

## **7.0 RARE VEGETATION TYPES OF THE NIAGARA REGION, ONTARIO: A PRELIMINARY CHECKLIST**

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### **7.1 INTRODUCTION**

The Niagara Peninsula encompasses a variety of significant landforms and plant communities (Vegetation Types). Escarpment talus slopes and cliffs, alvars, prairies, Great Lakes shorelines, bogs and fens are all examples of rare plant communities that occur in the Regional Municipality of Niagara. Many of these rare plant communities provide habitats for conservative and specialized plant species that are rare in both Niagara and Ontario. Rare plant communities are of considerable conservation interest, often representing highly specialized habitats and the last remnants of formerly more widespread vegetation.

The main body of this report provides an overview of the rare Vegetation Types in the Regional Municipality of Niagara (Niagara Region), as well as the portion of Haldimand County which lies within the Niagara Peninsula Conservation Authority (NPCA) watershed. Table 1 presents a summary of rare plant communities and Table 2 is a checklist of all plant communities known from the Niagara Region.

### **7.2 ECOLOGICAL LAND CLASSIFICATION (ELC)**

The goal of the provincial Ecological Land Classification (ELC) program is to develop a province-wide, comprehensive and consistent approach to ecosystem description, inventory and interpretation (Lee et al. 1998). The ELC program is intended to provide a uniform and consistent means to identify, describe, name and map important landscape patterns and plant communities (Riley and Mohr 1994). The *Ecological Land Classification in Southern Ontario* (Lee et al. 1998) applies to Site Regions 6E and 7E in southern Ontario.

The ELC comprises six nested levels. From the largest to the smallest scales, they are as follows: Site Region, System, Community Class, Community Series, Ecosite and Vegetation Type (Lee et al. 1998). The Ecosite and Vegetation Type are the main units mapped at the site-specific level. Bakowsky (1996) defined Ecosite and Vegetation Type as follows:

Ecosite is a mappable landscape unit defined by a relatively uniform parent material, soil and hydrology, and consequently supports a consistently recurring formation of plant species which develop over time (vegetation chronosequence). The Vegetation Type is part of an ecosite, and represents a specific assemblage of species which generally occur in a site with a more uniform parent material, soil and hydrology, and a more specific chronosequence.

The Vegetation Type is the basic plant community unit that is ranked in Ontario for conservation purposes (Bakowsky 1996). Provincial ranks are based on three factors: estimated number of occurrences, estimated community areal extent, and estimated range of the community within the province (Bakowsky 1996).

To the extent feasible, this report follows the plant community typology contained in the *Ecological Land Classification in Southern Ontario* (Lee et al. 1998) since this is the only published ELC document in wide circulation in southern Ontario. In some cases, more suitable Vegetation Types were used from “*Updates to the First Approximation Southern Ecological Land Classification*” (Lee 2003 [open document]). In a few cases, new Vegetation Types not contained in either ELC document were identified; these new types were reviewed and ranked in collaboration with W.D. Bakowsky (NHIC – Community Ecologist).

### **7.3 STATUS OF VEGETATION TYPES AND PLANT SPECIES (ONTARIO AND NIAGARA REGION)**

Definitions are provided below for the provincial and regional status of Vegetation Types and vascular plant species used in the main body of this report which is an annotated rare plant community checklist. Scientific and common names of vascular plants generally follow Oldham (2010).

#### **7.3.1 Ontario Rank (S-rank): Vegetation Types and Vascular Plant Species**

Provincial (or subnational) conservation status ranks (S-ranks) are used by the Ontario Natural Heritage Information Centre (NHIC) to set conservation priorities for rare species and natural plant communities. These ranks are not legal designations, unlike COSEWIC and MNR species at risk statuses. The most important factors considered in assigning provincial ranks are the total number of known, extant sites in Ontario, and the degree to which they are potentially or actively threatened with destruction. Other criteria include the number of known populations considered to be securely protected, the size and population trends of provincial occurrences, and the ability of the taxon to persist at its known sites. Ontario ranks follow Bakowsky (1996) for plant communities and Oldham and Brinker (2009) for native plant species of provincial conservation concern and the NHIC database for all other plant species. See the NHIC web page (<http://nhic.mnr.gov.on.ca/nhic.cfm>) for updated ranks.

**S1 = Critically Imperilled:** Critically imperilled in Ontario because of extreme rarity (often 5 or fewer occurrences) or because of some factor(s) such as very steep declines making it especially vulnerable to extirpation from the province.

**S2 = Imperilled:** Imperilled in Ontario because of rarity due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors making it very vulnerable to extirpation from the province.

**S3 = Vulnerable:** Vulnerable in Ontario due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors making it vulnerable to extirpation.

**S4 = Apparently Secure:** Uncommon but not rare; some cause for long-term concern due to declines or other factors.

**S5 = Secure:** Common, widespread, and abundant in Ontario.

### 7.3.2 Ontario Status (MNR) – Vascular Plant Species

Provincial species at risk (SAR) status assigned by the Committee on the Status of Species at Risk in Ontario (COSSARO), following the most recent Species At Risk in Ontario (SARO) list (Ontario Ministry of Natural Resources 2009). Endangered (END), Threatened (THR), and Extirpated (EXP) species are legally protected under the province's Endangered Species Act (ESA), 2007.

**END = Endangered.** A species facing imminent extinction or extirpation in Ontario.

**THR = Threatened.** A species that is at risk of becoming endangered in Ontario if limiting factors are not reversed.

**SC = Special Concern.** A species with characteristics that make it sensitive to human activities or natural events.

### 7.3.3 Niagara Region Status – Ecosites and Vegetation Types

**Regionally Rare =** ELC Ecosites and Vegetation Types known from 10 or fewer sites in the Regional Municipality of Niagara (based on NAI database and partial literature review). A portion of the NAI study area, i.e. the NPCA watershed, extends into Haldimand County. Occurrences of rare communities from Haldimand are included in the checklist, but only Niagara Region occurrences were considered when assigning regional status.

### 7.3.4 Niagara Region Status – Vascular Plants

**R = Regionally Rare.** Rare in the Regional Municipality of Niagara; known from 10 or fewer recently verified (post-1980) locations (Oldham 2010)

**U = Regionally Uncommon.** Uncommon in the Regional Municipality of Niagara; known from 11 to 20 recently verified (post-1980) sites (Oldham 2010).

**C = Common.** Common in the Regional Municipality of Niagara; known from more than 20 recently verified (post-1980) sites (Oldham 2010).

## 7.4 RARE VEGETATION TYPES IN THE NIAGARA REGION: A PRELIMINARY CHECKLIST

An overview of the rare Vegetation Types in the Niagara Region is provided in the following preliminary annotated checklist. Notes are provided under Community Class, Ecosite and Vegetation Type headings, including: Beach/Bar, Sand Dune, Cliff, Talus, Alvar, Tallgrass Prairie, Deciduous Forest, Coniferous Swamp, Deciduous Swamp, Thicket Swamp, Bog, Fen and Marsh.

Rare plant communities in the Niagara Region are defined as ELC Ecosites and Vegetation Types that are rare in Ontario, i.e., ranked S1, S2 or S3 by Bakowsky (1996; pers. comm. 2010) and/or regionally rare Ecosites and Vegetation Types, i.e., those known from 10 or fewer sites in Niagara Region. Ecosites or Vegetation Types not listed in the published ELC manual (Lee et

al. 1998) or more recent working document (Lee 2003 [open document]) are denoted with an asterisk “\*”. Ecosites and Vegetation Types listed in Lee (2003 [open document]) but not in the published 1998 ELC manual are denoted with a double-asterisk “\*\*”.

In the plant community descriptions, examples of provincially and regionally significant/rare plant taxa are denoted in parentheses with their status in bold font (e.g. **END, THR, SC, S1, S2, S3, R, U**). Table 1 provides a summary of rare Ecosites and Vegetation Types documented in the Niagara Region. Table 2 provides a working checklist of ELC Ecosites and Vegetation Types reported from the region.

This is a working document, and it is expected that the list of Ecosites and Vegetation Types reported from the Niagara Region will grow considerably over time, as knowledge increases with further research and field work. Reports of new and/or rare plant communities should be forwarded to the staff ecologist at the Niagara Peninsula Conservation Authority (NPCA) as well as to the Natural Heritage Information Centre (<http://nhic.mnr.gov.on.ca/>). The Conservation Authority maintains a Natural Heritage Database that includes an ELC mapping component (GIS-based).

#### 7.4.1 BEACH/BAR

##### *Mineral Open Beach/Bar Ecosite (BBO1)*

##### *Sea Rocket Sand Open Beach Type (BBO1-1) S2S3, Regionally Rare*

Open beach communities occur on unconsolidated sand substrates which are subject to active shoreline processes.

Scattered plants of Sea Rocket (*Cakile edentula* **R**) and occasionally Wormwood (*Artemisia campestris* ssp. *caudata* **R**) occur along the open sand beaches between the seasonal high water mark or waveline and the toe of the dune slope. Typically this community is sparsely vegetated and can support occasional woody species such as Sandbar Willow (*Salix interior* [*Salix exigua*]), Eastern Cottonwood (*Populus deltoides* ssp. *deltoides*) and Black Locust (*Robinia pseudo-acacia*), as well as, trailing vines of Riverbank Grape (*Vitis riparia*). Other regionally rare and uncommon shoreline species include Beach Pea (*Lathyrus japonicus* **R**), Trailing Wild Bean (*Strophostyles helvula* **R**), Seaside spurge (*Euphorbia polygonifolia* [*Chamaesyce polygonifolia*] **R**), Clammy-weed (*Polanisia dodecandra* **U**), Sand Grass (*Triplasis purpurea* **R**) and Long-spined Sandbur (*Cenchrus longispinus* **R**); these species are more or less restricted to the shoreline areas of the Great Lakes (Riley 1989a, after Guire and Voss 1963). This community generally occurs along the shallow bays between intervening headlands of the Lake Erie shoreline, including NAI study area PC-10. Low-lying sections of beach in many locations are being invaded by European Common Reed (*Phragmites australis* ssp. *australis*), which displaces native plant species.

##### *Bedrock Open Beach/Bar Ecosite (BBO2)*

##### *Calcareous Open Bedrock Shoreline Type (BBO2-?\*) S3?, Regionally Rare*

Open limestone bedrock shoreline occurs along the headlands of the Lake Erie coast, particularly along the eastern half of the lake. Large expanses of open limestone shoreline are criss-crossed by crevices and fractures (grykes) that contain a thin veneer of washed-in sands. This community varies in extent in response to the cycle of the lake levels. The variable flooding regime, along with ice scour, keeps these communities generally free of woody

vegetation. Occasionally however, weather-beaten trees persist, including Manitoba Maple (*Acer negundo*), Eastern Cottonwood (*Populus deltoides* ssp. *deltoides*), Green Ash (*Fraxinus pennsylvanica*), and on rare occasions, Sycamore (*Platanus occidentalis* **U**). Occasional ice-shorn thickets of Sandbar Willow (*Salix interior* [*Salix exigua*]) can take hold in the bedrock crevices or on thin deposits of sands and broken/pulverized Zebra Mussel shells. Scattered low shrubs of Kalm's St. John's-wort (*Hypericum kalmianum* **R**) can also be found. In the open bedrock area, cracks and crevices lined with moist sands support a mix of species such as Grass-leaved Goldenrod (*Euthamia graminifolia*), Tufted Hairgrass (*Deschampsia cespitosa* ssp. *cespitosa* **R**), Purple Loosestrife (*Lythrum salicaria*), Little Bluestem (*Schizachyrium scoparium* **R**), Frank's Love Grass (*Eragrostis frankii* **R**), Fall Panic Grass (*Panicum dichotomiflorum*), Panic Grass (*Dichanthelium acuminatum* ssp. *implicatum*), Greenish Sedge (*Carex viridula* **U**), Elliptic Spike-rush (*Eleocharis elliptica* **R**), Common Three-square (*Schoenoplectus pungens* [*Scirpus pungens*] **U**), Shining Cyperus (*Cyperus bipartitus* **U**), rushes (e.g. *Juncus alpinoarticulatus* **R**, *J. articulatus* **U**, *J. nodosus* **R**), Pale Smartweed (*Persicaria lapathifolia* [*Polygonum lapathifolium*]), European Water-horehound (*Lycopus europaeus*), Slender Agalinis (*Agalinis tenuifolia* **R**), Kalm's Lobelia (*Lobelia kalmii* **R**), Prairie Loosestrife (*Lysimachia quadriflora* **R**) and Wild Savory (*Clinopodium arkansanum* [*Calamintha arkansana*] **R**) (Macdonald 1990). Most of these species are regionally rare and/or regionally restricted to coastal areas.

*Mineral Shrub Beach/Bar Ecosite (BBS1)*

*Willow Gravel Shrub Beach Type (BBS1-2) S3? Regionally Rare*

This community is restricted to the Lake Erie and Lake Ontario shorelines on unconsolidated mineral substrates (sands, gravels and weathered Zebra Mussel shells); similar communities occur on exposed limestone bedrock shorelines (typically rooting in bedrock cracks and fissures). Sandbar Willow (*Salix interior* [*Salix exigua*]) is the main species forming thickets which are subject to ice scour, fluctuating water levels, and wave energy. Trees are generally absent, although young Eastern Cottonwoods (*Populus deltoides* ssp. *deltoides*) temporarily can persist. Low thickets of Ninebark (*Physocarpus opulifolius*) and Kalm's St. John's-wort (*Hypericum kalmianum* **R**) can also be part of this community. Willow shrub beach communities occur along portions of the Lake Erie shoreline and on beach bars along Lake Ontario.

*Mineral Treed Beach / Bar Ecosite (BBT1)*

*Cottonwood Mineral Treed Shoreline Type (SHTM1-1\*\*) Regionally Rare*

Open sand beaches along the Lake Erie shoreline which have not been recently scoured by ice or inundated by high water levels can support young stands of Eastern Cottonwoods (*Populus deltoides* ssp. *deltoides*), Black Locust (*Robinia pseudo-acacia*), Manitoba Maple (*Acer negundo*) and occasionally Tree-of-heaven (*Ailanthus altissima*). Often a dense layer of shrub willows (*Salix* spp.) and tangled vines of Riverbank Grape (*Vitis riparia*) occur in the shrub layer.

## 7.4.2 SAND DUNE

*Open Sand Dune Ecosite (SDO1)*

*Beach Grass – Wormwood Open Graminoid Sand Dune Type (SBOD1-4\*\*) S2, Regionally Rare*

Active sand dunes that have not be negatively impacted by hardened shorelines (e.g. cement blocks, rip-rap or shorewalls) and invasive species support open and dynamic communities dominated by dense colonies of Beach Grass (*Ammophila breviligulata* **R**), and scattered clumps of Canada Wild-rye (*Elymus canadensis* **U**), Switchgrass (*Panicum virgatum* **U**), Wormwood (*Artemisia campestris* ssp. *caudata* **R**), and occasional patches of Starry False Solomon's-seal (*Maianthemum stellatum*) and Little Bluestem (*Schizachryium scoparium* **R**). Trailing vines of Riverbank Grape (*Vitis riparia*) and Poison-ivy (*Toxicodendron rydbergii* [*Rhus radicans* ssp. *rydbergii*]) are also very common. The lower slopes of the dunes also support shoreline species such as Cocklebur (*Xanthium strumarium*), Silverweed (*Potentilla anserina*), Sea-rocket (*Cakile edentula* **R**), Seaside Spurge (*Euphorbia polygonifolia* [*Chamaesyce polygonifolia*] **R**), Clammy-weed (*Polanisia dodecandra* **U**) and Grass-leaved Goldenrod (*Euthamia graminifolia*). Beach Grass – Wormwood Open Graminoid Sand Dune and similar communities occur on some sections of the Lake Erie coast, including NAI Study Area PC-04.

