

A BOTANICAL
INVENTORY AND EVALUATION
OF THE HIGH PARK OAK WOODLANDS

AREA OF NATURAL AND SCIENTIFIC INTEREST

S. Varga

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Ontario Ministry of Natural Resources
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PREFACE

The Areas of Natural and Scientific (ANSI) Program of the Ontario Ministry of Natural Resources is responsible for the identification and documentation of significant natural areas outside the provincial parks program. The ANSI program encourages the protection of significant natural areas through the informed stewardship of their owners.

In 1988, the City of Toronto Parks and Recreation Department asked M.N.R.'s Central Region to assist them with their management planning of High Park by providing ecological advice on the natural vegetation communities of the park, and an evaluation of their significance and longterm viability as natural systems.

In the summer of 1989, discussions between ANSI program staff and City of Toronto staff involved with the High Park Master Planning Study resulted in tentative park zones being proposed. These park zones will be presented at future open houses on the park master plan. The proposed Nature Reserve/Natural Environment Zones, in conjunction with appropriate management practices (e.g. removal of exotics, restoration of the rare Black Oak savannahs, etc.), would ensure the protection of High Park's significant biological features. On this basis, the Ontario Ministry of Natural Resources is recommending a provincially significant status for the High Park Oak Woodlands Area of Natural and Scientific Interest.

With the support of the City of Toronto's Department of Parks and Recreation the Ministry is recommending the designation of the High Park Nature Reserve Zones as provincially significant ANSIs in its upcoming amendments to the Maple District Land Use Guidelines.

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HIGH PARK OAK WOODLANDS NATURAL AREAS

CHAPTER I: REGIONAL BACKGROUND

(i) INTRODUCTION

High Park is one of the most significant natural areas in the Regions of York and Metropolitan Toronto, especially in terms of its vegetation communities and its rare flora. It is the last sizeable natural area remaining on Toronto's Iroquois Sand Plain. These sands were laid down on the shores of glacial Lake Iroquois, the larger version of Lake Ontario, that was formed when the glaciers retreated from our area about 12,800 years ago (Chapman and Putnam, 1984). The old shoreline cliffs of this ancient lake are readily apparent along Davenport Road in the vicinity of Casa Loma and elsewhere across Toronto. The Iroquois Sand Plain extends from Scarborough Bluffs, across to Danforth Ave. near Kingston Road, and west to Islington Avenue.

Historically, the dry soils of Toronto's Iroquois Sand Plain supported spectacular open oak woodlands or savannahs and pine barrens. John Goldie, an early botanist who explored the area in 1819, noted that it was "as good a Botanical Spot as any that ever I was in" (Goldie, 1819).

In areas such as on the Humber Plains (a region around the Humber River between Mimico Creek and High Park) there was a flat expanse of pine barrens (Lizars, 1913; Goldie, 1819). It supported groves of Sassafras and an occasional gnarled and stunted Black Oak and White Pine. More abundant were shrubs such as Dry-land Blueberry and Black Huckleberry intermixed with a number of prairie grasses. Throughout the growing season, the plain was also ablaze with colourful herbs. In the spring there were the yellows of Prairie Buttercup (Ranunculus rhomboideus), and Stargrass (Hypoxis hirsuta) while in the summer the orange Wood Lily (Lilium philadelphicum) and the blue Wild Lupine (Lupinus perennis) came into flower. The lupines provided a food source for the beautiful Karner Blue Butterfly - proposed as a provincially endangered species (Syme, 1962; Campbell & Coulson, 1990). Another noteworthy butterfly was the Great Plains (Gorgone) Checkerspot, a mid-western species known in Ontario only from the Humber Plains (Campbell & Coulson, 1990).

The rolling uplands of High Park supported Black Oak savannahs and moist Red Oak forests with many southern and prairie/savannah species. For example, the Wild Lupine and the associated Karner Blue Butterfly were once common on the dry south-facing slopes (Syme, 1962). The provincially rare skipper, the Mottled Dusky Wing, fed on the plentiful shrub patches of New Jersey Tea (Campbell & Coulson, 1990). Additional southern butterflies such as the Spicebush Swallowtail and the Scrub-oak (Edward's) Hairstreak fed on the prevalent southern trees of Sassafras and Black Oak (pers. comm. Bill Edmund).

In contrast, the ravine bottomlands contained cool mixed swamps with many northern species. Other wetlands could also be found in the High Park area. At that time, Grenadier Pond was separated from the lake only by a narrow sand bar and was ringed by extensive cattail marshes (Wainio et al., 1976). These marshes provided habitat for many species of dragonfly including such southern ones as Vesper Bluet (Enallagma vesperum) and Halloween Penitent (Celithemis eponina) (Walker, 1941; Walker 1953; Walker & Corbet, 1975).

A small kettle pond just west of Grenadier even supported a Sphagnum bog full of such boreal plants as: Rose Pogonia (Pogonia ophioglossoides) and Grass-pink (Calopogon tuberosus) - two showy orchids, Pitcher Plant (Sarracenia purpurea), Round-leaved Sundew (Drosera rotundifolia), Labrador-tea (Ledum groenlandicum) and Bog-laurel (Kalmia polifolia) (Graham, 1913).

In 1905, the Sphagnum bog was filled in (Graham, 1913). All that is left of the Humber Plains today are a few small remnants at Lambton Park and less than a hectare north of the Humber Sewage Treatment Plant.

Only at High Park can you still get a glimpse of the variety of habitats which once occurred throughout Toronto's Iroquois Sand Plain. It is our connection to Toronto's wilderness past, but it has not escaped unscathed. It has lost more than half of its rare plant species over the years (41 species including such national rarities as Ague Weed (Gentianella quinquefolia), Virginia Yellow Flax (Linum virginianum) and Monkey-flower (Mimulus glabratus var. fremontii) (see Table 1)). Many of the rare insect species have also disappeared, such as the Karner Blue Butterfly, Spicebush Swallowtail, Mottled Dusky Wing Skipper and the two southern species of dragonfly.

Despite the loss of natural areas to make way for other uses, High Park still supports a remarkable assemblage of rare flora and significant vegetation communities. They include (1) four nationally/provincially and 37 regionally rare plant species (see Table 1), (2) an exceptional floral assemblage of southern, prairie/savannah and northern species, (3) 50.3 ha of natural areas (see Figure 1), (4) a provincially rare Black Oak savannah/forest with many plant rarities, (5) regionally rare examples of moist Red Oak and Hemlock forests and (6) a locally significant lakeshore marsh (e.g. Grenadier Pond), natural bottomlands and dry Red Oak - White Oak upland forests.

HIGH PARK OAK WOODLANDS

NATURAL AREAS




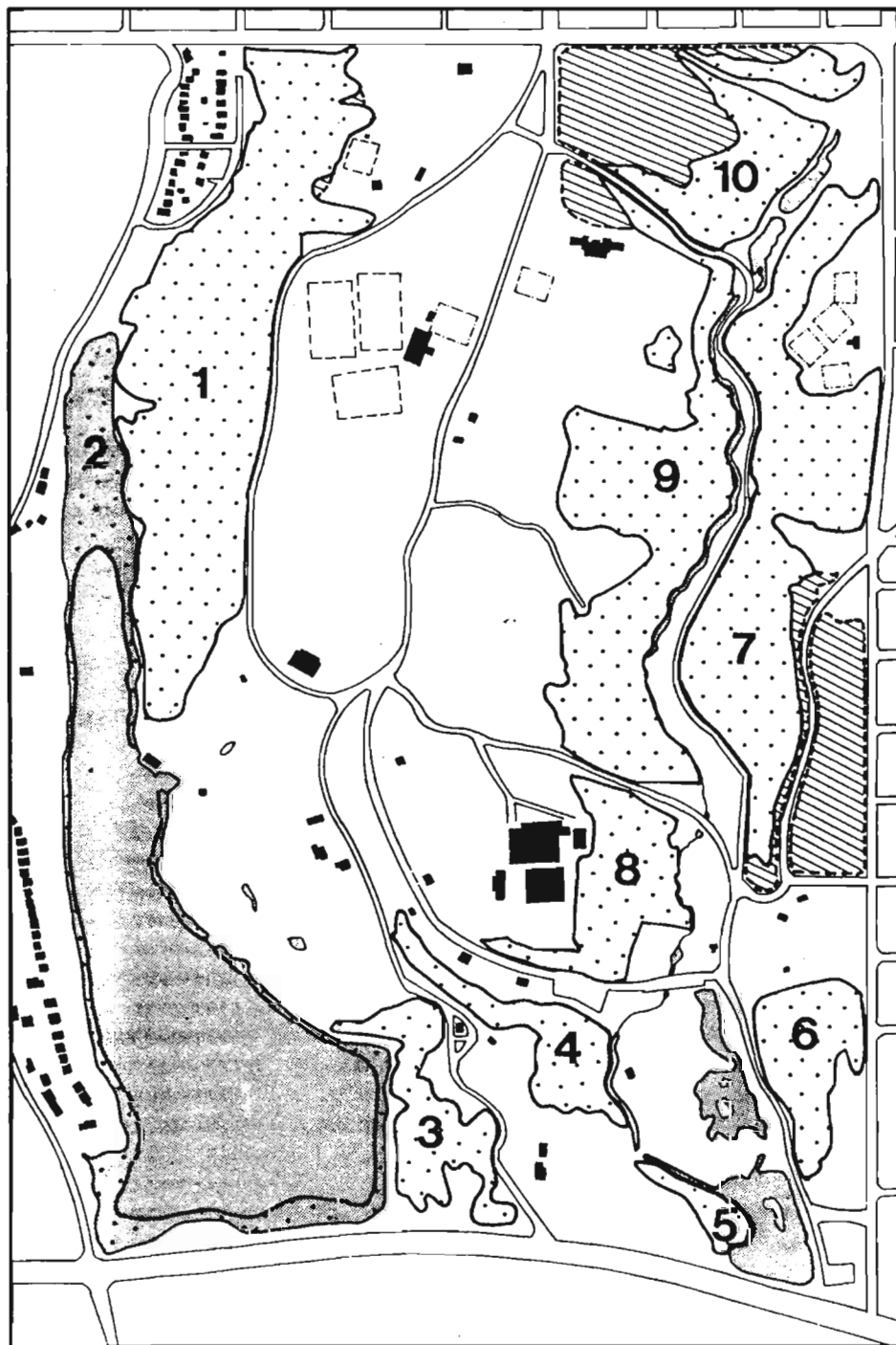
-  Natural Areas (1-10)
-  Potential Restoration Areas (native savannah overstory but formal parkland in understory)
-  Open Water

Figure 1



Scale 1 : 10 000
metres 100 0 100 200 300 400 500 metres

Table 1: Significant Vascular Plants of the High Park Oak Woodlands Natural Areas

Species	Source	Most recent voucher or sight record	No. of Sites York/Metropolitan Toronto	Rare in MNR Central Region (Riley, 1988)
Nationally and Provincially Rare (Argus & Pryer, 1986; Argus et al., 1982-87)				
+ <u>Aureolaria pedicularia</u> (Woodland Fern-leaf)	SV	1980-SR, TRT	1	*
<u>Gentianella quinquefolia</u> (Ague Weed)		1907-TRT	0	*
+ <u>Hypericum prolificum</u> (Shrubby St. John's-wort)	KM	1976-SR only	1	*
<u>Linum virginianum</u> (Virginia Yellow Flax)		1890-TRT	0	*
+ <u>Lupinus perennis</u> (Wild Lupine)	KM, SV	1988-SR, TRT	2	*
<u>Mimulus glabratus</u> var. <u>fremontii</u> (Monkey Flower)		1922-TRT	0	*
+ <u>Silphium perfoliatum</u> (Cup-plant)	KM, SV	1988-SR, TRT	3	*
Provincially Rare (Argus & Pryer, 1986; Argus et al., 1982-87)				
<u>Potentilla paradoxa</u> (Lower Great Lakes Cinquefoil)		1901-TRT	4	*
Regionally Rare (A species is considered regionally rare if it occurs at 5 or less post -1925 sites in the Regional Municipalities of York and Metropolitan Toronto, formerly York County (Varga, et al. 1986)).				
+ <u>Acorus calamus</u> (Sweet Flag)	KM	1976-TRT	3	
<u>Agalinis paupercula</u> (Purple Gerardia)	TFN	1972-SR, TRT	1	
+ <u>Agrimonia pubescens</u> (Hairy Agrimony)	KM	1976-TRT	1	*
+ <u>Amelanchier spicata</u> var. <u>stolonifera</u> (Serviceberry)	SV, KM	1988-SR, 1976-TRT	2	
+ <u>Andropogon scoparius</u> (Little Bluestem)	SV, KM	1988-SR, TRT	3	
<u>Asclepias exaltata</u> (Poke Milkweed)	TFN	1972-SR, TRT	4	
<u>Asclepias tuberosa</u> (Orange Milkweed)		1941-TRT	2	
<u>Aster laevis</u> (Smooth Aster)	TFN	1972-SR only	3	
<u>Astragalus canadensis</u> (Canada Milk-vetch)		1891-TRT	1	*
<u>Botrychium simplex</u> (Least Moonwort)		1906-TRT	1	
+ <u>Brachyelytrum erectum</u> (Bearded Shorthusk)	SV, RP	1982-TRT	4	
<u>Bromus kalmii</u> (Kalm's Brome)		1890-TRT	1	
+ <u>Campanula rotundifolia</u> (Harebell)	SV	1988-SR, 1976-TRT	4	
+ <u>Carex aquatilis</u> (Sedge)	SV	1980-TRT	3	
<u>Carex diandra</u> (Sedge)		1939-TRT	3	
+ <u>Carex foenea</u> (Sedge)	SV	1980-TRT	3	*
+ <u>Carex laevivaginata</u> (Sedge)	SV, KM	1980-TRT	4	
<u>Carex lasiocarpa</u> (Sedge)		1986-TRT	5	
+ <u>Carex muhlenbergii</u> (Sedge)	SV	1980-TRT	5	
+ <u>Carex ruqosperma</u> (Sedge)	SV	1980-TRT	4	
<u>Castilleja coccinea</u> (Indian Paintbrush)		1890-TRT	0	
<u>Chimaphila umbellata</u> (Pipisewa)		1894-TRT	5	
<u>Cirsium muticum</u> (Swamp Thistle)		1953-TRT	2	
+ <u>Cyperus filiculmis</u> (Nut-grass)	SV, KM	1980-SR, TRT	3	
+ <u>Deschampsia flexuosa</u> (Common Hairgrass)	KM	1976-TRT	1	
+ <u>Elodea nuttallii</u> (Nuttall's Waterweed)	KM	1976-TRT	1	*
+ <u>Epigaea repens</u> (Trailing Arbutus)	SV, KM	1988-SR, TRT	4	
<u>Equisetum pratense</u> (Meadow Horsetail)		1939-TRT	4	
<u>Erigeron pulchellus</u> (Robin's-plantain)		1890-TRT	2	
<u>Gaultheria hispidula</u> (Creeping Snowberry)		1907-TRT	2	
+ <u>Gaylussacia baccata</u> (Black Huckleberry)	SV, KM	1988-SR, 1976-TRT	2	
<u>Gentiana andrewsii</u> (Closed Gentian)		1889-TRT	4	
<u>Gentiana crinita</u> (Fringed Gentian)		pre-1925-TRT	4	*

