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OF THE NIAGARA RIVER GORGE, U.S.A. AND CANADA**

Patricia M. Eckel

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**PRELIMINARY REVIEW OF THE RARE PLANTS
OF THE NIAGARA RIVER GORGE, U.S.A. AND CANADA**

by P.M. Eckel
Clinton Herbarium
Buffalo Museum of Science

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Because of a number of recent proposals to develop the Niagara River gorge and its environment by government and private interests, it was thought important to put together certain information accumulated during work done by the author over the past decade regarding the value of the gorge as a natural resource to the governments of Ontario and New York.

The Niagara River is a strait connecting Lakes Ontario and Erie. The gorge section of the Niagara River extends seven miles from the cataracts of the river, situated beside the cities of Niagara Falls, New York, and Niagara Falls, Ontario, north to the cities of Lewiston, New York, and Queenston, Ontario (Bastedo, in Tesmer, 1981). The Niagara River, including its gorge, forms the international territorial boundary between the United States of America and the Dominion of Canada.

It is not the purpose of this paper to describe in detail the geophysical and biological characteristics of this gorge except in the most general terms. It is oriented generally north-south, with east/west exposures of the steep gorge walls. Gorge depth varies from its shallowest end at the falls, around 167 feet, and is on average around 209 feet from the surface of the river. The caprock is composed of dolomite, with limestone, shales and sandstone in the lower strata.

The preservation of biological species, in an age of diminishing biodiversity, has become a government priority like never before, with a whole range of laws on every level of government intended to protect the natural heritage of areas. This paper is one of a series of papers I hope to write to present general information on the biological and biohistorical significance of the falls of Niagara and the area in its vicinity.

The natural history resources of the Niagara gorge have evolved and exist as a single unit, irrespective of the fact that this geophysical phenomenon is shared by two separate nations. The fact that two governments are involved means that the geo-biological significance of the gorge is obscured by, for example, government sponsored research being limited to only that side of the Niagara River within the boundaries of a government jurisdiction. Important information displayed on government maps, for example, is lost when mapped features stop at the political boundary this is especially true of climatic features influenced by the Great Lakes and the regional distribution of limestone outcrops and vegetational elements.

Again, assessments of rarity and hence government protection of certain species will vary for political, not biological reasons. For example, Deerberry, *Vaccinium stamineum*, was considered rather frequent in western New York in 1934 by Zenkert, but it is considered rare in Ontario. Elimination of populations of this plant in New York State, because it is not rare, would threaten the viability of plants occurring in Ontario due to increased isolation of populations.

A similar situation exists for Kalm's St. John's Wort (*Hypericum kalmianum*). The only station known to have occurred in New York State was in the vicinity of the cataracts, yet it is not considered rare in Ontario where stations occur along the north shore of Lake Erie to the westward (Zenkert, 1934). The range of habitats which exist in Ontario differs from those in New York, and this will effect attributions of rarity for various species. International cooperation in preserving habitats in which populations of species considered of importance to one state or province should be considered by those governments in their preservation protocols.

Nowhere is this more apparent than in the government park lands created in the nineteenth century on both sides of the Niagara River, both originally established to preserve Niagara's internationally recognized natural resources. Administrations must pursue a vigorous natural resource preservation policy with mutual

benefit toward the protection policies of either country in order to ensure met preservation objectives. Ontario serves as a corridor for rare biological elements in New York State, and New York for Ontario.

My researches into the Niagara Gorge flora, since begun systematically in 1984, recognize the general model, yet to be elaborated and tested, that the Niagara Gorge serves as part of a critical biological boundary between two interconnected floristic types. The prairie element of species characteristic of areas to the west of Niagara extends through Niagara following the Great Lakes geophysical and climatic influence up at least as far as the St. Lawrence Seaway, or the far eastern end of Lake Ontario (see floristic maps by Kuechler, 1964 for a suggestion of this corridor). A pattern of limestone/dolomite exposures also appears to characterize this general area, further emphasizing edaphically, micro-climatic and geo-chemical characters reminiscent of the Great Plains, a great limestone basin. Rare plants in New York State with a plains affinity appear to favor this regional association with the Great Lakes, within which lies the Niagara gorge.

