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THE UNIVERSITY OF MICHIGAN
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The Terrestrial Vegetation and Flora
of the Mainland Portion of
Sleeping Bear Dunes National Lakeshore

Technical Report No. 13

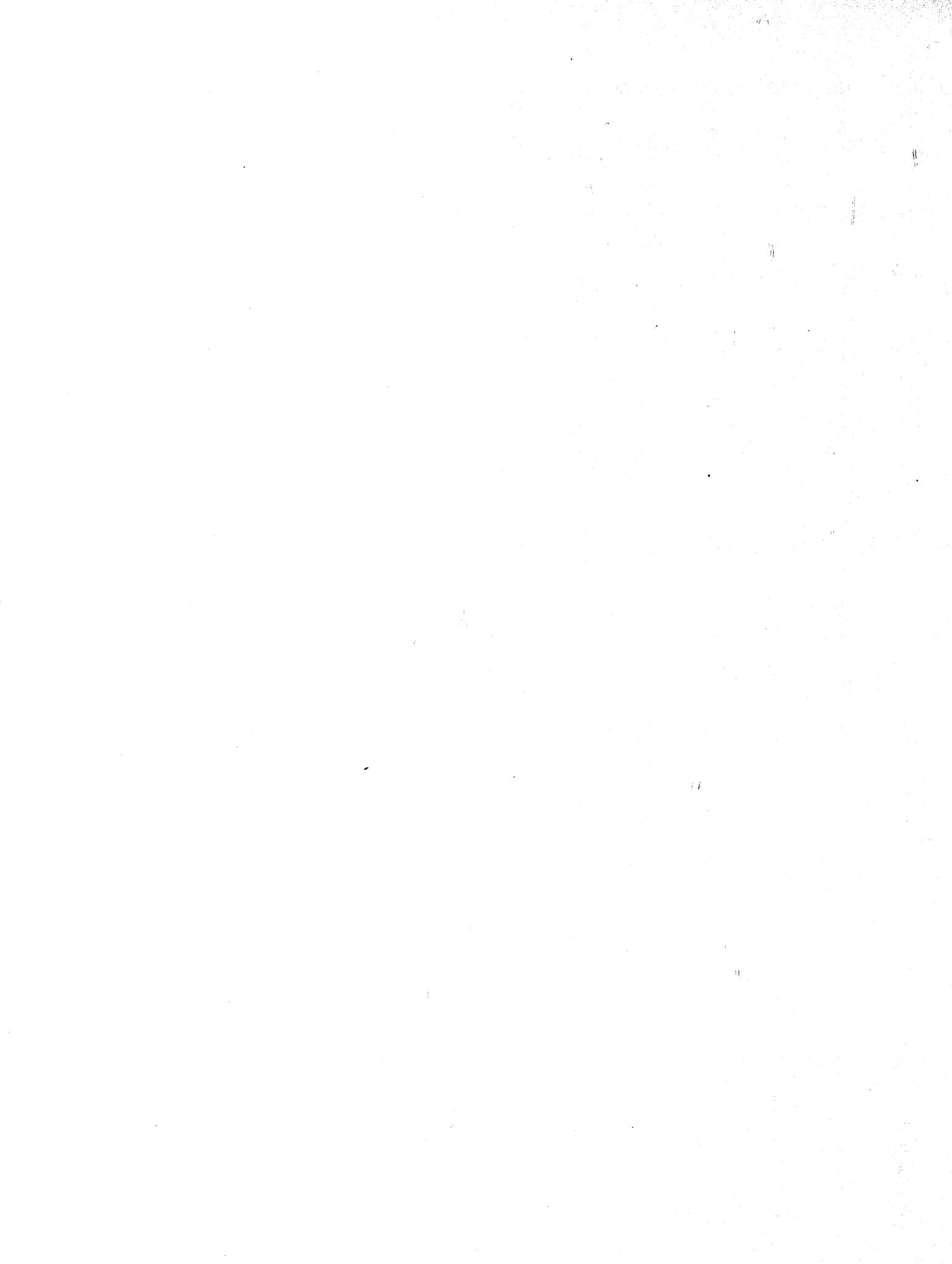
Brian T. Hazlett



Douglas Lake State Park

November 1986

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THE TERRESTRIAL VEGETATION AND FLORA
OF THE MAINLAND PORTION OF
SLEEPING BEAR DUNES NATIONAL LAKESHORE,
BENZIE AND LEELANAU COUNTIES,
MICHIGAN