* <u>Helianthemum bicknellii</u> (Bicknell's Frostweed)	SV	1980-TRT	3	*
* <u>Helianthemum canadense</u> (Canada Frostweed)	SV, KM	1980-TRT	2	*
* <u>Helianthus strumosus</u> (Pale-leaved Sunflower)	SV	1980-SR, TRT	2	*
<u>Hieracium canadense</u> (Canada Hawkweed)		1949-TRT	0	
* <u>Impatiens pallida</u> (Yellow Jewelweed)	KM	1976-SR only	4	
* <u>Lechea intermedia</u> (Pinweed)	SV, KM	1988-SR, TRT	4	
* <u>Lespedeza capitata</u> (Round-headed Bush Clover)	SV, KM	1988-SR, TRT	3	*
* <u>Lespedeza hirta</u> (Hairy Bush Clover)	SV, KM	1988-SR, TRT	1	*
* <u>Liatris cylindracea</u> (Cylindric Blazing Star)	SV, KM	1988-SR, TRT	2	*
<u>Luzula multiflora</u> (Wood Rush)		1890-TRT	2	
* <u>Lysimachia quadrifolia</u> (Whorled Loosestrife)	KM	1976-TRT	1	
* <u>Muhlenbergia frondosa</u> (Wire-stemmed Muhly Grass)	SV, RP	1980-TRT	2	*
* <u>Myrica asplenifolia</u> (Sweet Fern)	SV, KM	1988-SR, TRT	3	
<u>Ophioglossum vulgatum</u> (Northern Adder's-tongue Fern)	SV, KM	1866-TRT	2	
<u>Oryzopsis pungens</u> (Mountain-rice)		1890-TRT	2	
<u>Panicum columbianum</u> (Panic Grass)		1936-TRT	4	
<u>Panicum latifolium</u> (Broad-leaved Panic Grass)		1927, TRT	5	
<u>Panicum xanthophyllum</u> (Panic Grass)		1953-TRT	1	
<u>Pedicularis lanceolata</u> (Swamp Lousewort)		1914-TRT	1	*
<u>Petasites palmatus</u> (Sweet Coltsfoot)		1933-TRT	3	
<u>Physalis virginiana</u> var. <u>sonorae</u> (Ground-cherry)		1909-TRT	0	*
* <u>Pinus resinosa</u> (Red Pine)	SV, KM	1988-SR, TRT	4	
* <u>Platanus occidentalis</u> (Sycamore)	SV, KM	1988-SR only	3	
<u>Potamogeton amplifolius</u> (Large-leaved Pondweed)		1896-TRT	2	
<u>Polygala polygama</u> (Racemed Milkwort)		1931-TRT	2	*
<u>Polygala verticillata</u> (Milkwort)		1910-TRT	0	
* <u>Polygonatum biflorum</u> (Solomon's-seal)	KM	1976-TRT	1	
<u>Pontederia cordata</u> (Pickerelweed)		1953-TRT	2	
* <u>Quercus velutina</u> (Black Oak)	SV, KM	1988-SR, 1976-TRT	3	
<u>Ranunculus fascicularis</u> (Early Buttercup)	TFN	1972-SR, TRT	0	*
<u>Ranunculus longirostris</u> (White Water-crowfoot)		1910-TRT	4	
<u>Ranunculus rhomboideus</u> (Prairie Buttercup)		1933-TRT	1	*
* <u>Rosa carolina</u> (Pasture Rose)	KM	1976-SR only	1	
* <u>Rubus flagellaris</u> (Northern Dewberry)	SV, KM	1980, 1976-TRT	4	
<u>Sagittaria rigida</u> (Sessile-fruited Arrowhead)		1949-TRT	0	
* <u>Sassafras albidum</u> (Sassafras)	SV, KM	1988-SR, TRT	3	
<u>Saxifraga virginiana</u> (Early Saxifrage)		1905-TRT	4	
<u>Solidago bicolor</u> (White Goldenrod)		1954-TRT	5	
* <u>Solidago squarrosa</u> (Stout Goldenrod)	SV, KM	1980-TRT	2	
* <u>Sorghastrum nutans</u> (Indian Grass)	SV, KM	1988-SR, TRT	4	
<u>Spiranthes romanzoffiana</u> (Hooded Ladies'-tresses)		1896-TRT	5	
<u>Taenidia integerrima</u> (Yellow Pimpernel)		1933-TRT	3	
* <u>Vaccinium pallidum</u> (Dry-land Blueberry)	SV, KM	1988-SR, TRT	3	

Legend:

KM - Karen McIntosh
SV - Steve Varga
RP - Roger Powley
SR - sight record

TRT - Voucher deposited in the Vascular Plant
Herbarium, Royal Ontario Museum
+ - Species found during the surveys of 1976, 1980-82, 1988
(other species noted may be extirpated)
TFN - Toronto Field Naturalists (1972)

(ii) METHODS

Field surveys were carried out on December 6, 7, 13, 21 in 1988 and January 2, 8 in 1989. Previous information on High Park was also obtained from the author's articles (Varga, 1981a, 1981b), and collection notes dating from 1980-82, and the 1976 findings of K.L. McIntosh in Wainio *et al.*, 1976. The locations of rare plants mapped in 1976 by K.L. McIntosh have been incorporated into this study.

During the 1988-89 survey, natural areas and community types were delineated on 1:2,000 maps (see Map 1 and 2) and rare species were noted for each of High Park's 10 natural areas (see Table 4). A species was considered regionally rare if it occurred at 5 or less post-1925 sites in the Regional Municipalities of York and Metropolitan Toronto (formerly York County) (Varga *et al.*, 1986). The national and provincial significance of High Park's plant species are based on an unpublished list (Argus and Pryer, 1986) and "The Rare Plant Atlas of Ontario" (Argus *et al.*, 1982-87).

A complete list of historical and extant rare species at High Park (Table 1) is based on the field surveys of 1976, 1980-82 and 1988-89, and a search of collections at the Royal Ontario Museum, Department of Botany, Vascular Plant Herbarium.

CHAPTER II: HIGH PARK OAK WOODLANDS NATURAL AREAS

(i) COMMUNITY DESCRIPTIONS

The 17 plant communities within the High Park Oak Woodlands Natural Areas are grouped under 3 major headings: wetlands, native uplands and disturbed uplands. The communities are outlined on Map 1. Because there are few communities in nature with distinct boundaries, the lines delineating the different communities on Map 1 must be regarded as best approximations.

Brief descriptions of the tree, sapling and understory layers are given for each community. In addition, there is a brief outline of the soil moisture, microclimate, physical features, location in the study area and significant species.

WETLAND VEGETATION TYPES

1. Open Water

a. Submerged/Floating Aquatics and b. No Aquatics

This wetland type is confined to Grenadier Pond. Areas of open water along the shoreline, less than 2 metres deep, support a submerged and floating aquatic community dominated by the pondweeds Potamogeton crispus, and P. pectinatus, Nuttall's Waterweed (Elodea nuttallii) and to a lesser extent Common Coontail (Ceratophyllum demersum), Greater Duckweed (Spirodela polyrrhiza), Common Duckweed (Lemna minor), Fragrant Water-lily (Nymphaea odorata) and Bullhead Lily (Nuphar variegata). In deeper waters towards the centre of Grenadier Pond, aquatics are largely absent.

Significant species: The regionally rare Nuttall's Waterweed.

2. Marsh

a. Emergent Marsh: Common Cattail/Sweet Flag

Common Cattail (Typha latifolia) marshes are located at the northern and southwestern corners of Grenadier Pond. In amongst the cattails are such prevalent exotic species as Purple Loosestrife (Lythrum salicaria) and European Water-horehound (Lycopus europaeus).

Emergent marshes dominated by Sweet Flag (Acorus calamus) and Yellow Iris (Iris pseudacorus) line the western shorelines of Grenadier Pond. Other common species in this marsh include Blue Flag (Iris versicolor), Common Cattail and the water-horehounds Lycopus europaeus and L. americanus.

Significant species: The regionally rare Sweet Flag.

b. Meadow Marsh: Canada Bluejoint - Spotted Jewelweed - Cutgrass - Sedges (Carex pseudo-cyperus, C. aquatilis) and

c. Shrub-rich Marsh: Red-osier Dogwood - Speckled Alder

Small areas of meadow marsh intermixed with shrub-rich marsh are located on bottomlands along the west side of Spring Road Ravine between Deer Pen Road and Spring Road, and along a tributary stream on the east side feeding into Spring Road Ravine. These wetlands are maintained by water seeping from the base of the ravine slopes.

The meadow marshes are dominated by such grasses as Canada Bluejoint (Calamagrostis canadensis), Cutgrass (Leersia oryzoides), Redtop (Agrostis gigantea) and sedges (Carex pseudo-cyperus, C. aquatilis). Common herbaceous species include Spotted Jewelweed (Impatiens capensis) and to a lesser extent Red-stemmed Aster (Aster puniceus), Spotted Joe-Pye-Weed (Eupatorium maculatum) and two knotweeds (Polygonum hydropiper, P. lapathifolium).

The shrub-rich marshes have a shrub layer of Red-osier Dogwood (Cornus stolonifera) with scattered patches of Speckled Alder (Alnus rugosa). The understory is similar to that noted for the meadow marsh.

Significant species: The regionally rare sedges Carex laevivaginata and C. aquatilis.

SWAMP

3. Thicket Swamp: Speckled Alder

One small area of thicket swamp occurs at the bottom of a 'U' shaped ravine in the southeast portion of High Park. It is maintained by water seeping out from the base of the surrounding uplands.

The thicket swamp supports a tall shrub layer of Speckled Alder with scattered trees and saplings of White Birch (Betula papyrifera). A moat around the margin of the thicket swamp contains a dense sward of Yellow Iris and Cutgrass.

4. Bottomland Forest

Bottomland forest occurs in Wendigo Ravine and along the western side of Spring Road Ravine. They support Manitoba Maple (Acer negundo) and to a lesser extent Eastern Cottonwood (Populus deltoides), Crack Willow (Salix fragilis), Yellow Birch (Betula alleghaniensis) and White Elm (Ulmus americana). The understory is a mixture of native and introduced species, such as Hairy Willowherb (Epilobium hirsutum), Smaller Forget-me-not (Myosotis laxa), Field Horsetail (Equisetum arvense), Spotted Jewelweed and Himalayan Balsam (Impatiens glandulifera).

Significant species: The regional rarities: Sycamore (Platanus occidentalis - several trees), a sedge Carex laevivaginata and Yellow Jewelweed (Impatiens pallida).

UPLAND VEGETATION TYPES

NATIVE UPLANDS

5. Dry Deciduous Savannah/Forest

a. Black Oak - White Oak - Red Oak Savannah/Forest

The dry upper slopes and tableland of High Park support an open woodland or savannah of mature Black Oak (Quercus velutina), with scattered trees of Red Oak (Quercus rubra), White Oak (Quercus alba) and the occasional White Pine (Pinus strobus) and Red Pine (Pinus resinosa). Below the semi-open tree canopy there are saplings and young trees of Black Oak, Red Oak, White Oak, Sassafras (Sassafras albidum) and Large-toothed Aspen (Populus grandidentata) which form dense patches, especially in the more protected valleys. In addition, there are the occasional tall shrub patches of Staghorn Sumac (Rhus typhina). This proliferation of younger trees, saplings and shrubs occurs in savannahs where rejuvenating ground fires have been eliminated.

A low shrub layer is common and includes such species as Serviceberry (Amelanchier spicata var stolonifera), Bush Honeysuckle (Diervilla lonicera), Sweet Fern (Myrica asplenifolia), the blueberries Vaccinium pallidum and V. angustifolium, Common Blackberry (Rubus allegheniensis), Poison-ivy (Rhus radicans), Black Huckleberry (Gaylussacia baccata), New Jersey Tea (Ceanothus americanus), Upland Willow (Salix humilis), Smooth Rose (Rosa blanda) and Northern Dewberry (Rubus flagellaris).

Grasses and forbs, many with prairie affinities, occur intermixed with the low shrub patches, especially in the larger openings on knoll tops. Most plentiful are prairie grasses such as Big Bluestem (Andropogon gerardii), Indian Grass (Sorghastrum nutans), Little Bluestem, (Andropogon scoparius), the sedges Carex pensylvanica and Carex foenea and an introduced fescue grass (Festuca longifolia). Common forbs include Azure Aster (Aster azureus), Round-headed Bush Clover (Lespedeza capitata), Pale-leaved Sunflower (Helianthus strumosus), Woodland Sunflower (Helianthus divaricatus), Bastard Toadflax (Comandra umbellata), Canada Tick-trefoil (Desmodium canadense), Bracken Fern (Pteridium aquilinum), Bird Vetch (Vicia cracca), Early Goldenrod (Solidago juncea), Gray Goldenrod (Solidago nemoralis), Large-leaved Aster (Aster macrophyllus), Common Cinquefoil (Potentilla simplex) and Wild Lupine (Lupinus perennis).

Most of the species in the savannahs have southern or prairie affinities, however, some are more typical of the Boreal or Mixed Forest Regions. These northern species include Red Pine, Common Hairgrass (Deschampsia flexuosa) and Dragonhead (Dracocephalum parviflorum).

Significant species: Almost 80% of the rare species in High Park are restricted (27 species) or partially restricted (5 species) to this community. They include 3 nationally/provincially rare species, Wild Lupine (Lupinus perennis), Woodland Fern-leaf (Aureolaria pedicularia) and Cup-plant (Silphium perfoliatum). In addition there are 29 regionally rare species, including Serviceberry (Amelanchier spicata var. stolonifera), Little Bluestem, Bearded Shorthusk (Brachyelytrum erectum), Harebell (Campanula rotundifolia), the sedges (Carex foenea, C. muhlenbergii, C. rugosperma), Nut-grass (Cyperus filiculmis), Common Hairgrass (Deschampsia flexuosa), Black Huckleberry, the frostweeds Helianthemum bicknellii and H. canadense, Pale-leaved Sunflower, the bush clovers Lespedeza capitata and L. hirta, Pinweed (Lechea intermedia), Hairy Agrimony (Agrimonia pubescens), Cylindric Blazing Star (Liatris cylindrica), Whorled Loosestrife (Lysimachia quadrifolia), Wire-stemmed Muhly Grass (Muhlenbergia frondosa), Sweet Fern, Red Pine, Northern Dewberry (Rubus flagellaris), Black Oak, Pasture Rose (Rosa carolina), Sassafras, Stout Goldenrod (Solidago squarrosa), Indian Grass and Dry-land Blueberry.

b. Red Oak - White Oak Forest

Two sand ridges in the southcentral portion of High Park support small forested stands dominated by Red Oak and White Oak with a scattering of Black Cherry (Prunus serotina). The understory is transitional between the dry oak savannah/forest (community type 5a) and the dry mesic Red Oak forest (community type 6b).

Significant species: The regionally rare Sassafras, Pale-leaved Sunflower and Whorled Loosestrife.

6. Dry Mesic/Mesic Deciduous Forest

- a. Red Oak - Black Cherry - Red Maple - Black Oak - White Pine,
- b. Red Oak,
- c. Red Oak - Red Maple - Black Cherry - Hemlock - White Birch - Beech and
- d. Red Maple - Black Cherry - White Ash - White Birch - Red Oak

Moist upland deciduous forests are restricted to the lower slopes of Wendigo Ravine and Spring Road Ravine, the northfacing slope of Deer Pen Road Ravine, and the small ravine slopes and a few knolls scattered along the southern edge of High Park. Deep and relatively narrow, the ravines sustain a cooler microclimate which helps to retain moisture in the soil.

The moist upland forests at High Park, for the most part, are dominated by Red Oak. The secondary tree species associated with Red Oak vary according to changes in soil moisture along a continuum from dry mesic to mesic.

On the drier sites, Red Oak is almost the only tree species in the canopy (e.g. community 6b, located in the southern portion of High Park), or it is associated with Black Cherry (e.g. community 6a, located throughout the park).

