# Field Botanists of Ontario

## Newsletter

Summer 2003
Volume 16(2)
ISSN: 1180-1417

**Bush Honeysuckle (*Diervilla lonicera* L.)**
**Photo by Ed Morris**

*FIELD BOTANISTS of ONTARIO*

## FIELD BOTANISTS OF ONTARIO NEWSLETTER

Published quarterly by the FBO. ISSN: 1180-1417.

*The FBO is a non-profit organization founded in 1984 for those interested in botany and conservation in the province of Ontario.*

**www.trentu.ca/fbo/**


| | | |
|---|---|---|
| **President:** | Carole Ann Lacroix, Botany Dept., University of Guelph, Guelph, ON. N1G 2W1 | (519) 824-4120 ext. 8581<br>botcal@uoguelph.ca |
| **Vice President:** | Dirk Janas, 301 Taylor Mills Drive North, Richmond Hill, ON. L4C 2T8 | (905) 737-6094<br>djanas@gartnerlee.com |
| **Treasurer:** | George Bryant, 89 Constance St., Toronto, ON. M6R 1S7 | (416) 762-7941<br>naturalhistorytravel@sympatico.ca |
| **Secretary:** | Nick Hodges | nhodges.ecotec@aztec-net.com |
| **Past President:** | Madeline Austen | (905) 854-4994<br>Madeline.Austen@ec.gc.ca |
| **Membership:** | Bill McIlveen, RR#1, Acton, ON. L7J 2L7 | (519) 853-3948<br>wmcilveen@aztec-net.com |
| **Field Trips:** | Mary Ann Johnson<br>c/o North-South Environmental Inc.,<br>PO Box 518, Campbellville ON. L0P 1B0 | (519) 837-1767<br>mjohnson@nsenvironmental.com |
| | Sarah Mainguy, RR#3, Guelph, ON. N1H 6H9 | (519) 822-5221<br>mainrod@sympatico.ca |
| **Newsletter Editor:** | Ed Morris, Box 2, Site 29, RR#3, Sudbury, ON. P3E 4N1 | (705) 522-1972<br>edmorris@ican.net |
| **Associate Editors:** | Michael J. Oldham | (705) 755-2160<br>michael.oldham@mnr.gov.on.ca |
| | Allan Harris | (807) 344-7213<br>aharris@tbaytel.net |
| **Website**: | Kellie Bonnici | (705) 741-3061<br>kbonnici@home.net |

The **deadline** for submissions for **Volume 16(3) - Fall 2003** is **October 21th, 2003**.

Standard source for scientific names of vascular plants:

Newmaster, S.G., A. Lehela, P.W.C. Uhlig, S. McMurray and M.J. Oldham. 1998. Ontario Plant List. Ontario Ministry of Natural Resources, Ontario Forest Research Institute, Sault Ste. Marie, Ontario. Forest Research Information Paper No. 123, 550 pp. + appendices.

---

# Editorial Style Note:

As a rule, I have included full scientific names in both field trip reports and feature articles. It is my preference to maintain this practise, but do agree that a few exceptions can and should be made. For example, in the article on the following page, the author refers to a forest dominated by Sugar Maple and American Beech. The author had included full scientific names, including authors and subspecies, which made the sentence rather awkward to read. From now on, I may choose to omit scientific names of abundant tree species, particularly when used to describe a forest stand or community.

Ed Morris, Editor

# Field Trip Reports:

## A Fen-tanstic Day at Wye Marsh

Saturday, 31st May 2003

When it was announced that Dr. Anthony (Tony) Reznicek would be leading a botany trip, many FBO members, including myself, tried to register for it. With this unprecedented demand the initial quota of 15 participants was doubled and Bob Bowles (another expert) was added as co-leader. Tony and Bob are synonymous with the vascular plant flora of Simcoe County. The fen at Wye Marsh, with these leaders and its botanic riches, was 'the' place to be for plant enthusiasts.

This was one of those rare trips where all of the biophysiographic elements of a fascinating site were expertly interpreted. Tony and Bob clearly explained the glaciation, hydrology, human history, microclimate, ecological succession and current species and community distribution at the site. We all appreciated that Tony used "his best undergraduate lecture hall voice" when addressing this relatively large group.

After some introductory comments and arranging local car-pooling at the visitor's centre, we drove to the south boundary of the Wye Marsh Provincial Wildlife Area. We began on a sandy upland in a mature Sugar Maple-American Beech forest[1] on the ancient glacial beaches of Georgian Bay. We discussed the influences of local, small scale disturbance on forest vegetation and how light is such a precious commodity for selected orchids and sedges adapted to life on the forest floor. Species like Back's Sedge (*Carex backii* F. Boott), with its enlarged pistillate bracts, the early flowering Fibrous-rooted Sedge (*Carex communis* L. Bailey), and the enigmatic Cancer-root (*Conopholis americana* (L.) Wallr.) were pointed out. I was intrigued to learn that the familiar White-grained Mountain Rice Grass (*Oryzopsis asperifolia* Michx.) is one of few grasses with somewhat petiolate leaves and that they are more glaucous above than below.

As we moved down slope from the sandy uplands we descended the Algonquin Bluff, which was a short, but steep ridge. Along the way we had a look some trailside graminoids such as Poverty Oat Grass (*Danthonia spicata* (L.) P. Beauv. ex Roemer & Schultes), Drooping Wood Sedge (*Carex arctata* Boott), Bald Sedge (*Carex tonsa* (Fern.) Bickn.), and Long-stalked Sedge (*Carex pedunculata* Muhl. ex Willd.). The low stature of Bald Sedge and the long basal peduncles, which wilt when mature, of Long-stalked Sedge encourage seed dispersal by ants. The perigynia of both species have eliasomes, which are modified structures, which in these species contain sugary substrates that are attractive to dispersal agents such as ants.

Soon our descent leveled off and the forest and understorey changed markedly. This was because we came to a series of springs, which were 'flagged' by a reliable indicator: Rough Sedge (*Carex scabrata* Schwein.). The springs formed at the base of the slope because groundwater drainage, percolating through the adjacent uplands, reached the local water table and moved laterally to where it emerged in seepage areas. The pools are relatively fertile because the water dissolved nutrients from the lime-rich substrates in the upland parent material. Beneath the canopy of Eastern White Cedar (*Thuja occidentalis* L.) we noted Hobblebush (*Viburnum lantanoides* Michx.), Northern Maidenhair Fern (*Adiantum pedatum* L. ssp. *pedatum*), Dwarf Scouring-rush (*Equisetum scirpoides* Michx.), Yellow Marsh-marigold (*Caltha palustris* L. ssp. *palustris*), and Jack-in-the-pulpit (*Arisaema triphyllum* (L.) Schott ssp. *triphyllum*).

