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The Vascular Flora of Akimiski Island, Nunavut Territory

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The James Bay region is floristically little known. In this paper, we substantially expand and revise the flora of the largest of the James Bay islands: Akimiski Island, Nunavut Territory. We have added 73 taxa in 32 families, for a total of 273 native taxa and 5 exotics. In addition, we have updated taxonomy and have provided information on rarity. A large fraction of the plants on Akimiski are classed as uncommon or rare in Ontario; in many cases, these represent either coastal species, or species near their geographic range limits. Some may be threatened by climate change and habitat degradation.

Key words: Akimiski Island, Biodiversity, Flora, Global Change, James Bay, Nunavut, Lesser Snow Geese
**Introduction**

Little detailed floristic information exists describing the coastal Hudson Bay Lowlands. Most of this region lies north or west of the area considered by the major eastern North American vascular floras (Gleason 1952; Fernald 1970; Gleason and Cronquist 1991; Marie-Victorin 1995), and south or east of the area primarily covered by Porsild and Cody (1980). The problem is acute for the Ontario coast and adjacent areas. The only flora to cover this region is Scoggan (1978), which contains little local detail. The lists of Morton and Venn (1990) and Newmaster et al. (1998) do include records from this region, but contain little or no information on geographic distributions, while Argus et al. (1982-1987) and Oldham (1999) include some distributional information but are solely concerned with rare species. The most detailed floristic publications specifically devoted to the James Bay region are Dutilly et al. (1958) and Riley and McKay (1980); more complete lists of Hudson Bay Lowlands plants with distributional maps also have been compiled by Riley (1980).

James Bay and Hudson Bay together represent a biogeographic region very distinct from the remainder of North America. Their low-latitude seacoasts are unique within the centre of the continent, and are isolated from the Hudson Strait, their connection to the Atlantic, by more than 10 degrees of latitude. Because climate zones dip south around Hudson Bay, this region contains habitats and species typical of much higher latitudes; for example, one of the southernmost mainland areas of sea-level tundra in the northern hemisphere is located on Cape Henrietta Maria, at the junction of James Bay and Hudson Bay. The paucity of published floristic information for this region not only represents a gap in our knowledge of North America's ecosystems, but also may hamper efforts to predict future threats to the biodiversity of the Hudson Bay Lowlands.
In this paper, we focus on the vascular plants of a single location: Akimiski Island, Nunavut Territory (including associated islets and shoals). This flora previously has been described by Riley (1981); we hope that our additions and revisions will make this one of the most complete floras for this region. Our work is significant not only because it adds substantially to existing knowledge, but also because the limited area and isolation of offshore islands limits rates of colonization and increases the risk of extinctions (e.g., MacArthur and Wilson 1967; Brown 1995). Our paper constitutes a record of current floristic diversity on this island, but this flora is likely to change substantially in future; we intend to create a record so that species lost or added in response to environmental changes may be recognized.

Methods

Study Site

Akimiski Island (53°N; 81°W; 2300km²) is the largest island in James Bay. It is separated from the Ontario mainland by the Akimiski Strait, which is about 20km wide, but contains numerous shoals (Riley 1981; Martini 1984). The island is and its flora are geologically very young, having been exposed by the recession of the Tyrrell Sea about 3500-4000 years ago (Martini and Glooschenko 1984). This postglacial uplift is still occurring at a rate of about 0.7cmyr⁻¹ (Martini and Glooschenko 1984); as a result, new land is continuously being exposed, especially on the north and west sides of the island. With the exception of a few small outcrops of Palaeozoic limestones, the surficial geology of the island is dominated by marine silts and clays, generally covered with a peat layer, and interrupted by numerous gravel beach ridges (Martini and Glooschenko 1984). The highest elevations are along the south coast, where the shore rapidly rises to about 60m in elevation; in contrast, most other coastal areas are dominated by extensive, low-gradient marshes and mudflats (Martini and Glooschenko 1984). Sporadic permafrost exists
in inland areas (Martini and Glooschenko 1984), where palsas and other permafrost features occur. Numerous large lakes are found near the south shore of the island, while linear marsh systems lie between the south shore and the first few beach ridges. Most rivers drain towards the north shore.