Other common tree species in the latter community include Red Maple (Acer rubrum), Black Oak, White Pine (Pinus strobus) and, to a lesser extent, White Birch and White Oak.

The moister forests are restricted to the northwest and eastfacing slopes of Spring Road Ravine, the northfacing slopes of Deer Pen Road Ravine and a small tributary valley entering Spring Road Ravine. On the first 2 sites, Red Oak is strongly associated with Red Maple. Other common tree species include Black Cherry, Hemlock (Tsuga canadensis), White Birch, Beech (Fagus grandifolia), Yellow Birch, and to a lesser extent, White Pine and the occasional Sugar Maple (Acer saccharum). In the small tributary ravine, Black Cherry, Red Maple and White Ash (Fraxinus americana) share dominance in the tree layer. Less frequent in this stand are Red Oak and White Birch.

In contrast to the low shrub and prairie understory of the dry savannahs, these moist forests have an understory of tall shrubs and spring flowering herbs. The dense layer of tall shrubs is formed by Round-leaved Dogwood (Cornus rugosa), Beaked Hazel (Corylus cornuta), Chokecherry (Prunus virginiana), Witch-hazel (Hamamelis virginiana), Red-osier Dogwood, Maple-leaved Viburnum (Viburnum acerifolium), the honeysuckles (Lonicera canadensis and the introduced L. tatarica, L. morrowii, L. Xbella), Nannyberry (Viburnum lentago), Mountain Maple (Acer spicatum) and Speckled Alder. The latter three species are concentrated along the moister bases of ravine slopes (community 6c). Less frequent are such low shrubs as Common Blackberry, Red Raspberry (Rubus strigosus), Flowering Raspberry (Rubus odoratus) and Poison-ivy.

Below the shrub layer there is a common herbaceous layer of False Solomon's-seal (Smilacina racemosa), White and Red Trillium (Trillium grandiflorum, T. erectum), Wild Lily-of-the-Valley (Maianthemum canadense) and less frequently Hairy Solomon's-seal (Polygonatum pubescens), Wild Sarsaparilla (Aralia nudicaulis), the sedge Carex pedunculata, Early Meadow-rue (Thalictrum dioicum) and Blue-stemmed Goldenrod (Solidago caesia). The moister sites also support such species as Mayapple (Podophyllum peltatum), White and Red Baneberry (Actaea alba, A. rubra), Wood Anemone (Anemone quinquefolia), Spotted Cranesbill (Geranium maculatum) and Zig-zag Goldenrod (Solidago flexicaulis). Herbaceous species more typical of the Boreal or Mixed Forest Regions of Ontario are largely confined to scattered patches along the mesic lower slopes of community 6c, and include Bluebead Lily (Clintonia borealis), Northern Beech Fern (Phegopteris connectilis), Rose-twisted Stalk (Streptopus roseus), Trailing Arbutus (Epigaea repens), Bunchberry (Cornus canadensis) and one clump of Goldthread (Coptis trifolia). In addition, seepage areas near the base of the slopes support Speckled Alder - Mountain Maple (Acer spicatum) thickets with an understory of Foamflower (Tiarella cordifolia), Dwarf Dewberry (Rubus pubescens) and Mitrewort (Mitella diphylla).

Significant species: Communities 6a and 6b both support the nationally/provincially rare Cup-plant and the regionally rare Black Oak and Sassafras. In addition, community 6a sustains the regionally rare Red Pine, and community 6b the nationally/provincially rare Shrubby St. John's-wort (Hypericum prolificum - restricted to one shrub, based on a sight record in Wainio et al., 1976), and the regionally rare Whorled Loosestrife and Solomon's-seal (Polygonatum biflorum - confined to one patch).

The moister forests of community 6c sustain three regionally rare species: Black Oak, Red Pine, and Trailing Arbutus (two of only 3 remaining patches in High Park).

7. Dry Mesic Mixed Forest: Hemlock - Red Oak - Black Oak - Red Maple - White Pine

Mixed forests in High Park are confined to three small stands along the eastern slopes of Spring Road Ravine. The tree layer is dominated by Hemlock, with such strong secondary species as Red Oak, Black Oak, Red Maple and White Pine. Less frequent are White Oak, White Cedar (Thuja occidentalis), White Birch, Black Cherry and Yellow Birch. The shrub and herbaceous understory is similar to those described for the dry mesic/mesic deciduous forests.

Significant species: The regionally rare Black Oak and Trailing Arbutus.

DISTURBED UPLANDS

8. Exotic Forests

Exotic forests are confined to the margins of natural areas, generally where fill or landslides have disturbed the original substrate. Stands occur along the landfilled slopes abutting Bloor Street in the northwest corner of the park and along Parkside Drive. Exotic forests are also found in two small tributary ravines off Wendigo Ravine and a tributary ravine on the west side of Spring Road Ravine.

Manitoba Maple, and such introduced trees as Siberian Elm (Ulmus pumila) and Norway Maple (Acer platanoides) dominate the forest. Less frequent are such native trees as White Ash and Eastern Cottonwood. The understory supports a wide assortment of weedy and native species.

9. Thickets and Fields

Thickets and fields on formerly disturbed sites are scattered throughout High Park, often in association with areas of exotic forest.

10. Native Forests Heavily Infested in the Understory by Exotics

The oak forested ravine slopes surrounding a former compost dump near Colborne Lodge are heavily infested in the understory by Himalayan Balsam. Another stand occurs on the north side of Deer Pen Road Ravine around the animal paddocks. These oak forests contain many introduced shrubs and herbs, and the occasional planted trees.

11. Plantations

Plantations of oak (Quercus spp.), mountain-ash (Sorbus americana), spruce (Picea spp.) are confined to the central portion of High Park and along small sections of the Deer Pen Road Ravine on the north side. For the most part, these plantations have weedy understories, but one plantation of oak and mountain-ash, in the midst of a Black Oak savannah, contains a rich assortment of prairie grasses and forbs.

Significant species: The plantation with the prairie understory supports the regionally rare Indian Grass, Little Bluestem, Round-headed Bush Clover and Cylindric Blazing Star.

(ii) FLORISTICS

High Park is situated near the northeastern edge of the Eastern Deciduous Forest or Carolinian Life Zone of Ontario, a region which stretches south of a line from Grand Bend through London to Toronto, containing many plants and animals more typical of areas to the south or west in the United States. Some species are derived from prairie and savannah habitats in the midwest, while others have affinities with the Eastern Deciduous Forests centred in the Carolinas, hence the name Carolinian Life Zone. The Carolinian Life Zone contains many of the most endangered habitats in Canada as exemplified by the fact that it sustains 65% of Ontario's rare plant species (Oldham, 1989).

High Park's natural areas support a large assemblage of 57 species with southern or prairie/savannah affinities (see Table 2). Eight of the southern taxa occur at the limit of their Ontario distributions at High Park. The distributions of 6 provincially rare southern and prairie species are illustrated in Appendix A (see Ague Weed, Woodland Fern-leaf, Shrubby St. John's-wort, Virginia Yellow Flax, Wild Lupine and Cup-plant).

The assemblage of 41 prairie/savannah species (30 species extant) is exceptionally rich for an area near the northeastern limit of prairies and savannahs in Ontario. Other sites supporting prairie/savannah assemblages in the Ministry of Natural Resources, Central Region are listed in Table 3.

High Park is also noteworthy for supporting 14 species more typical of the Boreal or Mixed Forest Regions to our north (see Table 2). Seven of these species are still present in the park.

Finally, two historical species in High Park have affinities with the Great Lakes shorelines, Indian Paintbrush (Castilleja coccinea) and Bushy Cinquefoil (Potentilla paradoxa). The distribution of the latter provincially rare species is illustrated in Appendix A.

In conclusion, High Park sustains a significant floristic assemblage not replicated elsewhere in the region (Site District 7-4).

Table 2: Geographic Affinities of Vascular Plants
in the High Park Oak Woodlands Natural Areas

Southern species at or near the limit of their range in High Park
(Species at their range limit in High Park are denoted by the symbol "**")

+ <u>Agrimonia pubescens</u>	<u>Linum virginianum</u> *
+ <u>Aster azureus</u>	+ <u>Lupinus perennis</u>
+ <u>Aureolaria pedicularia</u> *	+ <u>Lysimachia quadrofolia</u> *
<u>Cardamine douglassii</u>	+ <u>Muhlenbergia frondosa</u>
+ <u>Carex laevivaginata</u>	+ <u>Panicum latifolium</u>
+ <u>Ceanothus americanus</u>	+ <u>Physalis virginiana</u> var. <u>sonorae</u>
<u>Erigeron pulchellus</u>	+ <u>Platanus occidentalis</u>
<u>Gentianella quinquefolia</u>	<u>Polygala verticillata</u> *
+ <u>Hamamelis virginiana</u>	+ <u>Polygonatum biflorum</u> *
+ <u>Helianthemum bicknellii</u>	+ <u>Quercus velutina</u>
+ <u>Helianthus strumosus</u>	+ <u>Rosa carolina</u>
+ <u>Hypericum prolificum</u> *	+ <u>Sassafras albidum</u> *
+ <u>Impatiens pallida</u>	+ <u>Silphium perfoliatum</u> *
+ <u>Lespedeza captata</u>	<u>Solidago bicolor</u>
+ <u>Lespedeza hirta</u>	+ <u>Solidago patula</u>

Northern species near the limit of their range in High Park

+ <u>Clintonia borealis</u>	<u>Hieracium canadense</u>
+ <u>Coptis trifolia</u>	<u>Menyanthes trifoliata</u>
+ <u>Corallorhiza trifida</u>	<u>Petasites palmatus</u>
+ <u>Cornus canadensis</u>	+ <u>Phegopteris connectilis</u>
+ <u>Deschampsia flexuosa</u>	+ <u>Pinus resinosa</u>
+ <u>Dracocephalum parviflorum</u>	<u>Spiranthes romanzoffiana</u>
<u>Gaultheria hispida</u>	+ <u>Streptopus roseus</u>

Species with prairie/savannah affinities (Reznicek, 1983;
Bakowsky 1988; Catling et al., 1975; Faber-Langendoen, 1984)

+ <u>Amelanchier spicata</u>	<u>Gentianella quinquefolia</u>
var. <u>stolonifera</u>	+ <u>Helianthemum bicknellii</u>
+ <u>Andropogon gerardii</u>	+ <u>Helianthemum canadense</u>
+ <u>Andropogon scoparius</u>	+ <u>Helianthus strumosus</u>
+ <u>Anemone cylindrica</u>	+ <u>Lechea intermedia</u>
<u>Asclepias tuberosa</u>	+ <u>Lespedeza capitata</u>
+ <u>Aster azureus</u>	+ <u>Lespedeza hirta</u>
<u>Aster laevis</u>	+ <u>Liatris cylindrica</u>
+ <u>Aster sagittifolius</u>	<u>Linum virginianum</u>
+ <u>Aureolaria pedicularia</u>	+ <u>Lupinus perennis</u>
<u>Bromus kalmii</u>	+ <u>Lysimachia quadrifolia</u>
+ <u>Campanula rotundifolia</u>	<u>Polygala polygama</u>
+ <u>Carex foenea</u>	<u>Polygala verticillata</u>
+ <u>Carex muhlenbergii</u>	<u>Ranunculus fascicularis</u>
+ <u>Ceanothus americanus</u>	<u>Ranunculus rhomboideus</u>
+ <u>Comandra umbellata</u>	+ <u>Rosa carolina</u>
+ <u>Cyperus filiculmis</u>	+ <u>Sorghastrum nutans</u>
+ <u>Desmodium canadense</u>	+ <u>Sporobolus cryptandrus</u>
+ <u>Dracocephalum parviflorum</u>	+ <u>Vaccinium palidum</u>
<u>Elymus canadensis</u>	+ <u>Viola fimbriatula</u>
<u>Erigeron pulchellus</u>	

Legend:

+ - species found during the surveys of 1976, 1980-82, 1988-89.

Table 3: List of Prairies and Savannahs in the Ministry of Natural Resources, Central Region.

The prairie and savannah sites are grouped by County or Regional Municipality. The number of plant species with prairie/savannah affinities are noted, where available, for each of the sites. In some cases, there is also information on historical records. Finally, the number of provincially rare (Argus *et al.*, 1982-87) and regionally rare species (Riley, 1988) were tabulated.

Site	No. of Prairie/ Savannah Species (Historical) Extant	Level of Rarity		Source
		(Historical) Rare	(Historical) Extant	
<u>Metropolitan Toronto R.M.</u>				
High Park Oak Woodlands	(41) 30	(5) 3	(11) 8	Varga
Lambton Park Prairie (Part of the Humber Plains)	(50) 20	(11) 1	(10) 4	Varga (See Appendix B)
<u>York R.M.</u>				
Holland Landing Prairie	31	(2) 1	9	Rezniecek, 1983
<u>Simcoe County</u>				
DeGrassi Point	(27) 20	(2) 1	(6) 4	Rezniecek, 1983
Kempenfeldt Bay	28	1	8	Rezniecek, 1983
Fort Willow	18	1	1	Rezniecek, 1983
<u>Peel R.M.</u>				
Lorne Park Prairie	22	2	5	Webber, 1984
Stavebank Prairie	?	?	?	Hanna, 1984
<u>Halton, R.M.</u>				
Bronte Creek Provincial Park	23	1	4	House and Carleton, 1988
<u>Waterloo R.M.</u>				
Branchton Prairie	(26) 14	1	4	pers. comm., G. Allen Craig Campbell,
Sudden Bog	17	1	1	pers. comm. D. A. Sutherland
<u>Brant County</u>				
Brantford Savannah	24	4	7	Bakowsky, 1988; Allen, 1988; Gould & Sutherland, 1987
Grand River Bluff Prairie	6	0	1	pers. comm. Gary Allen
St. George Prairie	?	?	?	Langendoen, 1984
Blue Lakes Prairie	?	?	?	Langendoen, 1984

CHAPTER III: PLANNING CONSIDERATIONS

(i) SIGNIFICANT FEATURES

a. Significant Areas and Areas Sensitive to Development

Nine vegetation types, totalling 48.2 ha, were delineated during the course of this study as significant and sensitive areas. They include all the larger examples of native upland communities (e.g. 5a, 5b, 6a-d, 7) and the wetland communities (e.g. 1a, 2a-c, 3, 4). Other areas making up 6.5 ha were not considered significant because they are disturbed uplands (e.g. community types 8, 9, 10, 11) or they contain small isolated or slightly disturbed native uplands.

The significance of these 9 vegetation types was determined using the criteria developed by the Ministry of Natural Resources for their evaluation of Natural Areas of Scientific Interest (ANSIs) (O.M.N.R., 1976). The criteria include: (1) scientific value, (2) representative value (e.g. is it a good example of the vegetation typical of the region?), (3) education/interpretive value, (4) significant habitat/features (e.g. does it contain rare biota or vegetation?) and (5) overall biological significance. Whether areas are of local, regional or provincial significance is determined by examining the literature on vegetation ecology and making comparisons with other natural areas.

Comparisons are made on the basis of Site Region and Site District. For example, Ontario's vegetation is divided from north to south into 7 regions, such as tundra, boreal forest, etc. Each of these regions is further subdivided into Site Districts on the basis of major physiographic features (e.g. moraines, escarpments, former lake beds, etc.).

High Park occurs near the edge of the Deciduous Forest Region or Carolinian Life Zone (Site Region 7). This region contains many southern plants and animals and is considered to have some of the most threatened habitats in Canada (Eagles & Beechey, 1985). Within the Carolinian Life Zone, High Park is part of Site District 7-4. This district encompasses a broad band along Lake Ontario centered around the City of Toronto. It is characterized by the cliffs, terraces and ancient shorelines of the old Lake Iroquois lakebed.