As we moved away from the springs, towards the fen, Tamarack (*Larix laricina* (Duroi) K. Koch) and Black Spruce (*Picea mariana* (Miller) B.S.P.) began to dominate the open canopy. Here we encountered the inappropriately named Northern Bog Violet (*Viola nephrophylla* (E. Greene), Buckbean (*Menyanthes trifoliata* L.), with its fringe-petaled flowers and the enchanting Small Yellow Lady's Slipper (*Cypripedium calceolus* L.). Bob told us of insects that can live their entire life in the water held in the leaves of the Pitcher Plants (*Sarracenia purpurea* L.) that we were seeing everywhere. This habitat also supported the regionally rare

"Here is a photo that I took during the FBO outing to Wye Marsh when Tony and I found a new plant the day before when we scouted out the trip... The photo [is] of the Sandberg's Birch (*Betula* x *sandbergii* Britton)... We found four trees (mostly shrubs) and all [were] at or near the edge of the fen. We have never found Dwarf Birch [*Betula pumila*] in Simcoe County, so it makes you wonder [how we have] the hybrid."

Photo and caption by Bob Bowles

[1] See editorial style note at the bottom of page 2.

Crossing a beaver dam (across a tributary of the Wye River) while tony looks on; the hill and the fen we hiked through are in the background. Photo and caption by Paul O'Hara.

Poison Sumac (*Rhus vernix* L.). Although still leafless, this southern disjunct could still lay a hurtin' on an unwary naturalist.

Continuing north, we finally encountered the featured habitat and all of those green, leafy things that characterize it. You couldn't swing a dead cattail without hitting Beaked Spike-rush (*Eleocharis rostellata* (Torr.) Torr.) or Hard-stem Bulrush (*Scirpus acutus* Muhl. ex Bigel.) but the Hoary Willows (*Salix candida* Fluegge ex Willd.) were widely scattered. I couldn't help but think of comedy legend Steve Martin and his "Let's Get Small" album when Tony began to point out the following series of diminutive monocots: Yellow Bog Sedge (*Carex gynocrates* Wormskj. ex Drejer), Sterile Sedge (*Carex sterilis* Willd.) and Hudson Bay Bulrush (*Scirpus hudsonianus* (Michx.) Fern.). Rounding out his list of dwarf species were both the green and red morphs of Heart-leaved Twayblade (*Listera cordata* (L.) R.Br.), which were blooming side by side in an island of Black Spruce. Other fen residents included Tussock Sedge (*Carex stricta* Lam.), Buxbaum's Sedge (*Carex buxbaumii* Wahl.), Ohio Goldenrod (*Solidago ohioensis* Riddell) and Balsam Groundsel (*Senecio pauperculus* Michx.).

The diversity of the fen was enhanced by the presence of mossy hummocks, which provided microhabitats more typical of bogs. Because these sites are raised above the surface waters of the fen, they often have lower pH (enhanced by conifer leaf litter) and nutrient levels. Their primary source of moisture is precipitation. The only Bog Laurels (*Kalmia polifolia* Wangenh.) that we found today were on hummocks. Pink Lady's Slipper (*Cypripedium acaule* Ait.), which is normally found on dry, upland, acidic sites, was also seen on a hummock by a lucky few.

With our estimated lunch time well behind us (and rumblings of mutiny), we reluctantly left the fen and made our way to a more sheltered spot to eat. Back in the rich forest were found a good variety of common ferns, dwarf evergreen shrubs and a few more Heart-leaved Twayblades. We then began the long, gradual ascent back up the slope. The birders were treated to Sandhill Cranes and Red-shouldered Hawks, and the mycologists identified Yellow Morels (*Morchella esculenta* (L.:Fr.) Pers.) and Hexagonal-pored Polypore (*Polyporus alveolaris* (DC.) Bond & Singer).

Hiking through the fen. Photo by Paul O'Hara.

Today was one of those perfect days to be in the field - no rain, not much wind, few biting insects, and not too hot. This was one of those trips where you felt like you learned a lot, but weren't over-saturated with information. However, for an unfortunate few, who didn't successfully navigate the 'stable' beaver dam, there were a few saturated socks! Thanks Tony and Bob, for sharing with us a few of the secrets of your local patch!!

Burke Korol
Huntsville, ON

## Cameron Ranch Alvar

June 8th, 2003

The lowing of cows greeted us as we crossed through the gate marked with a weatherbeaten sign saying "Cameron Ranch". For many people, this was their first glimpse of the Cameron Ranch Alvar, a property recently purchased by the Nature Conservancy of Canada. Cameron Ranch is the heart of the Carden alvar - a rich mosaic of natural grasslands, shrublands, wetlands, and alvar communities, with vibrant populations of songbirds and other wildlife. The Cameron Ranch is the largest single property 1160 ha (2,869 acres) on the Carden Plain. Its purchase, together with an adjacent (40 ha (100 acre) property already owned by The Nature Conservancy of Canada, secured a block of about 1200 ha (3,000 acres) of natural lands.

Dale Leadbeater and James Kamstra led us to a section of the alvar called the "corral". There Dale told the group some facts about alvar communities. Alvars occur only on limestone bedrock with little or no soil, where spring flooding and summer drought create harsh conditions. Alvars are globally imperilled communities, occurring only in the south of Sweden and scattered around the Great Lakes Basin. Carden Township's alvars are thought to be among the richest in the province, with a great diversity of alvar species.

Some species encountered during the first part of the trip included plants largely restricted to alvars, such as:

*Calamintha arkansana* (Nutt.) Shinners
Wild Calamint

*Carex richardsonii* R. Br.
Richardson's Sedge

*Cerastium arvense* L.
Field Chickweed

*Dracocephalum parviflorum* Nutt.
American Dragonhead

*Geranium bicknellii* Britt.
Bicknell's Crane's-bill

*Hedyotis longifolia* (Gaertn.) Hook.
Long-leaved Houstonia or Venus'-pride

*Penstemon hirsutus* (L.) Willd.
Hairy Beard-tongue

*Ranunculus fascicularis* Muhl. ex Bigelow
Early Buttercup

*Senecio pauperculus* Michx.
Balsam Ragwort

Alvar plants do not compete well with common weeds. Alvar habitats can be very damaged by disturbance and the introduction of weed seeds. We saw some evidence of this, as the area at "the corral" was dominated by Field Cress (*Lepidium campestre* (L.) R.Br.).

After a quick break for lunch, the troop split into three groups in order to spend the remainder of the day preparing an inventory of the ranch based on a checklist for the Carden Plain provided by Dale and James. Each group surveyed a different section of the many alvar communities found at the Cameron Ranch. My group surveyed a section north of the corral, which we classified as Shrub Alvar dominated by Red-Panicled Dogwood (*Cornus foemina* Miller ssp. *racemosa* (Lam.) J.S. Wilson).

After surveying the site for approximately an hour, the groups returned to the corral to compare notes. Notable plant species seen by the groups included White Camass (*Zigadenus elegans* Pursh. ssp. *glaucus* (Nutt.) Hultén), Indian Paintbrush (*Castilleja coccinea* (L.) Spreng.), and Crawe's Sedge (*Carex crawei* Dewey). A more complete plant list will likely be compiled from the information collected during the field trip. This will aid the Nature Conservancy and the Couchiching Conservancy in developing a management plan for the site.