Akimiski Island lies within the boreal forest region. Regional vegetation is well summarized by Riley and McKay (1980), Riley (1981), and Martini and Glooschenko (1984). *Picea mariana*, *Picea glauca*, and *Larix laricina* forest are common throughout the island on beach ridges and as "islands" in peatland vegetation. Widespread shrub fens (largely *Salix* spp. and *Myrica gale*) occur close to the coasts, while graminoid-dominated peatlands occupy much of the island's interior. Dry tundra-like vegetation (*e.g.*, *Saxifraga tricuspidata*, *Dryas integrifolia*) is found on exposed beach ridges, primarily along the north coast. Coastal salt marshes are most commonly dominated by *Festuca rubra* at higher elevations and *Puccinellia phryganodes*, *Carex subspathacea*, and *Glaux maritima* at lower sites, but in many areas these species are replaced by *Salicornia borealis* and *Spergularia canadensis*. A thematic vegetation map of the island has been prepared from LANDSAT TM data by Andrew Jano of the Ontario Ministry of Natural Resources (reference: AKIBAMP95).

Beaver formerly inhabited the island but are now apparently scarce, though abandoned dams are common. Resident populations of caribou and moose are absent. Parts of the north shore are used by a rapidly expanding breeding colony of Lesser Snow Geese; Canada Geese nest throughout the island (Abraham et al. 1999). Most of the island now falls within a federal Migratory Bird Sanctuary.

Akimiski Island has a limited history of human occupancy, with most impacts confined to coastal areas. Several Cree families from Ontario historically trapped and hunted on the island for extended periods of the year (K. Abraham, personal communication 1999). There are no villages
on the island itself, but the island still is regularly visited by Cree from the Ontario shore, and there currently are some hunting camps near the west end. The only other structures on the island are associated with a research camp near Houston Point on the north shore, where studies of goose biology have been conducted by the Ontario Ministry of Natural Resources since the 1970's. A small Hudson Bay Company post once existed on the south coast, but its location is unclear (Riley 1981).

Sources of Information

Numerous collectors have visited the island, but typically for very short periods. The early history of botanical explorations is summarized by Riley (1981). Most of the collecting since that date has been associated with the Ontario Ministry of Natural Resources research camp on the north shore. In particular, Ken Abraham, Jennifer Bull, and Carol Lamey have collected and identified numerous specimens in the course of goose-related work; we have re-examined all of these specimens. In addition, in 1998, we had the opportunity to spend three weeks botanizing on the island; this represents the longest botanical collecting expedition in the history of Akimiski. Most of our collecting was performed in coastal areas (intertidal and supratidal marshes), but we also spent significant periods of time in freshwater habitats (mostly sedge and willow fens), and briefly visited remote areas in the interior and the east end of the island. Riley (1981) stated no "shallow marshes, beaver meadows, post-fire ridge systems, larch fens, black spruce swamp or thickets" had yet been sampled on Akimiski, and that "graminoid and lowshrub fens" had been very little sampled. We visited all of these habitats except spruce swamp, though we did examine several areas of spruce forest. Because of the high costs of helicopter travel, it is unlikely that any comparable expedition will happen in the near future.

Results
Our observations and collections have substantially increased the known flora of Akimiski Island, and have provided vouchers at the University of Toronto herbarium (TRT) for many new and previously reported taxa. We also have updated and revised the taxonomy of Riley's (1981) list; see Morton and Venn (1990) and Newmaster et al. (1998) for summaries of recent synonymy. A revised checklist is provided in Appendix A; this list has changed substantially from the 211 taxa in 51 families reported by Riley (1981). Taxonomic changes led to the removal of 6 taxa, which we consider to be synonymous with others on Riley's list, but our list also includes 73 additions in 32 families, for a new total flora of 278 species in 55 families.