The Ministry of Natural Resources has identified 8 provincially significant ANSIs and 24 regionally significant ones in Site District 7-4. High Park was considered to be a regionally significant ANSI, requiring further study and evaluation as a special area deserving protection through sensitive planning (Hanna, 1984; O.M.N.R., 1983).

Following the inventory work carried out in this study the Ministry is recommending a provincially significant ANSI designation for 72.8 hectares of High Park. This designation will be put forward in 1990 as an amendment to the Maple District Land Use Guidelines, a document which directs the Ministry's responsibilities for the provinces natural resources (including parks and ANSIs).

High Park's natural areas provide a regionally unique opportunity for scientific research, and education/interpretation. Scientists can study: (1) rare savannah and prairie vegetation communities near the limits of their range, (2) the relationship of vegetation to such physical parameters as soil moisture, microclimate and slope aspect, (3) the ecology of 4 nationally rare plant species and (4) past lake levels and past climate/vegetation as revealed in the bottom sediments of Grenadier Pond.

Two Masters theses and a number of scientific papers have already used information obtained from the park's natural areas (Faber-Langendoen, 1984; Langendoen and Maycock, 1983; McCarthy, 1986; McCarthy and McAndrews, 1988). High Park is also used as an education tool by the University of Toronto. Courses in Palynology, Ontario Flora, Plant Ecology and Plant Taxonomy all have field trips to the area. Most frequented are Grenadier Pond (communities 1a, 1b, 2a) and the Black Oak savannah/forests (community 5a).

On the basis of overall biological significance, the Black Oak savannah/forest (H1, M1) is considered provincially rare, i.e. its oak woodlands are not represented in any of the other ANSIs in Site District 7-4 and it supports an exceptionally large assemblage of rare flora. Better quality examples are only known to occur in Ontario at 3 sites much further to the southwest (Bakowsky, 1988). The moist Red Oak and mixed forests (H3, M3, H4) are regionally rare, and the wetlands (E1, E2, E3, E4, E5) and dry Red Oak - White Oak forests (H1) are locally significant in the City of Toronto.

The significant areas of High Park show either extreme, high or moderate sensitivity to development. The wetlands (communities 1a, 2a-c, 3, 4) are considered to be extremely sensitive because of their organic soils and high water tables. Disturbance could also lead to rapid destruction of the root mat. In contrast, the native uplands (communities 5a, 5b, 6a-d, 7) were given a rating of moderate sensitivity on the tableland and gradual slopes, and high sensitivity on the steeper slopes. The sandy soils and the sometimes rugged topography of the uplands make them susceptible to erosion.

**E1 OPEN WATER: Submerged/Floating Aquatics, and
E2 EMERGENT MARSH (Common Cattail/Sweet Flag)**

The open water and emergent marsh communities along the shallow edges of Grenadier Pond are representative of lakefront marshes occurring in Site District 7-4. Higher quality examples on the Iroquois Plain occur at the Lower Rouge Marshes ANSI on clay substrates and the Rattray Marsh ANSI on sand substrates. Lakefront marshes are also represented at the following regionally significant ANSIs: Dufferin Creek Marshes, Shoal Point Marsh, and the Credit River Marshes.

The wetland communities at Grenadier Pond are noteworthy at the local level for harbouring one of only two remaining lakefront marshes in the City of Toronto, the other being the Humber River Marshes. Until the 1900's the City's major lakefront marsh was Ashbridges Bay, a spectacular 400 ha wetland at the mouth of the Don River (Barnett, 1971). Wetlands remaining today at the Humber River and Grenadier Pond have also been diminished in size over the years. For example, 2 of the 7 marshes on the Humber were filled in during the 1960's and a third was greatly reduced in size by the construction of the Queen Elizabeth Way and a sewage treatment plant (Varga, 1980). The southern and eastern edge of Grenadier Pond, which once contained an extensive marsh, was altered to make way for the Queensway and a shoreline "beautification" program in the late 1950's and into the 60's (Wainio, *et al.*, 1976). This resulted in the loss of such rare wetland species as Swamp Lousewort (*Pedicularis lanceolata*), Large-leaved Pondweed (*Potamogeton amplifolius*), White Water-crowfoot (*Ranunculus longirostris*), Sessile-fruited Arrowhead (*Sagittaria rigida*) and Pickerelweed (*Pontederia cordata*). Calculation of the amount of wetlands lost at these sites leads to the conclusion that wetlands have declined by over 94% in the City of Toronto since 1900.

The remaining wetlands at Grenadier Pond should be protected as a locally significant lakefront marsh which still supports regionally rare wetland species. One of these rarities, Nuttall's Waterweed (*Elodea nuttallii*), is only known in the York and Toronto Regions from Grenadier Pond. Grenadier is also an important scientific benchmark for research into Lake Ontario water levels, and past climates and vegetation in the region. Sediment cores taken from the pond's bottom have demonstrated that 4,200, 3,100, 2,100 and 1,200 years ago, rapidly rising water levels in Lake Ontario correlated with short periods (200-300 years long) of wetter climates than we have at present (McCarthy, 1986). Tree pollen taken from the cores suggests that during the wetter periods, High Park has more moisture-loving Beech, Maple and Hemlock forests, in contrast to the drought-tolerant Oak-Pine forests which dominate during the drier climatic periods.

E3 MEADOW MARSH AND SHRUB-RICH MARSH,
E4 THICKET SWAMP (Speckled Alder) and
E5 BOTTOMLAND FOREST

The bottomland wetlands at High Park are representative of those occurring in Site District 7-4. Better quality examples occur on the Iroquois Plain at the following provincially and regionally significant ANSIs: the Rouge River Central Woodland Valley Complex, Finch Avenue Meander Scar, Morningside Tributary Ravine, Credit River at Erindale, Rattray Marsh, the Credit River Marshes, Lower Rouge Marshes, Dufferin Creek Marsh and Bronte Creek Provincial Park.

At the local level, these wetland communities harbour some of the few natural bottomlands remaining in the City of Toronto. In addition, they sustain 4 regionally rare plant species, including such southern ones as Sycamore (Platanus occidentalis), the sedge Carex laevivaginata and Yellow Jewelweed (Impatiens pallida). Another 11 rare species, including 2 national rarities, once resided in the bottomland swamps and marshes of High Park (e.g. Ague Weed (Gentianella quinquefolia), a monkey-flower (Mimulus glabratus var. fremontii), the sedges Carex diandra and C. lasiocarpa), Swamp Thistle (Cirsium muticum), Meadow Horsetail (Equisetum pratense), Creeping Snowberry (Gaultheria hispidula), the gentians Gentiana crinita, and G. andrewsii, Sweet Coltsfoot (Petasites palmatus), and Hooded Ladies'-tresses (Spiranthes romanzoffiana). These species are now extirpated from the park probably largely as a result of the conversion of native bottomlands to formal parkland.

H1, M1 DRY DECIDUOUS UPLAND SAVANNAH/FOREST (Black Oak - White Oak - Red Oak)

This community is a mixture of forest and savannah. Savannahs are fire-dependent communities midway between treeless tallgrass prairie and closed-canopy deciduous forest. On savannahs, open grown oaks share dominance with grasses and forbs, giving a pleasing park-like aspect to the community. Understory forest species, however, also thrive in the shade cast by the scattered trees. The park-like aspect of savannahs is maintained by periodic ground fires. In the absence of ground fires, trees, saplings and shrubs eventually shade out the prairie grasses and forbs.

The dry oak savannahs at High Park are considered to be a provincially rare vegetation type. They are known to occur at only five other sites in Ontario, all of them confined to the Carolinian Life Zone of southwestern Ontario (e.g. the Long Point Wildlife Refuge, Pinery Provincial Park, Pelee Island, Brantford Savannah and Turkey Point) (Bakowsky, 1988).

Historically, savannahs were more widespread in southern Ontario occurring on sand plains between Ingersoll and London, along the Lower Thames River, Paris and Galt, Turkey Point, south of Windsor along the banks of the Detroit River, on the eastern

shores of Lake St. Clair, and in the Toronto vicinity between the Scarborough Bluffs and Mimico Creek (Bakowsky, 1988). In the adjacent United States, savannahs originally occupied 11 to 13 million ha, but only 2,600 ha of high quality could be located in the U.S. midwest in a 1985 study (Nuzzo, 1986). This has resulted from conversion of savannah to agricultural land, urbanization, and the control of ground fires.

The savannahs of southern Ontario are also considered relict communities. It is postulated that between 4,200 and 8,000 years ago, the climate was warmer and drier than today, allowing prairies and savannahs from the midwest to extend into Ontario, occupying formerly forested uplands (Bakowsky, 1988; Reznicek, 1983). As the climate reverted to present conditions, forest development was again favoured. On specialized sites, however, such as High Park with its well drained sandy soils and its southern exposures, this midwestern vegetation was able to persist. The native Indians who long occupied the High Park area (Lizars, 1913), may have burned vegetation to maintain open conditions.

In Site District 7-4, High Park is the only remaining sizeable example of Black Oak savannah or Black Oak forest. Other small remnants only exist at Lambton Park Prairie (east side of the Humber River, north of Dundas St. W.) and a small woodlot north of the Humber Sewage Treatment Plant. These two sites are all that remain of the famous Humber Plains which once stretched from High Park to Mimico Creek.

The savannahs at High Park harbour 32 of the 41 rare species now known from the Park. These include such national rarities as Woodland Fern-leaf (Aureolaria pedicularia), Wild Lupine (Lupinus perennis) and Cup-plant (Silphium perfoliatum).

An additional 24 rare species occurred historically on these savannahs, probably extirpated through picking, transplanting, zealous botanists and the conversion of some portions to formal parkland. This represents 43% of the rarities in the High Park savannah flora (e.g. Ague Weed (Gentianella quinquefolia), Virginia Yellow Flax (Linum virginianum), Orange Milkweed (Asclepias tuberosa), Smooth Aster (Aster laevis), Canada Milk-vetch (Astragalus canadensis), Least Moonwort (Botrychium simplex), Kalm's Brome (Bromus kalmii), Pipsissewa (Chimaphila umbellata), Robin's Plantain (Erigeron pulchellus), Canada Hawkweed (Hieracium canadense), Wood Rush (Luzula multiflora), Mountain-rice (Oryzopsis pungens), the panic grasses Panicum columbianum, P. latifolium and P. xanthophysum, Ground-cherry (Physalis virginiana var. sonorae), the milkworts Polygala polygama and P. verticillata, Indian Paintbrush (Castilleja coccinea), Early Buttercup (Ranunculus fascicularis), Prairie Buttercup (Ranunculus rhomboideus), Early Saxifrage (Saxifraga virginensis), White Goldenrod (Solidago bicolor) and Yellow Pimpernel (Taenidia integerrima)).

Finally, the savannahs are important for educational and scientific purposes. The prairie openings have been sampled as part of an ecological study on prairie vegetation in southern Ontario (Faber-Langendoen, 1984). The area is also used by plant taxonomy, flora, and plant ecology classes from the University of Toronto.

Keeping in mind the provincial significance of savannahs, consideration should be given to restoration of the 7.7 ha of savannah at High Park that have an intact tree layer of Black Oak, but are currently used as formal parkland. These areas and their sensitivity, if restored, are outlined in Map 2.

H2 DRY DECIDUOUS FOREST (Red Oak - White Oak)

The dry Red Oak - White Oak forests at High Park are representative of those occurring in Site District 7-4. Similar examples occur on the Iroquois Plain at the following provincial and regionally significant ANSIs: Rattray Marsh, Rouge River Central Woodland Valley Complex, Credit River Marshes, Lower Rouge Marshes, Iroquois Shoreline Woods and Stavebank Oak Woods.

In High Park these oak forests sustain 3 regionally rare species, two at the northern limits of their range e.g. Sassafras (Sassafras albidum) and Whorled Loosestrife (Lysimachia quadrifolia).

H3, M3 DRY MESIC/MESIC DECIDUOUS UPLAND FOREST and H4 DRY MESIC MIXED UPLAND FOREST

This assortment of dry mesic/mesic forests is representative of those occurring in the Carolinian Life Zone (Site Region 7) of southwestern Ontario. The high component of Black Oak in many of these moist forests appears to be rare in Site District 7-4. Black Oak's distribution in the district is confined to the Lake Ontario shore up to High Park. It appears to be absent from moist forests in other ANSIs on the Iroquois Plain.

The forests are also noteworthy for their rich assortment of both northern and southern species, 8 of which are considered to be regionally or provincially rare. There are southern ones such as Black Oak (Quercus velutina), Solomon's-seal (Polygonatum biflorum), Cup-plant (Silphium perfoliatum), Sassafras (Sassafras albidum), Whorled Loosestrife (Lysimachia quadrifolia) and Shrubby St. John's-wort (Hypericum prolificum). Many of these taxa occur next to species more typical of boreal or mixed forest regions such as Bunchberry (Cornus canadensis), Goldthread (Coptis trifolia), Rose-twisted Stalk (Streptopus roseus), Bluebead Lily (Clintonia borealis), Northern Beech Fern (Phegopteris connectilis), Trailing Arbutus (Epigaea repens) and Red Pine (Pinus resinosa).

b. OTHER AREAS SENSITIVE TO DEVELOPMENT

H5 DISTURBED UPLANDS UPSLOPE FROM SIGNIFICANT AREAS

2.1 ha of disturbed uplands were considered highly sensitive to development because they are situated on valley slopes or rim habitats upslope from significant native vegetation types. Development on such upslope habitats could have negative impacts on the adjacent native vegetation. These small areas are scattered throughout the park.

c. HIGH PARK NATURAL AREAS - A SUMMARY

The ten natural areas of High Park shown on Map 2 (50.3 ha), contain all of the significant vegetation communities at High Park (48.3 ha), the sensitive disturbed uplands upslope from these significant communities (2.1 ha) and all of High Park's 41 rare plant species. The distribution of rare species within each of the 10 natural areas is summarized in Table 4.

The 10 natural areas include:

(1) GRENADIER POND - EAST SLOPE (NORTH)

This large upland supports an excellent example of provincially rare Black Oak savannah/forest, a good example of moist Red Oak forests and High Park's largest concentration of rare species, many with southern, prairie or savannah affinities. Size: 13.0 ha plus 0.1 ha with a potential for restoration.

(2) GRENADIER POND

High Park's only example of open water and emergent marsh wetland communities, with 2 regionally rare species. Size: 6.0 ha, does not include the 14.8 ha of Grenadier Pond too deep to support aquatic plants (e.g. community 1b).

(3) GRENADIER POND, EAST SLOPE (SOUTH)

A small dissected upland sustaining dry Black Oak and Red Oak - White Oak forests and moist Red Oak forests, with 8 rare plant species of southern affinities. Two of the species are restricted in High Park to this natural area (e.g. Hairy Agrimony (Agrimonia pubescens) and Solomon's-seal (Polygonatum biflorum)). Size: 2.3 ha.

(4) DEER PEN ROAD RAVINE (NORTH)

A small but very diverse area harbouring good examples of dry Black Oak forest, moist Red Oak forests, meadow marsh and High Park's only example of thicket swamp. In addition, 3 regionally rare species with southern affinities occur in this natural area. Size: 2.0 ha.

(5) DEER PEN ROAD RAVINE (SOUTH)

A small Red Oak forested ridge which supports the nationally/provincially rare Shrubby St. John's-wort (Hypericum prolificum - based only on a sight record) and the regionally rare Whorled Loosestrife (Lysimachia quadrifolia). Size: 0.6 ha.

(6) SPRING ROAD RAVINE, EAST SLOPE (SOUTH)

A small upland forest in the southeast corner of the park. It sustains a stand of the regionally rare Black Oak (Quercus velutina). Size: 2.1 ha.