Melinda J. Thompson

## FBO Trip to Joker's Hill

July 12th, 2003

Despite an overcast day and an occasional rain shower, the weather did not prove to be any great problem for the approximately 25 participants (Fig. 1) on the FBO outing to look at the interactions of plants and insects. In fact, the temperature was not too hot and there were numerous insects to be found. The leaders for this trip were Marc Johnson, Carl Rothfels, and Will Godsoe. Marc is a Ph.D candidate at the University of Toronto, Carl is employed by the Royal Botanical Gardens, and Will is an undergraduate at the University of Guelph.

The trip took place on the Koffler Scientific Reserve at Joker's Hill located about 3 km southwest of Newmarket. The 1000 acre parcel of land was recently donated to the University of Toronto by the Kofflers (of Shopper's Drugmart fame) in order to support biological research. It is located on the Oak Ridges Moraine and therefore has a rolling topography of uplands and wet areas that form the headwaters of streams that flow towards Lake Ontario. The property is extensively covered in woodlands, both as natural stands and plantations. The land has relatively few invasive plants and measures are being taken to prevent the spread of those species that do occur. The site therefore provides tremendous opportunities for conducting ecological research.

The first item on the trip agenda for the day was a taste test. The leaders handed around small samples of Mossy Stonecrop (*Sedum acre* L.) for the participants to chew. The slightly peppery taste was illustrative of the first of three main types of strategies plants use to cope with herbivores. This was an example of the mechanism known as "constitutive defences" present in many plants; these are defences that are always present, at the ready to thwart would be herbivores. Examples of such defences include the presence of a chemical compound (such as that which caused the Stonecrop to have the peppery taste), or the development of physical barriers such as bark, thorns, or hairs. The second response is "induced defences" in which new chemicals are formed *de novo* following an attack by insects. These chemicals are not present unless the plants are attacked by some agent and they are effective at reducing future herbivory. The third response is "tolerance" to being attacked. In this situation, the affected plant simply tries to replace or outgrow the lost tissue. A classic case of tolerance is demonstrated by grasses that are able to sustain repeated cutting or cropping. When it is considered that lawns are maintained by regular mowing by that super urban herbivore 'the lawnmower", one starts to appreciate the magnitude or capacity of plants to respond in this manner.

Figure 1. Members of FBO listening to discussions about forest ecology on field trip at Joker's Hill, July 5, 2003.

Plants have other important interactions with insects and other organisms. Parasites, pathogens, and herbivores can regulate plant populations under the conditions imposed through evolution. Such is the case with Garlic Mustard (*Alliaria petiolata* (M. Bieb.) Cavara & Grande). Because few pathogens or parasites specific to the species accompanied it when it was introduced to North America, Garlic Mustard has become a major pest. In its native Europe, the situation is quite different and the plant populations are maintained in smaller numbers. The importance of insects as a controlling influence on this weed are therefore evident. At one location, the effect of ant activity in controlling vegetation around an anthill was evident (Fig. 2). The ants damage the roots of goldenrod within about 30 cm of the margin of the anthill and none of these plants could develop, while grasses appear little affected. The sun could therefore readily warm the colony.

Plant species can identify and react to individual insect

Figure 2. The vegetation around the ant colony has been controlled by the ants which damage the roots of goldenrod plants. The ant hill is opened up to receive more sunlight.

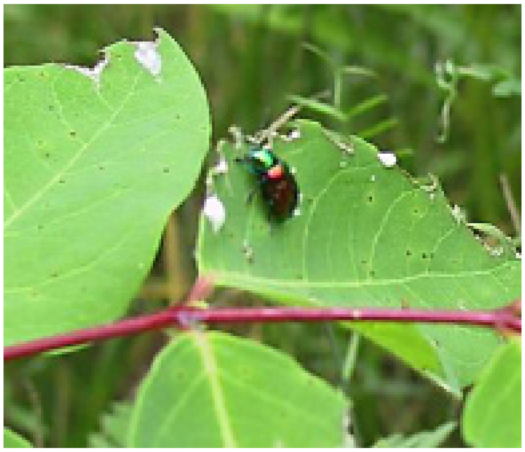


Figure 3. Dogbane Beetle feeding on Spreading Dogbane (*Apocynum androsaemifolium* L.). Note white latex oozing from damaged edge of the leaf.

species and respond accordingly via specific defence strategies tailored for that species. For example, flea beetles (Chrysomelidae), Three-lined Potato Beetle *(Lema trilinea*; Chrysomelidae), Tortoise Beetle (*Plagiomatriona clavata*), and slugs (Limacidae and Arionidae) are all recognized individually by Climbing Nightshade (*Solanum dulcamara* L.). The response of plants to counter the effects of insect attacks is a tradeoff by the plants with respect to their investment of resources. In effect, they must either use their energy and other resources against the herbivores by increasing the amount of energy invested in producing a large number of seed (to provide the greatest potential for species propagation) or by using that energy to form defensive chemicals or other mechanisms that will reduce the rate herbivore attack but give a greater assurance that seed will be produced although the numbers of seed will be less.

The chemical constituents of Common Milkweed (A*sclepias syriaca* L.), composed of both latex and cardinolides (a heart-stopping compound) have been extensively studied. It has been established that these chemicals are accumulated in the tissues of the caterpillars of the Monarch Butterfly (*Danaus plexippus*) that feed on the Milkweed foliage thereby rendering the insect either toxic or distasteful to predators. Less well known is the dense cover of hairs on the leaves of these plants that act as a physical barrier to insects. Tannins, which are present in notable concentrations in the tissues of conifers and other species such as oak, act to protect the plant in another way. When the plant tissue is consumed, the tannins bind to proteins in the gut of insects and slows their rate of food digestion. While this mechanism by itself will not greatly influence the life of the insects involved, it will diminish their overall performance and thus slow the rate of growth of the insect population. Some plant species such as grass, and notably Horsetails (*Equisetum* sp.), contain high concentrations of silica. The silica acts as a physical barrier that slows the rate of feeding by insects. In air, the latex produced by certain plants such as Milkweed and Dogbanes (*Apocynum* spp.) will start to solidify and gum up the mouthparts of most insects that attempt to feed on the tissues. Some species have found the means to overcome this problem, including the Monarch Butterfly, the Milkweed Tussock Moth (*Euchaetes egle*, Arctiidae), and the Dogbane Beetle (*Chrysochus auratus*, Chrysomelidae) (Fig. 3), by severing the latex carrying tissues.

Figure 4. Flower of Clammy Ground-cherry (*Physalis heterophylla*).

Recently, it has been recognized that volatile compounds released by Solanaceous species, like Clammy Ground Cherry (*Physalis heterophylla* Nees) (Fig. 4), attracts parasitoids that attack insects that would otherwise feed on this plant species. This relationship is an “indirect” means of self protection and has likely evolved as a [plant-parasitoid co-adaptation] to reduce herbivory. Work is underway on the Joker’s Hill property to determine whether the phenomenon is working under field conditions as well.