*Shrub Sand Dune Ecosite (SDS1)*

*Hop-tree Shrub Dune Type (SDS1-2) S2, Regionally Rare*

Along the tops or ridges of active sand dunes on the Lake Erie shoreline, thickets of Common Hop-tree (*Ptelea trifoliata* var. *trifoliata* **S3, THR, R**) are rarely encountered. Dense thickets of Common Hop-tree shrubs dominate this community, often with tangles of Riverbank Grape (*Vitis riparia*) and occasional clusters of Bladdernut (*Staphylea trifolia* **U**). Dune grasses such as Canada Wild-rye (*Elymus canadensis* **U**) and occasionally Beach Grass (*Ammophila breviligulata* **R**) can be found in the very open ground layer, sometimes occurring with Starry False Solomon's-seal (*Maianthemum stellatum*). Reported from NAI study area PC-06.

*Treed Sand Dune Ecosite (SDT1)*

*Cottonwood Treed Dune Type (SDT1-1) S1, Regionally Rare*

Active dunes along the Lake Erie shoreline occasionally support open-grown individuals and small groves of tall Eastern Cottonwood (*Populus deltoides* ssp. *deltoides*). This very open stand mixes with expanses of open sand dunes and shares the same suite of species in the shrub and ground layer as open dune communities. Red Oak (*Quercus rubra*) can be an occasional associate. On more disturbed dunes, Manitoba Maple (*Acer negundo*), and non-native trees such as Lombardy Poplar (*Populus nigra*), Scots Pine (*Pinus sylvestris*), Black Locust (*Robinia pseudo-acacia*), White Poplar (*Populus alba*) and Tree-of-heaven (*Ailanthus altissima*) can also be persistent invaders.

### 7.4.3 NIAGARA ESCARPMENT – CLIFF AND TALUS

The cliff rims, cliffs, talus slopes, terraces and bedrock gorges associated with the Niagara Escarpment landform represent specialized habitats of limited extent in southern Ontario. A number of fern species are mainly restricted to the Niagara Escarpment and limestone river cliffs (Riley 1989a). Four of these 'Escarpment' species are present in the Niagara Region: Purple-stemmed Cliff-brake (*Pellaea atropurpurea* **S3, R**), Smooth Cliff-brake (*Pellaea glabella* **R**), Tetraploid Maidenhair Spleenwort (*Asplenium trichomanes* ssp. *quadrivalens* **R**) and Walking Fern (*Asplenium rhizophyllum* **R**). Within the Niagara Region, several other species exhibit a close association with the Niagara Escarpment, including Green Violet (*Hybanthus concolor* **S2, R**) and Small-flowered Leaf-cup (*Polymnia canadensis* **U**).

#### 7.4.4 CLIFF

##### *Carbonate Open Cliff Ecosite (CLO1)*

##### *Cliffbrake – Lichen Carbonate Open Cliff Type (CLO1-1) S2, Regionally Rare*

Open cliffs with Smooth Cliff-brake (*Pellaea glabella* ssp. *glabella* **R**) and lichens are known from the Niagara Gorge along the open carbonate (dolostone/limestone) cliff face above the Niagara Glen, Fifteen and Sixteen Mile Valleys (including above the 15 Mile Creek Gorge at Rockway Conservation Area), Beamsville Escarpment and the Niagara Section Escarpment near the boundary with the City of Hamilton (Riley et al. 1996). Purple-stemmed Cliff-brake (*Pellaea atropurpurea* **S3, R**) also occurs on some of these cliffs.

##### *Bulblet Fern – Herb Robert Carbonate Open Cliff Type (CLO1-2) S3, Regionally Rare*

Bulblet Fern (*Cystopteris bulbifera*) and Herb Robert (*Geranium robertianum*) dominated open cliffs occur along the Niagara Escarpment; reported from eight Areas of Natural and Scientific Interest (ANSI) (Riley et al. 1996). A small example occurs on a cliff face of the Onondaga Escarpment along the Ridge Road area in Fort Erie.

##### *Moist Open Carbonate Cliff Seepage Type (CLO1-4) S3, Regionally Rare*

Open cliff seepage areas exist along the cliff face of the Niagara Gorge and are home to the rare Allegheny Mountain Dusky and Northern Dusky Salamanders. These moist open carbonate cliff seepage communities are dominated by Satin Grass (*Muhlenbergia mexicana*), White Snakeroot (*Ageratina altissima* [*Eupatorium rugosum*]), Bulblet Fern (*Cystopteris bulbifera*) and Ontario Aster (*Symphotrichum ontarionis* var. *ontarionis* [*Aster ontarionis*]) (Riley et al. 1996). Pale Jewelweed (*Impatiens pallida* **U**) and Bulblet Fern are dominants at Short Hills Provincial Park (Riley et al. 1996).

##### *Open Carbonate Cliff Rim Type (CLO-1-5) S2, Regionally Rare*

Open cliff rim communities with Canada Blue Grass (*Poa compressa*) occur along the Niagara Gorge (Riley et al. 1996).

##### *Carbonate Treed Cliff Ecosite (CLT1)*

##### *White Cedar Treed Carbonate Cliff Type (CLT1-1) S3, Regionally Rare*

White Cedar (*Thuja occidentalis*) dominates the escarpment cliff at Beamer Memorial Conservation Area in the Niagara Escarpment Section ANSI (Riley et al. 1996).

#### 7.4.5 TALUS

##### *Carbonate Open Talus Ecosite (TAO1)*

##### *Dry – Fresh Carbonate Open Talus Type (TAO1-1) S2, Regionally Rare*

Dry open talus dominated by Leaf-cup (*Polymnia canadensis* **U**) and Thicket Creeper (*Parthenocissus inserta*) occurs along the Niagara Gorge (Riley et al. 1996).

##### *Fresh – Moist Carbonate Open Talus Type (TAO1-2) S2, Regionally Rare*

Moist open talus communities occur along the Niagara Gorge, dominated either by White Snakeroot (*Ageratina altissima* [*Eupatorium rugosum*]) - Arrow-leaved Aster (*Symphyotrichum urophyllum* [*Aster urophyllus*] **U**) or Wild Yam (*Dioscorea villosa* [*Dioscorea quaternata*] **U**) – Big Bluestem (*Andropogon gerardii* **U**) – White Snakeroot. At DeCew Gorge, moist open talus is dominated by Zig-zag Goldenrod (*Solidago flexicaulis*) – White Snakeroot – Coltsfoot (*Tussilago farfara*) (Riley et al. 1996).

#### *Carbonate Shrub Talus Ecosite (TAS1) S3*

Limestone talus in Ontario is very restricted in its distribution, with the majority restricted to the Niagara Escarpment. In addition, limestone shrub talus occupies a relatively small area. At the ecosite level it can be ranked S3 (Wasy Bakowsky, pers. comm.).

#### *Mountain Maple Carbonate Shrub Talus Type (TAS1-2) S3, Regionally Rare*

Mountain Maple (*Acer spicatum*) dominated shrub talus occurs at the Homer Escarpment ANSI (Riley et al. 1996). Mountain Maple – American Yew (*Taxus canadensis*) – Black Raspberry (*Rubus occidentalis*) shrub talus occurs at the Beamsville Escarpment ANSI (Riley et al. 1996).

Some limestone talus types listed by Riley et al. (1996) do not fit readily into the ELC, however they are ranked **S3** at the ecosite level (W.D Bakowsky, pers. comm.). These other examples of carbonate shrub talus reported by Riley et al. (1996) include:

Ninebark (*Physocarpus opulifolius*) – Niagara Gorge  
Riverbank Grape (*Vitis riparia*) – Jordan Valley  
Red-berried Elder (*Sambucus racemosa* ssp. *pubens*) - DeCew Gorge  
Red-berried Elder – Round-leaved Dogwood (*Cornus rugosa*) – 15 and 16 Mile Creek Valleys  
Red-berried Elder – Flowering Raspberry (*Rubus odoratus*) – Niagara Section Escarpment  
Red-berried Elder – Riverbank Grape (*Vitis riparia*) – Niagara Section Escarpment  
Staghorn Sumac (*Rhus typhina*) – Niagara Gorge; DeCew Gorge, Jordan Valley

#### *Carbonate Treed Talus Ecosite (TAT1)*

#### *Dry-Fresh Chinquapin Oak Carbonate Treed Talus Type (TAT1-1) S1S2?, Regionally Rare*

Semi-open Chinquapin Oak (*Quercus muhlenbergii* **U**) dominated talus slope woods occur in the Niagara Gorge (Riley et al. 1996).

#### *Dry – Fresh White Birch Carbonate Treed Talus Type (TAT1-3) S3, Regionally Rare*

White Birch (*Betula papyrifera*) treed talus communities are described from the Niagara Gorge and Niagara Section Escarpment ANSI (Riley et al. 1996).

#### *Fresh-Moist Sugar Maple Carbonate Treed Talus Type (TAT1-4) S3*

Sugar Maple (*Acer saccharum* ssp. *saccharum*) treed talus stands are common along the Niagara Escarpment (Riley et al. 1996) and also known from smaller talus slopes along the Onondaga Escarpment in Fort Erie.

#### *Fresh-Moist Basswood – White Ash Carbonate Treed Talus Type (TAT1-5) S2, Regionally Rare*

Basswood (*Tilia americana*) and White Ash (*Fraxinus americana*) treed talus communities are reported from the Niagara Gorge (Riley et al. 1996).

*Fresh-Moist Hemlock – Sugar Maple Carbonate Treed Talus Type (TAT1-6) S2, Regionally Rare*

Eastern Hemlock (*Tsuga canadensis*) and Sugar Maple (*Acer saccharum* ssp. *saccharum*) treed talus communities are described from the Niagara Gorge, Jordan Valley and Niagara Section Escarpment ANSI (Riley et al. 1996).

A number of other carbonate treed talus community associations that do not fit readily into the ELC are listed in Riley et al. (1996).

#### 7.4.6 ALVAR

*Open Alvar Ecosite (ALO1)*

*Dry Lichen – Moss Open Alvar Pavement Type (ALO1-1) S1, Regionally Rare*

*Treed Alvar Ecosite (ALT1)*

*Red Cedar – False Pennyroyal Treed Alvar Type (ALT1-?\*) S2?, Regionally Rare*

All natural alvar communities in Ontario are ranked between S1 and S3 (Bakowsky 1996, pers. comm.). In the Niagara Region, 'alvar' communities generally occur in more disturbed, cultural landscapes. Alvar habitats in the Niagara Region are disjunct by hundreds of kilometres from the nearest of the main alvar regions in Ontario (e.g., western Lake Erie, Bruce Peninsula, Carden Plain). Some alvar vegetation is found closer on the Flamborough Plain at Hayesland and elsewhere (Goodban 1995), on the Onondaga Escarpment at the Salem-Rockford Rocklands near Hagersville (Gartshore et al. 1987).

Some Red Cedar (*Juniperus virginiana*) communities occur on shallow soils over limestone near the Lake Erie shore near Morgan's Point; these areas were not visited during the NAI. Alvar sites that once existed along the Onondaga Escarpment between Fort Erie and Hagersville appear to have largely been destroyed (Catling et al. 1975; Catling and Brownell 1995).

Cultural alvar communities, or 'pseudo-alvars', have developed in some areas where overlying soils have been removed, exposing flat expanses of open limestone bedrock. Lichens and mosses have colonized the exposed bedrock and some alvar species like False Pennyroyal (*Trichostema brachiatum* **R**), Early Saxifrage (*Micranthes virginensis* [*Saxifraga virginensis*] **U**) and Hairy Beardtongue (*Penstemon digitalis* **U**) also occur. The regionally rare Ebony Spleenwort (*Asplenium platyneuron* **R**) has also colonized these areas. This community is known from two NAI study areas in Wainfleet (WF-22) and Fort Erie (FE-11).

Near Point Abino, there is a disturbed alvar that appears to have been artificially created through removal of topsoil to reveal exposed limestone bedrock. The presence of alvar species such as False Pennyroyal (*Trichostema brachiatum* **R**), suggests that there is or was some natural alvar in the general vicinity. This community is extensively disturbed and dominated by alien species, but it is one of very few examples of alvar vegetation in the Niagara Peninsula and was considered of regional conservation significance by Oldham (2000).

Alvar communities were also reported from east of Smithville in Lincoln Township (Colville Consulting 2006; Dougan and Associates 1999), classified as a "Red Cedar Cultural Alvar Savannah" community. This feature is on shallow soils (Farmington Loam) and there are some

dolostone bedrock outcrops. Some of the more open areas in the eastern portion of this unit show signs of soil disturbance on 1978 aerial photography. Red Cedar (*Juniperus virginiana*) is the main tree species, with Bur Oak (*Quercus macrocarpa*), Chinquapin Oak (*Quercus muhlenbergii* **U**), White Ash (*Fraxinus americana*) and thickets of Northern Prickly-ash (*Zanthoxylum americanum*) and Gray Dogwood (*Cornus foemina* ssp. *racemosa*) interspersed with openings dominated by Poverty Oat Grass (*Danthonia spicata*) and Pennsylvania Sedge (*Carex pensylvanica*). Other shrubs include, Chokecherry (*Prunus virginiana*), Downy Arrowwood (*Viburnum rafinesquianum*), Bladdernut (*Staphylea trifolia* **U**), hawthorns (*Crataegus* spp.), Staghorn Sumac (*Rhus typhina*) and Common Buckthorn (*Rhamnus cathartica*). Several species largely restricted to alvars in southern Ontario (Catling 1995) occur in this area, such as False Pennyroyal (*Trichostema brachiatum* **R**), Balsam Ragwort (*Packera paupercula* [*Senecio pauperculus*] **R**) and Dwarf Vervain (*Verbena simplex* **R**). Other native herbaceous species of open habitats include Hairy Beardtongue (*Penstemon hirsutus* **U**), Foxglove Beardtongue (*Penstemon digitalis* **U**), Wild Bergamot (*Monarda fistulosa*), Tower Mustard (*Turritis glabra* [*Arabis glabra*] **R**), Narrow-leaved Panic-grass (*Panicum linearifolium* **R**) and Ensheathed Dropseed (*Sporobolus neglectus* **R**).

#### 7.4.7 CALCAREOUS SHALLOW SOIL SAVANNAH\*

*Dry Chinquapin Oak - Little Bluestem - Big Bluestem Calcareous Shallow Soil Savannah*  
Type\* **S1**,  
**Regionally Rare**

Bakowsky (2007) classified the savannah communities along the rim of the Niagara Gorge downstream from Niagara Falls as *Chinquapin Oak – Little Bluestem – Big Bluestem Calcareous Shallow Soil Savannah\**. This community type occurs on shallow soils over limestone or dolostone bedrock in southern Ontario. This type is related to alvar savannahs, but the soils in this Vegetation Type are deeper than those found on alvars (generally greater than 15 cm in depth) and Chinquapin Oak (*Quercus muhlenbergii* **U**) is one of the main canopy species. Several alvar plant species have been recorded from the Niagara Gorge, including Small Skullcap (*Scutellaria parvula* var. *parvula* **R**), Balsam Ragwort (*Packera paupercula* [*Senecio pauperculus*] **R**) and Upland Goldenrod (*Solidago ptarmicoides* **R**), although only the latter has been seen recently.

This type of vegetation was described previously by several authors (McIntosh and Catling 1979; Riley et al. 1996; Varga and Kor 1993). In a narrow band along the rim of the gorge downstream from Niagara Falls, five patches were mapped in total. The Niagara Parkway runs close to the rim of the gorge for several kilometers and open grown oaks (*Quercus* spp.) and hickories (*Carya* spp.) occur for several kilometers next to this road. Although much of this area contains manicured grounds and gardens, there are remaining areas of semi-natural vegetation. These trees occupy a band up to several hundred meters in width, which suggests this vegetation was originally fairly extensive along the edge of the Niagara Gorge. Varga (unpublished, NHIC Archives) mapped much of this area as savannah in his unpublished pre-European settlement savannah mapping for the Niagara Region.