We also have provided additional information on rarity and distribution. A high proportion of Akimiski taxa are classified as rare in Ontario (28 spp: Newmaster et al. 1998; Oldham 1999); in many cases, these represent either coastal species or species near their southern range limits. As well, two Akimiski species currently are unknown from Ontario: Potentilla crantzii and Salicornia borealis. The taxonomically difficult Potentilla crantzii occurs not far to the north (Scoggan 1978; Porsild and Cody 1980); Salicornia borealis is found in coastal regions of Hudson Bay (Wolff and Jefferies 1987).

Discussion

Riley (1981) speculated that 70 species could be added to the flora of Akimiski Island. This was conservative: our checklist adds more than this number, and there is little reason to believe that this list is now complete. Further explorations of less-visited areas of Akimiski (especially the interior, the south shore, and both ends of the island) would undoubtedly yield additional species. Despite this, the current evidence suggests that diversity is lower on Akimiski than on the Ontario mainland. The Ontario coast south of the Attawapiskat River supports almost 450 vascular plant taxa (Riley 1980, 1981), and about 320 taxa are found north of Lake River on Cape Henrietta Maria (Riley
and McKay 1980; Riley 1981), though diversity in the coastal areas closest to Akimiski is lower (Riley 1981). In contrast to the vascular flora, the lichen and bryophyte flora of Akimiski remain very poorly known, despite the great abundance of mosses and lichens in many habits; it is to be hoped that future research will address this gap in floristic knowledge.

Though smaller, the flora of Akimiski generally is similar to that of the Ontario mainland (Riley 1980, Riley and McKay 1980; Riley 1981). The large number of Akimiski taxa recorded as rare in Ontario probably reflects both the limited provincial distribution of tundra, treeline, and seacoast habitats, and the limited surveying of inland sites which has yet taken place; most are likely to occur in suitable mainland areas, such as Cape Henrietta Maria. As a result, the true degree of rarity of some of these species may be open to question. Similarly, few Akimiski species are likely to represent true range limits; instead, apparent distributional outliers often may represent species which occur in suitable habitats elsewhere within this region.

As is true of most remote northern floras (though not of transportation centres like Churchill: Scott 1996), the flora of Akimiski is almost entirely native, with only five clear exceptions (Morton and Venn 1990). Four of these (Chrysanthemum leucanthemum, Plantago major, Sonchus arvensis, Taraxacum officinale) are cosmopolitan weedy species; one (Carum carvi) probably was deliberately introduced by traders stationed at the Hudson Bay Company post (Riley 1981). None of these species is abundant. Morton and Venn (1990) also consider Artemisia tileii, Erysimum cheiranthoides, Potentilla norvegica, and Rhinanthus minor to be introduced to Ontario, but these species are widespread in northern Canada, and at least northern populations are not treated as exotics by many authorities (Scoggan 1978; Porsild and Cody 1980; Newmaster et al. 1998; Voss 1972-1996; Cody 1996).

Although few exotics have yet colonized the island, in future the Akimiski flora is likely to suffer from two other types of impact. First, there is a significant risk that species will be lost as a
result of global warming (Chapin et al. 1992). Northern ecosystems may be especially sensitive to climate change because small increases in temperature are expected to have significant effects on such important variables as snow cover, thaw depth, and peatland water tables (Maxwell 1992; Harvey 1997). As a result, like past climatic variation, future changes are likely to produce large shifts in treeline location, community composition, and ecosystem characteristics (Stevens and Fox 1991; Gates 1993). Akimiski lies not far to the north of the southern edge of permafrost; as temperatures rise, palsas and other permafrost-influenced landforms may be reduced or lost entirely (Maxwell 1992), to the detriment of species requiring drier or elevated microhabitats within the otherwise monotonous sedge fens that dominate the interior of the island (e.g., *Rubus chamaemorus*, *Cladina*). As well, though Akimiski is nearly 500 km south of the continental treeline in Keewatin or Québec, much of its flora has arctic affinities; such plants may be threatened by small increases in regional temperature. Akimiski may be especially at risk since many tundra species are already restricted to limited microhabitats (e.g., beach ridges, palsas), and since isolation from the mainland may both prevent these species from migrating as their habitat declines, and slow their replacement by species suited to a warmer climate.