Herbivorous insects that feed on the surface of plants could be quite vulnerable to attack by many predators and many have adapted different strategies to avoid this threat. This includes seeking shelter within the plant tissues themselves. One group has taken to feeding within the tissues of leaves. This necessitates that the particular insects involved are rather small so as to fit withing the narrow confine between the upper and lower epidermis of single leaves. At least five different leaf miners of at least three rather different insect types were noted without taking the time to search for others during the trip. One was a miner (*Leucanthiza dircella* Gracillariidae) that caused large blotches on the foliage of Leatherwood (*Dirca palustris* L.), while the others were a fly (*Phytomyza aquilegiae*, Agromyzidae) that attacks Wild Columbine *(Aquilegia canadensis* L.) (Fig. 5), a sawfly (*Fenusa pusilla,* Tenthredinidae) that is common leaf mining pest of Paper Birch (*Betula papyrifera* Marshall), and a moth (*Phyllocnistis populiella,* Gracillariidae) that causes a distinctive Serpentine Mine on the leaves of poplar (*Populus* spp.) species. Leaves of Sugar Maple (*Acer saccharum* Marsh. ssp. *saccharum*) were injured by the Maple Blotch Leaf-miner (*Cameraria aceriella:* Gracillariidae)

Some insects take the association to a greater level of interaction and cause the cells forming the plant tissues attacked to multiply and form swellings known as galls. A sample of a gall produced on Wood Nettle (*Laportea canadensis* (L.) Wedd.) was examined by the group. A gall formed by the fly *Chirosia betuleti* (Anthomyiidae) on Ostrich Fern (*Matteuccia struthiopteris* (L.) Tod.) and known as a Frond Knotting Gall (Fig. 6) that was mentioned during the walk was discovered later in the day. The familiar Ball Gall that forms on Tall Goldenrod (*Solidago altissima* L. var. *altissima*) was also discussed. Both the plant and the gall-forming fly (*Eurosta solidaginis* Tephritidae) are undergoing in a co-evolutionary game of ping pong; the plant is evolving to cause the gall to be smaller so that parasitoids can more easily reach the young insect, while the fly is evolving to increase the size of the gall to reduce the probability that insect within can be accessed by the ovipositors of the parasitoids.

One of the most interesting finds of the day was the larvae of the Cherry Gall Azure butterfly (*Celastrina* sp.)

Figure 5. Feeding tunnels left by the leaf-mining Agromyzid fly (*Phytomyza aquilegiae*) on the foliage of Wild Columbine (*Aquilegia canadensis* L.).

(Lycaenidae), a species not previously recorded on the property. The larvae feed on the spindle galls that are produced on the foliage of Black Cherry (*Prunus serotina* Ehrh) and Choke Cherry (*P. virginiana*) by the mite *Eriophyes padi* (Eriophyidae) (Fig. 7). Not only was the plant supporting the mites and consequently the butterfly as a secondary beneficiary, but an ant was observed tending the butterfly larvae. Many members of this butterfly family have developed a relationship with ants that obtain a sugary solution released by the larvae.

I am certain that I am not alone in saying that this field trip was extremely interesting and very worthwhile and helped our understanding of the ecological relationships between plants and insects[1]. Not only was the trip informative, but the leaders demonstrated a very great ability to explain the topic. To find such a blend of expertise, knowledge, and enthusiasm among a rather youthful group of botanists/ecologists certainly bodes well for the future of these disciplines in Ontario. It is contagious thing that is sure to invigorate those of us who have been around for some years. Thank you Marc! Thank you Carl! Thank you Will!

W.D. McIlveen

# Feature:

## Common Forest Vascular Plants of Northeastern Ontario.

Edward R. Morris[2]

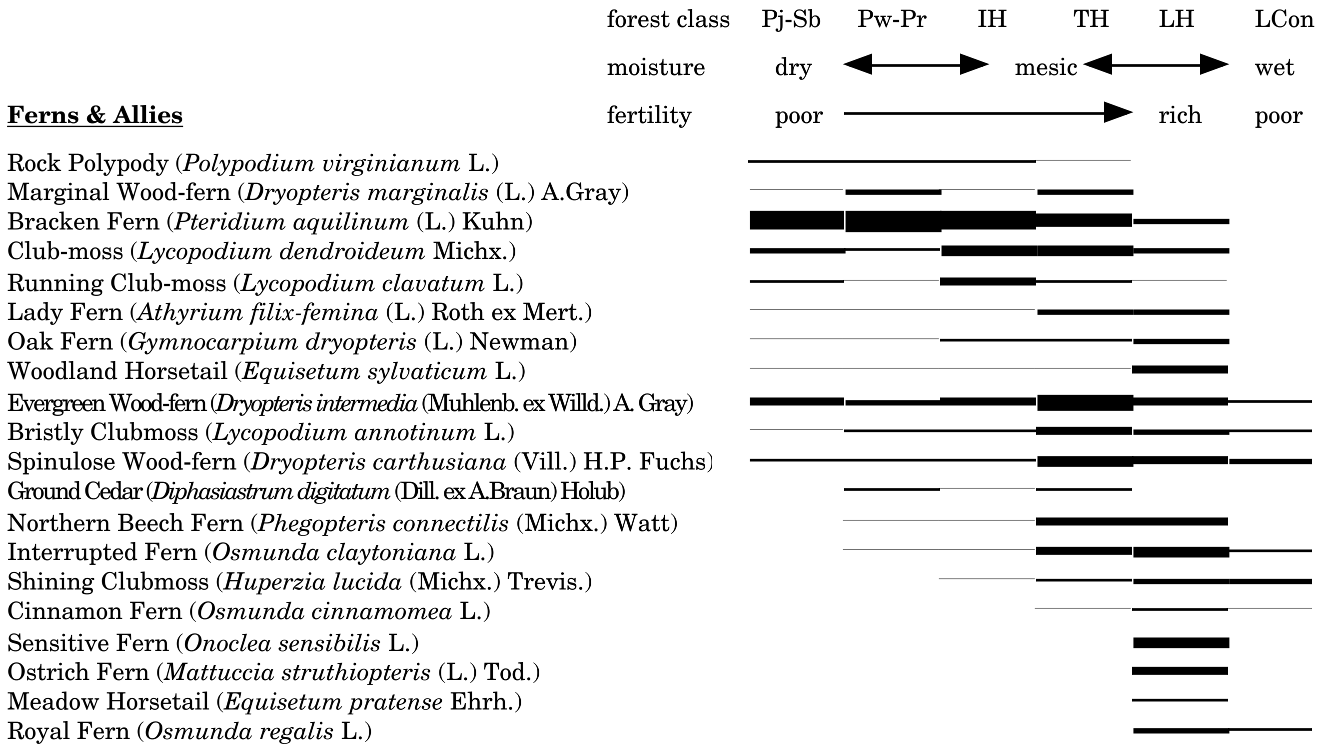
Since joining Ontario Parks in 2000, I have been responsible for conducting or coordinating the inventories of many of the new parks designated under Ontario's Living Legacy (OLL). In essence, OLL was a long-term public lands management policy statement from the Government of Ontario. Under OLL, an additional 189 new conservation reserves, parks and park additions were created in the Northeast Region, covering over 1.1 million ha (2.7 million acres) of land and water. For most individual sites, it would take the better part of a year to produce a detailed life-science inventory. In the more high-profile sites, the Ministry of Natural Resources tendered-out contracts for precisely this kind of work. Over the past three years, consultants have provided the Ministry with detailed life science reports as well as field inventory data from a variety of of forested and non-forested locations (see Bibliography). In this article, I presented a synthesis of these data: mostly in the form of figures. The purpose was to present a list of the most common forest species of northeastern Ontario, as well as allow readers to speculate about the factors which affect the distribution and abundance of various forest species. It has been a challenge not to let this article balloon into a short-course in plant ecology. Ath the same time, these data can be used to illustrate some important relationships between plant species and their environment: hopefully I have found the right balance. The exercise was particularly useful for me, both as a

Figure 6. Typical Frond Knotting Gall *caused by* the Anthomyiid fly *Chirosia betuleti* on Ostrich Fern (*Matteuccia struthiopteris* (L.) Tod.).