At the rim of the Niagara Gorge on shallow soils over limestone bedrock, *Chinquapin Oak – Little Bluestem – Big Bluestem Calcareous Shallow Soil Savannah\** is dominated by open grown Chinquapin Oak, White Oak (*Quercus alba*) and Black Oak (*Quercus velutina* **U**), with less frequent Pignut Hickory (*Carya glabra* **S3 U**) and Shagbark Hickory (*Carya ovata*). Between the trees, openings are dominated by a mix of prairie grass and forb species. Closer to the edge

of the cliff rim where soils are shallowest, groundcovers are dominated by Little Bluestem (*Schizachyrium scoparium* **R**) and Rough Dropseed (*Sporobolus compositus* [*Sporobolus asper*] **R**), where there are some areas of exposed bedrock. The soils become deeper further from the cliff, where Little Bluestem becomes mixed with Big Bluestem (*Andropogon gerardii* **U**) and occasionally Indian Grass (*Sorghastrum nutans* **R**), as well as a greater diversity of forb species. Other prairie or woodland species present are Butterfly Weed (*Asclepias tuberosa* **R**), Hairy Beardtongue (*Penstemon hirsutus* **U**), Sky-blue Aster (*Symphyotrichum oolentangiense* [*Aster azureus*, *A. oolentangiensis*] **R**), Smooth Aster (*S. laeve* [*Aster laevis*] **U**), Fragrant Sumac (*Rhus aromatica* **R**), Intermediate Tick-trefoil (*Lespedeza violacea* [*L. intermedia*] **R**), Seneca Snakeroot (*Polygala senega* **R**) and Wild Bergamot (*Monarda fistulosa*) (Bakowsky 2007).

The greatest threat to this Vegetation Type at the Niagara Gorge is encroachment by woody species, including invasive species such as Common Buckthorn (*Rhamnus cathartica*). Many significant plant species formerly known from this area have not been recorded for some time. Careful management, including the controlled use of fire, needs to be continued to restore this vegetation (Bakowsky 2007).

Chinquapin Oak is also dominant along a section of the cliff rim on dolostone pavement above the talus slope at Louth Conservation Area in Lincoln (A. Thompson, pers. comm.).

#### 7.4.8 TALLGRASS PRAIRIE, SAVANNAH AND WOODLAND

*Dry Tallgrass Prairie Ecosite (TPO1)*

*Dry Tallgrass Prairie Type (TPO1-1) S1, Regionally Rare*

Small, disturbed prairie remnants occur on the sands and gravels of the St. David's Buried Gorge. Extensive aggregate extraction in this area has impacted most of the original plant communities; however, small patches of prairie grasses occur on the fringes of active aggregate operations and along sections of the railroad which bisects the geologic feature. 'Prairie' species found here include Big Bluestem (*Andropogon gerardii* **U**), Little Bluestem (*Schizachyrium scoparium* **R**), Indian Grass (*Sorghastrum nutans* **R**), Butterfly Weed (*Asclepias tuberosa* **R**) and Showy Tick-trefoil (*Desmodium canadense* **U**).

Historically, prairie, tallgrass oak savannah and woodland likely existed over the section of the Fonthill Kame-Delta, near Lookout Street in Pelham, where the highest elevations of this feature exist. However, extensive and early agricultural and horticultural nursery activities have disturbed much of the original plant communities. During colonization, this area was also sought out as a military base owing to the vantage point of this height of land and the open nature of the woodlands which naturally occurred here. Most likely these were oak woodlands and savannahs mixed with open prairie areas. Southwest of Lookout Street and Highway 20, an extremely mature remnant Black Oak woodland remains. Massive, open grown Black Oak (*Quercus velutina* **U**) and White Oak (*Quercus alba*) trees form an open woodland canopy with Pignut Hickory (*Carya glabra* **S3, U**) as an occasional associate. In the very sparse and open understorey, Flowering Dogwood (*Cornus florida* **END, U**) can also be found.

Small patches of open Tallgrass Prairie (TPO) occur as part of a mosaic of dune and coastal marsh habitats at Windmill Point and Erie Beach on the Lake Erie shore. Dominant prairie and shoreline grass species include Big Bluestem (*Andropogon gerardii* **U**), Switch Grass (*Panicum virgatum* **U**), Little Bluestem (*Schizachyrium scoparium* **R**), Indian Grass (*Sorghastrum nutans* **R**) and Canada Wild-rye (*Elymus canadensis* **U**). Scattered trees include Eastern Cottonwood

(*Populus deltoides* ssp. *deltoides*), Sycamore (*Platanus occidentalis* **U**) and Black Oak (*Quercus velutina* **U**). These patches occur on shallow sands (15-40 cm deep) over limestone bedrock and are apparently maintained by shoreline dynamics.

Prairie, oak savannah and tallgrass oak woodland communities typically need an ongoing program of monitoring and active management (e.g., prescribed burns, woody plant control, seeding/planting of conservative species) if their ecological integrity is to be maintained over the long term.

#### 7.4.9 DECIDUOUS FOREST

##### *Dry-Fresh Sugar Maple – Hardwood Calcareous Shallow Deciduous Forest Type (FODR1-1\*\*) – Regionally Rare (on the Onondaga Escarpment)*

Dry–Fresh Sugar Maple–Hardwood Calcareous Shallow Deciduous Forest Type occurs along the Onondaga Escarpment. This Sugar Maple – Hardwood forest is very similar to the Niagara Escarpment types and supports a diverse ground layer over shallow soils with exposed bedrock, fissures and crevices. Sugar Maple (*Acer saccharum* ssp. *saccharum*) dominates the closed canopy with White Ash (*Fraxinus americana*), Red Oak (*Quercus rubra*) and Black Cherry (*Prunus serotina*) as lesser associates. Sugar Maple and occasionally Ironwood (*Ostrya virginiana*) form the subcanopy. The understory is fairly open and the ground cover is rich, including Wild Leek (*Allium tricoccum*), Cleavers (*Gallium aparine*), Narrow-leaved Spring-beauty (*Claytonia virginiana*), Common Blue Violet (*Viola sororia*), Bloodroot (*Sanguinaria canadensis*), Mayapple (*Podophyllum peltatum*), Zig-zag Goldenrod (*Solidago flexicaulis*), Wild Geranium (*Geranium maculatum*), Early Meadow-rue (*Thalictrum dioicum*) and Cut-leaf Toothwort (*Cardamine concatenata*). The alien Garlic Mustard (*Alliaria petiolata*) also occurs in some parts of this community. Rare/uncommon species include Sharp-scaled Oak Sedge (*Carex albicans* var. *albicans* **S2, U**), Giant Yellow Hyssop (*Agastache nepetoides* **R**), Canada Waterleaf (*Hydrophyllum canadense* **U**), James' Sedge (*Carex jamesii* **R**), Pubescent Sedge (*Carex hirtifolia* **U**), Common Juniper (*Juniperus communis* var. *depressa* **U**) and Bladdernut (*Staphylea trifolia* **U**).

This community was documented at one NAI study site in Wainfleet Township (WF-13). Larger examples occur in Ridgeway on the Onondaga Escarpment. This type of forest is common along the Niagara Peninsula Section of the Niagara Escarpment.

##### *Dry-Fresh Oak Deciduous Forest Ecosite (FOD1)*

##### *Dry-Fresh Black Oak Deciduous Forest Type (FOD1-3) **S3, Regionally Rare***

This Vegetation Type is found on well drained sands. Black Oak (*Quercus velutina* **U**) dominated forests are generally confined to the driest sand ridges, upper slopes and valley rims on the Fonthill Kame-Delta and Dunnville Sand Plain, where the original vegetation would have been much more open. In these drought-tolerant communities, Black Oak dominates the canopy, with White Oak (*Quercus alba*), and to a lesser extent, Red Oak (*Quercus rubra*) occurring as associates. Black Cherry (*Prunus serotina*), Pignut Hickory (*Carya glabra* **S3**), Red Maple (*Acer rubrum*) and White Pine (*Pinus strobus*) also occur occasionally in these Black Oak forests. Beneath the canopy, in the understory and shrub/sapling layers, there is a mix of Black Cherry (*Prunus serotina*), maples (*Acer saccharum* ssp. *saccharum*, *A. rubrum*) and Beech (*Fagus grandifolia*), Witch-hazel (*Hamamelis virginiana*), Downy Serviceberry (*Amelanchier arborea*) and Sassafras (*Sassafras albidum*). Trailing vines of Summer Grape (*Vitis aestivalis*) reach the semi-open canopy. Groundcovers include Canada Mayflower

(*Maianthemum canadense*), Garlic Mustard (*Alliaria petiolata*), Pennsylvania Sedge (*Carex pensylvanica*), Blue-stem Goldenrod (*Solidago caesia*), Large-leaf Wood-aster (*Eurybia macrophylla* [*Aster macrophyllus*]), Heart-leaf Aster (*Symphyotrichum cordifolium* [*Aster cordifolius*]), False Solomon's-seal (*Maianthemum racemosum* ssp. *racemosum*) and Hairy Solomon's-seal (*Polygonatum pubescens*), along with low shrubs of Maple-leaved Viburnum (*Viburnum acerifolium*). Along lower slopes there are provincially rare tree species including American Chestnut (*Castanea dentata* **S3, END, U**), Eastern Flowering Dogwood (*Cornus florida* **S2?, END, U**), Cucumber Tree (*Magnolia acuminata* **S2, END, R**) and Butternut (*Juglans cinerea* **S3?, END, U**).

Black Oak Forest (FOD1-3) is known from 4 NAI study areas: NL-01, PL-01, PL-02 and PL-03. All of the Pelham (PL) sites are on the sandy ridges or upper ravine slopes on the Fonthill Kame-Delta and the Niagara-on-the-Lake site (NL-01) is at Fireman's Park on the St. David's Buried Gorge.

*Dry-Fresh Oak – Maple – Hickory Deciduous Forest Ecosite (FOD2)*

*Dry-Fresh Oak – Hickory Deciduous Forest Type (FOD2-2) S3S4, Regionally Rare*

This community typically occurs on upper to middle slopes on silty clays and silty very fine sands. Three examples were noted during the NAI, one along the 15 Mile Creek Valley in Pelham (PL-07), another following the rim and upper banks of Ussher's Creek (NF-01) and the last example was found along the rolling hills and valleys of Fireman's Park in Niagara Falls (NL-12). In places along the 15 Mile Creek Valley, an open canopy of Red Oak (*Quercus rubra*) dominates with Shagbark Hickory (*Carya ovata*) as a frequent associate. Sugar Maple (*Acer saccharum* ssp. *saccharum*), Shagbark Hickory and Red Oak form a sparse subcanopy while Chokecherry (*Prunus virginiana*) and White Ash (*Fraxinus americana*) dominate the shrub/sapling layer. Zig-zag Goldenrod (*Solidago flexicaulis*) and Herb Robert (*Geranium robertianum*) occur in the ground layer with about 30% cover. Along Ussher's Creek, Red Oak, White Oak (*Quercus alba*), Shagbark Hickory and White Ash form the canopy. At Fireman's Park, oaks co-dominate the canopy with Bitternut Hickory (*Carya cordiformis*), and the subcanopy is mainly Sassafras (*Sassafras albidum*), with Bitternut Hickory, Shagbark Hickory and Black Cherry (*Prunus serotina*) as associates.

Provincially rare plant species at Fireman's Park include American Chestnut (*Castanea dentata* **S2, END, U**), Eastern Flowering Dogwood (*Cornus florida* **S2?, END, U**) and Butternut (*Juglans cinerea* **S3?, END, U**), as well as regionally rare species like Hairy Bush-clover (*Lespedeza hirta* **R**) and Butterfly Milkweed (*Asclepias tuberosa* **R**), which are indicators of open prairie and savannah habitat.

*Fresh-Moist Sugar Maple Deciduous Forest Ecosite (FOD6)*

*Fresh-Moist Sugar Maple – Black Maple Deciduous Forest Type (FOD6-2) S3?*  
**Regionally Rare**

*Fresh-Moist Lowland Deciduous Forest Ecosite (FOD7)*

*Fresh-Moist Black Maple Lowland Deciduous Forest Type (FOD7-5) S3, Regionally Rare*

Sugar Maple-Black Maple Deciduous Forest and Black Maple Lowland Deciduous Forest occur on moist, well drained sites along the bottomlands and terraces of the Twelve Mile Creek Headwaters (PL-01) on silty sands, silty very fine sands and silty clays. Sugar Maple (*Acer saccharum* ssp. *saccharum*) and Black Maple (*Acer saccharum* ssp. *nigrum* **U**) are co-dominant, forming a tall canopy. Associates include Blue-beech (*Carpinus caroliniana*), Basswood (*Tilia americana*), Ironwood (*Ostrya virginiana*), White Ash (*Fraxinus americana*), and

Green Ash (*Fraxinus pennsylvanica*). Rarely Hemlock (*Tsuga canadensis*) occurs in the bottomlands but it is more typical along adjacent north-facing valley slopes. The ground layer contains species such as Wild-ginger (*Asarum canadense*), Early Meadow-rue (*Thalictrum dioicum*), Blue Cohosh (*Caulophyllum thalictroides*) and Jack-in-the-pulpit (*Arisaema triphyllum* ssp. *triphyllum*). This community was not surveyed as part of the NAI. It is known to occur at Twelve Mile Creek Headwaters (PL-01) and is reported from the Short Hills Provincial Park (Gould 1989), Fifteen and Sixteen Mile Valleys and Jordan Valley. (Riley et al. 1996). The regionally rare Twinleaf (*Jeffersonia diphylla* **R**), an indicator of rich soils, occurs in this community.

*Fresh-Moist Lowland Deciduous Forest Ecosite (FOD7)*

*Fresh-Moist Black Walnut Lowland Deciduous Forest Type (FOD7-4)* **S2S3, Regionally Rare**

This Vegetation Type occurs on alluvial silts and clays, and rarely on sands, along floodplains. Large Black Walnut (*Juglans nigra*) trees with spreading crowns dominate these semi-open canopied floodplain communities. Associates include Green Ash (*Fraxinus pennsylvanica*), White Elm (*Ulmus americana*), Shagbark Hickory (*Carya ovata*), Basswood (*Tilia americana*) and oaks (*Quercus* spp.). Non-native grasses such as Orchard Grass (*Dactylis glomerata*), Timothy (*Phleum pratense*) and Kentucky Blue Grass (*Poa pratensis*), along with brambles (*Rubus* spp.) and vines such as Thicket Creeper (*Parthenocissus inserta*), Riverbank Grape (*Vitis riparia*) and Western Poison-ivy (*Toxicodendron rydbergii* [*Rhus radicans* ssp. *rydbergii*]) dominate the ground layer. Goldenrods (*Solidago canadensis* var. *canadensis*, *S. rugosa*) and Garlic Mustard (*Alliaria petiolata*) are also common. Hawthorns (*Crataegus* spp.), dogwoods (*Cornus foemina* ssp. *racemosa*, *Cornus amomum* ssp. *obliqua*), Chokecherry (*Prunus virginiana*) and occasionally Spicebush (*Lindera benzoin*) form the understory and shrub layer. Lowland stands of Black Walnut were recorded from five NAI study sites: PL-01, PL-05, NF-23, WF-07 and WF-29. Some stands may have been planted or have originated from planted trees, especially in non-lowland situations.

*Fresh-Moist Poplar-Sassafras Deciduous Forest Ecosite (FOD8)*

*Fresh-Moist Sassafras Deciduous Forest Type (FOD8-2)* **S3, Regionally Rare**

Only a handful of Sassafras (*Sassafras albidum*) stands were documented from three NAI study areas (PL-01, PL-03 and NL-01). Most are small inclusions within larger Red Maple-Oak stands (FOD2-1), or Black Oak forests (FOD1-3) on the sandy Fonthill Kame-Delta, with one occurrence on the St. David's Buried Gorge at Fireman's Park. This is a successional community, often forming pure stands on steep dry sandy slopes. Typically, pure stands or mixed stands of Sassafras occur on mid to upper valley slopes, especially in disturbed areas, including hydro cuts, road cuts, large tip-ups, blow downs and other canopy gaps in Black Oak (*Quercus velutina* **U**) forests (FOD1-3), abandoned farmland, and along disturbed ridge tops.