The second biological boundary influencing the distribution of rarities at Niagara is the contact into Canada of what is known as the Carolinian floristic zone, occupying Ontario generally from the Bruce Peninsula east and south to and along the Great Lakes to the St. Lawrence River, but which is typical of and increasingly well developed south of Canada in the United States (Zenkert, 1934). The biological importance of this Carolinian zone flora, which occurs nowhere else in Canada is comparable to the tropical flora of the State of Florida, which occurs nowhere else in the United States. Deerberry is part of this flora south of Canada, reaching its northern limits in this part of southern Ontario again, most likely due to the moderating influence of the Great Lakes and edaphic characteristics.

There is much more of natural historic significance in the Niagara gorge and adjacent areas than simply the statistical rarity of its plant species elements. It geological strata have formed the basis for paleontological research since the time of Charles Lyell and James Hall and was an important indicator of the extensive periods of slow change through time critical to establishing the immense chronology of geological time, and which was a fundamental precept of Lyell's student Charles Darwin's theory of biological evolution (see Eckel, 1989).

Numerous type localities occur throughout the vicinity of Niagara Falls, including the type locality of a geologic stratum, the Goat Island Dolostone, ("Goat Island at the brink of Niagara Falls," Howell and Sanford, 1947; see also Zenger, 1965. For discussion and description of other strata in the Niagara gorge, see Tesmer, 1981).

One of the syntypes of *Satureja glabella* var. *angustifolia* (Torr.) Svenson. as described by Torrey (1843) (as *Micromeria*) was collected on Goat Island, the other on Table Rock (Ontario). The type of *Liatris flexuosa* Thorn. was collected on the "east bank of the Niagara river, below the Falls," (Thomas, 1839), now probably a synonym for the rare Blazing Star, *Liatris cylindracea* still growing in the gorge today.

At least two bryophyte types derive from Niagara, one in Ontario; *Grimmia hookeri* Drumm. "On a stone near the falls of Niagara in Upper Canada [= *Ptychomitrium incurvum* (Schwaegr.) Spruce], and the other in New York: *Didymodon diversifolius* Austin, No. 115 Musci Appalachiani by Coe F. Austin, 1870, Hab. ... about Niagara Falls, S. T. Oiney [= *Didymodon tophaceus*].

Fungi types include *Peziza hesperidea* C. & P. Goat Island is the type locality ("Among fallen leaves. Goat island, where it was first found. Clinton," Peck, 1873). *Puccinia clintonii* Peck (Leaves of Pedicularis. Goat island. Clinton. October, Peck, 1873). *Speira velutina* P. et C. "nov. sp." Goat Island. Ex Coil. G. W. Clinton, Buffalo, N.Y., Dec. 18, 1877 (BUF). *Thelephora willeyi* Clinton ("Goat Island."); correspondence at BUF demonstrates this is the type material of what is now referred to as *Stereum diaphanum*.

Algae types include *Scytonema cataractae* H. C. Wood; "This species grows abundantly in Niagara River on the rocks below the great cataract," H. C. Wood (Kellcott in Day, 1883). Niagara Falls is the type locality for this species (Wood, H.C. Prodr. Proceedings of the American Philosophical Society Vol. XI, 1871). *Zonotrichia mollis* Wood. "In saxi irroratis, "Cave of the Winds," Niagara, Wood. (H. C. Wood, 1872, "A contribution to the history of the fresh-water algae of North America" Smithsonian Contribution to Knowledge 19. 241:1-262. *Zonotrichia parcezonata* Wood. "In saxi irroratis, "Cave of the Winds," Niagara, Wood (H.C. Wood, 1872, "A contribution to the history of the fresh-water algae of North America" Smithsonian Contribution to Knowledge 19. 241:1-262. *Stephanodiscus niagarae* was described by Ehrenberg from material collected at Niagara Falls, Ontario (Hakansson & Locker, 1981).

Mollusk types occur in the area, such as *Pyrgulopsis letsoni* Walker. (= *Amnicola letsoni* Walker) found on the gravels on Goat Island (Letson 1901). Plant taxa are frequent with "Niagara" as their epithet, indicating their collection near the falls by working systematists, such as the mollusk *Gonlobasis niagarensis* Lea (*Gonlobasis livescens niagarensis* (Lea) (Calkin & Brett, 1978), *Oenothera niagarensis* R. R. Gates, and the rare *Potamogeton niagarensis* of Tuckerman, found at the falls.