Figure 7. Larva of the Cherry Gall Azure butterfly *Celastrina* sp. feeding on Black Cherry Spindle Galls caused by the mite *Eriophyes padi*.

[1] More information about Marc's research and that of his advisor (Prof. Anurag Agrawal) and contemporaries can be found at www.herbivory.com.

[2] Project Biologist, Ontario Parks, Northeast Zone, Ontario Ministry of Natural Resources, 199 Larch St, Suite 404, Sudbury, ON. P3E 5P9.




field botanist and applied ecologist. As a field botanists, I realized my need to improve recognition skills for several common genera and species.

Rather than present a mere systematic checklist, I have arranged species lists in such a way that some important ecological relationships were more apparent. I chose to show the frequency, a measure of commonness, in relation to broad forest categories. I recognized six broad categories of forest in Northeastern Ontario: Jack Pine and Black Spruce Upland Forests (Pj-Sb), White Pine and Red Pine Forests (Pw-Pr), Shade-intolerant Hardwood and Mixedwood Forests (IH), Shade-tolerant Hardwood Forests (TH), Lowland Hardwood Forests and Swamps (LH), and Lowland Coniferous Forests and Swamps (LCon). These are virtually the same forest classes recognized by Chambers *et al.* (1997), except I chose to recognize lowland forests as two distinct classes. Within these broad classes of forests, Chambers *et al.* (1997) described twenty-five separate forest ecosites (See "What is an ecosite?"). To compare and contrast twenty-five forest ecosites would have required a much larger data set. Moreover, it would have been difficult to present such an analysis without getting lost in the details.

The forest classes which developed on a particular site were in large part determined by available moisture and fertility. In the figures which accompany this article, I arranged the forest classes across a range of soil moisture and fertility types. I also arranged the common species according to their distribution across this spectrum. For example: The figure above shows twenty-one fern and fern-allies that are frequently seen in Northeastern Ontario forests, south of the Great Claybelt. After each species listed is a line of variable thickness. The thickness of the line is a reflection of the frequency that this species was encountered in a particular forest class. For example, Bracken Fern was most frequent in Pine and Shade-intolerant Hardwood forests, but was considerably less frequent in other forests.

As you scan down through various species lists, you may be able to pick out species 'guilds:' *groups of species that exploit the same class of environmental resources in a similar way*. As you scanned the list from top to bottom, you may be able to pick-out the following species guilds:

•species of dry, nutrient poor environments;

•species tolerant of a wide range of environmental conditions, though not equally frequent in all forest classes;

•species with relatively low tolerance for extreme environmental conditions, but able to survive in the face of competition;

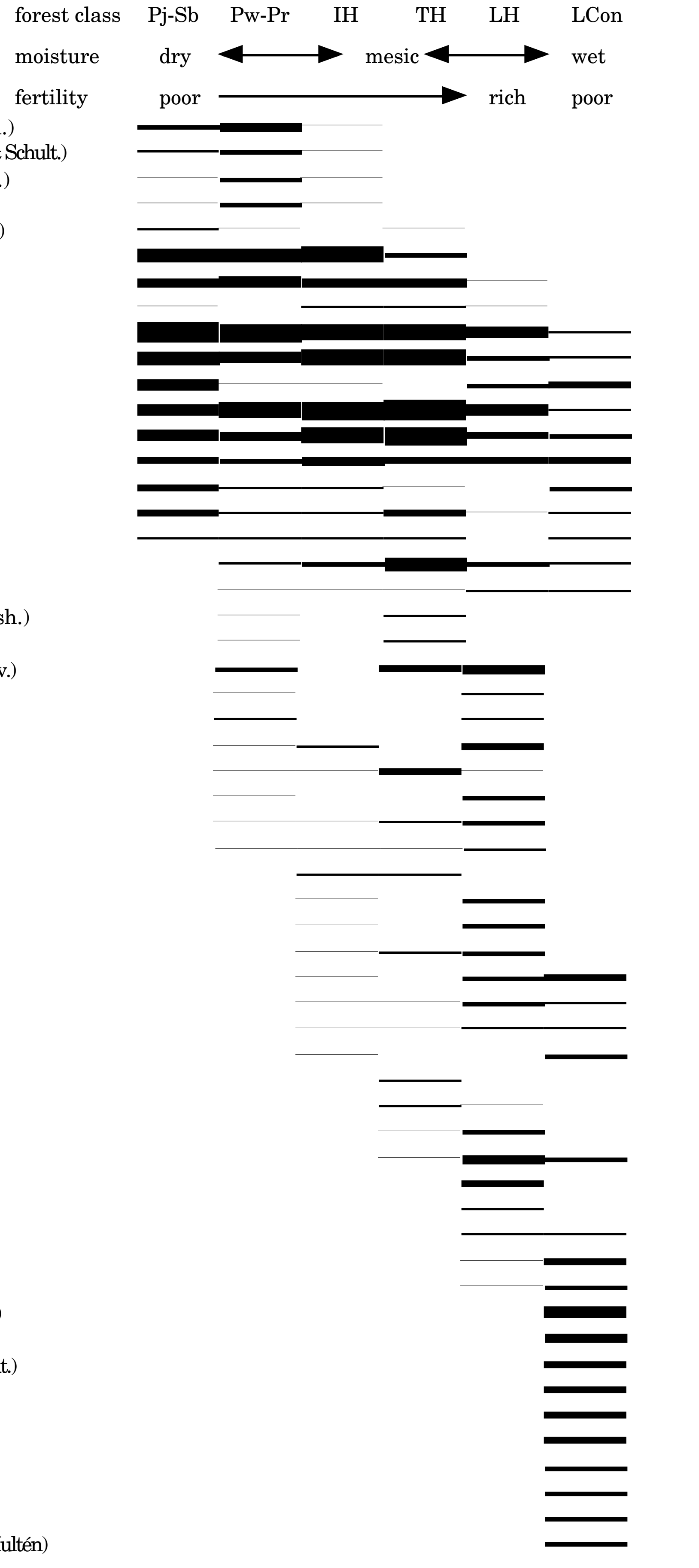
•species which require moist, nutrient rich habitats, some of which may tolerate shade, while others are more likely to be associated with natural openings in the forest canopy; and

•species tolerant of moist, nutrient poor environments, some may be shade tolerant, but most are likely to be associated with natural openings in the forest canopy.

Of course, some of these species guilds are less apparent (and thus more debateable) than others.