Open stands of Sassafras often occur with tangles of Summer Grape (*Vitis aestivalis*) in the canopy, subcanopy and shrub layers. Red Maple (*Acer rubrum*), Sugar Maple (*Acer saccharum* spp. *saccharum*), Black Walnut (*Juglans nigra*) and Bigtooth Aspen (*Populus grandidentata*) are occasional associates in the subcanopy and, to a lesser extent, in the open canopy layer. In the shrub layer, young Sassafras trees and Summer Grape occasionally mix with Staghorn Sumac (*Rhus typhina*), brambles (*Rubus* spp.) and Multiflora Rose (*Rosa multiflora*). Garlic Mustard (*Alliaria petiolata*), old field grasses, Canada Goldenrod (*Solidago canadensis*) and Eastern Bracken (*Pteridium aquilinum*) dominate the ground layer. Provincially and regionally rare/uncommon species associated with these communities include Cucumber Tree (*Magnolia*

*acuminata* **S2, END, R**), and species of open habitats such as Pignut Hickory (*Carya glabra* **S3, U**), Big Bluestem (*Andropogon gerardii* **U**), Hairy Bush-clover (*Lespedeza hirta* **R**), and Butterfly Milkweed (*Asclepias tuberosa* **R**).

#### 7.4.10 CONIFEROUS SWAMP

*White Pine – Hemlock Mineral Coniferous Swamp Ecosite (SWC2)*

*White Pine Mineral Coniferous Swamp Type (SWC2-1)* **Regionally Rare**

This rare White Pine (*Pinus strobus*) swamp community occurs on mineral soils of silty very fine sands and silty sands in seepage areas with organic accumulations up to 20cm+ and deeper pockets of organic substrates up to, or greater than 100cm. Massive, widely-spaced White Pines form a sparse cover and arise from large hummocks surrounded by open water or deep organics. Black Ash (*Fraxinus nigra*) and Red Maple (*Acer rubrum*) are occasional in the subcanopy. There is a dense shrub layer of Spicebush (*Lindera benzoin*) and Speckled Alder (*Alnus incana* ssp. *rugosa* **U**) with Red-osier Dogwood (*Cornus sericea* ssp. *sericea* [*Cornus stolonifera*]), Silky Dogwood (*Cornus amomum* ssp. *obliqua*) and Bebb's Willow (*Salix bebbiana*) also occurring less frequently. The ground layer is often dominated by Lake-bank Sedge (*Carex lacustris*), other sedges and Spotted Touch-me-not (*Impatiens capensis*), with Spotted Joe-pye-weed (*Eutrochium maculatum* var. *maculatum* [*Eupatorium maculatum*]) and Rough-leaved Goldenrod (*Solidago patula* **U**) as more occasional associates. This community was encountered only once during the NAI from study area PL-01.

#### 7.4.11 DECIDUOUS SWAMP

*Oak Mineral Deciduous Swamp Ecosite (SWD1)*

*Swamp White Oak Mineral Deciduous Swamp Type (SWD1-1)* **S2S3**

Swamp White Oak dominated swamps occur on silty clays, clays and silts. These sites usually support semi-open stands of Swamp White Oak (*Quercus bicolor*) and Swamp White Oak-Bur Oak (*Quercus macrocarpa*) hybrids. Occasional associates include Pin Oak (*Quercus palustris* **U**), Green Ash (*Fraxinus pennsylvanica*) and White Elm (*Ulmus americana*). The ground layer often supports a dense cover of Lake-bank Sedge (*Carex lacustris*) or more occasionally, Canada Blue-joint (*Calamagrostis canadensis*). Hop Sedge (*Carex lupulina*), Fringed Sedge (*Carex crinita*) and Bladder Sedge (*Carex intumescens*) often dominate a narrow band around the wetland-upland fringe. Other associates include Fowl Manna Grass (*Glyceria striata*), Stout Woodreed (*Cinna arundinacea*), One-sided Aster (*Symphyotrichum lateriflorum* [*Aster lateriflorus*]), Rough Goldenrod (*Solidago rugosa*) and Spotted Touch-me-not (*Impatiens capensis*). Seventeen (17) occurrences from 14 NAI study areas were documented: HAL-40, NF-04, 11, PC-02, PL-04, WE-03, 08, WF-01, WL-05, 06, 15, 20, 23 and 26.

*Bur Oak Mineral Deciduous Swamp Type (SWD1-2)* **S3, Regionally Rare**

This is a rare swamp type on silty clay soils, dominated by Bur Oak (*Quercus macrocarpa*), Swamp White Oak (*Quercus bicolor*) and their hybrids, as well as Pin Oak (*Quercus palustris* **U**). Frequent associates include Shagbark Hickory (*Carya ovata*), Green Ash (*Fraxinus pennsylvanica*), Swamp Hybrid Maple (*Acer X freemanii*) and Red Maple (*Acer rubrum*). The ground layer supports Lake-bank Sedge (*Carex lacustris*) and other sedge species, Spotted Touch-me-not (*Impatiens capensis*), Rough Goldenrod (*Solidago rugosa*), Sensitive Fern (*Onoclea sensibilis*), Jumpseed (*Persicaria virginiana* [*Polygonum virginianum*]) and Western

Poison-ivy (*Toxicodendron rydbergii* [*Rhus radicans* ssp. *rydbergii*]). Pure Bur Oak appears to be rare on the clay plain. Only three occurrences were documented from three NAI study sites: PC-05, WF-22 and WL-08.

#### *Pin Oak Mineral Deciduous Swamp Type (SWD1-3) S2S3*

Pin Oak (*Quercus palustris* **U**) swamps are common to locally abundant in the eastern half of the Niagara Peninsula. This swamp type covers or often encircles seasonally inundated slough ponds, usually within larger stands of maple swamps (SWD3). Pin Oak dominates the canopy almost exclusively, with Green Ash (*Fraxinus pennsylvanica*) and White Elm (*Ulmus americana*) as rare canopy associates or occasionally in the subcanopy. Typically, the understorey is fairly open to absent, their development hampered by extended periods of standing water. Often the groundcovers are sparse, including a mix of Hop Sedge (*Carex lupulina*), Fringed Sedge (*Carex crinita*), Bladder Sedge (*Carex intumescens*), Fowl Manna Grass (*Glyceria striata*) and Stout Woodreed (*Cinna arundinacea*). Pin Oak swamps were documented from 42 patches within 19 NAI study sites.

#### **7.4.12 THICKET SWAMP**

##### *Mineral Thicket Swamp Ecosite (SWT2)*

##### *Alder Mineral Thicket Swamp Type (SWT2-1) Regionally Rare*

Speckled Alder (*Alnus incana* ssp. *rugosa* **U**) dominated thicket swamps occur on silty very fine sands and silty sands at six patches within two NAI study sites (PL-01 and HAL-40). The largest example of this community type can be found in an expansive bottomland seepage marsh on the Fonthill Kame-Delta near the headwaters of Twelve Mile Creek (PL-01). Smaller examples are found interspersed in slough ponds and depressions on the Dunnville Sand Plain in Haldimand (HAL-40). In the Twelve Mile Creek watershed, tall shrubs of Speckled Alder dominate with a lower shrub layer of Spicebush (*Lindera benzoin*), and occasionally Gray Dogwood (*Cornus foemina* ssp. *racemosa*) and Silky Dogwood (*Cornus amomum* ssp. *obliqua*). A dense ground cover of Spotted Touch-me-not (*Impatiens capensis*), Skunk Cabbage (*Symplocarpus foetidus*) and Spring Clearweed (*Pilea fontana*) carpet the thin layer of organic accumulations and open water pockets. Rare/uncommon species include Weak Stellate Sedge (*Carex seorsa* **S2, U**), Groundnut (*Apios americana* **U**), Spring Clearweed (*Pilea fontana* **U**), Rough-leaved Goldenrod (*Solidago patula* **U**) and Poison Sumac (*Toxicodendron vernix* [*Rhus vernix*] **R**).

##### *Buttonbush Mineral Thicket Swamp Type (SWT2-4) S3*

Low tangled Buttonbush (*Cephalanthus occidentalis*) shrubs solely dominate this type of thicket swamp. Buttonbush thicket swamps are common on the Haldimand Clay Plain and occur throughout slough forests in the deeper slough ponds with a longer hydroperiod. The extent to which these pools dry up depends on precipitation patterns (i.e. wet versus dry years). The few associates most often encountered include Bittersweet Nightshade (*Solanum dulcamara*), Water-parsnip (*Sium suave*), Three-lobed Beggarticks (*Bidens tripartita*), Devil's Beggarticks (*Bidens frondosa*), Common Duckweed (*Lemna minor*), Star Duckweed (*Lemna trisulca* **U**) and a liverwort (*Riccia fluitans*). The regionally rare Swamp Beggarticks (*Bidens discoidea* **R**) is found in Buttonbush slough ponds; this species has a peculiar habit of rooting on old, furrowed or textured Buttonbush stems at the elevations of the waterline at the time of seed dispersal. Buttonbush thicket swamps were documented from 70 patches within 33 NAI study sites.

#### *Silky Dogwood Mineral Thicket Swamp Type (SWT2-8) S3S4*

Silky Dogwood (*Cornus amomum* ssp. *obliqua*) thicket swamps are common in wet depressions throughout slough forests, swamps and along riparian areas, typically occurring on clays, silty clays and silty clay loams. Green Ash (*Fraxinus pennsylvanica*), White Elm (*Ulmus americana*), Red Maple (*Acer rubrum*) and Swamp Hybrid Maple (*Acer X freemanii*) are common tree associates forming a sparse cover and grade into the adjacent swamp forest. Typical shrubs associated with Silky Dogwood thicket swamps include: Buttonbush (*Cephalanthus occidentalis*), shrub willows (*Salix* spp.), Common Elder (*Sambucus canadensis*), Swamp Rose (*Rosa palustris*), Winterberry (*Ilex verticillata*) and Highbush Blueberry (*Vaccinium corymbosum*). The ground layer often supports a dense cover of forbs including Spotted Touch-me-not (*Impatiens capensis*), False Nettle (*Boehmeria cylindrica*), Rough Goldenrod (*Solidago rugosa*), Dotted Smartweed (*Persicaria punctata* [*Polygonum punctatum*]), Fringed Loosestrife (*Lysimachia ciliata*), Moneywort (*Lysimachia nummularia*), Common Clearweed (*Pilea pumila*) and Swamp Aster (*Symphyotrichum puniceum* [*Aster puniceus* var. *puniceus*]). Typical graminoids include Hop Sedge (*Carex lupulina*), Fringed Sedge (*Carex crinita*), Fowl Manna Grass (*Glyceria striata*), Eastern Manna Grass (*Glyceria septentrionalis*), Stout Woodreed (*Cinna arundinacea*), Canada Blue-joint (*Calamagrostis canadensis*) and Reed Canary Grass (*Phalaris arundinacea*). Silky Dogwood thicket swamps were recorded from 18 study sites during the NAI.

#### *Gray Dogwood Mineral Thicket Swamp Type (SWT2-9) S3S4*

Gray Dogwood (*Cornus foemina* ssp. *racemosa*) dominated thicket swamps occur on silty clays, clays and silts; this Vegetation Type is often replaced by the widespread Meadowsweet Mineral Thicket Swamp Type (SWT2-6) in wetter areas. However, an ecotone or grading of the very common, upland/cultural Grey Dogwood Shrub Thicket Type (CUT1-4) into a wetter Grey Dogwood Thicket Swamp can often be found; many of these Grey Dogwood thicket swamps are of cultural origin, developing on former agricultural land. Associates in the shrub layer include Glossy Buckthorn (*Frangula alnus* [*Rhamnus frangula*]), Meadowsweet (*Spiraea alba*), and to a lesser extent, Southern Arrow-wood (*Viburnum dentatum* var. *lucidum* [*V. recognitum*]). Young, successional trees can often be common throughout forming a regeneration layer of Red Maple (*Acer rubrum*), White Elm (*Ulmus americana*) and Green Ash (*Fraxinus pennsylvanica*). Rough Goldenrod (*Solidago rugosa*) dominates the ground layer, frequently accompanied by Redtop (*Agrostis gigantea*), Creeping Bent Grass (*Agrostis stolonifera*) and sedges (*Carex* spp.). Swamp Aster (*Symphyotrichum puniceum* [*Aster puniceus* var. *puniceus*]), Canada Goldenrod (*Solidago canadensis*) and Reed Canary Grass (*Phalaris arundinacea*) occur to a lesser extent. Rare/uncommon species include Small-flowered Agrimony (*Agrimonia parviflora* **R**), Foxglove Beard-tongue (*Penstemon digitalis* **U**) and Virginia Mountain-mint (*Pycnanthemum virginianum* **R**). Gray Dogwood thicket swamps were documented in twenty-eight (28) patches from 19 NAI study sites.

#### *Southern Arrow-wood Mineral Thicket Swamp Type (SWT2-11) S3, Regionally Rare*

Southern Arrow-wood (*Viburnum dentatum* var. *lucidum* [*V. recognitum*]) thicket swamps occur on silty clays and shallow organic soils at two sites (Point Abino, FE-11 and WF-18). Although Southern Arrow-wood occurs widely on the Haldimand Clay Plain as a low shrub associate in thicket swamps and wet, regenerating old field meadows, it rarely dominates the shrub layer in a community. Often the leaves of Southern Arrow-wood become skeletonised due to insect pests and the shrubs show severe dieback.

Tall thickets of Southern Arrow-wood occur in a backdune swamp forest in the Point Abino area. A smaller example of this community (WF-18), showed signs of leaf die-back, NAI study area WF-18. Regenerating Green Ash (*Fraxinus pennsylvanica*) and Red Maple (*Acer rubrum*) occur as associates, with a lower shrub layer of Meadowsweet (*Spiraea alba*).

*Paw-paw Mineral Thicket Swamp Type (SWT2-12) S1, Regionally Rare*

Few patches of Paw-paw (*Asimina triloba* **S3**) thickets remain in the Niagara Region (Bowden and Miller 1951). Paw-paw usually forms a dense subcanopy beneath a taller canopy of floodplain or swamp forest. Examples usually occur in riparian areas on terraced floodplains. Historically it was recorded from several sites along the Niagara River, below the Niagara Escarpment in Lincoln and elsewhere in the Region (Bowden and Miller 1951), but recent records are few (e.g. M.J. Oldham, Navy Island in 2006; A. Goodban, east of Homer Escarpment ANSI in floodplain next to QEW in 1996; W.D. Bakowsky, St. David's in 1998).

*Organic Thicket Swamp Ecosite (SWT3)*

*Alder Organic Thicket Swamp Type (SWT3-1) – Regionally Rare*

The largest example of *Alder Organic Thicket Swamp* occurs in an expansive bottomland seepage marsh on the Fonthill Kame Delta, near the headwaters of Twelve Mile Creek (PL-01), where organics/peat depths exceed 100 cm in some areas. The vegetation is described above, under Alder Mineral Thicket Swamp (SWT2-1), since they share the same dominant species and occur together as a mosaic of Vegetation Types.

Elsewhere, small examples of Alder Organic Thicket Swamps are found interspersed throughout forested areas in slough ponds and depressions on the Dunnville Sand Plain in Haldimand, and to a lesser extent in Wainfleet Township. Here, Speckled Alder (*Alnus incana* ssp. *rugosa* **U**) dominates the tall shrub layer with Highbush Blueberry (*Vaccinium corymbosum*), Winterberry (*Ilex verticillata*) and Buttonbush (*Cephalanthus occidentalis*) as associates. Often Highbush Blueberry forms a dense ring around the open wetlands and grades into a narrow band of Swamp Hybrid Maple (*Acer X freemanii*) further encircling the community. The ground layer includes Spotted Touch-me-not (*Impatiens capensis*), Royal Fern (*Osmunda regalis*), Cinnamon Fern (*Osmunda cinnamomea*), Lake-bank Sedge (*Carex lacustris*), smartweeds (*Persicaria* spp. [*Polygonum* spp.]), beggarticks (*Bidens* spp.), Water-hemlock (*Cicuta maculata*) and free floating plants of Common Duckweed (*Lemna minor*) and a liverwort (*Riccia fluitans*). Regionally uncommon species include Poison Sumac (*Toxicodendron vernix* [*Rhus vernix*] **R**), and Wild Calla (*Calla palustris* **U**). Alder Organic Thicket Swamps were documented during the NAI from 7 study sites (21 occurrences): HAL-22, HAL-24, HAL-40, PL-01, WF-01, WF-02 and WF-25.

