River District from 15-18 July. The meeting was hosted by the Rainy River Valley Field Naturalists and organized by a team of individuals under the excellent leadership of Bill Morgenstern. A total of 32 people registered for the meeting, with an additional 16 people from the host organization attending portions of the meeting. Two NHIC staff (Colin Jones and Don Sutherland) attended the meeting.

The GLOM had its beginnings in Ontario, when in 2001 the inaugural meeting (hosted by the NHIC and organized by Colin Jones) was held north of Elliot Lake from 3-6 July (see NHIC Newsletter, Winter 2002, pages 8-10). The meeting was organized in order to bring together field biologists and Odonata enthusiasts from states and provinces within the Great Lakes Basin. The idea took off with subsequent meetings held in Michigan, Minnesota and Ohio. It was nice to see the meeting come back to Ontario in 2005.

The 2005 GLOM consisted of field outings during the day, talks and presentations in the evenings, as well a community day when local residents were encouraged to drop by displays that a number of experts had available.

Darren Elder, MNR Biologist from Ignace



Ontario Odonata Atlas map for Canada Darner (*Aeshna canadensis*).

who has studied dragonflies as a hobby for the last nine years, gave an excellent presentation on the dragonflies of northwestern Ontario and Rainy River District. Colin Jones spoke to the group about the rare Odonata of Ontario, as well as the Ontario Odonate Atlas and annual Ontario Odonata summary and how people can contribute records. Other speakers included Steve Kingston, Ontario Parks, who spoke about preserving biodiversity in northwestern Ontario, Kurt Mead, Minnesota naturalist and author of the field guide, "Dragonflies of the North Woods", and Marjorie Hughes of Winnipeg, who presented a summary of the Manitoba Dragonfly Survey project.

During Saturday's field outings, three groups spread across the district lead by Colin Jones, Marjorie Hughes, Darren Elder and Kurt Mead. The youngest, and probably most enthusiastic, participant at the GLOM was 6 year-old Noah Berg, who travelled from Wisconsin with his Dad just to attend the meeting. At each stop, Noah was the first one out of the vehicles, and was immediately running through the bog, wading into the stream, or searching along the shoreline for dragonflies with his net. The most significant find of the day was a population of Plains Emerald (*Somatochlora ensigera*) found just south of the Spruce Islands Provincial Nature Reserve by Darren and Kurt's group, a new record for Rainy River District and only the second record of this species from Ontario. Early Sunday morning Colin Jones, Darren Elder and Don Sutherland re-visited the Plains Emeralds site. More individuals were present as was a single male Arrowhead Spiketail, yet another new district record.

Later Sunday morning, at Lions Park, Emo, the GLOM hosted a community day when local residents met the Odonata experts that were present, and had to opportunity to see specimens, a variety of books on Odonata and pick up a net and try their hand at catching dragonflies and damselflies along the shore of the Rainy River. It was at this point that 10 year old Adam Van Ael captured the yet unrecorded Alkali Bluet (*Enallagma clausum*) adding yet another new species to the district list. Another highlight during the community day was the mass emergence of Elusive Clubtails from the river. Countless larvae of this rarely seen species were crawling out of the water in order to go through the final moult of their lives – the moult when the larval skin splits open and the adult dragonfly emerges. The whole process from the larva crawling out of the water to the adult flying away takes less than an hour and participants at the community day had the opportunity to witness this fascinating transformation. We weren't the only ones, however, with an eye on the action. A pair of Eastern Kingbirds was also watching the shoreline, swooping down and consuming adult dragonflies as they emerged from their larval skins!

By the end of the GLOM, 50 species of Odonata had been recorded, including one new damselfly record and four new dragonfly records for Rainy River District. The event was a huge success with a significant number of new people introduced to the enjoyment of odonata. Plans for GLOM 2006 in Wisconsin are in the works.