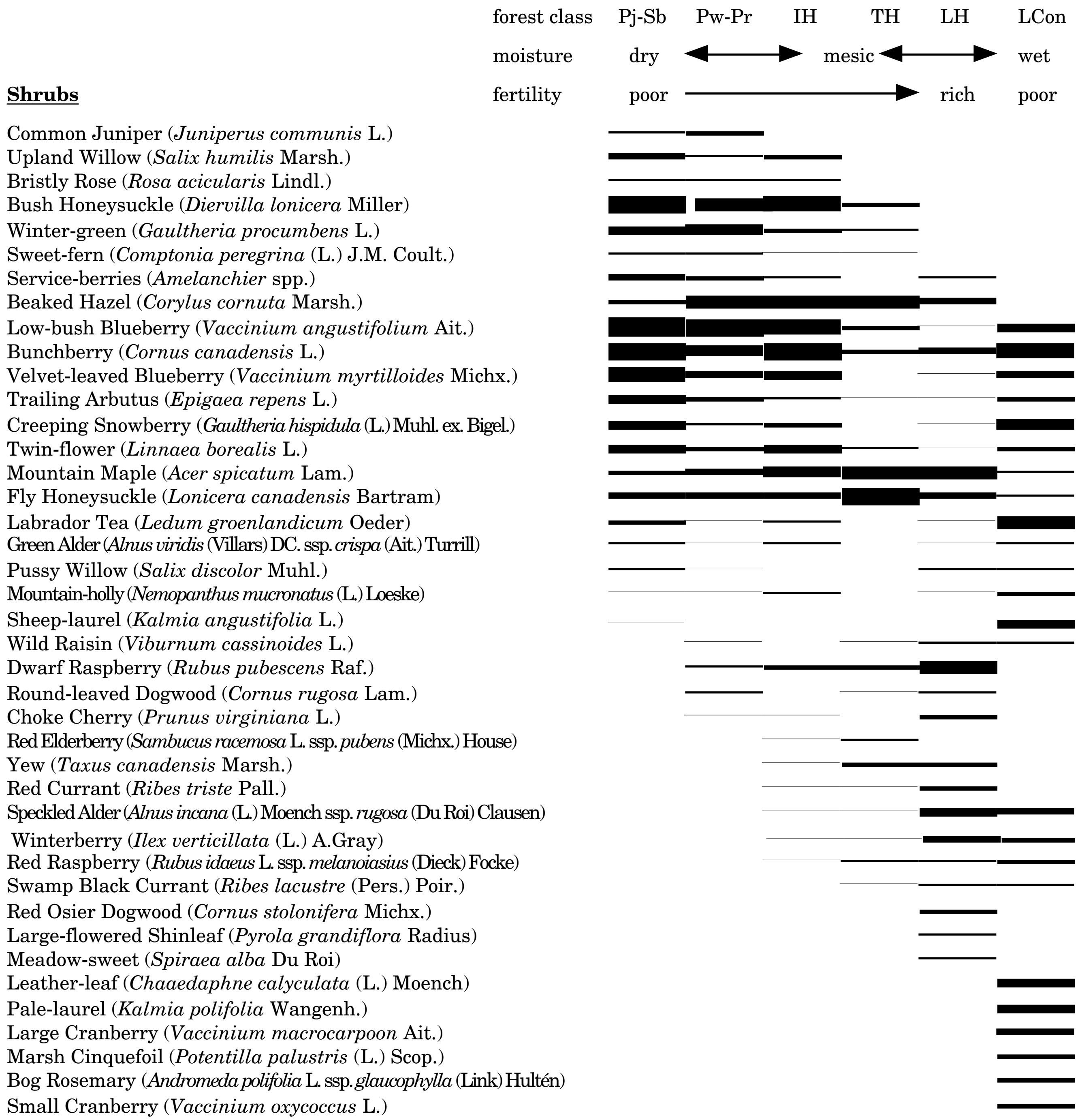
**'Atypical' Forest Species.**

As you reviewed the list, you have may noticed species that were not traditionally described as forest-dwelling species. It was not a mistake that these species were included. Their presence is a reflection that forests are *patchy* environments, containing microhabitats and openings which harbour a variety of species. One could have argued both for and against them as being 'representative' forest species. Patches within the forest may occur as a result of any combination of disturbance or microhabitats created by local physical, geochemical, or hydrological variations in the local environment. Their presence greatly enhanced the species richness within the forest.