*Buttonbush Organic Thicket Swamp Type (SWT3-4) S3*

Buttonbush (*Cephalanthus occidentalis*) Organic Thicket Swamps typically occur within slough forests and forested swamps; they occur in deepwater slough ponds and vernal pools which hold water for most of the year, drying only for short durations or occasionally during very dry years. This moisture regime allows organic accumulations to develop and supports open water ponds dominated by a tangled shrub cover of Buttonbush. Common Duckweed (*Lemna minor*) is abundant. Ringing the upland edges, shrubs such as Highbush Blueberry (*Vaccinium corymbosum*), Winterberry (*Ilex verticillata*) and Silky Dogwood (*Cornus amomum* ssp. *obliqua*) grow from mossy hummocks. Trailing vines of Bittersweet Nightshade (*Solanum dulcamara*) are common, as are forbs such as Three-lobed Beggarticks (*Bidens tripartita*), Marsh Fern

(*Thelypteris palustris*), Cinnamon Fern (*Osmunda cinnamomea*), Royal Fern (*Osmunda regalis*) and Sensitive Fern (*Onoclea sensibilis*). A variety of sedges (*Carex* spp.) and Fowl Manna Grass (*Glyceria striata*) are also common throughout on mossy hummocks around the thicket swamp margins. Buttonbush Organic Thicket Swamps were recorded from 21 NAI study areas.

#### *Winterberry Organic Thicket Swamp Type (SWT3-7) S3S4, Regionally Rare*

Winterberry (*Ilex verticillata*) Organic Thicket Swamps are very similar in species composition to Poison Sumac (*Toxicodendron vernix* [*Rhus vernix*] **R**) Thicket Swamps (SWT3-13, described below). In either Vegetation Type, both species are codominant. Poison Sumac usually forms a sparse cover of tall shrubs above a dense lower shrub layer dominated by Winterberry. Other frequent associates include Highbush Blueberry (*Vaccinium corymbosum*), Speckled Alder (*Alnus incana* ssp. *rugosa* **U**), and low shrubs of Buttonbush (*Cephalanthus occidentalis*) and Black Chokeberry (*Aronia melanocarpa* **U**). Young Red Maples (*Acer rubrum*) are often scattered throughout. Abundant forbs include Devil's Beggarticks (*Bidens frondosa*), Spotted Touch-me-not (*Impatiens capensis*), Wild Calla (*Calla palustris* **U**), Royal Fern (*Osmunda regalis*), Cinnamon Fern (*Osmunda cinnamomea*) and Marsh Fern (*Thelypteris palustris*). Halberd-leaved Tear-thumb (*Persicaria arifolia* [*Polygonum arifolium*] **S3, U**) occurs in some of these Winterberry thickets. Known from five NAI study sites: HAL-23, 24, 28, 40 and WL-06.

#### *Spicebush Organic Thicket Swamp Type (SWT3-11) S3, Regionally Rare*

This thicket swamp type occurs in organic seepage areas underlain by sands, muck and peat. Spicebush thickets typically support a dense ground layer of Skunk Cabbage (*Symplocarpus foetidus*), Marsh Marigold (*Caltha palustris*), Spotted Joe-pye-weed (*Eutrochium maculatum* var. *maculatum* [*Eupatorium maculatum*]), Spotted Touch-me-not (*Impatiens capensis*), and occasional stunted trees of Red Maple (*Acer rubrum*) and Yellow Birch (*Betula alleghaniensis*). Poison Sumac (*Toxicodendron vernix* [*Rhus vernix*] **R**) and Butternut (*Juglans cinerea* **S3?, END, U**) can occur rarely in these communities. Reported from NAI study sites PL-01 and PL-04.

#### *Poison Sumac Organic Thicket Swamp Type (SWT3-13) S3, Regionally Rare*

Organic Thicket Swamps dominated by Poison Sumac (*Toxicodendron vernix* [*Rhus vernix*] **R**) are confined to open slough ponds with deep organic accumulations (50 to >120 cm) and are interspersed within surrounding slough forests or forested swamps. Winterberry (*Ilex verticillata*) is often co-dominant with Poison Sumac. Other shrub associates include Highbush Blueberry (*Vaccinium corymbosum*), Speckled Alder (*Alnus incana* ssp. *rugosa* **U**), and low shrubs of Buttonbush (*Cephalanthus occidentalis*), Black Chokeberry (*Aronia melanocarpa* **U**), Swamp Rose (*Rosa palustris*) and Meadowsweet (*Spiraea alba*). Sparse willow (*Salix* spp.) shrubs, young Red Maple (*Acer rubrum*) and Yellow Birch (*Betula alleghaniensis*) trees are often scattered throughout. Abundant forbs include Devil's Beggarticks (*Bidens frondosa*), smartweeds (*Persicaria* spp. [*Polygonum* spp.]), Spotted Touch-me-not (*Impatiens capensis*), Wild Calla (*Calla palustris* **U**), Royal Fern (*Osmunda regalis*), Cinnamon Fern (*Osmunda cinnamomea*) and Marsh Fern (*Thelypteris palustris*). Graminoids include Lake-bank Sedge (*Carex lacustris*), Rice Cut Grass (*Leersia oryzoides*) and Canada Blue-joint (*Calamagrostis canadensis*). Halberd-leaved Tear-thumb (*Persicaria arifolia* [*Polygonum arifolium*] **S3, U**) occurs in some of these Winterberry thickets. Known from six NAI study sites: HAL-24, 28, 40, WF-01, 29 and WL-06.

### 7.4.13 BOG

#### *Shrub Bog Ecosite (BOS1)*

*Leatherleaf Shrub Bog Type (BOS1-1) S2S3?, Regionally Rare*

*Highbush Blueberry Shrub Bog Type (BOS1-?) S2S3?, Regionally Rare*

Bogs and fens are of restricted distribution in Ontario south of the Canadian Shield (Riley 1989b) and in south-western Ontario, deep, extensive organic deposits are rare (Macdonald 1992). The larger sites, like the Wainfleet Bog are associated with rolling till and clay plain landforms. The Wainfleet Bog is a raised bog feature that formed in a shallow basin on the Haldimand Clay Plain, with the low Onondaga Escarpment at the southerly boundary. In contrast, most of the bogs in south-central and south-western Ontario are smaller features associated with kettle basins and valleys associated with various moraines.

Until the late 1930's, the Wainfleet Bog basin supported extensive low and tall shrub bog communities with local Black Spruce (*Picea mariana* R) and Tamarack (*Larix laricina* R) patches. Much of the peatland has since been extensively disturbed by peat extraction, drainage 'improvements' and agricultural activities; large areas have been invaded by European White Birch (*Betula pendula*) and Trembling Aspen (*Populus tremuloides*). The best remaining components, including Macdonald's (1992) "Open Low Shrub Bog" and "Open Tall Shrub Bog" are encompassed within the Wainfleet Bog ANSI. In 1996, the Niagara Peninsula Conservation Authority (NPCA) purchased the 801 ha Wainfleet Bog Conservation Area. Since then, restoration efforts have been underway, aimed at restoring site hydrology and the dependent bog plant communities and wildlife, and controlling European White Birch and other successional tree species. Recent Beaver activity may also improve site hydrology by blocking drainage ditches and raising water levels. Numerous regionally rare plant species are known from the Wainfleet Bog; many are only known from this one site in the Niagara Region.

*Leatherleaf Shrub Bog Type (BOS1-1) S2S3?, Regionally Rare (Open Low Shrub Bog [Macdonald 1992])*

Larger patches of this bog type cover approximately 1.5 ha of the ANSI and this type more commonly forms a mosaic with the *Open Low Shrub Bog – Hummock Phase* and *Open Tall Shrub Bog* communities (described below). Tree cover is sparse, limited mainly to saplings of European White Birch. Shrubs form a carpet of normally tall shrubs, here only 30 cm tall, of Black Chokeberry (*Aronia melanocarpa* U) with less frequent Highbush Blueberry (*Vaccinium corymbosum*) and Mountain-holly (*Ilex mucronata* [*Nemopanthus mucronatus*] R). Low shrubs include Leatherleaf (*Chamaedaphne calyculata* R), Velvet-leaved Blueberry (*Vaccinium myrtilloides* R), Sheep-laurel (*Kalmia angustifolia* R), Labrador-tea (*Rhododendron groenlandicum* [*Ledum groenlandicum*] R) and others.

Groundcovers include Hair-cap Moss (*Polytrichum strictum*), sphagnum (*Sphagnum* spp.), Billing's Three-fruited Sedge (*Carex billingsii* R), Tawny Cotton-grass (*Eriophorum virginicum* R), Canada Blue-joint (*Calamagrostis canadensis*), Beaked Sedge (*Carex utriculata* R), Swamp Dewberry (*Rubus hispidus*), Small Cranberry (*Vaccinium oxycoccus* R) and Rough Goldenrod (*Solidago rugosa*).

Other regionally rare species listed by Macdonald (1992) from the "Open Low Shrub Bog" include Virginia Chain Fern (*Woodwardia virginica* R), Few-flowered Sedge (*Carex oligosperma* R), Nodding Cotton-grass (*Eriophorum viridi-carinatum* R), Bunch Cotton-grass (*Eriophorum vaginatum* ssp. *spissum* R) and Pitcher-plant (*Sarracenia purpurea* R).

*Leatherleaf Shrub Bog Type (BOS1-1) S2S3?, Regionally Rare (Open Low Shrub Bog – Hummock Phase [Macdonald 1992])*

This 'hummock phase' of the *Open Low Shrub Bog* was differentiated by Macdonald (1992) based on the presence of 0.5 to 1.0 m tall hummocks with well-defined channels in between them, covering some 3.5 ha of the ANSI. The tall shrub layer forms thickets on the mounds, providing structural support. Dominants are Highbush Blueberry (*Vaccinium corymbosum*), Mountain-holly (*Ilex mucronata* [*Nemopanthus mucronatus*] **R**) and European White Birch (*Betula pendula*) saplings. Low shrub cover is dominated by Leatherleaf (*Chamaedaphne calyculata* **R**) and Black Chokeberry (*Aronia melanocarpa* **U**), with Labrador-tea (*Rhododendron groenlandicum* [*Ledum groenlandicum*] **R**), Sheep-laurel (*Kalmia angustifolia* **R**), and occasional Bog-laurel (*Kalmia polifolia* **R**). Groundcovers include Hair-cap Moss (*Polytrichum strictum*), sphagnum (*Sphagnum* spp.) and lichens (*Cladonia* spp.). Typical bog plant species include Tawny Cotton-grass (*Eriophorum virginicum* **R**), Billing's Three-fruited Sedge (*Carex billingsii* **R**), Brownish Sedge (*Carex brunnescens* **U**), Round-leaved Sundew (*Drosera rotundifolia* **R**), Three-flowered False Solomon's-seal (*Maianthemum trifolium* **R**) and Small Cranberry (*Vaccinium oxycoccus* **R**).

*Highbush Blueberry Shrub Bog Type (BOS1-?) S2S3?, Regionally Rare (Open Tall Shrub Bog [Macdonald 1992])*

Now restricted to the ANSI, *Highbush Blueberry Shrub Bog Type* was formerly the main natural vegetation cover in the basin of the Wainfleet Bog. This is still the most extensive sparsely treed wetland community within the ANSI; Macdonald (1992) mapped 74 ha of this community type within the Wainfleet Bog. Tree cover is very open, with scattered 4 m to 8 m tall European White Birch (*Betula pendula*) and Trembling Aspen (*Populus tremuloides*). A mosaic pattern of tall and low bog shrubs occurs in this community. Black Chokeberry (*Aronia melanocarpa* **U**) and Highbush Blueberry (*Vaccinium corymbosum*) are the dominant tall shrubs, with Mountain-holly (*Ilex mucronata* [*Nemopanthus mucronatus*] **R**) which dominates localized areas. The low shrub layer is dominated by Leatherleaf (*Chamaedaphne calyculata* **R**), Sheep-laurel (*Kalmia angustifolia* **R**), Velvet-leaved Blueberry (*Vaccinium myrtilloides* **R**) and Labrador-tea (*Rhododendron groenlandicum* [*Ledum groenlandicum*] **R**).

The ground layer is very open to semi-open and dominated by a moss cover of Hair-cap Moss (*Polytrichum strictum*), sphagnum (*Sphagnum* spp.) and occasional lichens (*Cladonia* spp.). The main herbs are Eastern Bracken (*Pteridium aquilinum*), Tawny Cotton-grass (*Eriophorum virginicum* **R**), Woolly Bulrush (*Scirpus cyperinus*), Billing's Three-fruited Sedge (*Carex billingsii* **R**), Swamp Dewberry (*Rubus hispida*) and Rough Goldenrod (*Solidago rugosa*).

Other regionally rare species include Virginia Bartonian (*Bartonia virginica* **S2, R**), Bristly Raspberry (*Rubus setosus* **R**), Bristly Sarsaparilla (*Aralia hispida* **R**), Sheep-laurel (*Kalmia angustifolia* **R**), Few-flowered Sedge (*Carex oligosperma* **R**), Stunted Sedge (*Carex magellanica* ssp. *irrigua* **R**) and Bog-laurel (*Kalmia polifolia* **R**).

#### **7.4.14 MARSH**

*Mineral Meadow Marsh Ecosite (MAM2)*

*Prairie Slough Grass Mineral Meadow Marsh Type (MAM2-8) S3, Regionally Rare*

At the northwest tip of Navy Island, at the base of a bluff along the shoreline of the Niagara River, is a rare example of a Prairie Slough Grass Mineral Meadow Marsh on alluvial deposits. Prairie Slough Grass (*Spartina pectinata* **R**) dominates the meadow marsh, along with other graminoids such as Canada Blue-joint (*Calamagrostis canadensis*) and more occasionally Water Sedge (*Carex aquatilis* **R**). This community forms a narrow band of marsh along the waterline and river flats below the bluff; it extends out into the river to the contact line with a Three-square Mineral Shallow Marsh Type (MAS2-6). Other regionally rare/uncommon species include Hard-stemmed Bulrush (*Schoenoplectus acutus* [*Scirpus acutus*] **R**) and Virginia Mountain-mint (*Pycnanthemum virginianum* **U**). The Navy Island site (NF-06) was the only location for Prairie Slough Grass meadow marsh recorded during the NAI.

*Mineral Fen Meadow Marsh Ecosite (MAM5)*

*Mineral Fen Meadow Marsh Type (MAM5-1) Regionally Rare*

Riley et al. (1996) described a graminoid fen from the North Pelham Valley ANSI, on thin peats overlying calcareous gravels. This 'noteworthy graminoid fen' is dominated by Sterile Sedge (*Carex sterilis* **R**), Golden-fruit Sedge (*Carex aurea* **U**), and Bristle-stalked Sedge (*Carex leptalea* ssp. *leptalea* **R**) with scattered Inland Sedge (*Carex interior* **U**), Tall Meadow-rue (*Thalictrum pubescens*), Nodding Cotton-grass (*Eriophorum viridi-carinatum* **R**), Golden Ragwort (*Packera aurea* [*Senecio aureus*] **R**), Field Horsetail (*Equisetum arvense*), Marsh Violet (*Viola cucullata* **U**), Rough-leaved Goldenrod (*Solidago patula* **U**), and scattered Indian Paintbrush (*Castilleja coccinea* **R**). This seep is fringed with stunted Tamarack (*Larix laricina* **R**), and occasional Alder-leaved Buckthorn (*Rhamnus alnifolia* **U**), Spicebush (*Lindera benzoin*) and Black Chokeberry (*Aronia melanocarpa* **U**).