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ABSTRACT

The vegetation and flora of the mainland portion of Sleeping Bear Dunes National Lakeshore was surveyed during the summers on 1984 and 1985 in scope similar to that of a previous study of the Manitou Islands. The vegetation associations were mapped and described, and a catalogue of 704 vascular plant species compiled. Ten permanent plots were established within the study area to observe any future vegetation changes at selected sites. The mainland distributions of nine native species listed as threatened or of special concern by the State of Michigan were noted and fragile habitats identified. An investigation of the habitat, frequency, and distribution of the Sleeping Bear Dunewort, a potentially new species of *Botrychium* discovered on the area's perched dunes, was made. Recommendations concerning the resource management of the mainland were proposed.

The Terrestrial Vegetation and Flora
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Sleeping Bear Dunes National Lakeshore,
Benzie and Leelanau Counties,
Michigan

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INTRODUCTION

The scenic vistas, prominent headlands, and long, open shorelines of Sleeping Bear Dunes National Lakeshore are outstanding. The richness of the Lakeshore's physiography, and therefore its vegetation, can be attributed to its legacy of moraines and outwash plains and to the postglacial effects of water and wind which formed relict beach ridges, bluffs, and dunes. The various natural plant communities which have developed on these landforms have made the Sleeping Bear region a prime area for botanical research. Comprehensive vegetation descriptions of the region now encompassed by Sleeping Bear Dunes National Lakeshore were first written by Waterman (1922, 1926). The dunes of the Sleeping Bear Pt. and the Sleeping Bear plateau, however, were briefly described earlier in Cowles's (1899) comprehensive study of dune vegetation along Lake Michigan. The vegetation and changing appearance of the Sleeping Bear Dune, itself, has been documented by Gates (1950) and Gillis and Bakeman (1963). A general description of the entire National Lakeshore region has been written by Thompson (1967).

The mainland portion of Sleeping Bear Dunes National Lakeshore (Figure 1) is composed of three major sections. These sections will be referred to in this report as the Platte, Glen Haven, and Good Harbor sections. The Platte section, largely in Benzie County, covers 14,299 acres with 11 miles of Lake Michigan shoreline. Six lakes, Round Lake, Mud Lake, Loon Lake, Deer Lake, Bass Lake, and Otter Lake, and two major streams, Otter Creek and the Platte River, occur within this section. The Glen Haven and Good Harbor sections rest entirely inside Leelanau County. The Glen Haven section covers 11,786 acres with 7.5 miles of Lake Michigan shoreline. Aquatic habitats can be found at North Bar Lake, Day Mill Pond, and a small part of Glen Lake. The Good Harbor section includes 11,394 acres with 11 miles of Lake Michigan shoreline. Five lakes, School Lake, Bass Lake, Shell Lake, Tucker Lake, and Narada Lake, and two streams, Shalda Creek and the Crystal River provide most of the aquatic habitats. The

Bow Lakes area, a 975 acre National Lakeshore tract southeast of Burdickville, was included in this study, but the proposed scenic corridor in Benzie Co. was not.

The natural vegetation of the Mainland has been influenced by human activity since the mid-1800s. The mainland settlement pattern was similar to that for the Manitou Islands. The initial cordwood and timber production was succeeded by agriculture. Later the region became a popular recreation area for summer residents and tourists. Both agriculture and recreation have been more intense on the Mainland than on the Manitous due to greater accessibility during the last century.

The terrestrial vegetation and flora of the mainland portion of the Lakeshore was surveyed in similar method and scope to the Manitou Islands (Hazlett and Vande Kopple, 1983). The vegetation and flora of aquatic habitats and adjacent areas of the entire Lakeshore will be covered in detail during a future study. This study should assist Sleeping Bear Dunes National Lakeshore in its natural resource management of the Mainland by

- 1) continuing the vegetation studies of the National Lakeshore begun by Hazlett and Vande Kopple (1983),
- 2) providing baseline data on the present vegetation of the Mainland,
- 3) identifying fragile habitats which might be damaged through misuse or development,
- 4) documenting the vascular flora and compiling a checklist of species to assess the status of the present flora,
- 5) mapping the locations of threatened species, and
- 6) recommending specific management alternatives from a botanical perspective.