**Herbaceous Species**

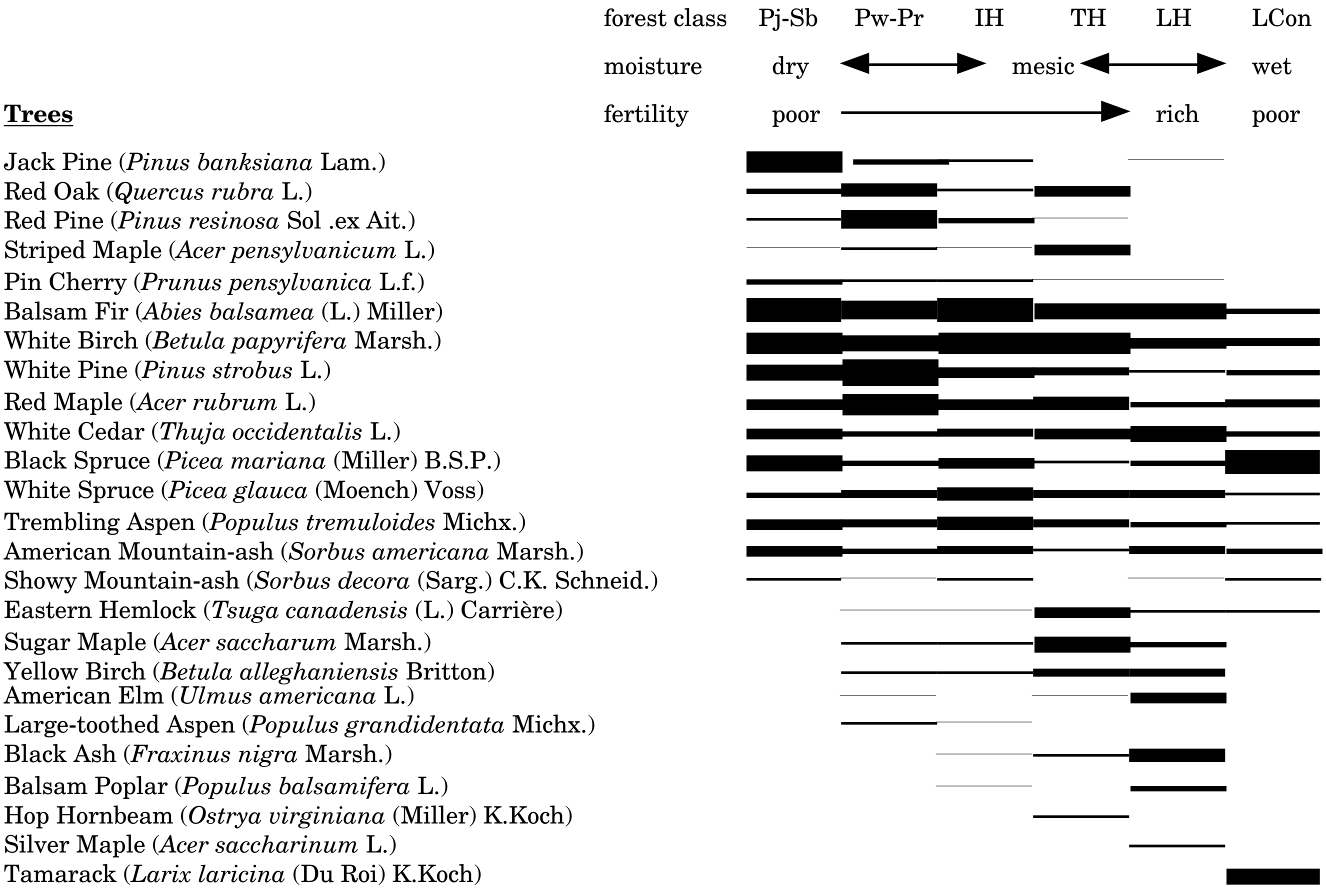
Flexuous Hair-grass (*Deschampsia flexuosa* (L.) Trin.)
Poverty Oat-grass (*Danthonia spicata* (L.) P.Beauv. ex Roem. & Schult.)
Spreading Dogbane (*Apocynum androsaemifolium* L.)
Cow Wheat (*Melampyrum lineare* Desr.)
Black-fringed Bindweed (*Polygonum cilinode* Michx.)
Larege-leaved Aster (*Aster macrophyllus* L.)
Mountain Rice-grass (*Oryzopsis asperifolia* Michx.)
Violets (*Viola* spp.)
Canada Mayflower (*Maianthemum canadense* Desf.)
Blue-bead Lily (*Clintonia borealis* (Ait.) Raf.)
Blue-joint (*Calamagrostis canadensis* (Michx.) P.Beauv.)
False Sarsaparilla (*Aralia nudicaulis* L.)
Star-flower (*Trientalis borealis* Raf.)
Gold-thread (*Coptis trifolia* (L.) Salisb.)
Pink Lady's-slipper (*Cypripedium acaule* Ait.)
Indian Pipe (*Monotropa uniflora* L.)
Rattle-snake Plantain (*Goodyera tesselata* Lodd.)
Rose Twisted-stalk (*Streptopus roseus* Michx.)
Wood-sorrel (*Oxalis acetosella* L. ssp. *montana* (Raf.) Hultén)
Solomon's Seal (*Polygonatum pubescens* (Willd. Marsh.)
Dewey's Sedge (*Carex deweyana* Schwein.)
Bearded Short-husk (*Brachyelytrum erectum* (Schreb.) P. Beauv.)
Filiform-leaved Sedge (*Carex gracillima* Schwein.)
Strawberry (*Fragaria virginiana* Miller)
Fragrant Bedstraw (*Galium triflorm* Michx.)
False Solomon's Seal (*Maianthemum racemosum* (L.) Link)
Calico Aster (*Aster lateriflorus* (L.) Britton)
Naked Mitrewort (*Mitella nuda* L.)
Goldenrods (*Solidago* spp.)
Drooping Wood-sedge (*Carex arctata* Boott)
Joe-Pye Weed (*Eupatorium maculatum* L.)
Northern Bugleweed (*Lycopus uniflorus* Michx.)
Nodding Trillium (*Trillium cernuum* L.)
Three-fruited Sedge (*Carex trisperma* Dewey)
Flat-tooped White Aster (*Aster umbellatus* Miller)
Bladder Sedge (*Carex intumescens* Rudge)
Lakeside Sedge (*Carex lacustris* Willd.)
Indian Cucumber-root (*Medeola virginiana* L.)
White Mandarin (*Streptopus amplexifolius* (L.) DC.)
Wood Anemone (*Anemone quinquefolius* L.)
Tall Meadow-rue (*Thalictrum pubescens* Pursh)
Blue Flag (*Iris versicolor* L.)
Virgin's Bower (*Clematis virginiana* L.)
Spotted Jewel-weed (*Impatiens capensis* Meerb.)
Marsh St. John's-wort (*Triadenum fraseri* (Spach) Gleason)
Cat-tail (*Typha latifolia* L.)
Three-leaved Mayflower (*Maianthemum trifolium* (L.) Sloboda)
Round-leaved Sundew (*Drosera rotundifolia* L.)
Bog Sedge (*Carex magellanica* Lam. ssp. *irrigua* (Wahlenb.) Hiit.)
Wild Calla (*Calla palustris* L.)
Silvery Sedge (*Carex canescens* L.)
Tussock Sedge (*Carex stricta* Lam.)
Bog Aster (*Aster nemoralis* Ait.)
Pitcher Plant (*Sarracenia purpurea* L.)
Star Sedge (*Carex echinata* Murray)
Cotton-grass (*Eriophorum vaginatum* L. ssp. *spissum* (Fern.) Hultén)
Cotton-grass (*Eriophorum virginicum* L.)




***What is an ecosite?***

A ecological community is a very broad and inclusive concept: the species that occur together in space and time. Communities can occur at any ecological scale. Theoreticians have argued that we should not be so preoccupied with the idea of setting boundaries on communites; rather we should focus our studies on interactions between species and their environment.

However, some very important fields of applied ecology and conservation ecology necessitate that land units be given boundaries. Enter Ecological Land Classification: ELC is an hierarchical system of setting units of land into categories, starting with the ecosphere (the earth) and sudividing down to smaller and smaller units. An ecosite is the second lowest level in the hierarchy. It is a "mappable, management-oriented grouping of vegetation which occur at spatial scales ranging from 1:10 000 to 1:50 000. Ecosites have relatively uniform soils and vegetation structure (Taylor *et al.* 2000)." Unlike the definition of an ecological community, an ecosite's scale is defined, as well as the apparent uniformity of the vegetation within it.




**How does species-richness compare between forest classes?**

Species-richness is simply a count of the *number of species which occur within a given area*. It is a component of species-diversity, which takes into account species-richness as well as the *abundance* of each species, expressed as a proportion of the total biomass. Not surprisingly, it is much more time consuming to collect both species-richness and abundance data. The data and analyses presented in this article are derived from species-richness data.

Figure 1 is a plot of cumulative species-richness versus number of plots sampled. For each forest class, the number of species encountered increased as more and more plots were inventoried. However, at some point, the rate at which new species were added falls and the plot line levelled. Note that for some forest classes the plot lines approached different asymptotes. In some forest classes (eg: LH and LCon), the asymptote was not yet reached because too few plots were sampled. Nonetheless, there was sufficient data to make, at least, some preliminary interpretations. Apparently, lowland forests, which are relatively uncommon in the landscape in ecoregions 4E and 5E, support more species than White and Red Pine, Shade-intolerant Hardwood, and Shade-tolerant Hardwood forests, whereas Jack Pine-Black Spruce forests were apparently less rich than all other forest classes.