(7-10) SPRING ROAD RAVINES

These last 4 natural areas, totalling 24.4 ha along Spring Road Ravine, are only separated by roads or narrow bands of formal parkland. One can consider them a single natural area. They sustain good examples of moist Red Oak forest and bottomland wetlands, and the only example of mixed upland forests. These communities also support High Park's second largest assemblage of rare flora, a total of 28 plant species, many with prairie and savannah affinities. Four of the species are confined in the park to the Spring Road ravine natural areas, including the nationally rare Woodland Fern-leaf (Aureolaria pedicularia).

(7) Spring Road Ravine, East Slope (North) - size: 9.4 ha plus 3.6 ha with a potential for restoration, (8). Spring Road Ravine, West Slope (South) - size: 2.9 ha, (9). Spring Road Ravine, West Slope (Middle) - size: 8.3 ha plus 0.6 ha with a potential for restoration and (10). Spring Road Ravine, West Slope (North) - size: 3.7 ha plus 3.4 ha with a potential for restoration.

Table 4, Legend:

VEGETATION TYPES

1-Open Water, 2-Marsh, 4-Bottomland Forest
5-Dry Deciduous Savannah/Forest, Dry Deciduous Forest
6-Dry Mesic/Mesic Deciduous Forest
7-Dry Mesic Mixed Forest

ABUNDANCE IN NATURAL AREA

R-Rare, restricted to 1 or 2 small populations
U-Uncommon, scattered populations
C-Common, widely distributed populations

Table 4: Rare Plant Species of the High Park Oak Woodlands By Natural Area, Vegetation Type, and Level of Abundance

Species	High Park Natural Areas (See Map 2)									
	1	2	3	4	5	6	7	8	9	10
<u>Acorus calamus</u> (Sweet Flag)		1C								
<u>Agrimonia pubescens</u> (Hairy Agrimony)			5R							
<u>Amelanchier spicata</u> var. <u>stolonifera</u> (Serviceberry)	5C					5U		5U		
<u>Andropogon scoparius</u> (Little Bluestem)	5C					5U	5R	5U	5U	
<u>Aureolaria pedicularia</u> (Woodland Fern-leaf)									5R	
<u>Brachyelytrum erectum</u> (Bearded Shorthusk)							6R			
<u>Campanula rotundifolia</u> (Harebell)	5C					5U		5U	5U	
<u>Carex aquatilis</u> (Sedge)								2R		
<u>Carex foenea</u> (Sedge)	5C								5U	
<u>Carex laevivaginata</u> (Sedge)	4R						2R			
<u>Carex muhlenbergii</u> (Sedge)									5R	
<u>Carex rugosperma</u> (Sedge)									5R	
<u>Cyperus filiculmis</u> (Nut-grass)	5U								5R	
<u>Deschampsia flexuosa</u> (Common Hairgrass)	5R									
<u>Elodea nuttallii</u> (Nuttall's Waterweed)		1C								
<u>Epigaea repens</u> (Trailing Arbutus)							6R		6R	
<u>Gaylussacia baccata</u> (Black Huckleberry)	5C						5U			
<u>Helianthemum bicknellii</u> (Bicknell's Frostweed)	5R									
<u>Helianthemum canadense</u> (Canada Frostweed)	5U								5R	
<u>Helianthus strumosus</u> (Pale-leaved Sunflower)	5C		5,6U				5C	5R	5R	5U
<u>Hypericum prolificum</u> (Shrubby St. John's-Wort)					6R					
<u>Impatiens pallida</u> (Yellow Jewelweed)	4U									
<u>Lechea intermedia</u> (Pinweed)	5C						5R		5U	
<u>Lespedeza capitata</u> (Round-headed Bush Clover)	5U		5R				5R		5U	5U
<u>Lespedeza hirta</u> (Hairy Bush Clover)	5U								5U	5U
<u>Liatris cylindracea</u> (Cylindric Blazing-star)	5U								5U	
<u>Lupinus perennis</u> (Wild Lupine)	5U									
<u>Lysimachia quadrifolia</u> (Whorled Loosestrife)	5U		5R			6R				
<u>Muhlenbergia frondosa</u> (Wire-stemmed Muhly Grass)	5U								5U	
<u>Myrica asplenifolia</u> (Sweet Fern)	5C						5U			
<u>Pinus resinosa</u> (Red Pine)	5,6U							5,6,7U	5,6U	5,6U
<u>Platanus occidentalis</u> (Sycamore)	4R								4R	
<u>Polygonatum biflorum</u> (Solomon's-seal)			5R							
<u>Quercus velutina</u> (Black Oak)	5,6C		5U	5,6U		5,6C	5,6,7C	5,6C	5,6C	5,6C
<u>Rosa carolina</u> (Pasture Rose)	5U									
<u>Rubus flagellaris</u> (Northern Dewberry)	5U									
<u>Sassafras albidum</u> (Sassfras)	5,6C		5,6U	6R			5,6R	5,6U	5,6U	5R
<u>Silphium perfoliatum</u> (Cup-plant)	5,6U		6R							
<u>Solidago squarrosa</u> (Stout Goldenrod)								5R	5R	
<u>Sorghastrum nutans</u> (Indian Grass)	5C						5C		5C	5U
<u>Vaccinium pallidum</u> (Dry-land Blueberry)	5C			5R			5R		5C	5R
Total Rare Flora	29	2	8	3	2	1	16	6	23	10
Number of Rare flora restricted to one natural area	6	2	2	0	1	0	0	1	3	0

(ii) MANAGEMENT CONSIDERATIONS

1. High Park contains some of the most significant natural areas in the regions of York and Metropolitan Toronto in terms of its vegetation communities and its rare flora. High Park's 10 natural areas sustain: (1) a noteworthy concentration of provincially and regionally rare plant species, (2) provincially rare Black Oak savannahs, (3) regionally rare moist forests of Red Oak and Hemlock, and (4) locally significant examples of lakeshore marsh (e.g. Grenadier Pond), natural bottomlands and dry Red Oak - White Oak upland forests. Retaining the significant features of High Park's natural areas should be the primary objective of managing these areas. Moreover, 7.7 ha of potential area for habitat restoration (see Figure 1, Map 2) provide an opportunity to enhance these significant features.
2. The High Park Master Planning Study provides the appropriate opportunity to highlight the significance of High Park's natural areas and put forward a management plan for their long-term conservation. Some of the concerns that should be addressed in discussion of the management plan for High Park's natural areas include the following:
- a) A management approach for High Park's natural areas.

The natural areas in High Park should be considered for status as Environmental Resource Areas (ERAs) (City of Toronto, Planning Department). They should be more or less equivalent to Nature Reserve Zones in the Provincial Park system.

For the most part, natural forces should be allowed to occur unhindered in these areas, as is already largely being carried out by the City's Parks Department.

The cleanup of fallen wood should be restricted to the main trails. Elsewhere, fallen trees, branches and tip-ups should be left to recycle back into the soil and provide a substrate for plants to establish. Many plant species, such as Yellow Birch, germinate mainly on rotting wood. These habitats are also important for many mammal, reptile and amphibian species.

Dead trees, unless they occur near a major trail, should be left standing. They are essential to nest cavity birds and mammals (e.g. flying squirrels, woodpeckers, tree swallows, wood ducks, etc.)

Plantings, even of species native to the park, should not be undertaken in the natural areas. Plantings render such sites useless for ecological research. The native trees and shrubs are self-sustaining, and produce adequate seed crops and seedlings for future generations.

Mowing would be inappropriate except as a management tool to control exotic species (see Management Consideration 2e) or a technique for maintenance of savannah (see Management Consideration 2c).

The spraying of herbicides would be inappropriate except for spot herbicide application where applicable, (see Management Consideration 2c and 2e).

Visitors should be discouraged from picking or removing plants.

Additional trails should not be placed in the natural areas.

b) Restoration of the Grenadier Pond Marshes

Extensive cattail marshes dominated Grenadier Pond up to the 1950's, but have been reduced over the years to two small remnant areas in the northern and southwestern corners. Options should be looked at to restore some of these cattail marshes to Grenadier Pond.

Restoration of the Grenadier Pond marshes may require an improvement in water quality (e.g. constructing a sedimentation/detention tank for storm water before it enters Grenadier Pond). Storm waters, such as those entering the north end of the pond, typically contain road salt, car-derived pollutants (e.g. motor oil, lead, cadmium, etc.) and high sediment loadings. The latter is particularly detrimental to aquatic plant communities.

In addition, it may also be necessary to look at an option discussed in Wainio *et al.* (1976). This report suggested a slight lowering of water levels in Grenadier Pond which would allow for the expansion of the Common Cattail (*Typha latifolia*) and Sweet Flag (*Acorus calamus*) emergent marshes further into the pond.

Enlarging the marshes at Grenadier Pond would greatly benefit wildlife (e.g. resident and migratory waterfowl, reptiles and amphibians and the resident fish). It would also provide visitors with the opportunity to experience a more diverse wetland within the confines of the City of Toronto.

c) Restoration and expansion of the Black Oak savannahs

Most of High Park once supported open grown Black Oaks in a parklike setting, with prairie grasses and forbs in the openings, intermixed with forest species under the oaks.

These open woodlands or savannahs supported a unique assemblage of southern and prairie/savannah plants having affinities with the Midwest. The parklike setting was maintained by periodic ground fires set by lightning strikes or possibly by native Indians resident in the area.

Today, High Park still supports sizeable remnants of these dry oak savannahs, a provincially rare vegetation type containing 78% of the park's rare species, including such rarities as the Woodland Fern-leaf and the Wild Lupine. Most of the savannahs, however, have become seriously overgrown with shrubs, saplings and young trees, some of which are exotic species. They are threatening to shade out the rare prairie species dependent on open ground conditions.

A management plan should be developed for the restoration of the dry oak savannahs. The critical areas for restoration are the southern two-thirds of Natural Area 1, the southern half of Natural Area 7, the central and southwestern portions of Natural Area 9 the section of Natural Area 10 along Spring Road and the potential restoration areas (formal parkland with an intact savannah overstory) (see Figure 2). These 5 critical areas comprise 22.7 hectares of the park.

An essential aspect of the management plan should be the selective removal of shrubs, saplings and young trees from 15.0 ha of existing savannah, under the direction of a botanist familiar with the area's vegetation. This must be carried out within the next 5 years, otherwise, some of the rare open ground species at High Park could be lost.

There should be specific goals set on the percentage of woody species which need to be removed. For example, (1) all introduced woody species should be removed, (2) maintain canopy cover below 60% and (3) reduce native understory woody species, over 1 meter in height, by 50% (woody understory cover should not exceed 20%). A spot herbicide should then be applied to the cut off stumps to kill the root and prevent suckering. This technique has been successfully used on oak savannah nature reserves in the United States. The success of such a program can only be ensured by putting in place a monitoring procedure (e.g. permanent plots) and making a long-term commitment. There will be a need for repeated applications of brush clearing to retain the open savannah conditions.

Ground fires should also be used periodically as a tool to rejuvenate the savannahs after the brush has been cleared. It has been used successfully to rejuvenate savannahs in the United States (Blewett, 1976; Tester, 1988; Vogl, 1964; White, 1983, 1986) and in Windsor's Ojibway Prairie Nature Reserve, by the City of Windsor Parks Department. These fires are restricted to the understory layer of grasses and forbs. There are fire ecologists in the Ontario Ministry of Natural Resources who are experienced in the setting of controlled ground fires. The Ministry has found that with a public education program directed to neighbours and the general public, full support can be obtained for using controlled ground fires to rejuvenate savannahs:

CRITICAL AREAS FOR THE RESTORATION AND MANAGEMENT OF OAK SAVANNAHS IN HIGH PARK




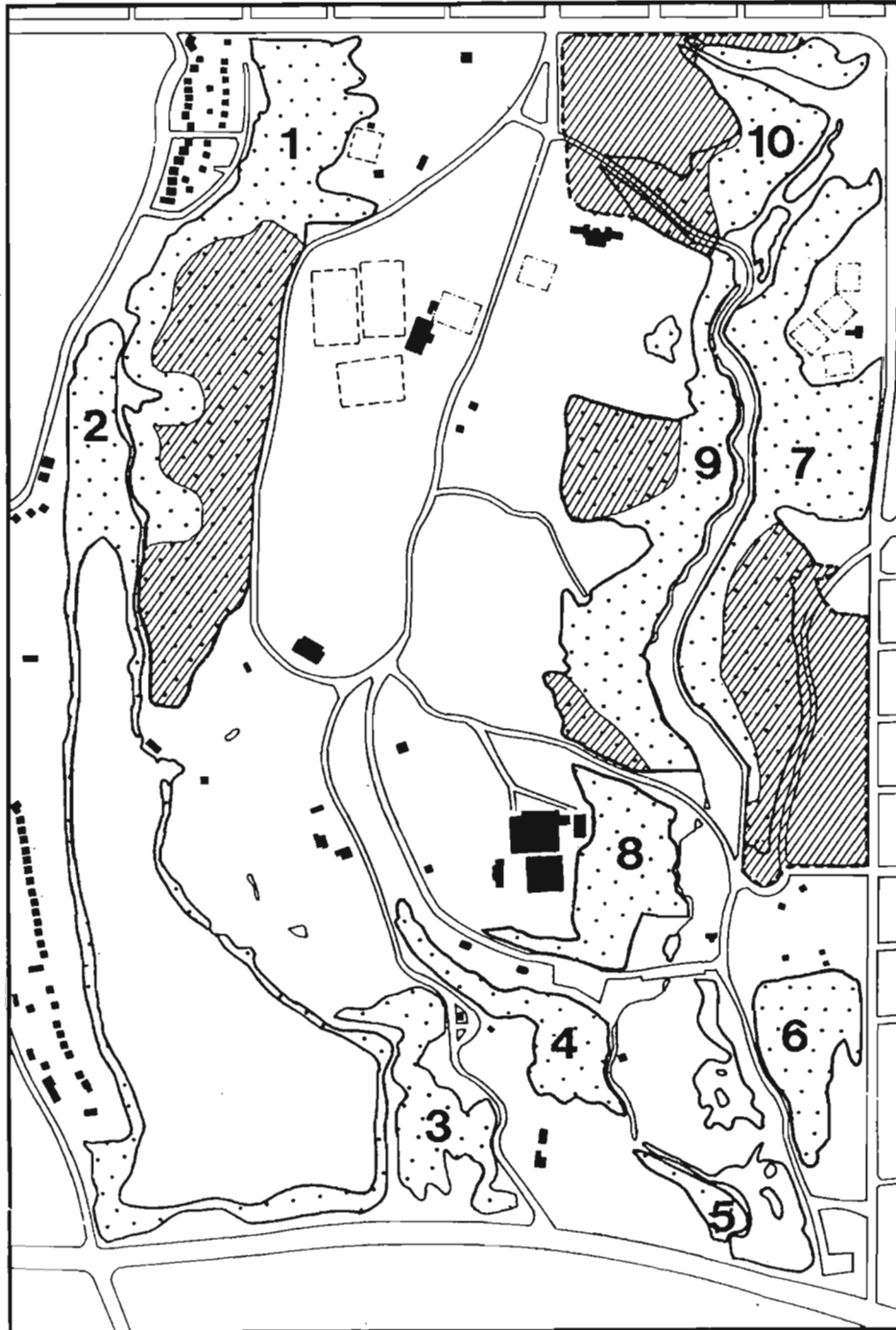
-  Critical Areas for the Restoration and Management of Oak Savannahs
-  Natural Areas (1-10)
-  Potential Restoration Areas (native savannah overstory but formal parkland in understory)

Figure 2



Scale 1:10 000

metres 100 0 100 200 300 400 500 metres

Normally, such fires form a narrow fire line about 25 cm high, burning leaves, low shrubs and seedlings. The ground fires are easily contained by narrow fire breaks as a foot trail. Following the fire, prairie grasses and forbs come back in much greater numbers, while the shrubs slowly regrow from underground suckers (White, 1983, 1986). Such fires mimic the natural fires which historically would have maintained the open savannah conditions at High Park.