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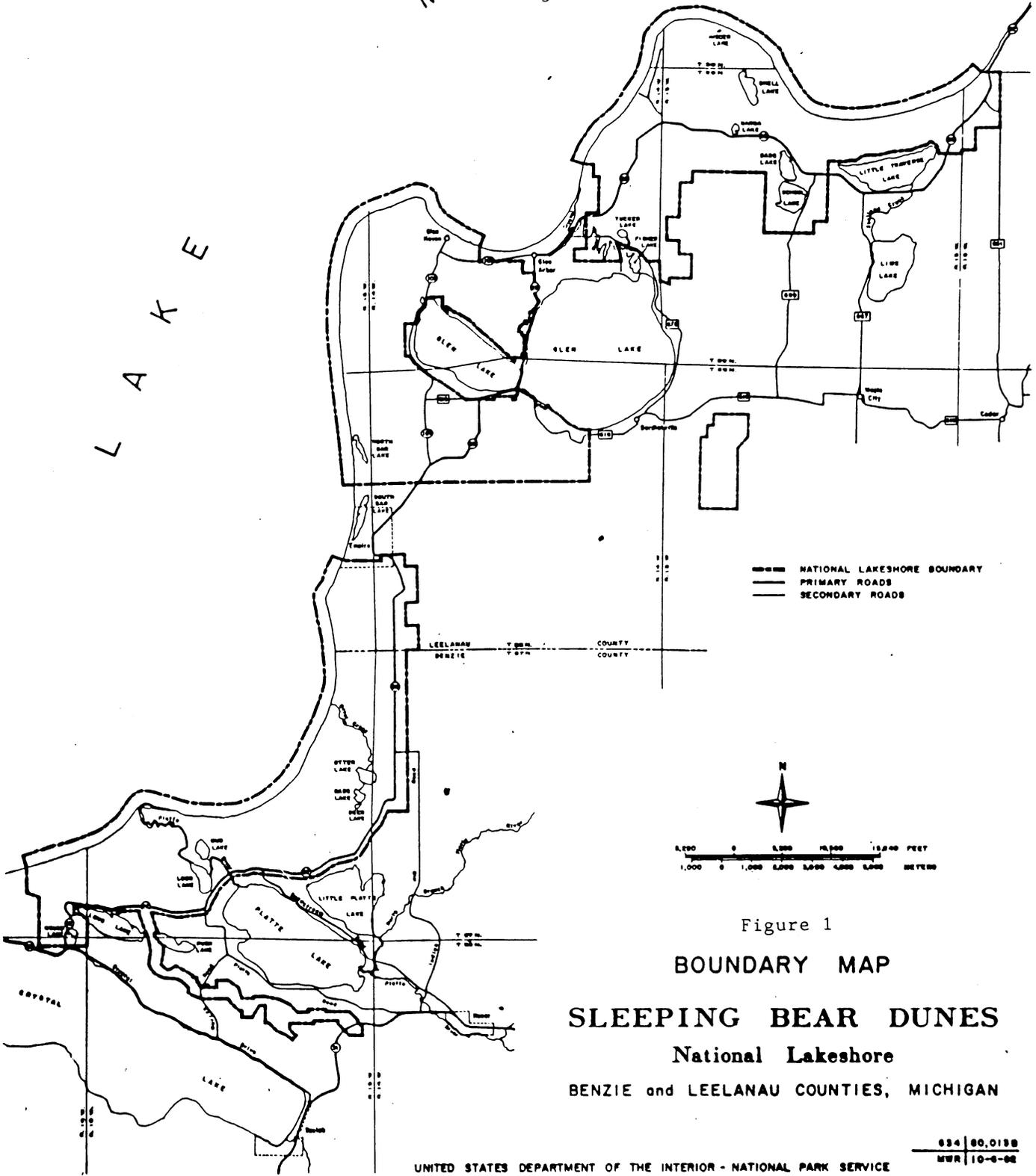
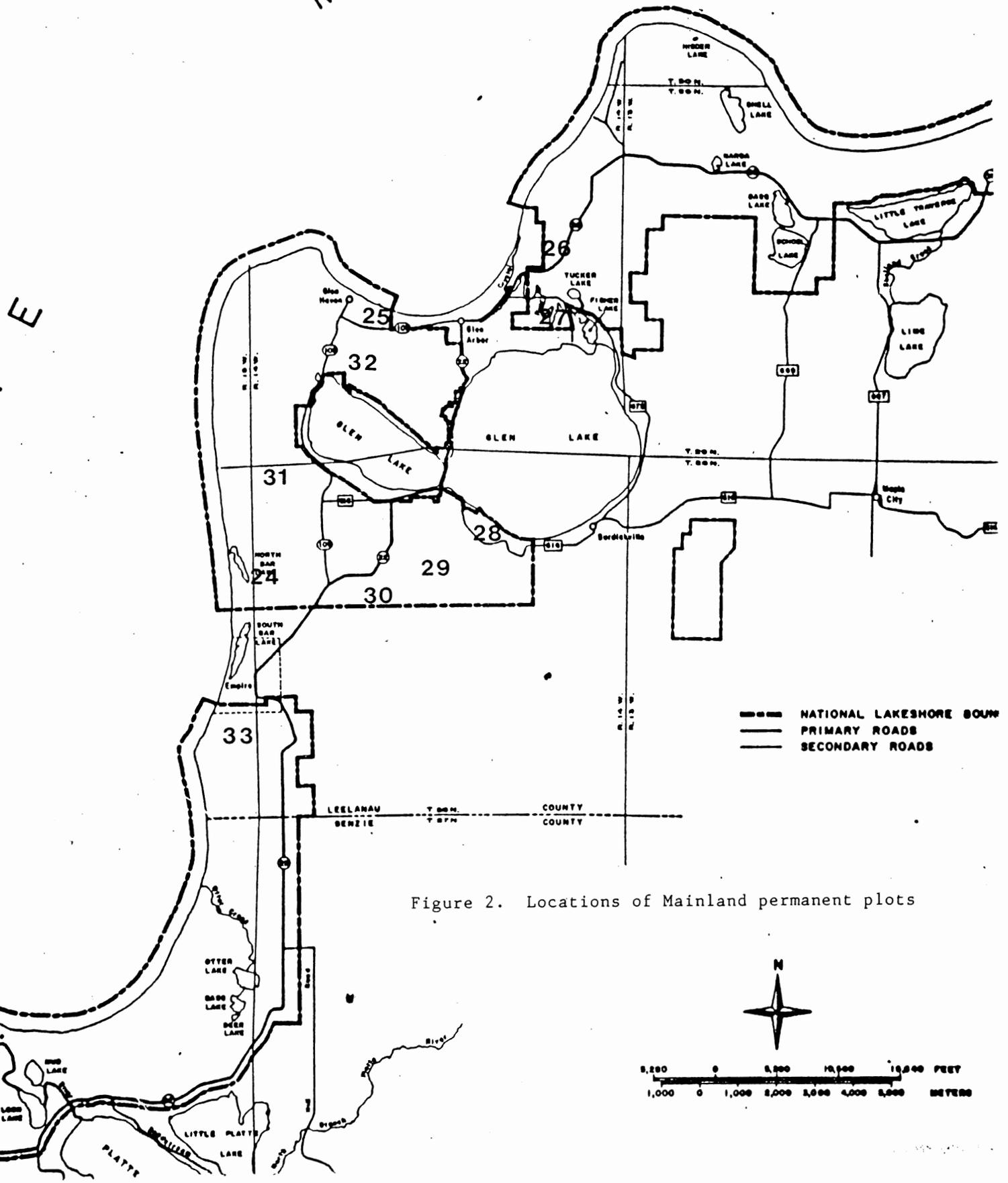