A second set of impacts relates to geese. Considerable areas of coastal wetlands in the Hudson Bay region have been degraded by the foraging of rapidly increasing populations of Lesser Snow Geese (Jefferies 1988; Abraham and Jefferies 1997). The north shore of Akimiski was formerly used by thousands of staging Lesser Snow Geese during their migration to more northerly colonies (Abraham et al. 1999), and since 1968 has supported a nesting colony, currently numbering about 4000 birds (Abraham et al. 1999). Impacts are localized to areas heavily used by geese, but in these areas, many kilometres of the intertidal *Puccinellia phryganodes* zone and much of the supratidal *Festuca rubra* zone have been severely degraded, and some areas contain high densities of *Salicornia borealis* and *Spergularia canadensis*, which are indicative of severe goose
damage (Srivastava and Jefferies 1996). Nearby fresh-water marshes also show signs of damage similar to those observed elsewhere on the Hudson Bay coast (Kerbes et al. 1990; Kotanen and Jefferies 1997). If the Akimiski colony continues to grow, it is probable that populations of sensitive coastal plant species will be locally reduced or lost, though most are likely to persist in less degraded areas.

In summary, this paper represents the most complete vascular flora yet compiled for Akimiski Island, and one of the more complete lists available for the James Bay region. More species inevitably will be discovered; however, results to date support the view that Akimiski has relatively low diversity compared to the mainland, as might be expected for an off-shore island. Currently, the flora of Akimiski includes numerous coastal and tundra species considered rare in Ontario, in addition to the many species typical of more southerly areas, but only a few exotics; if floristic changes do occur in future, this record represents a necessary first step towards their detection and documentation. Further work still is necessary to document the vascular flora of little-visited areas of the island, and to describe the diversity of other important taxa, particularly lichens and bryophytes.

**Acknowledgements**

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Appendix A: Checklist of the Vascular Plants of Akimiski Island, Nunavut Territory

This checklist is based on Riley (1981), and includes plants of Akimiski Island and associated islets and shoals. Nomenclature follows Morton and Venn (1990); family order follows Newmaster et al. (1998); these publications also provide synonymy. Where names have changed from those of Riley (1981), the name used by Riley is given [in square brackets]. Additions from Riley (1980) are indicated by †; additions from Riley (personal communication 1990) by ‡; other additions are indicated by *. Taxa listed as extremely rare (S1), very rare (S2), or rare to uncommon (S3) in Ontario are indicated accordingly; "?" indicates questionable status (Newmaster et al. 1998; Oldham 1999). In addition, *Potentilla crantzii* and *Salicornia borealis* are not included in recent Ontario checklists (Morton and Venn 1990; Newmaster et al. 1998). Plants believed to be locally exotic are underlined.

Taxa represented in the University of Toronto herbarium are indicated by "TRT"; those in the herbarium of the National Museum of Natural Sciences, Ottawa by "CAN"; those in the herbarium of the Plant Biosystematics Institute, Agriculture Canada, Ottawa by "DAO". Specimens collected by Ken Abraham, Jennifer Bull, and Carol Lamey, and in the collection of Ken Abraham (Ontario Ministry of Natural Resources) are indicated by "K". Marc Johnson contributed *Galium trifidum* and *Goodyera repens*. Specimens for which the authors have collected vouchers are indicated by "V"; these have been deposited with TRT.

This checklist represents an ongoing project. Future revisions will be reported on the Akimiski Flora Web Page (http://www.erin.utoronto.ca/w3pkota/akiplants.html), maintained by P. M. Kotanen (Department of Botany, Erindale College, 3359 Mississauga Road North, Mississauga, Ontario, L5L 1C6, CANADA; pkanan@credit.erin.utoronto.ca).
CHECKLIST

PTERIDOPHYTA

**EQUISETACEAE**
- *Equisetum arvense* L.  
- *Equisetum fluviatile* L.  
- *Equisetum variegatum* Schleicher ex Fried. Weber & Mohr  