Periodic mowing (e.g. in the late fall every 5-years) can be used as a tool to keep down shrubs and saplings. It tends, however, to encourage the suckering and proliferation of woody species and the spread of weeds at the expense of the rare prairie forbs and some of the prairie grasses (Christiansen, 1972). If the cuttings are removed it would also represent a loss in nutrients to the savannah, while leaving the cuttings could smother the understory species.

The management plan should also consider restoring 7.7 ha of former Black Oak savannah now used as formal parkland (potential restoration areas, see Figure 1, page 3 and Figure 2). On these lands the tree layer of Black Oak is still intact, but there is nothing in the understory except for the introduced Hard Fescue Grass (Festuca longifolia). As an interim measure, mowing should be stopped in these areas. Experimental test plots should then be used to find out the best methods for reintroducing native species to the understory.

For example, in one plot, native species could be allowed to seed in naturally from a surrounding intact savannah, to see if they will gradually replace the introduced lawn grass. In another plot, the lawn could be removed to see if native seeds in the soil and from the surrounding intact savannahs will be able to colonize the exposed sand. On a third plot, native seeds collected from the park's savannahs could be sprinkled by hand over an area where the lawn has been removed. Finally ground fires could be incorporated into some of the plots as a rejuvenating tool.

The first method allowing native species to seed in, has been very successful at High Park. For instance, the upper slopes of Natural Area 1 abutting West Road were mowed until the late 1970's. Since then the lawn of non-native Hard Fescue Grass has been partially replaced by native prairie/savannah species, 18 of which are regionally rare. Moreover, the park's largest populations of Wild Lupine, a provincially rare species, are located on this formerly mowed site.

When the 5 critical areas for savannah restoration have been fully restored, consideration should be given to connecting up the savannahs as proposed in the High Park Forest Working Plan (1988). The Natural Environment Zone outlined for the centre of High Park (Figure 3) would serve as an excellent connector. This area of the park once supported an extensive savannah. Some of the old open grown oaks from this savannah still remain amongst the exotic trees which have been planted over the years. The techniques used to successfully restore savannahs in the critical areas could be applied to expand savannah onto this connector site.

d) Removal of plantings from natural areas

Plantings of Scots Pine and Austrian Pine are found in scattered patches along the edges of some of the Black Oak savannahs. It would be adviseable to remove these species from High Park's natural areas, ensuring more open ground for the significant native prairie and savannah flora. A row plantation of oaks and mountain-ash in Natural Area 9 (Map 2) should also be removed. These plantings are shading out the prairie flora.

e) Control of exotic species

High Park is situated in the middle of a highly urbanized landscape. Gardens and introductions of exotic species are inevitable. A number of exotic species have already invaded High Park's natural areas, completely taking over a few sites. The most serious problem species should be removed from High Park's natural areas:

- (i) Himalayan Balsam (Impatiens glandulifera). It has become a noxious weed in the bottomlands of Wendigo Ravine, the bottomlands and regenerating slope east of the Allotment Gardens, and the valley bottomlands and ravine slopes east of Colborne Lodge. At the latter site it has spread from a disturbed bottomland habitat to the understories of adjacent oak slopes (community 10, Map 1).
- (ii) Introduced shrubs (e.g. the honeysuckles (Lonicera Xbella L. morrowii, L. tatarica), buckthorns (Rhamnus cathartica, R. frangula) and White Mulberry (Morus alba)). Birds have carried the fruits of these garden shrubs to High Park's natural areas where they germinate and eventually supplant the native shrubs.
- (iii) Introduced trees (e.g. Siberian Elm (Ulmus pumila), Norway Maple (Acer platanoides), Sweet Cherry (Prunus avium)) spreading into formerly disturbed uplands. The introduced Sweet Cherry is also occasionally found in the Black Oak savannahs.

- (iv) Orange Day-lily (Hemerocallis fulva) and Japanese Knotweed (Polygonum cuspidatum). Large patches are found along the edges of native uplands and in the formerly disturbed uplands.
- (v) Purple Loosestrife (Lythrum salicaria). This introduced wetland herb is common in the emergent marshes around Grenadier Pond and in some of the meadow marshes along Spring Road Ravine. It is supplanting native wetland species.

Mechanical or natural control measures should be emphasized in an eradication program. For example, many introduced species are not tolerant of the type of controlled ground fires which has been recommended for restoration of the savannahs in the park. Mechanical measures such as cutting, mowing, girdling or hand-pulling are also successful with many species (e.g. girdling would be a useful method for elimination of Siberian Elm).

The use of glyphosate herbicides^v to control exotic species should only be used as a last resort when other methods are ineffective in dealing with the spread of an exotic species. When applying herbicides, extreme care should be taken to:

1. avoid contacting non-target species and minimize drift through the use of spot applications,
2. target plants should not be sprayed to the point where herbicide runs off the plant and onto the ground or adjacent non-target plants,
3. only the minimum effective concentration of herbicide should be used.

These cautions in the control of exotic species have been adapted from a vegetation management manual developed by the Illinois Nature Preserves Commission (1989) (for copies write to the commission at 524 S. 2nd Street, Lincoln Tower Plaza, Springfield, Illinois, U.S.A., 62706).

To minimize the re-introduction of exotic species, only species known to be native to High Park should be planted in the park, with the exception of the Hillside Gardens, and areas of flower beds and ornamentals.

f) Monitoring and mapping the populations of rare species

Detailed mapping should be carried out of all the nationally, provincially and regionally rare species at High Park (see Table 4). The populations of rare species should also be monitored over time. This is particularly appropriate for the provincially and nationally rare Woodland Fern-leaf, Cup-plant, Shrubby St. John's-wort and Wild Lupine.

g) **Trail design and maintenance**

Trails in High Park's natural areas range from major ones about 4 meters wide to tracks only the width of a person's foot. It would be useful to map out the trail network at each natural area and note the condition of the trail. Is there evidence of off-trail use? Is the trail being badly eroded? Is it going through a colony of rare plants?

Pedestrians and trail bicyclers are a problem on the steeper slopes. It would be desirable to close off trails in some of these areas. The Parks Department practice of using snow fencing to keep people on the trails has greatly minimized the erosional problems (one area still needing snow fencing is the southern portion of Natural Area 5 which has been badly denuded by trail bicyclers).

For the most part, the existing sandy soils at High Park are a good base for trails. Moreover, the open sands on the trails provide habitat for a few of the park's rare species. (e.g. Nut-grass (Cyperus filiculmis), Wire-stemmed Muhly Grass (Muhlenbergia frondosa)).

h) **Promoting the values of the environment to the public**

With its 10 natural areas in the midst of Canada's most populated city, High Park provides a unique opportunity to promote the values of a natural environment to the public. The City's Parks Department has recognized this by developing a selfguided trail and booklet, "A Walk in Toronto's High Park; follow the trails to discover 37 tree species". Similar ones could also be developed for the park's fauna, shrubs and herbs. Information signs along the nature trails would also be useful. These signs could highlight the significance of the park's vegetation and discuss the natural history of particular plants and animals.

In addition to promoting the values of the environment, educational signs and booklets may help to reduce acts of vandalism. The picking of flowers and the digging up of rare plants should decline as more people become aware of the importance of High Park's natural areas.

3. A High Park Master Plan which recommends protective zones (e.g. Nature Reserves Zones, see Figure 3) for the park's natural areas and appropriate management practises (e.g. see Management Consideration 2, above), would safeguard its significant biological features. On this basis, the Ontario Ministry of Natural Resources should designate a provincially significant status for the High Park Oak Woodlands Area of Natural and Scientific Interest (encompassing 72.8 ha). The ANSI boundaries follow the boundaries of the Nature Reserve Zones as outlined in Figure 3. The proposed natural environment zones would serve as important connectors between the ANSIs.

PROPOSED PARK ZONES FOR HIGH PARK

Proposed by the City of Toronto's Department of Parks & Recreation (High Park Master Planning Study)

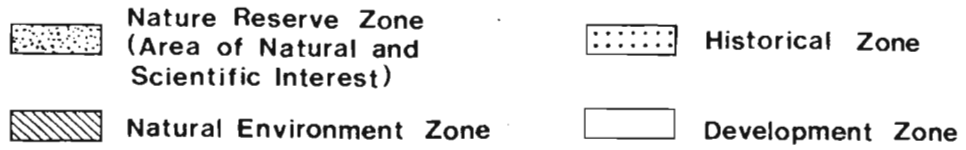
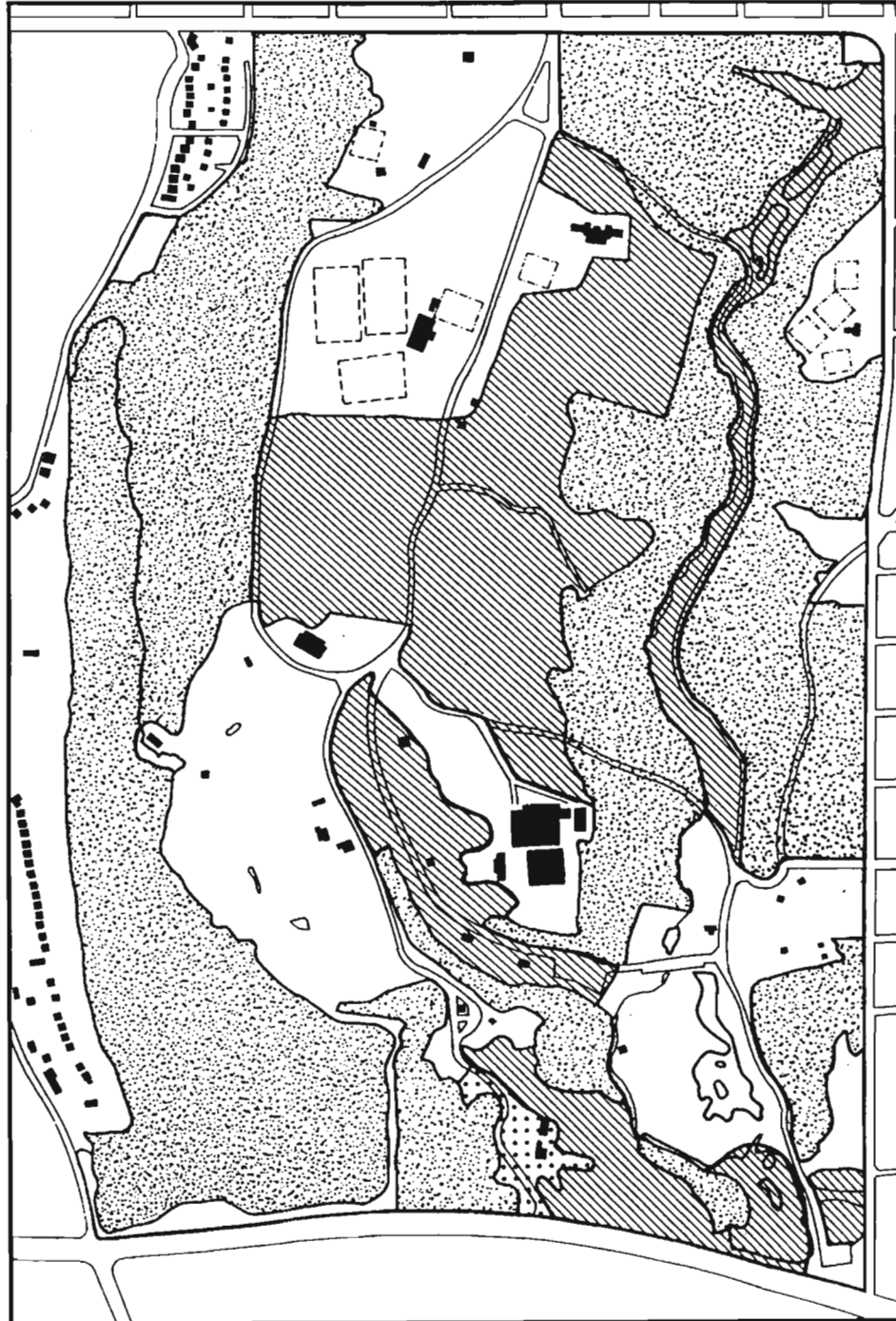


Figure 3



Scale 1:10 000

metres 100 0 100 200 300 400 500 metres

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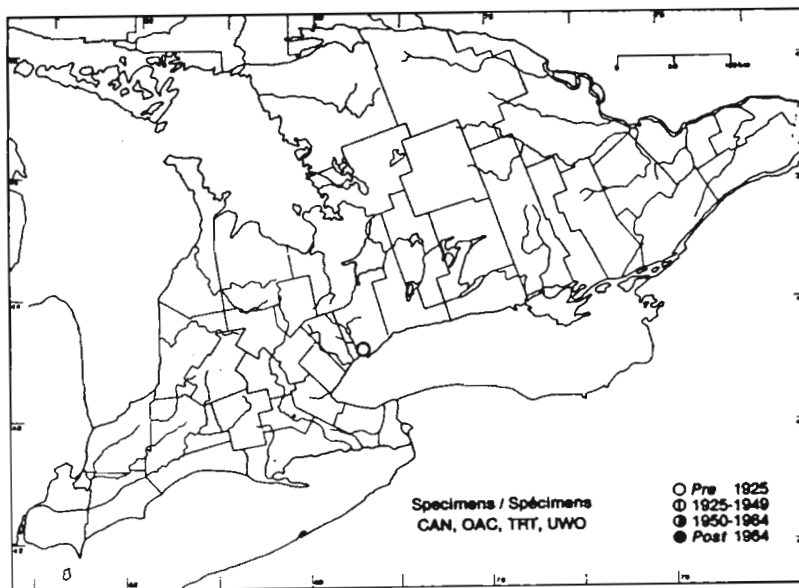
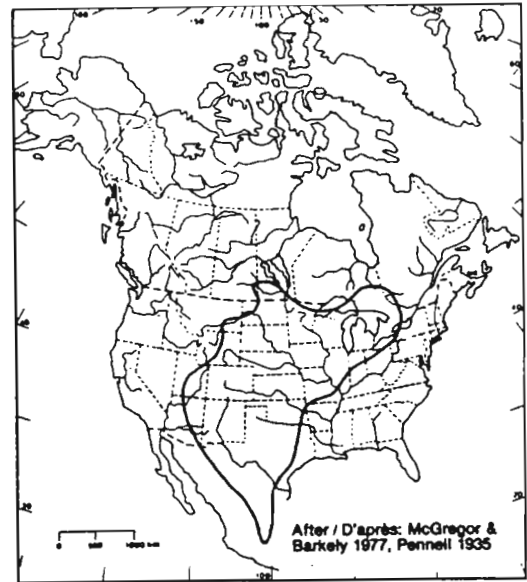
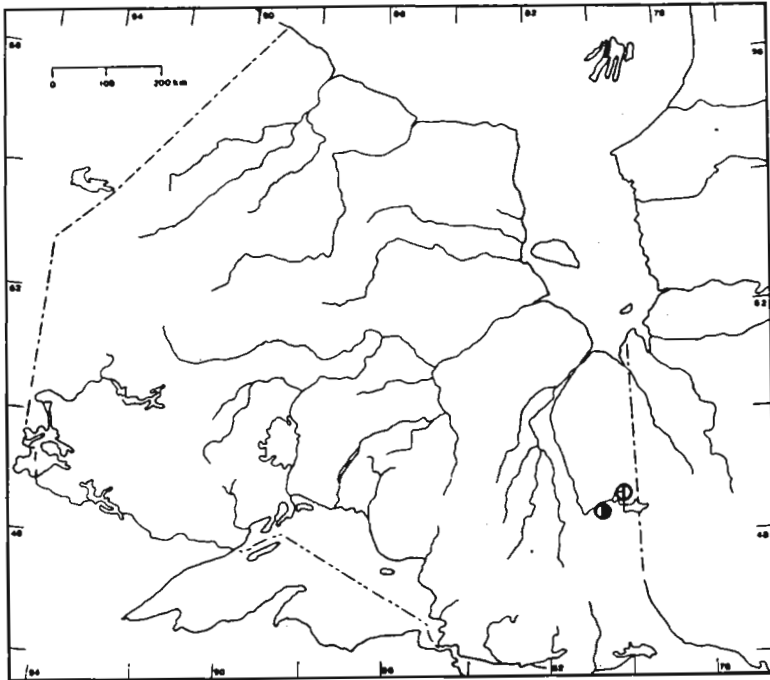
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APPENDIX A: DISTRIBUTION IN NORTH AMERICA AND ONTARIO FOR EIGHT PROVINCIALY RARE PLANTS AT THE HIGH PARK OAK WOODLANDS NATURAL AREAS
 (The first four species have not been seen in High Park after 1925, while the latter four species are still present in the park)