Colin D. Jones

NHIC Launches the Ontario Odonata Atlas Website

The Ontario Odonata (dragonflies and damselflies) Atlas website (http://nhic.mnr.gov.on.ca/MNR/nhic/odonates/atlas.html) is now available. The Ontario Odonata Atlas is a joint project between the Natural Heritage Information Centre (NHIC), the Toronto Entomologists' Association (TEA) and the editors of *Ontario Odonata*.

The Ontario Odonata Atlas project was initiated in 1995 by Don Sutherland of the NHIC, Ontario Ministry of Natural Resources, in an effort to compile all available information on the distribution of the Odonata of Ontario. In 1996, Matt Holder was contracted by the NHIC to conduct a survey of Odonata collections at the Royal Ontario Museum (ROM), Canadian National Collection (CNC), and University of Guelph, primarily to compile additional specimen data for rare species. Beginning with the 1999 season, as a result of increased interest in dragonflies and damselflies, and in order to have a means of compiling records on an annual basis, Paul Catling, Colin Jones and Paul Pratt began an annual summary of Odonata recorded in Ontario. These records are published by the TEA in an annual publication entitled *Ontario Odonata* (see http://www.ontarioinsects.org/publications.htm).

Ontario Odonata also provides a means of publishing papers and notes on interesting observations and behaviour, range extensions, regional

lists, and other subjects related to the study of Odonata in Ontario. The Ontario Odonata Atlas database currently contains over 40,000 geo-referenced records of Odonata from Ontario and each year the records submitted through the annual Ontario Odonata summary (usually 5,000 records or more per year) are added to the Ontario Odonata Atlas database.

The Ontario Odonata Atlas website is hosted on the NHIC website and features distribution maps (plotted by 10x10 km squares) for each of the 167 Odonata species known to occur in Ontario, as well as a few subspecies/forms (e.g. *Aeshna interrupta interrupta* and *A. i. lineata*).

The site also features background information on the Ontario Odonata Atlas and the annual Ontario Odonata summary, information on how people can contribute records (including a template for data submission), a list of contributors, acknowledgements, and the conservation ranks for Ontario's Odonata.

For more information contact Colin Jones or Don Sutherland at the NHIC.

Colin D. Jones

Aquatic Invasive Species Database Project

The NHIC has been involved in a project to migrate aquatic invasive species data into the Biotics spatial database. The project is a collaborative effort between the Habitat Unit of the Biodiversity Section, and the Ontario Federation of Anglers and Hunters. Funding for this project is from the Canada Ontario Agreement, with funds allocated from MNR's Aquatic Invasive Species (AIS) program. This undertaking is being done through an agreement with NatureServe Canada and MNR.

Work thus far has focussed on data-mapping between the existing AIS database and NHIC-Biotics, and examining the technical and conceptual issues surrounding the spatial presentation of invasive species sightings. Location data for three species (Zebra Mussel, Round Goby, and Spiny Water Flea) have been converted to a spatial layer (shapefile) and will be imported into Biotics.

Ross Ealey

Great Lakes Islands Biodiversity Project

The Great Lakes islands form the world's largest collection of freshwater islands and contain key elements of biodiversity including rare habitats and species that are endemic or disjunct in the Great Lakes region. Some Great Lakes islands are also important nesting areas for colonial waterbirds, stopover sites for landbirds and islands associated with fish spawning and/or nursery areas. Strongly influenced by coastal processes, Ontario's Great Lakes islands contain over 13 000 km of shoreline and harbour many species and communities of provincial and global conservation concern.

The current understanding of Great Lakes island biogeography has been generally limited to studies on specific taxa or island complexes. A comprehensive analysis of biodiversity, threats and existing protection for Great Lakes islands is a strategic step towards ensuring long-term conservation of these important areas.

The NHIC has partnered with the NCC with support from The Canada-Ontario Agreement Respecting the Great Lakes Basin Ecosystem (COA) to classify and assess Ontario's Great Lakes islands. This work will enhance our understanding of the biodiversity of Ontario's islands and better identify conservation needs.