*Mineral Shallow Marsh Ecosite (MAS2)*

*Lizard's-tail - Arrow-arum Mineral Shallow Marsh Type (MAS2-?\*) S2?, Regionally Rare*

Narrow bands of mineral shallow marsh dominated by Lizard's-tail (*Saururus cernuus* **S3, R**) and Arrow Arum (*Peltandra virginica* **S2, R**) occur along the margins of the slow-moving Ussher's Creek, near its confluence with the Niagara River. Dense beds of the emergent Lizard's-tail line the shoreline, with robust colonies of Arrow Arum interspersed in pockets throughout the shallow marsh. Occasionally, low arching shrubs of Water-willow (*Decodon verticillatus* **R**) also occur, with tangles of Common Dodder (*Cuscuta gronovii*). Grading into the deeper water and mixed throughout are floating beds of Fragrant Water-lily (*Nymphaea odorata* **U**). The Lizard's-tail – Arrow Arum community grades into a submergent aquatic community dominated by Wild Celery (*Vallisneria americana* **U**) with occasional pondweeds (*Potamogeton* spp.). This community was only documented from Ussher's Creek in NAI study area NF-12.

*Organic Shallow Marsh Ecosite (MAS3)*

*Water Willow Organic Shallow Marsh Type (MAS3-12) Regionally Rare*

This community was documented from three patches within NAI study area NF-01, along Lyons Creek. Stems of Water-willow (*Decodon verticillatus* **R**) arch over the open water channel of the creek, strongly dominating the edge of the shallow marsh where it grades into open water. Common Duckweed (*Lemna minor*) is often the only associate with Water-willow. In another example of this rare community, Dotted Smartweed (*Persicaria punctata* [*Polygonum punctatum*]) and Water Smartweed (*Persicaria amphibia* [*Polygonum amphibium*] **U**) are codominant with Water-willow, and Giant Bur-reed (*Sparganium eurycarpum*) is an occasional associate. Other rare/uncommon species include Arrow Arum (*Peltandra virginica* **S2, R**), Mosquito Fern (*Azolla caroliniana* **S1?, R**) and Star Duckweed (*Lemna trisulca* **U**).

*Great Lakes Coastal Meadow Marsh Ecosite (MAM4)*  
*Graminoid Coastal Meadow Marsh Type (MAM4-1) S2, Regionally Rare*

Along the east shore of the Point Abino peninsula, on Abino Bay, there is a dynamic coastal meadow marsh which often changes structure and species composition from year to year due to shifting sands, fluctuating lake levels and ice scour. This coastal meadow marsh occupies the sand flats along the shoreline of Lake Erie.

The upland edge, adjacent to Point Abino Road, is marked by a thin band of Sandbar Willow (*Salix interior* [*Salix exigua*]) thicket. This grades into a rich open meadow marsh dominated by taller plants like Spotted Joe-pye-weed (*Eutrochium maculatum* var. *maculatum* [*Eupatorium maculatum*]), Canada Goldenrod (*Solidago canadensis*), Boneset (*Eupatorium perfoliatum*), Purple Loosestrife (*Lythrum salicaria*) and Canada Blue-joint (*Calamagrostis canadensis*). Abundant shorter plants include Sneezeweed (*Helenium autumnale* **R**), Silverweed (*Potentilla anserina*), Spotted Touch-me-not (*Impatiens capensis*), Cocklebur (*Xanthium strumarium*) and Wild Blue-flag (*Iris versicolor*). The meadow marsh grades into shallow water emergent marsh with Common Three-square (*Schoenoplectus pungens* [*Scirpus pungens*] **U**), Soft-stem Bulrush (*Schoenoplectus tabernaemontani* [*Scirpus validus*]), Soft Rush (*Juncus effusus*), Baltic Rush (*Juncus balticus* **U**), Flat-stemmed Pondweed (*Potamogeton zosteriformis* **R**), Bushy Naiad (*Najas flexilis* **R**) and European Water-milfoil (*Myriophyllum spicatum*) (Macdonald 1990). A narrow strip at the waterline is lined with Red-based Spike-rush (*Eleocharis erythropoda* **U**), Blunt Spike-rush (*Eleocharis obtusa*), Common Three-square, Baltic Rush, Marsh Yellow Cress (*Rorippa palustris* **U**) and Silverweed (*Potentilla anserina*). Other regionally rare/uncommon species include Ribbon-leaved Pondweed (*Potamogeton epihydrus* **R**), Narrow-leaved Waterplantain (*Alisma gramineum* **R**), Red-rooted Cyperus (*Cyperus erythrorhizos* **U**), Coarse Cyperus (*Cyperus odoratus* var. *engelmannii* **U**), Tuckerman's Witch Grass (*Panicum tuckermanii* **R**), Low Cyperus (*Cyperus diandrus* **R**), Spring Clearweed (*Pilea fontana* **U**), Olive-fruited Spike-rush (*Eleocharis flavescens* var. *olivacea* **R**), and Fragrant Cyperus (*Cyperus odoratus* var. *odoratus* **U**).

## 7.5 SUMMARY AND RECOMMENDATIONS

As described above, the natural heritage of the Niagara Region includes a diverse mix of rare Vegetation Types. Great Lakes shorelines (Lakes Erie and Ontario), talus slopes and cliffs along the Niagara Escarpment, alvars, prairies and bogs all support examples of provincially and regionally rare Vegetation Types occurring in the Niagara Region. They are of considerable conservation interest, often representing highly specialized habitats and the last remnants of formerly more widespread Vegetation Types.

The protection and conservation of rare plant communities as part of the Niagara Region's natural heritage requires:

- ongoing research and inventory efforts (e.g., further literature reviews, ELC mapping/descriptions, scoped/focused searches for particular types, etc.);
- planning tools to ensure protection (e.g., Official Plan policies, Provincial Policy Statement, etc.);
- management of plant communities on public land or in partnership with private landowners (e.g., prescribed burns, restoring site hydrology, forest management, restoration plantings, etc.);
- long term monitoring of protected sites (to provide feedback to management plans);

- private land stewardship and support programs (e.g., landowner contact, stewardship awards/recognition); and,
- programs to promote public awareness and encourage participation/support for conservation efforts.

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**Table 1: Summary of Significant Vegetation Types in the Niagara Region, Ontario**

ELC UNIT	ELC CODE	STATUS	OCCURRENCE SUMMARY
<b><u>TERRESTRIAL</u></b>			
<b>BEACH/BAR</b>	BB		
<i>Mineral Open Beach/Bar Ecosite</i>	BBO1		
Sea Rocket Sand Open Beach Type	BBO1-1	S2S3, RR	Lake Erie shoreline, including NAI study area PC-10.
<i>Bedrock Open Beach/Bar Ecosite</i>	BBO2		
Calcareous Open Bedrock Shoreline Type*	BBO2-?*	S3?, RR	Open bedrock shoreline occurs along the Lake Erie coast.
<i>Mineral Shrub Beach/Bar Ecosite</i>	BBS1		
Willow Gravel Shrub Beach Type	BBS1-2	RR	Scattered locations along the Lake Erie shoreline and on beach bars along the Lake Ontario shore.
<i>Mineral Treed Beach / Bar Ecosite</i>	BBT1		
Cottonwood Mineral Treed Shoreline Type**	SHTM1-1**	RR	Known from Lake Erie shoreline.
<b>SAND DUNE</b>	SD		
<i>Open Sand Dune Ecosite</i>	SDO1		
Beach Grass - Wormwood Open Graminoid Sand Dune Type**	SBOD1-4**	S2, RR	Known from the Lake Erie coast (NAI study area PC-04).
<i>Shrub Sand Dune Ecosite</i>	SDS1		
Hop-tree Shrub Dune Type	SDS1-2	S1, RR	Known from the Lake Erie coast (NAI study area PC-06).
<i>Treed Sand Dune Ecosite</i>	SDT1		
Cottonwood Treed Dune Type	SDT1-1	S1, RR	Known from the Lake Erie shoreline.
<b>CLIFF</b>	CL		
<i>Carbonate Open Cliff Ecosite</i>	CLO1		

ELC UNIT	ELC CODE	STATUS	OCCURRENCE SUMMARY
Cliffbrake – Lichen Carbonate Open Cliff Type	CLO1-1	S3, RR	Niagara Gorge, Niagara Glen, Fifteen and Sixteen Mile Valleys, Beamsville Escarpment and Niagara Section Escarpment ANSI (Riley et al. 1996).
Bulblet Fern - Herb Robert Carbonate Open Cliff Type	CLO1-2	S3, RR	Fairly common on cliffs along the Niagara Escarpment; reported from 8 ANSI (Riley et al. 1996). A small example occurs on a cliff face of the Onondaga Escarpment along the Ridge Road area in Fort Erie.
Moist Open Carbonate Cliff Seepage Type	CLO1-4	S3, RR	Niagara Gorge and Short Hills Provincial Park (Riley et al. 1996).
Open Carbonate Cliff Rim Type	CLO1-5	S2, RR	Niagara Gorge (Riley et al. 1996).
<i>Carbonate Treed Cliff Ecosite</i>	CLT1		
White Cedar Treed Carbonate Cliff Type	CLT1-1	S3, RR	Beamer Memorial Conservation Area (Riley et al. 1996).
<b>TALUS</b>	TA		
<i>Carbonate Open Talus Ecosite</i>	TAO1		
Dry – Fresh Carbonate Open Talus Type	TAO1-1	S2, RR	Niagara Gorge (Riley et al. 1996).
Fresh – Moist Carbonate Open Talus Type	TAO1-2	S2, RR	Niagara Gorge (Riley et al. 1996).
<i>Carbonate Shrub Talus Ecosite</i>	TAS1	S3	
Mountain Maple Carbonate Shrub Talus Type	TAS1-2	S3, RR	Homer Escarpment and Beamer Escarpment ANSI (Riley et al. 1996).
<i>Carbonate Treed Talus Ecosite</i>	TAT1		
Dry - Fresh Chinquapin Oak Carbonate Treed Talus Type	TAT1-1	S1S2?, RR	Niagara Gorge (Riley et al. 1996).
Dry – Fresh White Birch Carbonate Treed Talus Type	TAT1-3	S3, RR	Niagara Gorge and Niagara Section Escarpment ANSI (Riley et al. 1996).
Fresh - Moist Sugar Maple Carbonate Treed Talus Type	TAT1-4	S3	Common along the Niagara Escarpment (Riley et al. 1996); also occurs along the Onondaga Escarpment in Fort Erie.

ELC UNIT	ELC CODE	STATUS	OCCURRENCE SUMMARY
Fresh - Moist Basswood - White Ash Carbonate Treed Talus Type	TAT1-5	S2, RR	Niagara Gorge (Riley et al. 1996).
Fresh - Moist Hemlock - Sugar Maple Carbonate Treed Talus Type	TAT1-6	S2, RR	Niagara Gorge, Jordan Valley and Niagara Section Escarpment ANSI (Riley et al. 1996).
<b>ALVAR</b>	AL		
<i>Open Alvar Ecosite</i>	ALO1		
Dry Lichen – Moss Open Alvar Pavement Type	ALO1-1	S1, RR	Wainfleet (WF-22) and Fort Erie (FE-11); Point Abino.
<i>Treed Alvar Ecosite</i>	ALT1		
Red Cedar – False Pennyroyal Treed Alvar Type*	ALT1-?*	S2?, RR	East of Smithville, Lincoln (Colville Consulting 2006; Dougan and Associates 1999).
<b>CALCAREOUS SHALLOW SOIL SAVANNAH*</b>			
<i>Calcareous Shallow Soil Savannah Ecosite*</i>			
Dry Chinquapin Oak - Little Bluestem - Big Bluestem Calcareous Shallow Soil Savannah Type*		S1, RR	Rim of Niagara Gorge downstream of Niagara Falls (Bakowsky 2007); also at Louth Conservation Area in Lincoln.
<b>TALLGRASS PRAIRIE, SAVANNAH AND WOODLAND</b>	TP		
<i>Dry Tallgrass Prairie Ecosite</i>	TPO1		
Dry Tallgrass Prairie Type	TPO1-1	S1, RR	St. David's Buried Gorge; Lake Erie shore at Windmill Point and Erie Beach.
<b>FOREST</b>	FO		
<b>DECIDUOUS FOREST</b>	FOD		
<i>Calcareous Shallow Soil Deciduous Forest Ecosite**</i>	FODR1**		
Dry-Fresh Sugar Maple – Hardwood Calcareous Shallow Deciduous Forest **	FODR1-1**	RR	Common along the Niagara Escarpment; regionally rare on the Onondaga Escarpment. One NAI study site (WF-13); larger examples occur in Ridgeway on the Onondaga Escarpment.

ELC UNIT	ELC CODE	STATUS	OCCURRENCE SUMMARY
<i>Dry-Fresh Oak Deciduous Forest Type</i>	FOD1		
Dry-Fresh Black Oak Deciduous Forest Type	FOD1-3	S3, RR	Four NAI study areas: NL-01, PL-01, PL-02 and PL-03.
<i>Dry-Fresh Oak - Maple - Hickory Deciduous Forest Ecosite</i>	FOD2		
Dry - Fresh Oak - Hickory Deciduous Forest Type	FOD2-2	S3S4, RR	Three NAI study areas: NL-01, NL-12 and PL-07.
<i>Fresh-Moist Sugar Maple Deciduous Forest Ecosite</i>	FOD6		
Fresh - Moist Sugar Maple - Black Maple Deciduous Forest Type	FOD6-2	S3?, RR	Twelve Mile Creek Headwaters (PL-01), Short Hills Provincial Park (Gould 1989), Fifteen and Sixteen Mile Valleys and Jordan Valley ANSI (Riley et al. 1996).
<i>Fresh-Moist Lowland Deciduous Forest Ecosite</i>	FOD7		
Fresh - Moist Black Walnut Lowland Deciduous Forest Type	FOD7-4	S2S3, RR	Five NAI study areas: PL-01, PL-05, NF-23, WF-07 and WF-29.
Fresh - Moist Black Maple Lowland Deciduous Forest Type	FOD7-5	S3, RR	See notes for FOD6-2 above.
<i>Fresh-Moist Poplar-Sassafras Deciduous Forest Ecosite</i>	FOD8		
Fresh-Moist Sassafras Deciduous Forest Type	FOD8-2	S3, RR	Three NAI study areas: PL-01, PL-03 and NL-01.
<b><u>WETLAND</u></b>			
<b>SWAMP</b>	SW		
<b>CONIFEROUS SWAMP</b>	SWC		
<i>White Pine – Hemlock Mineral Coniferous Swamp Ecosite</i>	SWC2		
White Pine Mineral Coniferous Swamp Type	SWC2-1	RR	One NAI study area: PL-01.
<b>DECIDUOUS SWAMP</b>	SWD		
<i>Oak Mineral Deciduous Swamp Ecosite</i>	SWD1		
Swamp White Oak Mineral Deciduous Swamp Type	SWD1-1	S2S3	Seventeen patches at 14 NAI study areas.
Bur Oak Mineral Deciduous Swamp Type	SWD1-2	S3, RR	Three NAI study areas: PC-05, WF-22 and WL-08.

ELC UNIT	ELC CODE	STATUS	OCCURRENCE SUMMARY
Pin Oak Mineral Deciduous Swamp Type	SWD1-3	S2S3	Forty-two patches at 19 NAI study areas.
<b>THICKET SWAMP</b>	SWT		
<i>Mineral Thicket Swamp Ecosite</i>	SWT2		
Alder Mineral Thicket Swamp Type	SWT2-1	RR	Six patches at NAI study areas PL-01 and HAL-40.
Buttonbush Mineral Thicket Swamp Type	SWT2-4	S3	Seventy patches at 33 NAI study areas.
Silky Dogwood Mineral Thicket Swamp Type	SWT2-8	S3S4	Eighteen NAI study areas.
Grey Dogwood Mineral Thicket Swamp Type	SWT2-9	S3S4	Twenty-eight patches at 18 NAI study areas.
Southern Arrow-wood Mineral Thicket Swamp Type	SWT2-11	S3, RR	Point Abino (FE-11) and NAI study area WF-18.
Paw-paw Mineral Thicket Swamp Type	SWT2-12	S1, RR	Recorded historically from several sites along the Niagara River, below the Niagara Escarpment in Lincoln and elsewhere in Niagara Region, but recent records of Paw-paw are few.
<i>Organic Thicket Swamp Ecosite</i>	SWT3		
Alder Organic Thicket Swamp Type	SWT3-1	RR	Twenty-one patches at 7 NAI study areas: HAL-22, 24, 40, PL-01, WF-01, 02 and WF-25.
Buttonbush Organic Thicket Swamp Type	SWT3-4	S3	Twenty-one NAI study areas.
Winterberry Organic Thicket Swamp Type	SWT3-7	S3S4, RR	Five NAI study areas: HAL-23, 224, 28, 40 and WL-06.
Spicebush Organic Thicket Swamp Type	SWT3-11	S3, RR	Two NAI study areas: PL-01 and 04.
Poison Sumac Organic Thicket Swamp Type	SWT3-13	S3, RR	Six NAI study areas: HAL-24, 28, 40, WF-01, 29 and WL-06.
<b>BOG</b>	BO		
<i>Shrub Bog Ecosite (BOS1)</i>	BOS1		
Leatherleaf Shrub Bog Type	BOS1-1	S2S3?, RR	Wainfleet Bog (Macdonald 1992) in NAI study area WF-13.