It is worth mentioning at this time that non-vascular plants can account for a sizeable portion of the biomass in some forest communties. In particular, Schreber's Moss (*Pleurozium schreberi* (Brid.) Mitt.) typically develops into a thick moss mat in Jack Pine-Black Spruce forests. Similarly, arboreal and terrestrial lichens account for significant biomass too. Unfortunately, identification of non-vascular species in the field is very difficult. While an attempt was made to collect non-vascular species during the field visits, we could give no assurances that all non-vascular species were collected from

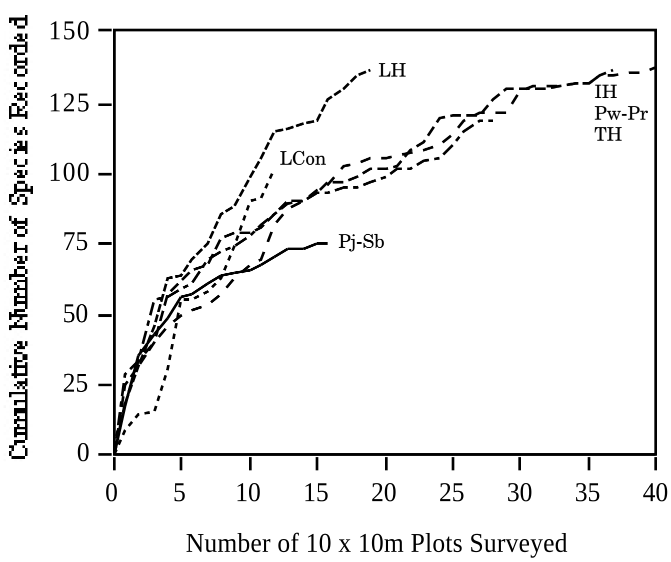



Figure 1: Cumultive number of species recorded versus number of plots surveyed for five broad forest classes found in Northeastern Ontario. LH = Lowland Hardwood Forests; LCon = Lowland Coniferous Forests; IH = Shade-intolerant Hardwood Forests; Pw-Pr = White Pine-Red Pine Forests; TH = Shate-tolerant Forests; and Pj-Sb = Upland Jack Pine-Black Spruce Forests.

each field plot. This approach was sufficient for our studies' orginal intent--inventory--but did not lend itself so well to the analyses presented here.

**Applications for Inventory Studies.**

Figure 1 could also be used to determine how much sampling effort--how many inventory plots--is needed to obtain an adequate inventory of each forest class. If we desired to conduct for a particular site *and* were interested in making comparisons between forest classes, I would suggest that a minimum of twenty 10m x 10m sample plots would be necessary from each forest class. If the purpose was simply to obtain a species list for the area, fewer inventory plots would be required as there were many plant species which occurred in several or even all forest classes. Since the lowland forests were more species-rich than others, and these classes were more likely to include exclusive species (not occurring in other classes), more inventory plots should be located in these forests relative to the others.

### Bibliography

Chambers, B.A., B.J. Naylor, J. Nieppola, B. Merchant, and P. Uhlig. 1997. Field Guide to Forest Ecosystems of Central Ontario. Southcentral Sciences Section, Ontario Ministry of Natural Resources, Queen's Printer for Ontario.

Government of Ontario. 1999. Ontario's Living Legacy Crown Land Use Strategy. Queen's Printer for Ontario.

Mainguy, S.K. (ed.) 2003. Life Science Report: Killarney Signature Site. Prepared by North-South Environmental, Inc. for Ontario Parks, Ontario Ministry of Natural Resources, Queen's Printer for Ontario.

Mainguy, S.K. (ed.) 2001a. Life Science Report: Algoma Headwaters and Adjoining Waterway Provincial Parks. Prepared by North-South Environmental, Inc. for Ontario Parks, Ontario Ministry of Natural Resources, Queen's Printer for Ontario.

Mainguy, S.K. (ed.) 2001b. Life Science Report: Spanish River Provincial Park including Biscotasi Provincial Park and Addition. Prepared by North-South Environmental, Inc. for Ontario Parks, Ontario Ministry of Natural Resources, Queen's Printer for Ontario.

Taylor, K.C., R.W. Arnup, B.G. Merchant, W.J. Parton, and J. Nieppola. 2000. A Field Guide to Forest Ecosystems of Northeastern Ontario (2nd ed.). Northeast Science and Technology, Ontario Ministry of Natural Resources, Queen's Printer for Ontario.

# Reviews:

## Waldron, Gerry. 2003. Trees of the Carolinian Forest: A Guide to Species, Their Ecology and Uses. Boston Mills Press. 275 pages, $24.95

Perhaps no one is more familiar with the trees of southwestern Ontario than Gerry Waldron. He has had 30 years experience in agricultural research, field biology and environmental planning. His home on a family farm near Amherstburg, Ontario has been an excellent base from which to study the trees of southwestern Ontario. Proof of this commitment is readily visible. Field botanists derive considerable satisfaction in finding a new county plant, enhanced further if the plant is new for the province, or even country. Consider if the plant is a tree new to Canada, all species of which should have been recognized for centuries? The author has found or identified not one, but three, species of tree new to Canada: Shumard Oak, Pumpkin Ash and, in November 2002, Swamp Cottonwood. Gerry Waldron loves trees and his affection is abundantly shown in this book.

The contents of this book can be divided into three. The first part cover a range of issues including ecology, biodiversity, forest restoration, history of forests, and an analysis of the centuries-old derivation of that Canadian neologism, "Carolinian Zone". The second part consists of "species fact sheets", very detailed descriptions of the 73 native species considered as Carolinian. For a restoration ecologist, the information per species on how to identify, preserve, propagate and minimize problems is invaluable. This is followed by a glossary, list of resources (restoration, forestry and arboreta), and tables on species distribution by soil and landforms and site appropriate restoration species, the latter reflecting the author's considerable experience in the subject.

The book is greatly enhanced by superb colour photographs by the author and Scott Hughes. These provide lovely and often interesting comparisons between acorns, nuts, leaves and fruit of similar species. The line drawings and tree silhouettes, by the author's son, Ryan Waldron, accompanying each species are also of very high quality.

The author does hold strong opinions about trees and these can be quite entertaining. What is "without peer, our ugliest tree"? Manitoba Maple does not qualify because, "I don't consider Manitoba maple a native, and I am not alone in that view." Admittedly this species does behave like a weed, but surely it was native somewhere in Ontario, at least according to the Ontario Plant List. Who would ever guess the answer is Dwarf Hackberry! In the discussion of Bitternut Hickory, I enjoyed his dismissal of Mockernut Hickory as a putative native species. In this case, his opinion is supported by the OPL. Although the genuine species grows on the south shore of Lake Erie, any purported specimen has turned out to be atypical Shellbark Hickory.

In the Ecological Restoration chapter, I found the discussion of "passive restoration" particulary interesting. A lot of money and time, both contractual and volunteer, can go into plant restorations. Too often the efforts are misguided and subsequent results bear little resemblance to the original target. What if the area was simply fenced and nature let to take its course? This is certainly not a solution in all restoration cases, but the author does provide some interesting comments on the topic.

This book is so thorough and entertaining that any criticism seems petty. To my mind, the one section which is missing and would have enhanced the text is a "where to find" for certain key species. Many Carolinian trees have very limited distribution in Ontario and are impossible to find growing naturally without direction. There are public areas in which Blue Ash, Black Gum and Pumpkin Ash can be viewed. A few sentences on the best sites to observe these and other Carolinian specialties would have been a bonus. One hopes this may be the subject for a follow-up.

George Bryant