This project is built on a science-based, multi-disciplinary approach to complete an island classification system and conduct a biodiversity assessment for islands or island groups in the Ontario portion of the Great Lakes. An overall assessment of islands that includes a biodiversity analysis, gap analysis and threats assessment will be used to develop conservation recommendations for Great Lakes islands.

All islands will be assessed based on biological diversity, physical diversity, size and distinctiveness using an automated GIS methodology. This approach builds on the ranking system developed by the The Nature Conservancy and the NCC that is summarized in the 'Biological Ranking Criteria for Conservation of Islands in the Laurentian Great Lakes' (Ewert *et al.* 2004).

A subsequent threats analysis will identify where biodiversity values may be at greatest risk. A gap analysis will identify those islands currently within regulated protected areas, other natural heritage designations, or represented in the Great Lakes Conservation Blueprint for Biodiversity (Henson *et al.* 2005). These analyses will assist in prioritizing where conservation action is most needed.

Results from this project will contribute to the goals of the Ontario's Biodiversity Strategy, key MNR COA commitments, and other government initiatives. Canadian islands can also be prioritized based on the results of this project for increased stewardship and conservation action.

Ontario's contribution to the documentation of Great Lakes island biodiversity will also better inform the biodiversity significance of U.S. islands in a Great Lakes basin context. This project extends Ontario's participation in the

George A. Coker

Aquatic invasive species Round Goby (*Neogobius melanostomus*) and Zebra Mussel (*Dreissena polymorpha*).

C. J. Lewis - NHIC Archive

Flooded Jellyskin (*Leptogium rivulare*), Ontario's only COSEWIC -listed lichen.

binational Collaborative for the Conservation of Great Lakes Islands. This Collaborative was formed in 2003 through funding from the United States Environmental Protection Agency - Great Lakes Program Office, and is comprised of government and NGOs in Canada and the U.S. The Collaborative was initiated to assemble information on Great Lake islands and identify conservation needs. The Great Lakes Islands Biodiversity project in Ontario is intended to directly contribute to the creation of a robust, enduring binational framework to ensure long-term island conservation in the Great Lakes basin.

The NHIC is coordinating the technical analysis to assess Ontario's Great Lakes islands with the assistance of the Provincial Geomatics Service Centre. These results will be summarized in a report that will classify and assess Great Lakes islands and will be made available in 2007.

Bonnie L. Henson

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Lichen Biodiversity Project

Lichens are a common and conspicuous component of biodiversity in many parts of the province. In northern Ontario they provide a primary food source for the Threatened boreal population of Woodland Caribou (*Rangifer tarandus*) and in southern Ontario they can be sensitive indicators of atmospheric pollution levels. Although often treated as plants, lichens are life forms developed from a symbiotic relationship between fungi and photosynthetic algae or cyanobacteria (or blue-green algae). More than 800 of the close to 14,000 species of lichens occur in Ontario.

Despite their abundance and diversity in the province, the distribution and status of Ontario's lichens are poorly known. Some lichen species are rare and declining and one Ontario species, Flooded Jellyskin (*Leptogium rivulare*), is a recent addition to the national (COSEWIC) list of Threatened species. In order to improve the list of Ontario lichens in the NHIC Element Table (ET) and the subnational conservation status ranks (Sranks) assigned to them, Trent University student Chris Lewis spent the summer at NHIC working on a lichen biodiversity project. Funding was provided by MNR's Species At Risk unit and Chris was hired under contract to NatureServe Canada.

The project involved researching the status of Ontario lichens by reviewing literature and visiting museum collections to examine specimens. Prior to this project there were 730 lichens in the NHIC Element Tracking List. Chris' research added 96 additional lichens to the NHIC database, most of which now have Sranks. This new information will be added to the NHIC Biotics database and will allow us to better document, track, and conserve Ontario's lichen diversity.