ELC UNIT	ELC CODE	STATUS	OCCURRENCE SUMMARY
Highbush Blueberry Shrub Bog Type*	BOS1-?*	S2S3?, RR	Wainfleet Bog (Macdonald 1992) in NAI study area WF-13.
<b>MARSH</b>	MA		
<i>Mineral Meadow Marsh Ecosite</i>	MAM2		
Prairie Slough Grass Mineral Meadow Marsh Type	MAM2-8	S3, RR	Navy Island (NF-06).
<i>Great Lakes Coastal Meadow Marsh Ecosite</i>	MAM4		
Graminoid Coastal Meadow Marsh Type	MAM4-1	S2, RR	Point Abino on Lake Erie in NAI study area FE-11.
<i>Mineral Fen Meadow Marsh Ecosite</i>	MAM5		
Mineral Fen Meadow Marsh Type	MAM5-1	S3, RR	North Pelham Valley ANSI (Riley et al. 1996) in NAI study area PL-01.
<i>Mineral Shallow Marsh Ecosite</i>	MAS2		
Lizard's-tail - Arrow-arum Mineral Shallow Marsh*	MAS2-?*	S2? RR	Along Ussher's Creek in NAI study area NF-12.
<i>Organic Shallow Marsh Ecosite</i>	MAS3		
Water Willow Organic Shallow Marsh Type	MAS3-12	RR	Three patches along Lyons Creek in NAI study area NF-01.

ELC UNIT	ELC CODE	STATUS	OCCURRENCE SUMMARY
<p><b>ELC Ecosites and Vegetation Types:</b>  Plant community typology generally follows Lee et al. (1998). ‘New’ community types not listed in the ELC are denoted with a single-asterisk (*) under the ELC Unit and ELC Code columns. Plant community types listed in the subsequent <i>open document</i> draft version of ELC (Lee 2003), but not in Lee et al. (1998) are denoted with a double-asterisk (**)</p> <p><b>VEGETATION COMMUNITY STATUS (ONTARIO AND NIAGARA REGION)</b></p> <p>S-ranks for imperilled and vulnerable plant community types (i.e. S1, S2 and S3) are listed under the “Status” column (from Bakowsky 1996 or Bakowsky pers. comm.).</p> <p><u>Ontario Rank (S-rank):</u></p> <p><b>S1 = Critically Imperilled:</b> Critically imperilled in Ontario because of extreme rarity (often 5 or fewer occurrences) or because of some factor(s) such as very steep declines making it especially vulnerable to extirpation from the province.</p> <p><b>S2 = Imperilled:</b> Imperilled in Ontario because of rarity due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors making it very vulnerable to extirpation from the province.</p> <p><b>S3 = Vulnerable:</b> Vulnerable in Ontario due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors making it vulnerable to extirpation.</p> <p><b>S4 = Apparently Secure:</b> Uncommon but not rare; some cause for long-term concern due to declines or other factors.</p> <p><b>S5 = Secure:</b> Common, widespread, and abundant in Ontario.</p> <p><u>Niagara Region Status – Vegetation Communities</u></p> <p><b>RR = Regionally Rare:</b> Vegetation communities (ELC Ecosite or Vegetation Type) known from 10 or fewer sites in Niagara Region (based on NAI database and partial literature review).</p>			



**TABLE 2: PLANT COMMUNITY SUMMARY (ELC ECOSITES AND VEGETATION TYPES)  
REGIONAL MUNICIPALITY OF NIAGARA, ONTARIO**

<b>NESTED ELC COMMUNITY UNITS</b>	<b>CODE</b>
<b><u>TERRESTRIAL</u></b>	
<b>BEACH / BAR</b>	BB
<i>Mineral Open Beach / Bar Ecosite</i>	BBO1
Sea Rocket Sand Open Beach Type	BBO1-1
<i>Bedrock Open Beach / Bar Ecosite</i>	BBO2
Calcareous Open Bedrock Shoreline Type*	BBO2-?*
<i>Mineral Shrub Beach / Bar Ecosite</i>	BBS1
Willow Gravel Shrub Beach Type	BBS1-2
<i>Mineral Treed Beach / Bar Ecosite</i>	BBT1
Cottonwood Mineral Treed Shoreline Type**	SHTM1-1**
<i>Bedrock Treed Beach / Bar Ecosite</i>	BBT2
<b>SAND DUNE</b>	SD
<i>Open Sand Dune Ecosite</i>	SDO1
Beachgrass – Wormwood Open Graminoid Sand Dune Type**	SBOD1-4**
<i>Shrub Sand Dune Ecosite</i>	SDS1
Hop-tree Shrub Dune Type	SDS1-2
<i>Treed Sand Dune Ecosite</i>	SDT1
Cottonwood Treed Dune Type	SDT1-1
<b>BLUFF</b>	BL
<i>Mineral Shrub Bluff Ecosite</i>	BLS1
Raspberry Low Shrub Bluff Type**	BLSM1-5**
<b>CLIFF</b>	CL
<i>Carbonate Open Cliff Ecosite</i>	CLO1
Cliffbrake – Lichen Carbonate Open Cliff Type	CLO1-1
Bulblet Fern - Herb Robert Carbonate Open Cliff Type	CLO1-2
Moist Open Carbonate Cliff Seepage Type	CLO1-4
Open Carbonate Cliff Rim Type	CLO1-5

<b>NESTED ELC COMMUNITY UNITS</b>	<b>CODE</b>
<i>Carbonate Treed Cliff Ecosite</i>	CLT1
White Cedar Treed Carbonate Cliff Type	CLT1-1
<b>TALUS</b>	TA
<i>Carbonate Open Talus Ecosite</i>	TAO1
Dry-Fresh Carbonate Open Talus Type	TAO1-1
Fresh-Moist Carbonate Open Talus Type	TAO1-2
<i>Carbonate Shrub Talus Ecosite</i>	TAS1
Mountain Maple Carbonate Shrub Talus Type	TAS1-2
<i>Carbonate Treed Talus Ecosite</i>	TAT1
Dry-Fresh Chinquapin Oak Carbonate Treed Talus Type	TAT1-1
Dry-Fresh White Birch Carbonate Treed Talus Type	TAT1-3
Fresh-Moist Sugar Maple Carbonate Treed Talus Type	TAT1-4
Fresh-Moist Basswood - White Ash Carbonate Treed Talus Type	TAT1-5
Fresh-Moist Hemlock - Sugar Maple Carbonate Treed Talus Type	TAT1-6
<b>CREVICE AND CAVE</b>	CC
<i>Carbonate Crevice Ecosite**</i>	CCR1**
<i>Carbonate Cave Ecosite**</i>	CCA1**
<b>ALVAR</b>	AL
<i>Open Alvar Ecosite</i>	ALO1
Dry Lichen - Moss Open Alvar Pavement Type	ALO1-1
<i>Treed Alvar Ecosite</i>	ALT1
Red Cedar – False Pennyroyal Treed Alvar Type*	ALT1-?*
<b>CALCAREOUS SHALLOW SOIL SAVANNAH*</b>	
<i>Calcareous Shallow Soil Savannah Type*</i>	
Dry Chinquapin Oak – Little Bluestem – Big Bluestem Calcareous Shallow Soil Savannah Type*	
<b>TALLGRASS PRAIRIE, SAVANNAH AND WOODLAND</b>	TP
<i>Dry Tallgrass Prairie Ecosite</i>	TPO1
Dry Tallgrass Prairie Type	TPO1-1

<b>NESTED ELC COMMUNITY UNITS</b>	<b>CODE</b>
<b>FOREST</b>	FO
<b>CONIFEROUS FOREST</b>	FOC
<i>Fresh-Moist Hemlock Coniferous Forest Ecosite</i>	FOC3
Fresh-Moist Hemlock Coniferous Forest Type	FOC3-1
Fresh-Moist Hemlock – White Pine Coniferous Forest Type**	FOCM3-2**
<i>Naturalized Coniferous Plantation Ecosite**</i>	FOCM6**
Dry - Fresh White Pine Naturalized Coniferous Plantation Type**	FOCM6-1**
Dry - Fresh Red Pine Naturalized Coniferous Plantation Type**	FOCM6-2**
Dry – Fresh Scotch Pine Naturalized Coniferous Plantation Type**	FOCM6-3**
<b>MIXED FOREST</b>	FOM
<i>Dry-Fresh Hardwood - Hemlock Mixed Forest Ecosite</i>	FOM3
Dry-Fresh Hardwood - Hemlock Mixed Forest Type	FOM3-1
Dry-Fresh Sugar Maple - Hemlock Mixed Forest Type	FOM3-2
Dry-Fresh Hemlock – White Pine Mixed Forest Type**	FOMM3-3**
<i>Fresh-Moist Sugar Maple - Hemlock Mixed Forest Ecosite</i>	FOM6
Fresh-Moist Sugar Maple - Hemlock Mixed Forest Type	FOM6-1
Fresh-Moist Hemlock – Hardwood Mixed Forest Type	FOM6-2
<i>Fresh-Moist Poplar – White Birch Mixed Forest Ecosite</i>	FOM8
Fresh-Moist White Birch Mixed Forest Type	FOM8-2
<i>Fresh-Moist White Pine – Hardwood Mixed Forest Ecosite**</i>	FOMM9**
Fresh-Moist White Pine - Sugar Maple Mixed Forest Type**	FOMM9-1**
<b>DECIDUOUS FOREST</b>	FOD
<i>Dry-Fresh Sugar Maple – Hardwood Calcareous Shallow Deciduous Forest Ecosite**</i>	FODR1**
Dry-Fresh Sugar Maple – Hardwood Calcareous Shallow Deciduous Forest Type**	FODR1-1**
<i>Dry-Fresh Oak Deciduous Forest Ecosite</i>	FOD1
Dry-Fresh Red Oak Deciduous Forest Type	FOD1-1
Dry-Fresh White Oak Deciduous Forest Type	FOD1-2
Dry-Fresh Black Oak Deciduous Forest Type	FOD1-3

<b>NESTED ELC COMMUNITY UNITS</b>	<b>CODE</b>
<i>Dry-Fresh Oak - Maple - Hickory Deciduous Forest Ecosite</i>	FOD2
Dry-Fresh Oak - Red Maple Deciduous Forest Type	FOD2-1
Dry-Fresh Oak - Hickory Deciduous Forest Type	FOD2-2
Dry-Fresh Oak - Hardwood Deciduous Forest Type	FOD2-4
<i>Dry-Fresh Poplar-White Birch Deciduous Forest Ecosite</i>	FOD3
Dry-Fresh Poplar Deciduous Forest Type	FOD3-1
Dry-Fresh White Birch Deciduous Forest Type	FOD3-2
<i>Dry-Fresh Deciduous Forest Ecosite</i>	FOD4
Dry-Fresh Beech Deciduous Forest Type	FOD4-1
Dry-Fresh White Ash Deciduous Forest Type	FOD4-2
Dry - Fresh Ironwood Deciduous Forest Type**	FODM4-4**
Dry - Fresh Manitoba Maple Deciduous Forest Type**	FODM4-5**
Dry - Fresh Norway Maple Deciduous Forest Type**	FODM4-6**
Dry - Fresh Red Maple Deciduous Forest Type**	FODM4-7**
Dry - Fresh Black Cherry Deciduous Forest Type**	FODM4-8**
Dry - Fresh Hawthorn - Apple Deciduous Forest Type**	FODM4-10**
Dry - Fresh Black Locust Deciduous Forest Type**	FODM4-11**
Dry - Fresh Exotic Deciduous Forest Type**	FODM4-12**
<i>Dry-Fresh Sugar Maple Deciduous Forest Ecosite</i>	FOD5
Dry-Fresh Sugar Maple Deciduous Forest Type	FOD5-1
Dry-Fresh Sugar Maple - Beech Deciduous Forest Type	FOD5-2
Dry-Fresh Sugar Maple - Oak Deciduous Forest Type	FOD5-3
Dry-Fresh Sugar Maple - Ironwood Deciduous Forest Type	FOD5-4
Dry-Fresh Sugar Maple - Hickory Deciduous Forest Type	FOD5-5
Dry-Fresh Sugar Maple - Basswood Deciduous Forest Type	FOD5-6
Dry-Fresh Sugar Maple - White Ash Deciduous Forest Type	FOD5-8
Dry-Fresh Sugar Maple - Red Maple Deciduous Forest Type	FOD5-9
Dry-Fresh Sugar Maple – Hardwood Deciduous Forest Type**	FODM5-11**
<i>Fresh-Moist Sugar Maple Deciduous Forest Ecosite</i>	FOD6

<b>NESTED ELC COMMUNITY UNITS</b>	<b>CODE</b>
Fresh-Moist Sugar Maple - Lowland Ash Deciduous Forest Type	FOD6-1
Fresh-Moist Sugar Maple - Black Maple Deciduous Forest Type	FOD6-2
Fresh-Moist Sugar Maple – Yellow Birch Deciduous Forest Type	FOD6-3
Fresh-Moist Sugar Maple - Hardwood Deciduous Forest Type	FOD6-5
<i>Fresh-Moist Lowland Deciduous Forest Ecosite</i>	FOD7
Fresh-Moist White Elm Lowland Deciduous Forest Type	FOD7-1
Fresh-Moist Ash Lowland Deciduous Forest Type	FOD7-2
Fresh-Moist Willow Lowland Deciduous Forest Type	FOD7-3
Fresh-Moist Black Walnut Lowland Deciduous Forest Type	FOD7-4
Fresh-Moist Black Maple Lowland Deciduous Forest Type	FOD7-5
Fresh-Moist Manitoba Maple Lowland Deciduous Forest Type**	FODM7-7**
Fresh-Moist Exotic Lowland Deciduous Forest Type**	FODM7-9**
<i>Fresh-Moist Poplar Deciduous Forest Ecosite</i>	FOD8
Fresh-Moist Poplar Deciduous Forest Type	FOD8-1
Fresh-Moist Sassafras Deciduous Forest Type	FOD8-2
Fresh-Moist Cottonwood Deciduous Forest Type**	FODM8-3**
<i>Fresh-Moist Oak - Maple - Hickory Deciduous Forest Ecosite</i>	FOD9
Fresh-Moist Oak - Sugar Maple Deciduous Forest Type	FOD9-1
Fresh-Moist Oak - Maple Deciduous Forest Type	FOD9-2
Fresh-Moist Shagbark Hickory Deciduous Forest Type	FOD9-4
Fresh-Moist Bitternut Hickory Deciduous Forest Type	FOD9-5
Fresh-Moist Oak – Hardwood Deciduous Forest Type**	FODM9-6**
<i>Fresh-Moist Carolinian Deciduous Forest Ecosite</i>	FODM10**
Fresh - Moist Sugar Maple - Beech Carolinian Deciduous Forest Type**	FODM10-1**
Fresh - Moist Oak Carolinian Deciduous Forest Type**	FODM10-2**
<i>Naturalized Deciduous Plantation Ecosite**</i>	FODM12**
<b>CULTURAL</b>	CU
<b>PLANTATION</b>	CUP
<i>Deciduous Plantation</i>	CUP1