Mimulus glaberratus HBK. var. *fremontii* (Benth.) A.L. Grant

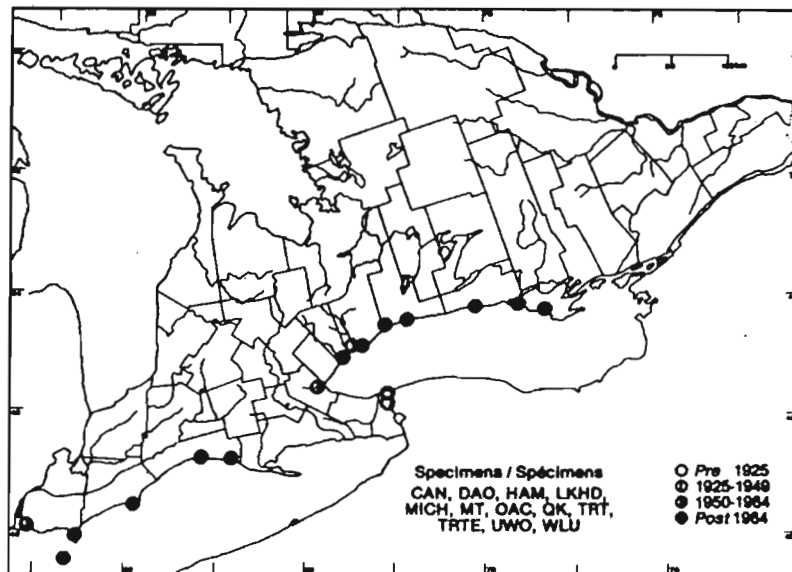
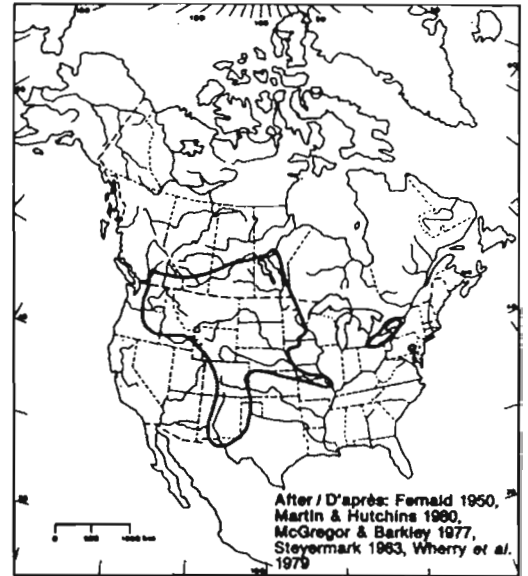
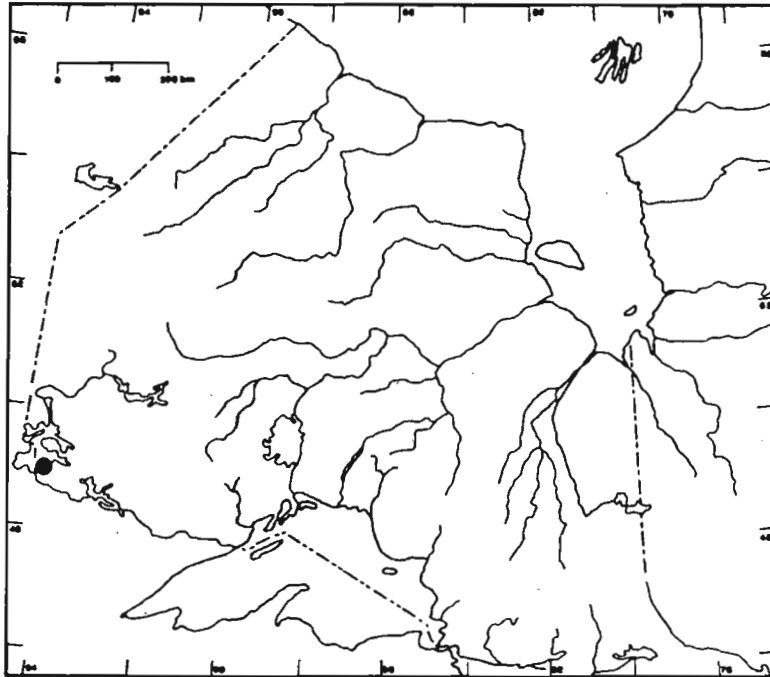
Monkey-flower
 Mimule



D.J. White & R.V. Maher, 1983

Potentilla paradoxa Nutt.

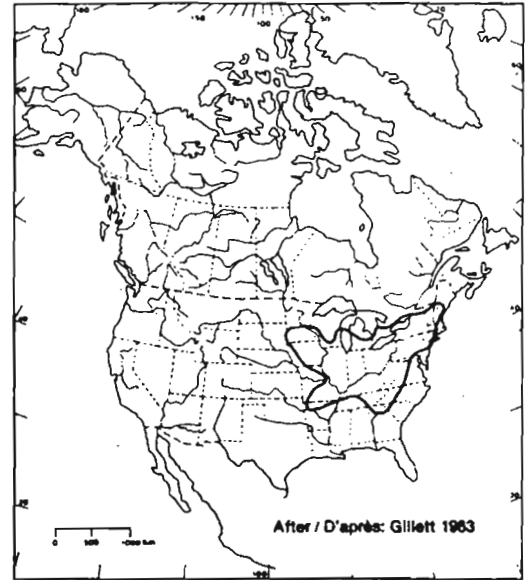
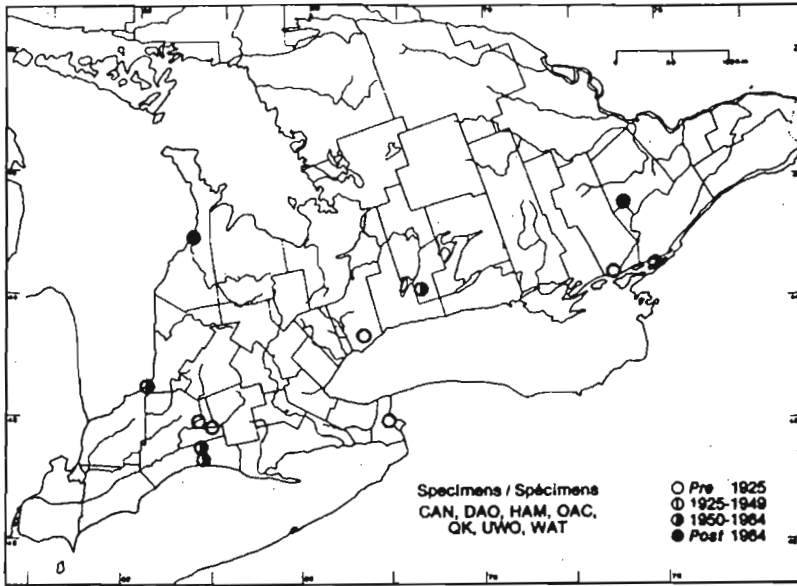
Cinquefoil, five-finger
Potentille



C.J. Keddy, 1984

***Gentianella quinquefolia* (L.) Small**
 (*Gentiana quinquefolia* L.)

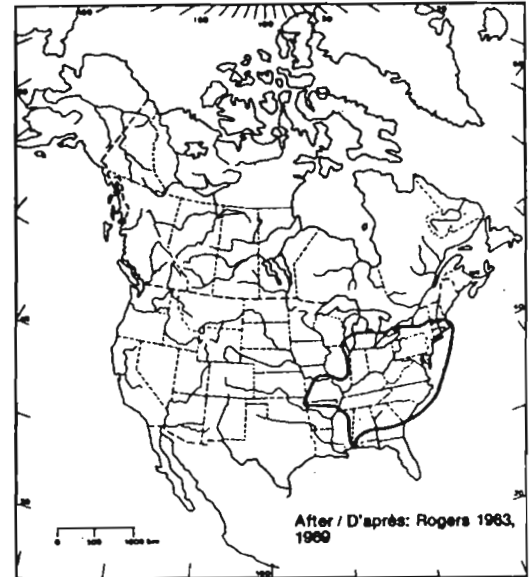
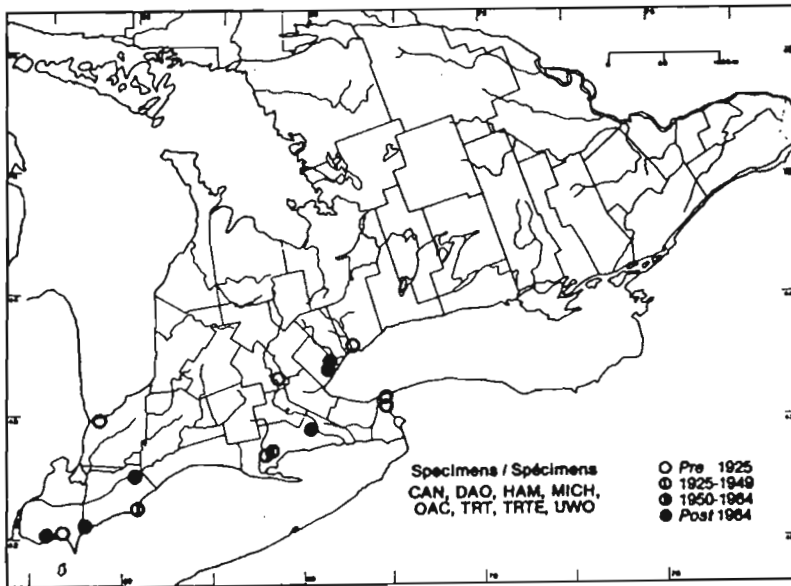
Ague weed
 Gentiane



J.M. Gillett & C.J. Keddy, 1984

***Linum virginianum* L.**

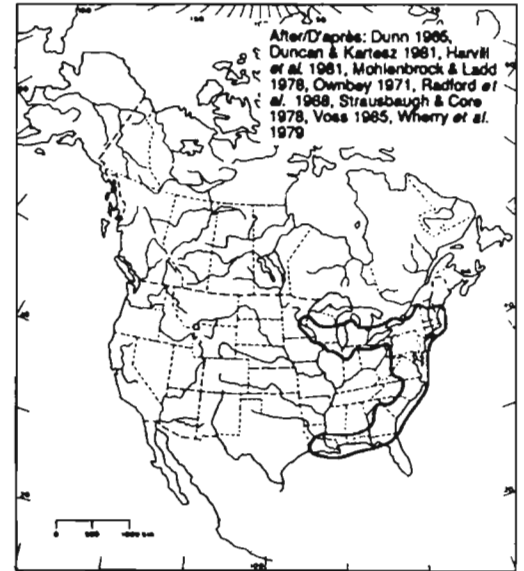
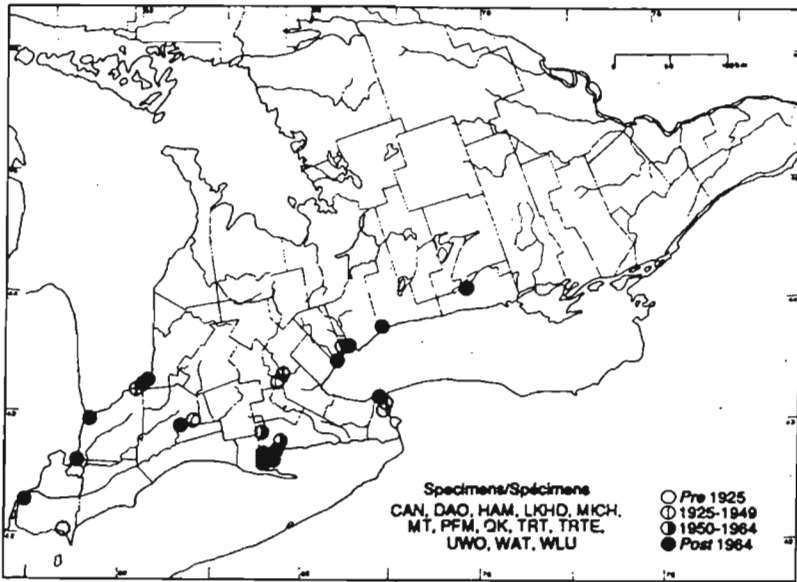
Virginia yellow flax
 Lin de Virginie



A. Dugal, 1984

Lupinus perennis L.

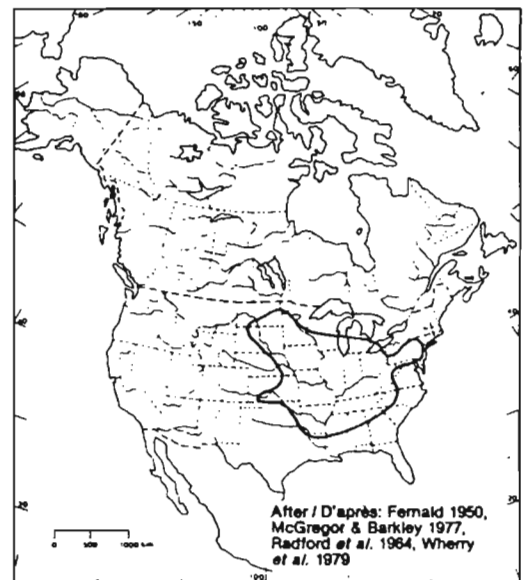
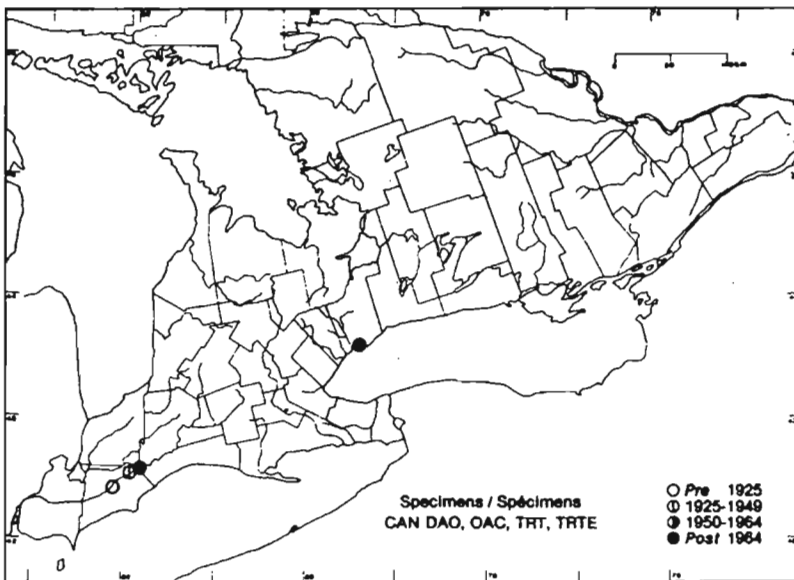
Wild lupine
Lupin vivace



A.A. Reznicek & J.M. Gillett, 1987

Silphium perfoliatum L.