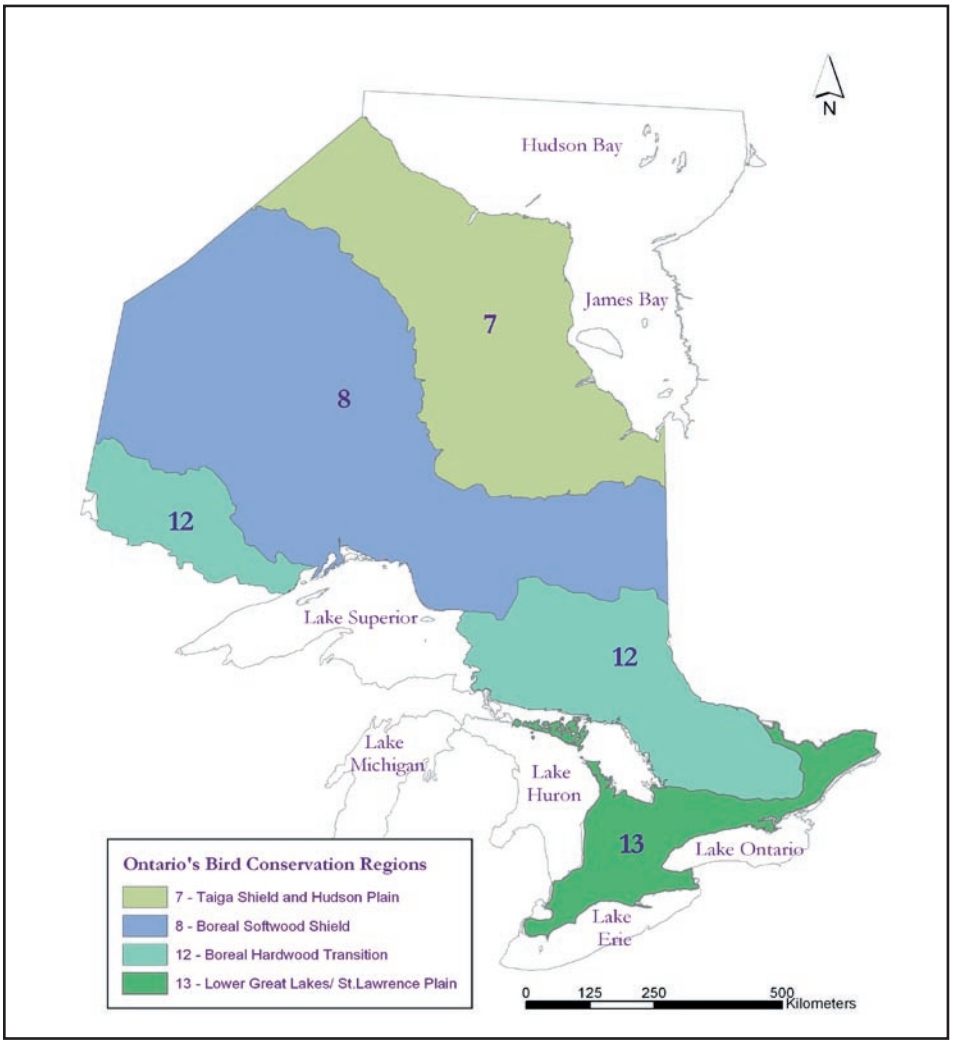
Michael J. Oldham

Summer Experience Program at the NHIC

This past summer, the NHIC was very fortunate to have had three responsible, independent and hard-working summer students join our team. All three were hired under the government Summer Experience Program.

Julia Monkman, a student of Biology and International Development Studies at Trent University, was a very valuable member of the NHIC zoology team. Julia has a strong background in biology and ecology having been interested in the natural world since early childhood. Her past experiences were also an asset and include working as a naturalist for Ontario Parks and conducting flying squirrel research in central Ontario.