<b>NESTED ELC COMMUNITY UNITS</b>	<b>CODE</b>
Black Walnut Deciduous Plantation Type	CUP1-3
Green Ash Deciduous Plantation Type	CUP1-7
<i>Mixed Plantation</i>	CUP2
Black Walnut – White Pine Mixed Plantation Type	CUP2-1
<i>Coniferous Plantation</i>	CUP3
Red Pine Coniferous Plantation Type	CUP3-1
White Pine Coniferous Plantation Type	CUP3-2
Scots Pine Coniferous Plantation Type	CUP3-3
European Larch Coniferous Plantation Type	CUP3-6
White Spruce - European Larch Coniferous Plantation Type	CUP3-8
Norway Spruce – European Larch Coniferous Plantation Type	CUP3-9
<b>HEDGEROW</b>	
<i>Naturalized Coniferous Hedgerow Ecosite**</i>	FOCM5**
<i>Naturalized Deciduous Hedgerow Ecosite**</i>	FODM11**
<b>CULTURAL MEADOW</b>	CUM
<i>Mineral Cultural Meadow Ecosite</i>	CUM1
Dry-Moist Old Field Meadow Type	CUM1-1
Poverty Oat Grass Graminoid Meadow Type**	MEGM3-1**
Kentucky Blue Grass Graminoid Meadow Type**	MEGM3-4**
Orchard Grass Graminoid Meadow Type**	MEGM3-6**
Timothy Grass Graminoid Meadow Type**	MEGM3-7**
Reed Canary Grass Graminoid Meadow Type**	MEGM3-8**
Fresh - Moist Open Graminoid Meadow Type**	MEGM4-1**
Goldenrod Forb Meadow Type**	MEFM1-1**
Aster Forb Meadow Type**	MEFM1-2**
<i>Fresh – Moist Open Forb Meadow Ecosite**</i>	MEFM4**
<i>Fresh – Moist Mixed Meadow Ecosite**</i>	MEMM4**
<i>Bedrock Cultural Meadow Ecosite</i>	CUM2
<b>CULTURAL THICKET</b>	CUT

<b>NESTED ELC COMMUNITY UNITS</b>	<b>CODE</b>
<i>Mineral Cultural Thicket Ecosite</i>	CUT1
Sumac Cultural Thicket Type	CUT1-1
Gray Dogwood Cultural Thicket Type	CUT1-4
Raspberry Cultural Thicket Type	CUT1-5
Buckthorn Deciduous Shrub Thicket Type**	THDM2-6**
Hawthorn Deciduous Shrub Thicket Type**	THDM2-11**
Native Shrub Deciduous Hedgerow Thicket Type**	THDM3-2**
Native Deciduous Regeneration Thicket Type**	THDM4-1**
Fresh – Moist Gray Dogwood Deciduous Thicket Type**	THDM5-1**
<i>Bedrock Cultural Thicket Ecosite</i>	CUT2
<b>CULTURAL SAVANNAH</b>	CUS
<i>Mineral Cultural Savannah Ecosite</i>	CUS1
Hawthorn Cultural Savannah Type	CUS1-1
Fresh – Moist Willow Deciduous Savannah Type**	SVDM4-1**
<i>Bedrock Cultural Savannah Ecosite</i>	CUS2
<b>CULTURAL WOODLAND</b>	CUW
<i>Mineral Cultural Woodland Ecosite</i>	CUW1
Dry – Fresh Hawthorn / Apple Deciduous Woodland Type**	WODM4-1**
Dry – Fresh White Ash Deciduous Woodland Type**	WODM4-2**
Dry – Fresh Black Walnut Deciduous Woodland Type**	WODM4-4**
Fresh – Moist Elm Deciduous Woodland Type**	WODM5-2**
Fresh – Moist Hawthorn / Apple Deciduous Woodland Type**	WODM5-4**
<i>Bedrock Cultural Woodland Ecosite</i>	CUW2
<b><u>WETLAND</u></b>	
<b>SWAMP</b>	SW
<b>CONIFEROUS SWAMP</b>	SWC
<i>White Pine - Hemlock Mineral Coniferous Swamp Ecosite</i>	SWC2
White Pine Mineral Coniferous Swamp Type	SWC2-1
Hemlock Mineral Coniferous Swamp Type	SWC2-2

<b>NESTED ELC COMMUNITY UNITS</b>	<b>CODE</b>
<b>MIXED SWAMP</b>	SWM
<i>Birch - Poplar Mineral Mixed Swamp Ecosite</i>	SWM3
Yellow Birch – Conifer Mineral Mixed Swamp	SWM3-1
<i>Birch - Poplar Organic Mixed Swamp Ecosite</i>	SWM6
Yellow Birch – Conifer Organic Mixed Swamp	SWM6-1
Hemlock – Hardwood Organic Mixed Swamp Type**	SWMO4-2**
<b>DECIDUOUS SWAMP</b>	SWD
<i>Oak Mineral Deciduous Swamp Ecosite</i>	SWD1
Swamp White Oak Mineral Deciduous Swamp Type	SWD1-1
Bur Oak Mineral Deciduous Swamp Type	SWD1-2
Pin Oak Mineral Deciduous Swamp Type	SWD1-3
<i>Ash Mineral Deciduous Swamp Ecosite</i>	SWD2
Black Ash Mineral Deciduous Swamp Type	SWD2-1
Green Ash Mineral Deciduous Swamp Type	SWD2-2
<i>Maple Mineral Deciduous Swamp Ecosite</i>	SWD3
Red Maple Mineral Deciduous Swamp Type	SWD3-1
Silver Maple Mineral Deciduous Swamp Type	SWD3-2
Swamp Maple Mineral Deciduous Swamp Type	SWD3-3
Manitoba Maple Mineral Deciduous Swamp Type	SWD3-4
<i>Mineral Deciduous Swamp Ecosite</i>	SWD4
Willow Mineral Deciduous Swamp Type	SWD4-1
White Elm Mineral Deciduous Swamp Type	SWD4-2
Yellow Birch Mineral Deciduous Swamp Type	SWD4-4
Poplar Mineral Deciduous Swamp Type**	SWDM4-5**
White Birch – Cottonwood Deciduous Swamp Type**	SWDM4-6**
<i>Ash Organic Deciduous Swamp Ecosite</i>	SWD5
Green Ash Organic Deciduous Swamp Type**	SWDO1-2**
<i>Maple Organic Deciduous Swamp Ecosite</i>	SWD6
Red Maple Organic Deciduous Swamp Type	SWD6-1

<b>NESTED ELC COMMUNITY UNITS</b>	<b>CODE</b>
Silver Maple Organic Deciduous Swamp Type	SWD6-2
Swamp Maple Organic Deciduous Swamp Type	SWD6-3
<i>Birch - Poplar Organic Deciduous Swamp Ecosite</i>	SWD7
Yellow Birch Organic Deciduous Swamp Type	SWD7-2
Trembling Aspen Organic Swamp Type**	SWDO3-3**
<b>THICKET SWAMP</b>	SWT
<i>Mineral Thicket Swamp Ecosite</i>	SWT2
Alder Mineral Thicket Swamp Type	SWT2-1
Willow Mineral Thicket Swamp Type	SWT2-2
Buttonbush Mineral Thicket Swamp Type	SWT2-4
Meadowsweet Mineral Thicket Swamp Type	SWT2-6
Silky Dogwood Mineral Thicket Swamp Type	SWT2-8
Grey Dogwood Mineral Thicket Swamp Type	SWT2-9
Southern Arrow-wood Mineral Thicket Swamp Type	SWT2-11
Paw-paw Mineral Thicket Swamp Type	SWT2-12
European Alder Mineral Deciduous Thicket Swamp Type**	SWTM1-2**
Missouri Willow Mineral Deciduous Thicket Swamp Type**	SWTM3-1**
Bebb's Willow Mineral Deciduous Thicket Swamp Type**	SWTM3-2**
Winterberry Mineral Deciduous Thicket Swamp Type**	SWTM5-6**
Non-native Mineral Deciduous Thicket Swamp Type**	SWTM5-8**
<i>Organic Thicket Swamp Ecosite</i>	SWT3
Alder Organic Thicket Swamp Type	SWT3-1
Willow Organic Thicket Swamp Type	SWT3-2
Buttonbush Organic Thicket Swamp Type	SWT3-4
Red-osier Organic Thicket Swamp Type	SWT3-5
Winterberry Organic Thicket Swamp Type	SWT3-7
Spicebush Organic Thicket Swamp Type	SWT3-11
Poison Sumac Organic Thicket Swamp Type	SWT3-13
Bebb's Willow Organic Deciduous Thicket Swamp Type**	SWTO2-2**

<b>NESTED ELC COMMUNITY UNITS</b>	<b>CODE</b>
Silky Dogwood Organic Thicket Deciduous Swamp Type**	SWTO4-3**
Meadowsweet Organic Thicket Deciduous Swamp Type**	SWTO5-11**
<b>BOG</b>	BO
<i>Shrub Bog Ecosite</i>	BOS1
Leatherleaf Shrub Bog Type	BOS1-1
Highbush Blueberry Shrub Bog Type*	BOS1-?*
<b>MARSH</b>	MA
<b>MEADOW MARSH</b>	MAM
<i>Bedrock Meadow Marsh Ecosite</i>	MAM1
Reed-canary Grass Bedrock Meadow Marsh Type	MAM1-1
<i>Mineral Meadow Marsh Ecosite</i>	MAM2
Bluejoint Mineral Meadow Marsh Type	MAM2-1
Reed-canary Grass Mineral Meadow Marsh Type	MAM2-2
Red-top Mineral Meadow Marsh Type	MAM2-3
Fowl Manna Grass Mineral Meadow Marsh Type	MAM2-4
Narrow-leaved Sedge Mineral Meadow Marsh Type	MAM2-5
Prairie Slough Grass Mineral Meadow Marsh Type	MAM2-8
Jewelweed Mineral Meadow Marsh Type	MAM2-9
Forb Mineral Meadow Marsh Type	MAM2-10
Cattail Graminoid Mineral Meadow Marsh Type**	MAMM1-2**
Creeping Bent Grass Graminoid Mineral Meadow Marsh Type**	MAMM1-8**
Common Reed Graminoid Mineral Meadow Marsh Type**	MAMM1-12**
Rush Graminoid Mineral Meadow Marsh Type**	MAMM1-13**
Rice Cut-grass Graminoid Mineral Meadow Marsh Type**	MAMM1-14**
Bulrush Graminoid Mineral Meadow Marsh Type**	MAMM1-15**
Mixed Graminoid Mineral Meadow Marsh Type**	MAMM1-16**
Panicled Aster Mineral Meadow Marsh Type**	MAMM2-2**
Purple-stemmed Aster Mineral Meadow Marsh Type**	MAMM2-3**
Joe Pye Weed Forb Mineral Meadow Marsh Type**	MAMM2-6**

<b>NESTED ELC COMMUNITY UNITS</b>	<b>CODE</b>
Mixed Mineral Meadow Marsh Type**	MAMM3-1**
<i>Organic Meadow Marsh Ecosite</i>	MAM3
Rice Cut-grass Organic Meadow Marsh Type	MAM3-3
Narrow-leaved Sedge Organic Meadow Marsh Type	MAM3-5
Jewelweed Organic Meadow Marsh Type	MAM3-8
Forb Organic Meadow Marsh Type	MAM3-9
Joe-pye-weed Forb Organic Meadow Marsh Type**	MAMO2-2**
<i>Great Lakes Coastal Meadow Marsh Ecosite</i>	MAM4
Graminoid Coastal Meadow Marsh Type	MAM4-1
<i>Mineral Fen Meadow Marsh Ecosite</i>	MAM5
Mineral Fen Meadow Marsh Type	MAM5-1
<b>SHALLOW MARSH</b>	MAS
<i>Bedrock Shallow Marsh Ecosite</i>	MAS1
Graminoid Bedrock Shallow Marsh Type**	MASR1-1**
<i>Mineral Shallow Marsh Ecosite</i>	MAS2
Cattail Mineral Shallow Marsh Type	MAS2-1
Bulrush Mineral Shallow Marsh Type	MAS2-2
Narrow-leaved Sedge Mineral Shallow Marsh Type	MAS2-3
Broad-leaved Sedge Mineral Shallow Marsh Type	MAS2-4
Three-square Mineral Shallow Marsh Type	MAS2-6
Bur-reed Mineral Shallow Marsh Type	MAS2-7
Rice Cut-grass Mineral Shallow Marsh Type	MAS2-8
Forb Mineral Shallow Marsh Type	MAS2-9
Lizard's-tail – Arrow-arum Mineral Shallow Marsh Type*	MAS2-?*
Canada Blue-joint Graminoid Mineral Shallow Marsh Type**	MASM1-9**
Spike Rush Mineral Shallow Marsh Type**	MASM1-11**
Common Reed Mineral Shallow Marsh Type**	MASM1-12**
Reed Canary Grass Mineral Shallow Marsh Type**	MASM1-14**
Manna Grass Mineral Shallow Marsh Type**	MASM1-17**

<b>NESTED ELC COMMUNITY UNITS</b>	<b>CODE</b>
Beggar-ticks Mineral Shallow Marsh Type**	MASM2-2**
Arrow-head Mineral Shallow Marsh Type**	MASM2-3**
Purple Loosestrife Mineral Shallow Marsh Type**	MASM2-4**
<i>Organic Shallow Marsh Ecosite</i>	MAS3
Cattail Organic Shallow Marsh Type	MAS3-1
Bulrush Organic Shallow Marsh Type	MAS3-2
Broad-leaved Sedge Organic Shallow Marsh Type	MAS3-4
Spike Rush Organic Shallow Marsh Type	MAS3-6
Bur-reed Organic Shallow Marsh Type	MAS3-7
Rice Cut-grass Organic Shallow Marsh Type	MAS3-8
Forb Organic Shallow Marsh Type	MAS3-10
Water Willow Organic Shallow Marsh Type	MAS3-12
Canada Blue-joint Graminoid Organic Shallow Marsh Type**	MASO1-3**
Reed Canary Grass Organic Shallow Marsh Type**	MASO1-4**
Beggar-ticks Organic Shallow Marsh Type**	MASO2-4**
Water-parsnip Organic Shallow Marsh Type**	MASO2-5**
Smartweed Organic Shallow Marsh Type**	MASO2-6**
<b>OPEN WATER</b>	OA
<b>OPEN AQUATIC</b>	OA0
<b>SHALLOW WATER</b>	SA
<b>SUBMERGED SHALLOW AQUATIC</b>	SAS
<i>Submerged Shallow Aquatic Ecosite</i>	SAS1
Pondweed Submerged Shallow Aquatic Type	SAS1-1
Waterweed Submerged Shallow Aquatic Type	SAS1-2
Stonewort Submerged Shallow Aquatic Type	SAS1-3
Water Milfoil Submerged Shallow Aquatic Type	SAS1-4
Wild Celery Submerged Shallow Aquatic Type	SAS1-5
<b>MIXED SHALLOW AQUATIC</b>	SAM
<i>Mixed Shallow Aquatic Ecosite</i>	SAM1

<b>NESTED ELC COMMUNITY UNITS</b>	<b>CODE</b>
Duckweed Mixed Shallow Aquatic Type	SAM1-2
Pondweed Mixed Shallow Aquatic Type	SAM1-4
Bladderwort Mixed Shallow Aquatic Type	SAM1-6
Water Milfoil Mixed Shallow Aquatic Type	SAM1-7
Water Lily – Bullhead Lily Mixed Shallow Aquatic Type**	SAM1-8**
<b>FLOATING-LEAVED SHALLOW AQUATIC</b>	SAF
<i>Floating-leaved Shallow Aquatic Ecosite</i>	SAF1
Water Lily - Bullhead Lily Floating-leaved Shallow Aquatic Type	SAF1-1
Duckweed Floating-leaved Shallow Aquatic Type	SAF1-3
Pondweed Floating-leaved Shallow Aquatic**	SAF1-4**
<p><b>Notes:</b></p> <p>* 'New' ELC vegetation type – not listed in Lee et al. (1996) or more recent ELC <i>open document</i> (Lee 2003).</p> <p>** Not listed in ELC manual (Lee et al. 1996); listed in more recent ELC <i>open document</i> (Lee 2003).</p>	