Again, not only plants, but unique animals or animal behavior is in evidence in the Niagara environment, for example, a population of Fox Squirrel (*Sciurus niger*) occurs on Goat island, an island, part of the gorge, situated between the brinks of the cataracts in New York. This squirrel, abundant in the central and west-central

United States is so rare in western New York State that it is frequently reported as absent from the State (Collins, 1981).

Not least are the numbers of visitors to the falls of Niagara who have distinguished the history of botany, in whose publications, collections and personal journals the vegetation of Niagara has furthered the development of the science, individuals such as Andre Michaux, Asa Gray and Sir Joseph Dalton Hooker, Louis Agassiz and a host of others too numerous to mention here.

Day (1888) recognized that "some of the rarest plants of western New York and Ontario grow in the neighborhood of Niagara river . . .," some of these being Fragrant Sumac (*Rhus aromatica*) found recently to occur on Goat Island, Upland White Aster (*Aster ptarmicoides*), Four-leaved Milkweed (*Asclepias quadrifolia*) and Red Mulberry (*Morus rubra*) in addition to several ferns, Walking Fern (*Camptosorus rhyzophyllus*) and Maidenhair Spleenwort (*Asplenium trichomanes*), again, recently found on Goat island.

Nearly all the rare native species on Goat Island and other islands above the cataracts occur on the Island margins, roughly between the land and the river: at the edge of herbaceous mats and dolomite pavement, on the very edge of the cliff and the open air in the spray zone at Terrapin Point, and historically in the old Terrapin Point habitat, now absent, between the river and the mainland, in or near the spray zone, just above the Horseshoe Falls (*Hypericum kalmianum*, *Parnassia glauca*, *Justicia americana*, all now absent from this area).

Both weedy species, alien and native, and rare plants grow where there is unusual opportunity, for example, by reason of recent human disturbance of the typical growing conditions in the region (typical of weeds), or natural disturbance through time, that is, where natural disturbance is characteristic of the environment, and was in effect when the (rare) species first became introduced. Alien species whose establishment is unusual (rare) are also indicative of an unusual environment, and so these are included with the rare plant list below. Note that Niagara Falls was an important point of railroad transit between the two countries in the decade before the turn of the century and later, and is still considerably important in this regard. It is probable that many alien species entered the Niagara flora from this source, and from the considerable horticultural plantings and garden refuse of the government parks.

". . . Marie-Victorin (1938) pointed out that several western plants, when grown in limestone beds at the Montreal Botanical Garden, increased their area and thrived vigorously until finally crowded out by weeds. Several botanists, including Griggs (1934, 1940), had already noted that weeds are often found in the same habitat as rare plants. Species of both groups are adapted to survive on such typical rare-plant habitats as unstable seacliffs and river-gravels, but would be eliminated if the erosion cycle were able to reach a stage permitting establishment of the normal forest-flora of the region. The rare plants share the sun-loving character of weeds. The limestone cliffs, because of their splintered and angular type of weathering (with formation of extensive talus slopes at the base), will still bar conquest by the forest for an indefinite period" (Scoggan, 1978).

Most of the rare plants occurring at Niagara, noted by the New York Natural Heritage Program, were well known to New York botanists since Torrey's New York flora of 1843. George Clinton, who provided the first list of the plants of Buffalo and vicinity (1863), relied on Torrey's work for the relocation of plants of interest at Niagara, as had David Day (1888) on to the work of Charles Zenkert in 1934. It was no surprise to find stations of, for example, the Sky-blue Aster (*Aster oolentangiensis*) at the stations indicated in the literature and elsewhere in similar habitats in the gorge, nor Blazing Star (*Liatris cylindracea*), White Camus (*Zygadenus glaucus*), Fringed Gentian (*Gentianopsis procera*), Four-flowered Loosestrife (*Lysimachia quadriflora*). Continued systematic search, a consequence of increasing interest in Niagara's historic flora by the Ontario Ministry of Natural Resources and the New York State Department of Environmental Conservation, may yet reveal extant and additional stations of important species in the gorge flora.