Julia assisted with a variety of important projects from the curation and databasing of Odonata (dragonflies and damselflies) specimens as part of the Ontario Odonata Atlas project to field-work involving surveys for rare Odonata. Julia also helped with the management of the NHIC references library and the transfer of files to our new high-density filing system as well as other projects involving both butterflies and Great Gray Owls. The NHIC co-organized and co-hosted the annual Dragonfly Society of the Americas meeting in 2005 and Julia assisted with the preparation for this meeting, which was a huge success (see article on page 12). During the meeting, Julia's skills with a dragonfly net were well demonstrated when she netted the first Broad-tailed Shadowdragon (*Neurocordulia michaeli*) of the trip. This globally rare species was discovered new to Ontario in 2003 (see NHIC Newsletter, Winter 2005). It only flies at dusk and catching one in the



Bird Conservation Regions 7, 8, 12 & 13 (above) are Ontario's planning units for bird conservation under the North American Bird Conservation Initiative. They will be the basis for the Eastern Habitat Joint Venture Five Year (2006-2010) Implementation Plan.

waning light of the day is not an easy task!

Heather Foy also joined the NHIC this summer. She assisted Mike McMurtry and Bonnie Henson by organizing natural areas files and compiling literature on Great Lakes islands. This literature review will contribute to a project on island biodiversity being done in partnership with the Nature Conservancy of Canada. She also developed her GIS skills by adding attributes for islands to our project database. Heather assisted with several field projects and demonstrated an excellent knowledge of the local flora and fauna. She participated in breeding bird surveys with Mike; investigated prairie and alvar sites with Wasyl Bakowsky; and collected odonates with Colin Jones, Simon Dodsworth and Julia Monkman. Heather is now resuming her studies in Conservation Biology at Trent University.

Emma Todd was involved in a project to scan slides in the NHIC collection. Subject matter included plants, animals, vegetation and scenery images. For each slide, Emma entered the metadata available (e.g. photographer, subject, location, date, etc.) so that it is attached to the image digitally. Emma scanned 3,325 images for NHIC. These image files are now searchable for subject matter, using user-friendly and widely available software, such as Adobe PhotoAlbum, which means staff and clients seeking photos can now serve themselves. Emma also managed to get in the field, where she participated in field studies of prairies and savannahs, rock barrens, and Atlantic Coastal Plain shoreline vegetation.

Wasyl D. Bakowsky, Colin D. Jones & Michael J. McMurtry

Ontario Eastern Habitat Joint Venture GIS Project

The Ontario Eastern Habitat Joint Venture (EHJV) is a regional partnership delivered through international cooperation whose membership includes MNR, Environment Canada, Ontario Ministry of Agriculture, Food and Rural Affairs, Ducks Unlimited Canada, Nature Conservancy of Canada, Wildlife Habitat Canada, US Fish and Wildlife Service and many landowners and whose activities are focused on conserving wetlands and significant habitats for waterfowl, other wildlife and people. Further information about the EHJV is available on their website at http://www.on.ec.gc.ca/wildlife/ehjv/.

The Ontario EHJV partnership (formalized in 1994) has recently undertaken a review of its current activities and progress towards its objectives in order to determine a path forward for its habitat conservation programs through a new provincial 5-year implementation plan (2006-2010).

An important component of this planning exercise includes partnering with the NHIC to complete a GIS analysis which will help determine focal areas for future habitat securement and enhancement activities. This GIS-based approach will first summarize what has been collectively accomplished through the EHJV in Ontario since the late 80's, and then using this synopsis, in cooperation with biological information (such as important wetland and migratory bird areas) and agency priorities, determine where activities for the next five years should be delivered and what program strategies should be used in both priority areas and the intervening landscape.

The products from this Ontario EHJV project will display the accomplishments of the partnership to date, provide an overall picture of the biological importance of the province to waterfowl and other wetland-dependent species, identify priority areas for future implementation activities, and provide a visual representation of the habitat objectives of the Ontario EHJV for 2006-2010. Funding for this project is being provided by MNR, Environment Canada, Wildlife Habitat Canada, Ducks Unlimited Canada and the Nature Conservancy of Canada.