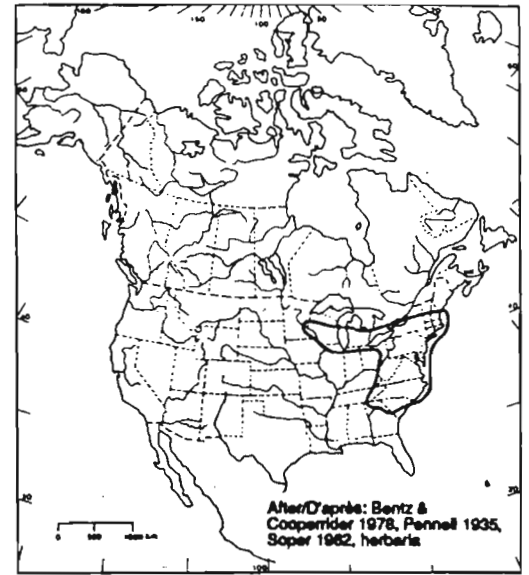
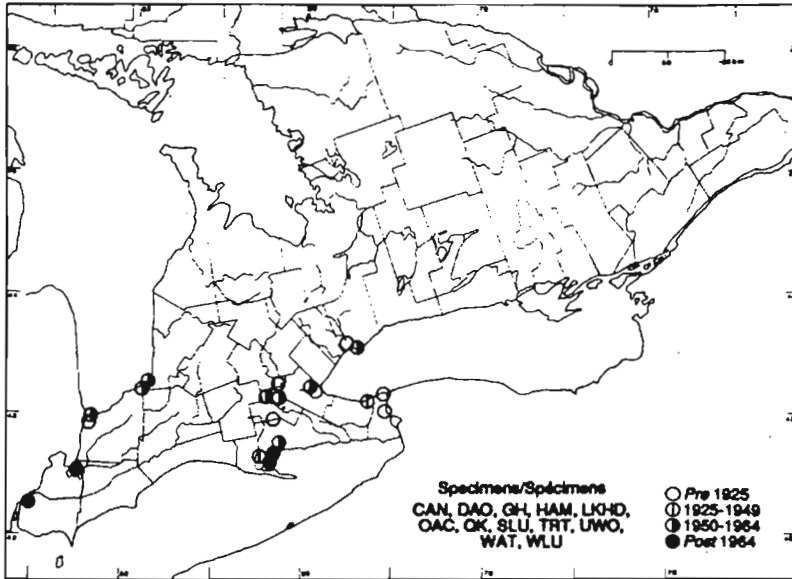
Cup-plant, Indian-cup
Silphie



D.J. White & R.V. Maher, 1983

***Aureolaria pedicularia* (L.) Raf.**
 (*Agalinis pedicularia* (L.) S.F. Blake, *Dasystema pedicularia* (L.) Benth., *Gerardia pedicularia* L.)

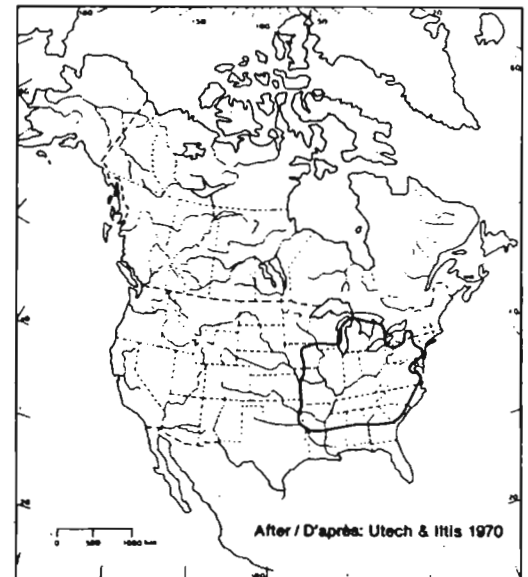
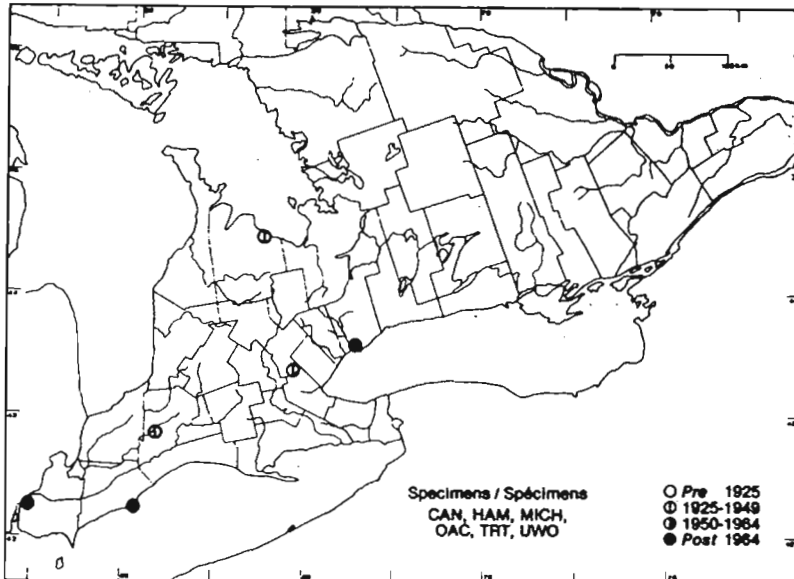
Woodland fern-leaf, false-foxglove
 Auréolaria



G.J. Cantrell & J.M. Canne, 1987

***Hypericum prolificum* L.**
 (*H. spathulatum* (Spach) Steud.)

Shrubby St. John's-wort
 Millepertuis prolifère



J.M. Gillett & C.J. Keddy, 1984

APPENDIX B: PLANT SPECIES OF PRAIRIE/SAVANNAH AFFINITY OCCURRING ON THE HUMBER PLAINS, TORONTO

List based on vouchers at the Royal Ontario Museum, Botany Department, Vascular Plant Herbarium, TRT.
+ = extant species on the Humber Plains remnant at Lambton Park Prairie (north of Dundas St. W., east side of the Humber River), all other species are probably extirpated. * = rare in the Ministry of Natural Resources, Central Region (Riley, 1988).

Provincially Rare Species (Argus et al., 1982-87)

- * Aureolaria pedicularia (Woodland Fern-leaf)
- * Gentiana puberulenta (Downy Gentian)
- * Gentiana quinquefolia (Ague Weed)
- * Gillenia trifoliata (Bowman's Root)
- * Hypoxis hirsuta (Yellow Stargrass)
- * Linum virginianum (Virginia Yellow Flax)
- * Lithospermum latifolium (American Gromwell)
- * + Lupinus perennis (Wild Lupine)
- * Panicum praecocius (Panic Grass)
- * Scleria triglomerata (Tall Nut-rush)
- * Spiranthes lacera var. gracilis (Southern Slender Ladies-tresses)

Other Species

- + Amelanchier spicata var. stolonifera (a Serviceberry)
- + Andropogon gerardii (Big Bluestem)
- + Andropogon scoparius (Little Bluestem)
- + Anemone cylindrica (Long-fruited Anemone)
- + Arabis divaricarpa (a Rock-cress)
- * Arabis hirsuta (a Rock-cress)
- + Asclepias tuberosa (Orange Milkweed)
- + Aster azureus (Azure Aster)
- + Aster sagittifolius (Arrow-leaved Aster)
- + Bromus kalmii (Kalm's Brome)
- + Campanula rotundifolia (Harebell)
- * + Carex foenea (a Sedge)
- + Carex muhlenbergii (a Sedge)
- + Ceanothus americanus (New Jersey-tea)
- + Comandra umbellata (Bastard Toadflax)
- + Corylus americana (American Hazel)
- + Cyperus filiculmis (Nut-grass)
- + Desmodium canadense (Canada Tick-trefoil)
- + Elymus canadensis (Canada Rye)
- + Erigeron pulchellus (Robin's-plantain)
- * Helianthemum bicknellii (Bicknell's Frostweed)
- * + Helianthemum canadense (Canada Frostweed)
- * Helianthus strumosus (Pale-leaved Sunflower)
- + Lechea intermedia (Pinweed)
- * + Lespedeza capitata (Round-headed Bush Clover)
- * Lespedeza hirta (Hairy Bush Clover)
- * + Liatris cylindrica (Cylindric Blazing Star)
- + Lysimachia quadrifolia (Whorled Loosestrife)

- * Polygala polygama (Racemed Milkwort)
- Polygala senega (Seneca-snakeroot)
- Polygala verticillata (a Milkwort)
- * Ranunculus rhomboideus (Prairie Buttercup)
- Prunus pumila var. susquehanae (Sand Cherry)
- Rosa carolina (Carolina Rose)
- + Sorghastrum nutans (Indian Grass)
- + Sporobolus cryptandrus (Dropseed)
- + Vaccinium pallidum (Dry-land Blueberry)
- + Viola fimbriatula (Arrow-leaved Violet)

APPENDIX C:
 AREA OF NATURAL AND SCIENTIFIC INTEREST - LIFE SCIENCE INVENTORY CHECK-SHEET

NAME High Park Oak Woodlands	MAP NAME Toronto	MAP NUMBER 30M/11	UTM REF. 240335
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COUNTY, DISTRICT or REGIONAL MUNICIPALITY R. M. of Metropolitan Toronto	LAT. 43 ° 39' N	LONG. 79 ° 28' W	ALT. MIN. 77m	MAX. 113m
LOCALITY Southwest corner of Bloor St. and Parkside Drive	1:50,000 NTS MAP SHOWING AREA BOUNDARIES			
TOWNSHIP City of Toronto				
AREA 180 acres 73 ha				
OWNERSHIP City of Toronto				
ADMINISTRATION Department of Parks & Recreation				
FOREST REGION AND DISTRICT SITE REGION AND DISTRICT 7-4				
MNR REGION AND DISTRICT Central Region	CONSERVATION AUTHORITY Metropolitan Toronto and Region			
AERIAL PHOTOGRAPHS				
BASE MAP:				
YEAR	ROLL	FLIGHT LINE	NUMBERS	
1978	54	4345	251-253	
OBM: 1017 6200 48300				

PHYSICAL AND BIOLOGICAL FEATURES

High Park Oak Woodlands is the best remaining natural area on the City of Toronto's Iroquois Sand Plain. Historically, the dry soils of the sand plain supported spectacular open oak woodlands or savannahs and pine barrens, with a rich assemblage of prairie grasses and forbs. In contrast, scattered wet depressions contained cool mixed swamps, marshes, ponds and up until 1905, a sphagnum bog.

High Park is deeply dissected by 2 major stream valleys and several associated tributary valleys, with a large plateau in the centre of the park. Grenadier Pond, the City of Toronto's only remaining lakeshore marsh, occupies most of the western side of the park.

The plateau and upper ravine slopes support dry Black Oak forests and savannahs with a prairie understory (oak savannahs are considered a provincially rare community type). The lower ravine slopes and those facing north or east contain moist deciduous forests of Red Oak with such secondary species as Black Cherry and Red Maple. Mixed forests of Hemlock - Red Oak are restricted to several stands along the lower slopes of Spring Road ravine.

(cont'd)->

DATA SHEETS ATTACHED		MAJOR INFORMATION SOURCES	
PHYSICAL DESCRIPTION	<input type="checkbox"/>	SUMMARY SPECIES LISTS	<input type="checkbox"/>
VEGETATION SUMMARY	<input type="checkbox"/>	PHYSICAL FEATURES MAP	<input type="checkbox"/>
EVALUATION SHEET	<input type="checkbox"/>	VEGETATION MAP	<input type="checkbox"/>
COMMUNITY DESCRS.	<input type="checkbox"/>	BIBLIOGRAPHY	<input type="checkbox"/>
COMMUNITY COMP. LISTS	<input type="checkbox"/>	PHOTOGRAPHS	<input type="checkbox"/>
Toronto Field Naturalists, 1972; Wainio, et al., 1976; Hanna 1980; Varga, 1981; Varga, 1989.			

EVALUATION AND PRIORITIES	Best remaining example of oak savannah on the Iroquois Plain in Site District 7-4 (a provincially rare community type) with 4 nationally/provincially rare and 37 regionally rare plant species.
DATE COMPILED	COMPILER
December 1989	S. Varga

(cont'd)

Most of the wetlands at High Park are found along the shore of Grenadier Pond. It contains submerged/floating aquatics in open water and emergent marshes of Common Cattail and Sweet Flag. Bottomlands along Wendigo and Spring Road ravines also support small remnants of Manitoba Maple forest, meadow marsh, Red-osier Dogwood shrub-rich marsh and Speckled Alder thicket swamp.

Anthropogenic communities are restricted to a few edge sites and include exotic forests of Siberian Elm - Norway Maple - Manitoba Maple, thickets, fields and plantations.

The flora of High Park is outstanding in the presence of 4 nationally/provincially rare(*), and 37 regionally rare species, many with southern and prairie/savannah affinities including: Woodland Fern-leaf (Aureolaria pedicularia)*, Wild Lupine (Lupinus perennis)*, Cup-plant (Silphium perfoliatum)*, Shrubby St. John's-wort (Hypericum prolificum)*, a serviceberry (Amelanchier spicata var. stolonifera), Hairy Agrimony (Agrimonia pubescens), Little Bluestem (Andropogon scoparius), the sedges (Carex muhlenbergii, C. rugosperma, C. foenea, C. laevivaginata), Cylindric Blazing-star (Liatris cylindracea), Whorled Loosestrife (Lysimachia quadrifolia), Sycamore (Platanus occidentalis), Solomon's-seal (Polygonatum biflorum), Black Oak (Quercus velutina), Pasture Rose (Rosa carolina), Indian Grass (Sorghastrum nutans), Dry-land Blueberry (Vaccinium pallidum), the bush-clovers (Lespedeza capitata, L. hirta), the frostweeds (Helianthemum canadense, H. bicknellii) and Sassafras (Sassafras albidum). A number of the rare species have northern affinities including: Red Pine (Pinus resinosa), Trailing Arbutus (Epigaea repens) and Common Hairgrass (Deschampsia flexuosa).

In the late 1800's and early 1900's, High Park supported an additional 37 regionally rare plant species and 4 provincial rarities: Ague Weed (Gentianella quinquefolia), Virginia Yellow Flax (Linum virginianum), Monkey-flower (Mimulus glabratus var. fremontii) and Lower Great Lakes Cinquefoil (Potentilla paradoxa). Many of the park's noteworthy insects have also disappeared, such as the provincially endangered Karner Blue Butterfly, a provincially rare skipper, the Mottled Dusky Wing, and two southern species of dragonfly: the Bluet and Halloween Penitent. This species decline is attributable to a loss of wetland/savannah habitats and overcollecting.

The ANSI occurs on 7 sites in High Park. These sites have been designated Nature Reserve Zones in the City of Toronto's proposed master plan for the park. The Nature Reserves designation, in conjunction with appropriate management practices (e.g. removal of exotics, restoration of the Black Oak savannahs, etc.) would ensure the protection of High Park's significant biological features.