**OPHIOGLOSSACEAE**
- *Botrychium lunaria* (L.) Sw.  
- *Botrychium minganense* Victorin  

SPERMATOPHYTA

**GYMNOSPERMAE**

**CUPRESSACEAE**
- *Juniperus communis* L. [var. montana Ait., var. depressa Pursh]  
- *Juniperus horizontalis* Moench  

**PINACEAE**
- *Larix laricina* (Duroi) K. Koch  
- *Picea glauca* (Moench) Voss [var. glauca, var. porsildii Raup]  
- *Picea mariana* (Miller) Britton, Sterns & Pogg.  
- *Pinus banksiana* Lambert  

**ANGIOSPERMAE**

**Dicotyledons**

**RANUNCULACEAE**
- *Anemone canadensis* L.  
- *Anemone multifida* Poiret ex Lam  
- *Anemone parviflora* Michaux  
- *Caltha palustris* L.  
- *Ranunculus cymbalaria* Pursh  
- *Ranunculus gmelinii* D.C.  

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<tr>
<th>S2</th>
<th>Ranunculus hyperboreus Rottb.</th>
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<tr>
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<td>Ranunculus macounii Britton</td>
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<tr>
<td>S2</td>
<td>Ranunculus pedatifidus Smith ex Rees</td>
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<td></td>
<td>* Ranunculus reptans L.</td>
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<td>* Ranunculus subrigidus Drew</td>
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<td></td>
<td>Thalictrum venulosum Trel.</td>
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<td>MYRICACEAE</td>
<td>Myrica gale L.</td>
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<td>S2</td>
<td>Suaeda calceoliformis (Hook.) Moq.</td>
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<td>BETULACEAE</td>
<td>Alnus incana (L.) Moench [A. rugosa (DuRoi)Spreng.]</td>
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<td></td>
<td>Betula pumila L. [var. glandulifera Regel]</td>
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<td>CHENOPODIACEAE</td>
<td>* Atriplex cf. subspicata (Nutt.) Rydb.</td>
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<td></td>
<td>* Chenopodium capitatum (L.) Asch.</td>
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<td>* Chenopodium glaucum L. ssp. salinum (Standley) Aellen</td>
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<td></td>
<td>Salicornia borealis S.L. Wolff &amp; Jefferies [S. europaea L.]</td>
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<td>CARYOPHYLLACEAE</td>
<td>Honkenya peploides (L.) Ehrh.</td>
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<td>Minuartia dawsonensis (Britton) House</td>
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<td>Moehringia lateriflora (L.) Fenzl [Arenaria laterifolia L.]</td>
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<td>* Sagina nodosa (L.) Fenzl</td>
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<td>Spergularia canadensis (Pers.) D. Don</td>
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<td>Stellaria longifolia Muhlenb. ex Willd.</td>
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<td>SARRACENIACEAE</td>
<td>* Sarracenia purpurea L.</td>
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<td>DROSERACEAE</td>
<td>Drosera anglica Hudson</td>
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<td>* Drosera rotundifolia L.</td>
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VIOLACEAE
*Viola nephrophylla* E. Greene
*Viola renifolia* A. Gray

SALICACEAE

*Populus balsamifera* L.
*Populus tremuloides* Michaux
*Salix arctophila* Cockrell ex Heller
*Salix bebbiana* Sarg.
*Salix brachycarpa* Nutt.
*Salix candida* Flüegge ex Willd.
*Salix glauca* L. ssp. callicarpaea (Trautv.) Böcher [S. glauca L. var. callicarpaea (Trautv.) Böcher]
*Salix myricoides* Muhlenb. [S. glaucophylloides Fern.]
*Salix myrtillifolia* Andersson
*Salix pedicellaris* Pursh
*Salix planifolia* Pursh
*Salix reticulata* L.
*Salix serissima* (L. Bailey) Fern.