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M. J. McMurtry - NHIC Archive

Marine terraces along the St. Lawrence River at Tadoussac, Quebec, one of the points of interest near September's Eastern Region NatureServe Conference.

Eastern Region NatureServe Conference, Beaupré, Québec

Several representatives from the NHIC attended the first regional NatureServe conference to be held in Canada. The event was held in Beaupré, Québec, next to both the St. Lawrence River and the Laurentian Mountains, and was hosted by the Centre de donnée sur le patrimoine naturel du Québec, the first conservation data centre established in Canada. The conference provided opportunities to see the landscape and biodiversity of the region as well as participate in presentations and workshops with our colleagues from the NatureServe network across northeastern North America. The value of belonging to an international network of centres devoted to tracking species, ecological communities and natural areas and providing the critical information needed for biodiversity conservation was evident to those who attended.

NHIC staff made presentations or led workshops on a variety of topics: Tools for Conservation Planning in Ontario, Classifying Aquatic Ecosystems for Conservation; Building, Sharing and Sustaining Binational Conservation Vision; Plant Ranking; and Tracking Invertebrates. In addition, there were sessions for the disciplines of zoology, botany, ecology and information management that allowed discussion on issues of special interest to these groups.

Two significant products were launched at the conference: *Our Home and Native Land: Canadian Species of Global Conservation Concern* (Cannings et al. 2005), and the *Québec Biodiversity Atlas* (Tardif et al. 2005). *Our Home and Native Land* (see next article on this page) provides an overview of the status of Canadian species in a global context based on data from the member programs of NatureServe. *The Quebec Biodiversity Atlas* provides a concise overview of the status and distribution of species designated as Threatened and Endangered by that province and the climatic and geographic factors influencing their distribution. Biodiversity hot spots priority sites are identified.

Michael J. McMurtry

References

Cannings, S., M. Anions, R. Rainer, and B. Stein. 2005. Our home and native land: Canadian species of global conservation concern. NatureServe Canada, Ottawa, Ontario. 39 p.

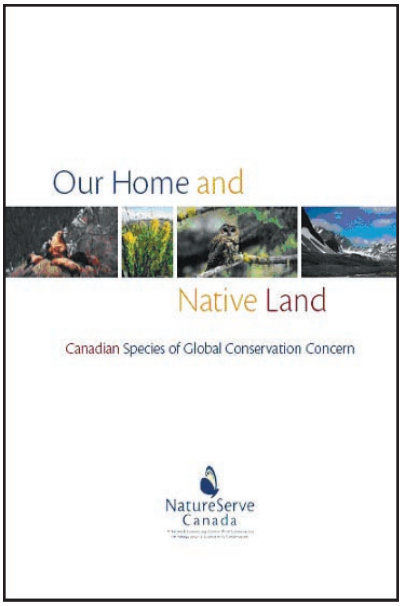
Tardif, B., G. Lavoie, and Y. Lachance. 2005. Québec Biodiversity Atlas. Threatened or Vulnerable Species. Gouvernment du Québec, Ministère du Développement durable, de l'Environment et des Parcs, Direction du développement durable, du patrimoine écologique et des parcs, Québec. 60 pp.

Data Supplied by NHIC Supports the Assessment of Species of Global Conservation Concern in Canada

The Ontario Ministry of Natural Resources (MNR), Natural Heritage Information Centre (NHIC) receives and manages rare species, community and natural areas data supplied from a wide range of conservation partners across Ontario. The NHIC compiles and maintains this information in support of local, regional, provincial, national and global biodiversity conservation initiatives. NHIC information was utilized along with similar data from other natural heritage programs across Canada, to produce the first review of the global status of species in Canada.