Additional stations of New York rare plants which I have found in the field, and for which I have no previous record of occurrence in the gorge flora, include a variety of Ninebark (*Physocarpus opulifolius* var. *intermedius*) which is considered a rarity in New York State, two Sedge species from the Goat island complex (*Carex garberi*, for which subsequent gorge stations have been found, and *Carex molesta*), a Speedwell (*Veronica peregrina* var. *xalapensis*) and Clearweed (*Pilea fontana*) from Goat Island, and Sylvan Spear-Grass (*Poa sylvestris*) up near Lewiston, New York. This gives an indication that the flora has many surprises yet to offer.

Smooth Cliff-brake (*Pellaea glabella*): Up until 1934, the only species of *Pellaea* reported for western New York State was *P. atropurpurea* (L.) Link, or Purple Cliff Brake (Zenkert, 1934). Subsequently, the material from the Niagara River Gorge at BUF has been re-identified by Stanley J. Smith, Curator of Botany of the New York State Museum, and later by Richard H. Zander, Curator of the Clinton Herbarium (BUF) to be *P. glabella* according to the characters detailed by Mitchell & Sheviak, (1981). The present writer has reviewed the relevant specimens at BUF and examined living populations in the Niagara gorge, and concurs with the changes in identification. Day's reference to *P. atropurpurea* ("Formerly on Goat Island and the Three Sisters. Not lately seen by us. Probably extirpated," Day, 1888) has been referred in this report to *Pellaea glabella*.

One specimen collected by George Clinton and hence dating prior to 1885, with no locality given (Herb. No. 35310) is *Pellaea glabella* by most characters, except it has very long stalks on its lower pinnae. It probably derives from the Niagara River gorge, as no other station for the genus occurs in western New York, or was reported from the Niagara Frontier Region before 1934 (Zenkert, 1934). Some doubt may exist whether *P. atropurpurea* occurs in the Niagara Frontier region at all. Day (1901) mentioned two species of *Pellaea* growing in the vicinity of Niagara Falls: *P. gracilis* and *P. atropurpurea*. *Pellaea glabella* is rare in New York State (Clemants, 1988), whereas *P. atropurpurea* is rare in Canada.

Since 1986, I have been maintaining a bibliographic and specimen database of plants known for the Niagara gorge and its vicinity, for areas in both the United States and Canada. The basis for these reports is a study provided to the New York State Department of Parks in January of 1990 by the author, and a report provided to the Niagara Frontier Chapter of the Adirondack Mountain Club in 1986. There are presently 1,272 species, not including varieties nor doubtfully occurring taxa. A crude calculation of the area under study involves a square of the following dimensions;

Length: 16 miles (seven mile gorge, length doubled since both vegetated sides are considered as one linear unit, plus the addition of two miles to include one mile above the cataracts on both sides of the river).

Width: 459 feet (200 feet perpendicular to the rim of the gorge) plus 209 feet average height of the gorge above river level plus 50 feet of the angle of talus slope and flat shelving parallel to the river).

The estimated area is less than two square miles, including such adjacent areas as Devil's Hole, Devaux Woods, Goat Island, Dufferin islands, and Niagara Glen.

The figure 1,272 species for this area is not an indication of the total number of species occurring there at any one time, but the total number of species reported over a century of exploration. The number represents the total flora of the Niagara River gorge and vicinity.

The recently published flora of the entire New York State county of Cattaraugus (Eaton & Schrot, 1987) recorded 1280 species for 1313 square miles. For the Niagara Frontier Region, an area of 7,850 square miles, 1597 species are recorded (Zander & Pierce, 1979). The recorded flora of the Niagara gorge and vicinity is the equivalent of that of a county flora, and constitutes 80 percent of the flora of a region. Admittedly, there is some danger in pushing this interpretation too hard, but an attempt is being made to give a hint of the biological uniqueness of the study area. Although Day (1888) did not draw comparisons, his catalogued total, which roughly followed the same study area described above, represented 70 percent of the same regional area known in 1882. Additional taxa continue to be added to the gorge flora with continued fieldwork.

In another attempt to indicate the extraordinary biological resource value of this area, I have extracted general lists of rare species known to have existed there. A species occurs on a list only if I have a record for its occurrence in New York and/or Ontario, that is, species noted from one side of the river are only noted if rare in the respective state or province in which the stations are recorded. For example, although a species may be rare in both Ontario and New York, if the plant has only been noted for Ontario, I give no indication of its status in New York. The lists are incomplete due to certain nomenclatural issues, specimen and bibliographic problems.