BRASSICACEAE

*Arabis arenicola* (Richardson ex Hook.) Gelert
*Cardamine pratensis* L. ssp. angustifolia (Hook.) O. Schulz
*Draba aurea* M. Vahl ex Hornem.
*Draba glabella* Pursh
*Draba incana* L.
*Erysimum cheiranthoides* L.
*Rorippa palustris* (L.) Besser ssp. fernaldiana (Butters & Abbe) Jonsell [R. palustris (L.) Besser ssp. glabra (Schulz) Stuckey var. glabrata (Lunell) Stuckey]

EMPETRACEAE

*Empetrum nigrum* L.

ERICACEAE

*Andromeda polifolia* L. ssp. glaucophylla (Link) Hultén [A. glaucophylla Link]
*Andromeda polifolia* L. ssp. polifolia [A. polifolia L.]
*Arctostaphylos alpina* (L.) Sprengel [A. alpina (L.) Spreng. var. alpina]
*Arctostaphylos rubra* (Rehder & E. Wilson) Fern. [A. alpina (L.) Spreng. var. rubra (Rehd. & Wils.) Bean]
*Arctostaphylos uva-ursi* (L.) Sprengel [A. uva-ursi (L.) Spreng. ssp. uvaursi, ssp. adenotricha (Fern. & Macbr.) Calder & Taylor]
*Chamaedaphne calyculata* (L.) Moench
*Gaultheria hispidula* (L.) Muhlenb. ex Bigelow
*Kalmia polifolia* Wangenh.
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<td>Geum macrophyllum Willd. [var. perincisium Rydb. Raup.]</td>
<td>V</td>
</tr>
<tr>
<td></td>
<td>Potentilla anserina L. [var. anserina, var. groenlandica Tratt.]</td>
<td>TRT,V</td>
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<tr>
<td></td>
<td>Potentilla crantzii (Cranz) G. Beck.</td>
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<tr>
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<td>Potentilla fruticosa L.</td>
<td>TRT</td>
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<tr>
<td>S2</td>
<td>Potentilla multifida L.</td>
<td>TRT,K</td>
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<tr>
<td>S2</td>
<td>Potentilla nivea L.</td>
<td>CAN</td>
</tr>
<tr>
<td>*</td>
<td>Potentilla norvegica L.</td>
<td>V</td>
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<tr>
<td>*</td>
<td>Potentilla palustris (L.) Scop.</td>
<td>K,V</td>
</tr>
<tr>
<td></td>
<td>Potentilla pensylvanica L. [var. pectinata (Raf.) Lepage]</td>
<td>TRT,CAN,V</td>
</tr>
<tr>
<td>S2</td>
<td>Potentilla pulchella R. Br.</td>
<td></td>
</tr>
</tbody>
</table>
Rubus acaulis Michaux
Rubus chamaemorus L.

FABACEAE
Astragalus alpinus L.
Hedysarum alpinum L. [var. americanum Michx.]
Hedysarum boreale Nutt. ssp. mackenzii (Richardson) Welsh [H. mackenzii Rich.]
Lathyrus japonicus Willd.
Lathyrus palustris L. [L. martimus Willd. var. pellitus (Fern.) Gl.]
S3 Oxytropis viscida Nutt. [var. hudsonica (Greene) Barneby]

ELAEAGNACEAE
Shepherdia canadensis (L.) Nutt.

HALORAGACEAE
* Myriophyllum sibiricum Komarov
* Myriophyllum verticillatum L.

ONAGRACEAE
Epilobium angustifolium L.
* Epilobium ciliatum Raf.
* Epilobium palustre L.

CORNACEAE
Cornus canadensis L.

SANTALACEAE
Geocaulon lividum (Richardson) Fern. [Comandra livida Rich.]

LINACEAE
S2 Linum lewisii Pursh ssp. lepagei (B. Boivin) Mosq.