The report, *Our Home and Native Land: Canadian Species of Global Conservation Concern*, provides a comprehensive examination of Canadian species in a global context, complementing the local and national perspectives used in other important studies and listing processes carried out by agencies of provincial and federal government.

The report was produced by NatureServe Canada, which is a non-profit organization that represents the network of Canadian natural heritage programs. The international NatureServe network of natural heritage pro-



grams is the leading source for information on rare and endangered species, ecosystems, and natural areas across the western hemisphere.

The report concludes that Canada still has the opportunity to sustain nearly its entire diversity of native plant and animal species. The report reviewed 5,685 native species, including vascular plants and the best-known groups of animals, and found that 362 of them, or 6.4%, are of global conservation concern. Of these species, 22% occur in Ontario. Further, 68 of these species are endemic to Canada, meaning they are found in no other country.

The identification of Canadian species which are of conservation concern in a global context is useful in prioritizing conservation efforts, including directing the review of species for species at risk designation, both nationally and provincially.

The NHIC appreciates the support from all providers of conservation data in Ontario and is pleased to make this information available for the advancement of global biodiversity conservation. In a very real sense, NHIC partnership data is acting local and thinking global.

A copy of the report can be downloaded from: http://www.natureserve.org/aboutUs/canadareport.jsp.

Jim Mackenzie

S. Dodsworth - NHIC Archive

NHIC's Rare Species Observation Form version 2.0 integrates GIS, GPS data capture, and customized data entry.

NHIC Revamps Electronic Data Capture Tool

After a field season of assessment, NHIC's electronic field form application has undergone major transformations since it's initial development in 2004. Field testing revealed various inefficiencies and areas for improvement, yielding a completely redesigned application: NHIC's Rare Species Observation Form version 2.0. Like its predecessor, this application, designed on ESRI's ArcPad Software, integrates Geographic Information Systems (GIS), Global Positioning Systems (GPS) data capture and customized data entry. Version 2.0 incorporates a host of functionality upgrades and was developed entirely from a field-based perspective. Upgrades include a redesigned user-friendly interface, all NHIC-tracked elements on demand, and the ability to enter multiple observations per site. With much increased efficiency, one of the largest advantages of version 2.0 is the speed of data entry, at an estimated three to five minutes per observation. All spatial and attribute data is written to a file in NHIC data format, eliminating data transcription time and streamlining the data capture process.

Developed in support of the 2005 Element Occurrence Mapping Project, this two phase project, consists of a single application loaded with both point (phase 1) and polygonal (phase 2) data capture abilities. Phase one is now complete, while phase two is scheduled for completion by the upcoming 2006 field season.

Simon Dodsworth

NHIC Joins New Biodiversity Section of MNR

To better support the Ontario Ministry of Natural Resources (MNR) new strategic direction outlined in *Our Sustainable Future*, the Natural Heritage Information Centre (NHIC) has been moved into the new Biodiversity Section of the Fish and Wildlife Branch. The NHIC joins the Species At Risk (SAR) program and many other biodiversity conservation programs and initiatives including wetlands conservation, aquatic invasive species, Conservation Land Tax Incentive Program (CLTIP), Eastern Habitat Joint Venture (EHJV) and education and stewardship programs within the Biodiversity Section. The Biodiversity Section will also be taking a lead coordination role on MNR's program to support *Ontario's Biodiversity Strategy – Protecting What Sustains Us*.

The NHIC and its wide network of conservation partners is recognized as providing key strategic support to biodiversity conservation in Ontario. Within the Biodiversity Section, the NHIC will be better positioned to:

- Directly support and integrate with Species At Risk programs
- Directly support implementation of Ontario's Biodiversity Strategy
- Support an ecological balancing of MNR's Fish and Wildlife Program
- Bring international network resources to support information management and tracking of invasive species
- Support conservation stewardship programs with natural heritage information and conservation planning tools

The Fish and Wildlife Branch and the Natural Resource Management Division of MNR are very pleased to have the NHIC and its wide network of conservation partners working with us towards our sustainable future.