Note that the most intense collecting activity occurred in the decades around the turn of the century, and no indication is given whether populations persist today. The nomenclature follows Zander and Pierce (1979). Although the flora has value to the natural resource calculation for New York State, the value to the entire nation of Canada of populations recorded for the western side of the river is quite spectacular.

Cryptogamous taxa will be treated in another paper in a recently created "New York Rare Bryophytes Newsletter" issued by the New York Botanical Garden, where species of rare mosses and hepatics known to have occurred in the Niagara gorge and which have been recently discovered will be addressed.

Additional published reports on the biological value of the Niagara gorge are expected to be issued soon by the Ontario Department of Natural Resources and the Natural Heritage unit of the New York State Department of Environmental Conservation.

LIST OF HISTORIC RECORDS OF RARE PLANTS OF THE NIAGARA RIVER GORGE AND VICINITY

Rare in Canada

The following species are rare in Canada, except where noted as Ontario only (Argus & White, 1977; Dore & McNeill, 1980). Note: the Argus and White publication has been significantly updated since, but its indications of rarity are adequate for the general purposes of this paper. [Z&P] includes plants rare in the Niagara Frontier Region, as defined below (i.e., usually not considered rare in the whole of New York State).

Agastache scrophulariaefolia (Willd.) Ktze. Purple Giant Hyssop [Z&P]
Agrimonia parviflora Ait. Small-flowered Agrimony

Anemonella thalictroides (L.) Spach. Rue Anemone
Arabis canadensis L. Sickle-pod
Arabis lyrata L. var. *lyrata* Lyre-leaved Rock Cress
Asclepias exaltata L. Poke Milkweed
Asclepias quadrifolia Jacq. Four-leaf Milkweed (Ontario) [Z&P]
Asplenium platyneuron (L.) Oakes Ebony Spleenwort [Z&P]
Aster divaricatus L. White Wood Aster
Aster prenanthoides Muhl. Crooked-stem Aster
Aster undulatus Mill. Wavy-leaved Aster [Z&P]
Aureolaria flava (L.) Farwell. Smooth False Foxglove
Aureolaria virginica (L.) Pennell. Downy False Foxglove
Aureolaria pedicularia (L.) Raf. Lousewort
Azolla caroliniana Willd. Carolina Azolla
Betula lenta L. Black Birch
Bidens coronata (L.) Britt. Tickseed
Bromus purgans L. Hairy Wood Chess (Ontario)
Campanula americana L. Tall Bellflower
Cardamine douglassii (Torr.) Britt. Purple Spring Cress
Carex oligocarpa Schkuhr. Few-fruited Sedge
Carex prasina Wahl. Drooping Sedge
Carex torta Boott. Twisted Sedge (Ontario)
Carex trichocarpa Muhl. Hairy-fruited Sedge [Z&P]
Carex virescens Muhl. Downy Green Sedge (Ontario) [Z&P]
Carya glabra (Mill.) Sweet. Pignut Hickory (Ontario)
Chimaphila maculata (L.) Pursh. Pipsissewa
Cimicifuga racemosa (L.) Nutt. Black Snakeroot
Cinna arundinacea L. Wood Reed Grass "
Collinsoma canadensis L. Citronella Horsebalm
Conopholis americana (L.) Wallr. Cancerroot
Corallorrhiza odororhiza (Willd.) Nutt. Autumn Coral-root [Z&P]
Coreopsis lanceolata Lance-leaved Tickseed (Ontario) [Z&P]
Corispermum hyssopifolium L. Bugseed (Ontario)
Cornus florida L. Flowering Dogwood [Z&P]
Cubelium concolor (Forst.) Raf. Green Violet [Z&P]
Desmodium ciliare (Muhl.) DC. Hairy Smallflowered Tick Trefoil
Desmodium cuspidatum (Muhl.) Loud. Pointedleaved Tick Trefoil
Desmodium rotundifolium (Michx.) DC. Roundleaved Tick Trefoil
Dioscorea villosa L. Wild Yam
Disporum lanuginosum (Michx.) Nichols. Yellow Mandarin
Elymus villosus Muhl. Slender Wild Rye
Erythronium albidum Nutt. White Adder's Tongue
Euonymus atropurpureus Jacq. Wahoo [Z&P]
Eupatorium purpureum L. Bluestemmed Joepywe Weed
Floerkea proserpinacoides Willd. False Mermaid
Galium pilosum Alt. Hairy Bedstraw [Z&P]
Gaura biennis L. Biennial Gaura
Hieracium gronovii L. Hairy Hawkweed [Z&P]
Hieracium paniculatum L. Panicked Hawkweed [Z&P]
Hieracium venosum var. *nudicaule* (Michx.) Farw. Rattlesmake Weed
Hydrophyllum canadense L. Water Leaf
Hypoxis hirsuta (L.) Cov. Star Grass (Ontario) [Z&P]
Ipomoea pandurata (L.) G.F. W. Meyer Man-of-the-earth
Juglans nigra L. Black Walnut
Justicia americana (L.) Vahl. Water-willow [ZAT]
Lespedeza intermedia (S. Wats.) Britt. Wandlike Bush-clover
Liriodendron tulipifera L. Tulip Tree
Lithospermum latifolium Michx. Broad-leaved Gromwell [Z&P]
Lupinus perennis L. Sundial Lupine [Z&P]