APIACEAE
S1 Carum carvi L.
* Cicuta bulbifera L.
* Cicuta maculata L.
* Cicuta virosa L.
S3 Ligusticum scoticum L.
Sium suave Walter

GENTIANACEAE
Gentianella amarella (L.) Börner ssp. acuta (Michaux) J.M. Gillett
* Gentianopsis detonsa (Rottb.) Ma (s.l.)
* Lomatogonium rotatum (L.) Fries ex Nyman

MENYANTHACEAE
Menyanthes trifoliata L. [var. minor Raf.]
BORAGINACEAE
   Mertensia maritima (L.) Gray TRT,K,V

HIPPURIDACEAE
   * Hippuris tetraphylla L.f. K,V
   Hippuris vulgaris L. TRT,K,V

PLANTAGINACEAE
   Plantago major L. TRT
   Plantago maritima L. TRT,CAN,K

SCROPHULARIACEAE
   Bartsia alpina L. TRT
   Castilleja raupii Pennell TRT,K
   Euphrasia hudsoniana Fern & Wieg. [E. arctica Lange] KV
   Pedicularis groenlandica Retz. TRT,V
   Pedicularis parviflora Smith ex Rees TRT,V
   Pedicularis sudetica Willd. TRT,V
   S3 Rhinanthus minor L. [R. cristagalli L. (s.l.)] TRT,K,V

LENTIBULARIACEAE
   Pinguicula vulgaris L. TRT,V
   Utricularia intermedia Hayne TRT
   * Utricularia vulgaris L. V

CAMPANULACEAE
   Campanula rotundifolia L. TRT,CAN
   * Lobelia kalmii L. K

RUBIACEAE
   Galium labradoricum (Wieg.) Wieg. TRT
   * Galium trifidum L. K

CAPRIFOLIACEAE
   Linnaea borealis L. ssp. longiflora (Torrey) Hultén [L. borealis L. var. americana (Forbes) Rehd.] TRT,V

VALERIANACEAE
   Valeriana dioica L. ssp. sylvatica (Sol. ex Rich.) F. Meyer [V. septentrionalis Rehd.] CAN,V

ASTERACEAE
   Achillea millefolium L. ssp. borealis (Bong.) Breitung [A. millefolium L. var. nigrescens Mey.] K,V
   Achillea millefolium L. ssp. lanulosa (Nutt.) Piper [A. millefolium L. var. occidentalis DC.] TRT
   Antennaria pulcherrima (Hook.) E. Greene CAN,V
   S1 Antennaria rosea E. Greene K,V
   Artemisia campestris L. ssp. borealis (Pallas) H.M. Hall & Clements [A. borealis Pall.; Artemisia canadensis Michx.] TRT,K,V
   S2 Artemisia tilesii Ledebo. ssp. elatior (Torrey & A. Gray) Hultén TRT,K,V
* Aster borealis (Torrey & A. Gray) Prov.

S3? Aster brachyactis S.F. Blake  
Aster longifolius Lam. [A. johannensis Fern.]

S3 Chrysanthemum arcticum L. ssp. polare Hultén  
Chrysanthemum leucanthemum L.

Erigeron acris L. [var. asteroides (Andrz. ex Bess.) DC.]  
Erigeron lonchophyllus Hook.

S3? Matricaria maritima L. ssp. phaeocephala (Rupr.) Rauschert [Tripleurospermum phaeocephalum (Rupr.) Pobed.]

Petasites sagittatus (Banks ex Pursh) A. Gray  
Senecio congestus (R. Br.) DC. [var. palustris (L.) Fern.]
Senecio indecorus E. Greene  
Senecio pauperculus Michaux

* Solidago multiradiata Aiton  
Solidago uliginosa Nutt.

* Sonchus arvensis L. ssp. uliginosus (M. Bieb.) Nyman

Taraxacum ceratophorum (Ledeb.) DC. (s.l.)  
Taraxacum lacerum E. Greene  
Taraxacum officinale G. Weber

Monocotyledons

SCHUECZERIACEAE
* Scheuchzeria palustris L.

JUNCAGINACEAE

Triglochin maritimum L.
Triglochin palustre L.

POTAMOGETONACEAE

Potamogeton alpinus Balbis  
Potamogeton filiformis Pers.  
Potamogeton gramineus L.

‡ Potamogeton richardsonii (A. Bennett) Rydb.

ZANNICHELLIACEAE

Zannichellia palustris L.