Cam Mack

Director, Fish & Wildlife Branch

Publication Notices

Vlasman, K. 2005. **Atlas of the Mammals of Hamilton**. *Hamilton Field Naturalists' Club. 136 pp.*

The *Atlas of the Mammals of Hamilton* by Kara Vlasman, an MNR Species At Risk Biologist in Guelph District, has been prepared using information from archaelogical, historical and more recent sources. It includes a map and species account for all of the mammals, including extirpated species, that are known from the City of Hamilton. Each map page includes a photo of each species and is in full colour. The text concentrates on the historical changes, if any, of each species' occurrence and gives a quick summary of its distinguishing characteristics and behaviour.

There are 45 species of mammals in Hamilton today and eight others that are considered extirpated. Most of the species we have today are considered common (33 of the 45) but a number are rare and some have not been recorded for many years. One extinct species, the mastodon, is also dealt with. There are introductory sections about the Hamilton area, its changing landscape, and previous studies of mammals in the Hamilton area.

For further information and ordering instructions see http://www.hamiltonnature.org/publications/mammalatlas.htm.

Ontario. 2005. **Protecting What Sustains Us: Ontario's Biodiversity Strategy**. 44 pp.

Ontario's Biodiversity Strategy was released in June 2005 by Natural Resources Minister David Ramsay. This strategy recommends actions by government, non-government and private sector organizations to protect, and preserve our natural heritage and variety of life. The strategy was developed by a broad range of contributors, including representatives of industry, environmental groups and government agencies, as well as members of the public. A 21-member Biodiversity Council will coordinate its implementation. The Strategy can be viewed at http://www.mnr.gov.on.ca/mnr/biodiversity.

Metcalfe-Smith, J., A. MacKenzie, I. Carmichael, and D. McGoldrick. 2006. **Photo Field Guide to the Freshwater Mussels of Ontario.** *St. Thomas Field Naturalists' Incorporated, St. Thomas, Ontario.*

As part of a continuing series of photographic field guides, a new guide to the freshwater mussels of Ontario is now in press and will be available in January 2006. This guide covers Ontario's 41 species of freshwater mussels, many of which are rare or endangered. The pocket-sized identification guide contains high quality colour photos to assist with identification as well as information on habitat, life history, and conservation. Retailing for $10.00, the book can be ordered from the St. Thomas Field Naturalists Inc., P.O. Box 23009, St. Thomas, Ontario N5R 6A3.

Cobb, B., E. Farnsworth, and C. Lowe. 2005. **Field Guide to Ferns and Fern Allies of Northeastern and Central North America. Second Edition**. The Peterson Field Guide Series, Houghton Mifflin Company, Boston. 417 pp.

For fifty years Broughton Cobb's *Field Guide to Ferns* was a standard reference for naturalists in northeastern and central North America. A completely revised second edition contains a wealth of new information and updates the taxonomy and nomenclature to current standards. The addition of colour photos, new line drawings, and identification keys make this an invaluable resource for those wishing to identify our local ferns and fern allies. This new addition retails for $28.95 in Canada and is available in many bookstores.

Marshal, S.A. 2006. **Insects: Their Natural History and Diversity, with a photographic guide to insects of eastern North America**. Firefly Books Ltd. 704 pp.

Although not yet published, this book is "in press" and will be available in April or May 2006. *Insects: Their Natural History and Diversity* is an impressive volume containing 4,000 colour photographs, illustrations, charts, bibliography, and index. This volume will allow users to quickly and accurately identify most insects to the family level. The more than 50 pages of picture keys, containing hundreds of illustrations, lead to the appropriate chapter and specific photos to confirm identification. The keys are comprehensive and easy for non-specialists to use. Dr. Steve Marshall of the University of Guelph has produced an attractive and useful book which will be very valuable to naturalists, biologists, and entomologists in Ontario and throughout eastern North America.

Michael Oldham

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