Monarda didyma L. Oswego Beebalm
Morus rubra L. Red Mulberry
Muhlenbergia schreberi J.F.Gmelin. Nimble will
Muhlenbergia sylvatica Torr. Woodland Dropseed, Forest Muhly
Muhlenbergia tenuiflora (Willd.) BSP. Slender Satin Grass [Z&P]
Myosotis verna Nutt. Early Forget-me-not [Z&P]
Nyssa sylvatica Marsh. Black Tupelo
Panax quinquefolium L. Ginseng [Z&P]
Panicum dichotomum L. Forked Panicum
Pedicularis lanceolata Michx. Swamp Louse wort
Polanisia dodecandra (L.) DC. Clammyweed
Polygonatum biflorum (Walt.) Ell. Great Solomon's Seal [Z&P]
Polymnia canadensis L. Small-flowered Leafcup
Polystichum lonchitis (L.) Roth Holly Fern (Ontario)
Prunus americana Marshall. Wild Plum
Quercus bicolor Willd. Swamp White Oak
Quercus palustris Muench. Pin Oak
Quercus prinoides Willd. Dwarf Chestnut Oak
Quercus muhlenbergii Engelm. Yellow Oak
Quercus prinus L. Chestnut Oak
Solidago arguta Ait. Cut-leaf Goldenrod
Solidago patula Muhl. Rough-leaved Goldenrod
Solidago ulmifolia Muhl. Elm-leaved Goldenrod [Z&P]
Sporobolus asper (Michx.) Kunth. Rush-grass [Z&P]
Swertia carolinensis (Walt.) Ktze. American Columbo [Z&P]
Vicia caroliniana Walt. Carolina Vetch
Spiranthes lucida (H.H.Eat.) Ames Wildleaf Lady's Tresses (Ontario).
Thaspium barbinode (Michx.) Nutt. Hairyjointed Meadow Parsnip
Triodanis perfoliata (L.) Nieuwl. Claspng Venus' Looking Glass (Ontario)
Uvularia perfoliata L. Perfoliate Bellwort (Ontario)
Vaccinium stamineum L. Deerberry
Vaccinium vacillans Kalm ex Torr. Latefruiting Blueberry

Rare in both Canada and New York Status as given by Natural Heritage Trust (DEC), Clemants (1988). Stations of these have been recorded for both sides of the Niagara River.

Agastache nepetoides Yellow Giant-Hyssop
Alectrum hyemale (Muhl.) Nutt. Putty-root
Asclepias viridiflora Green Milkweed
Asimina triloba (L.) Dunal. Pawpaw.
Astragalus neglectus (T. & G.) Sheldon. Cooper's Milk-vetch.
Carex complanata Torr. & Hook. Northern Hirsute Sedge. Canada, New York
Chamaelirium luteum (L.) Gray. Fairywand
Cornus drummondii C.A.Meyer. Drummond's Dogwood
Hydrastis canadensis L. Golden Seal
Jeffersonia diphylla (L.) Pers. Twinleaf
Pterospora andromedea Nutt. Pine Drops (Ontario)
Solidago ohioensis Riddell. Ohio Goldenrod

Rare in New York (Native)

Status according to the Natural Heritage Trust (DEC), Clemants (1988). Stations recorded in New York State.