ZOSTERACEAE

S2 Zostera marina L.
<table>
<thead>
<tr>
<th>JUNCACEAE</th>
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<tbody>
<tr>
<td><strong>Juncus alpinoarticulatus</strong> Chaix [J. alpinus Vill.]</td>
<td>TRT, V</td>
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<tr>
<td><strong>Juncus balticus</strong> Willd. [var. littoralis Engelm.]</td>
<td>TRT, K, V</td>
</tr>
<tr>
<td>* <strong>Juncus bufonius</strong> L.</td>
<td>K, V</td>
</tr>
<tr>
<td>*S3? <strong>Juncus castaneus</strong> Smith</td>
<td>V</td>
</tr>
<tr>
<td><em>Juncus triglumis</em>* L. ssp. albescens (Lange) Hultén Luzula parviflora (Ehrh.) Desv.</td>
<td>TRT, V</td>
</tr>
</tbody>
</table>
* Carex utriculata F. Boott
* Carex vaginata Tausch
* Carex viridula Michaux
* Eleocharis acicularis (L.) Roemer & Schultes
* Eleocharis smallii Britton
  Eriophorum angustifolium Honck.
  Eriophorum russeolium Fries ex Hartman
* Eriophorum tenellum Nutt.
* Eriophorum vaginatum L.
  Eriophorum viridi-carinatum (Engelm.) Fern.
  Kobresia simpliciuscula (Wahlenb.) Mackenzie
* Scirpus cespitosus L.
* Scirpus hudsonianus (Michaux) Fern.

POACEAE

* Calamagrostis canadensis (Michaux) P. Beauv.
* Calamagrostis stricta (Timm) Koeler ssp. inexpansa (A. Gray) C.W. Greene
  Calamagrostis stricta (Timm) Koeler ssp. stricta [C. stricta (Timm) Koeler]
* Deschampsia cespitosa (L.) P. Beauv.
  Dupontia fisheri R.Br. ssp. psilosantha (Rupr.) Hultén
  Elymus trachycaulus (Link) Gould in Shinn. ssp. trachycaulus [Agropyron trachycaulum (Link) Malte var. trachycaulum, var. novae-angliae (Scribn.) Fern.]
  Festuca brachyphylla Schultes & Schultes f.
  Festuca rubra L. ssp. rubra
  Festuca saximontana Rydb.
* Glyceria striata (Lam.) A. Hitchc.
  Hierochloe odorata (L.) P. Beauv.
  Hordeum jubatum L.
  Leymus mollis (Trin.) Pilger [Elymus mollis Trin. ssp. mollis]
  Poa alpina L.
  Poa arctica R. Br. ssp. arctica
  Poa glauca M. Vahl
  Poa palustris L.
  Poa pratensis L. ssp. alpigena (Blytt) Hiit.
  Puccinellia lucida Fern. & Weath.
  Puccinellia phryganodes (Trin.) Scribn. & Merr.
  Trisetum spicatum (L.) Richter [var. spicatum]

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TRT,K,V
SPARGANIACEAE
  * Sparganium angustifolium Michaux
  * Sparganium natans L.

TYPHACEAE
  * Typha latifolia L.

LILIACEAE
  Maianthemum trifolium (L.) Sloboda [Smilacina trifolia (L.) Desf.]
  Tofieldia glutinosa (Michaux) Pers.
  Tofieldia pusilla (Michaux) Pers.

IRIDACEAE
  Iris versicolor L.

ORCHIDACEAE
  * Amerorchis rotundifolia (Banks ex Pursh) Hultén
  Calypso bulbosa (L.) Oakes [var. americana (R.Br.) Luer]
  Corallorhiza trifida Châtel
  Cypripedium passerinum Richardson
  * Goodyera repens (L.) R.Br.

S2 Listera borealis Morong
  * Listera cordata (L.) R.Br.
  Platanthera dilatata (Pursh) Lindley ex Beck
  Platanthera hyperborea (L.) Lindley
  Platanthera obtusata (Banks ex Pursh) Lindley
  Spiranthes romanzoffiana Cham.