Bidens laevis (L.) BSP. Larger Bur Marigold
Carex retroflexa Muhl. Reflexed Sedge
Cynoglossum boreale Fernald. Northern Wild Comfrey
Cyperus odoratus L. Fragrant Cyperus
Lathyrus ochroleucus Hook. Cream-colored Vetchling
Onosmodium virginianum (L.) DC. Virginia False Gromwell

Scutellaria parvula Michx. Small Skullcap
Solidago rigida L. Stiff Goldenrod

Additional rare alien species, cf. Mitchell (1986, no Ontario plants are noted for bibliographic reasons).

Cerastium semidecandrum L. Small or Spring Mouse-ear Chickweed
Cymbalaria muralis Gaertn., Mey. & Scherb. Kenilworth Ivy
Diplotaxis muralis (L.) DC. Sand Rocket
Diplotaxis tenuifolia (L.) DC. Wall Rocket

Plants rare only in the Niagara Frontier Region

This area encompasses a circle with a fifty-mile radius with its center in Buffalo (Zander & Pierce, 1979), an area of about 7,850 square miles, including much of the eight westernmost counties of New York State, and the Regional Municipality of Niagara, Province of Ontario. Stations recorded for either side of the river or both.

Arabis drummondii Drummond's Rock-cress
Asclepias verticillata Whorled Milkweed
Aster ptarmicoides (Nees) Torr. and Gray. Upland White Aster
Bromus kalmii Gray. Kalm Brome
Callitriche verna L. Water Starwort
Camptosorus rhizophyllus (L.) Link. Walking Leaf
Carex aquatilis Wahl. Northern Water Sedge
Carex rostrata Stokes. Beaked Sedge
Carex straminea Willd. Straw Sedge
Cassia marylandica L. Wild Senna
Castilleja coccinea Spreng. Painted Cup
Cerastium nutans Raf. Nodding Chickweed
Cinna latifolia (Trev.) Griseb. Drooping Woodreed
Desmodium pauciflorum (Nutt.) DC. Fewflowered Tick Trefoil
Convolvulus spithameus L. Hedge Bindweed
Corylus americana Walt. American Hazelnut
Deschampsia flexuosa (L.) Trin. Common Hair Grass
Dulichium arundinaceum (L.) Britt. Dulichium
Equisetum laevigatum A. Br. Smooth Scouringrush
Helianthemum canadense (L.) Michx. Frostweed
Isanthus brachiatus (L.) BSP. False Pennyroyal
Monarda clinopodia L. Basil Beebalm
Polygala senega L. Seneca Snakeroot
Potentilla fruticosa L. Shrubby Cinquefoil
Puccinellia pallida (Torr.) Clausen. Pale Manna-grass
Robinia viscosa Vent. Clammy Locust
Senecio pauperculus Michx. Balsam Groundsel
Sisyrinchium montanum Greene. Mountain Blue-eyed Grass
Solidago uliginosa Nutt. Bog Goldenrod
Spiraea latifolia (Ait.) Borkh. Broad-leaved Meadow-sweet
Sporobolus neglectus Nash. Small Rush Grass
Utricularia cornuta Michx. Horned Bladderwort

Rare alien species:

Butomus umbellatus L. Flowering Rusl
Camelina microcarpa Andrz. Small-fruited False Flax
Camelina sativa (L.) Crantz. False Flax
Centaurea maculosa Lam. Spotted Centaurea
Cerastium arvense L. Field Chickweed
Cerastium viscosum L. Clammy Mouse-ear Chickweed
Cynanchum nigrum (L.) Pers. Black Swallowroot
Cynosurus cristatus L. Crested Dogtail

Euphorbia peplus L. Petty Spurge
Geranium pusillum L. Small-flowered Cranesbill
Hibiscus trionum L. Flower-of-an-hour
Lamium amplexicaule L. Henbit Dead Nettle
Lolium temulentum L. Bearded Darnel
Lycopsis arvensis L. Small Bugloss
Myosotis arvensis (L.) Hill. Field Forget-me-not, Mouse-ear
Petasites hybridus (L.) Gaertn., Mey. & Scherb. Butterfly Dock
Trifolium arvensis L. Rabbit's Foot Clover
Tripsacum dactyloides (L.) L. Gamma Grass
Veronica anagallis-aquatica L. Water Speedwell
Veronica chamaedrys L. Bird's-eye Speedwell
Veronica longifolia L. Long-leaved Speedwell

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