Figure 1
BOUNDARY MAP
SLEEPING BEAR DUNES
 National Lakeshore
 BENZIE and LEELANAU COUNTIES, MICHIGAN

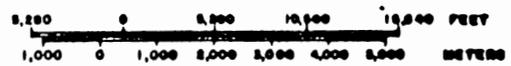
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 NATIONAL LAKESHORE BOUND
 PRIMARY ROADS
 SECONDARY ROADS

Figure 2. Locations of Mainland permanent plots



METHODS

Field work for this two-year study was conducted predominately from May 1984 to September 1985 with major emphasis on the survey of the vegetation and the documentation of the vascular flora. During the field work (May 12, 1984-August 22, 1984; May 7-August 23, 1985), I resided within the National Lakeshore. Two fall weekend trips (September 14-19, 1984; September 27-29, 1985) were also made.

The terrestrial vegetation was mapped using aerial photographs followed by extensive ground verification. Maps began as mylar overlays drawn directly from Agricultural Stabilization and Conservation Service (ASCS) black and white (b/w) coverage from 1982. Michigan Department of Natural Resources color infra-red photographs taken in 1977 and 1978 were also consulted. Next, most of the Mainland was covered on foot to correlate the overlay maps with the vegetation and to gather field notes used to write a description of each vegetation type.

In the field, the vegetation was typed following the dominant species concept (Curtis, 1959). In each stand the two to four dominant species based on cover were identified for each layer of the vegetation. For mapping purposes the overstory was defined as trees taller than 12 feet, the understory as shrubs and trees shorter than 12 feet, and the ground layer as those herbaceous plants and seedling of forest trees close to the ground. Generally, the overstory was given more importance in determining the final vegetation types. The minimum size of a stand was approximately ten acres except in well defined areas such as fields and clearings. In areas where the dominance of a few species was not easily observed such as in wetlands, a more general classification was used.

In addition, a few Mainland permanent plots were established, away from heavily used areas, to gather data at selected sites. These plots were established primarily to allow the observation of any natural vegetation changes at a specific site rather than to quantitatively describe the vegetation composition. These plots might also be used in a

comparison to those on the Manitou Islands (Hazlett and Vande Kopple, 1983). Ten permanent plots, the same size as those on the islands (40 ft. x 40 ft.), were placed in representative habitats. Each corner post of a plot was marked with an aluminum tag on which was written the plot number and the orientation (ie. NE, SE, SW, NW) of that corner. Inside the plot a complete list of all herbaceous species was made, the species and diameter at breast height (dbh) of all trees over 1 in. dbh were recorded (as a means of classifying the overstory), and the number of stems of each species taller than three feet and under 1 in. dbh was counted. Tallies from each plot are found in Appendix C. To further document any future changes in the plots, four photographs, one from each corner looking toward the opposite diagonal corner, were taken of each plot using both b/w print and 35 mm color slide film.

The corners of all ten permanent plots were marked by 6 ft. red-topped, T-section steel fence posts set 3-4 ft. high. Locations of these plots are shown in Figure 2. A brief site description of, and specific directions to, each permanent plot site can be found in Appendix B.

The vascular flora was documented by the collection of voucher specimens during the field investigation. The occurrence and relative abundance of threatened species were also noted. An annotated checklist of vascular plants compiled during this investigation has been included at the end of this report.

DESCRIPTION OF THE VEGETATION

The vegetation types show a strong correlation to the glacial and postglacial geology of the Mainland. The Coastal Forest predominately occurs on the post-Nipissing dunes and relict beach ridges, while the Northern Hardwoods are characteristically associated with moraines. The Oak-Aspen vegetation type also occurs on moraines, but these woods may be an example of delayed secondary succession. The Maple-Ash-

Basswood Northern Hardwoods subtype occurs on dunes, but these dunes are composed of sand derived directly from the morainal bluffs on which they rest. The subtle floristic differences among the other Northern Hardwood subtypes are harder to explain. Those Northern Hardwoods stands occurring on the moraines north and east of Big Glen Lake typically have more red oak and a depauperate herb layer compared to Northern Hardwoods stands to the west, or in the Bow Lakes section. The ultimate controlling factor may be slightly different deglaciation histories. Drexler (1975) demonstrates that much of the northern part of the Mainland was inundated by a glacial lake after the most recent period of deglaciation. The tops of the highest hills remained as islands, but the rest of the Mainland was subject to the action of water. (In addition to glacial lake flooding, several meltwater valleys were cut through some moraines perhaps having an additional influence on the development of a slightly different forest.) Meanwhile, the western moraines were still being formed, were covered with ice, or were high above the flooding and escaped its influence. Similarly, depressions of the Bow Lakes region were formed by the melting of stagnant ice in the unconsolidated glacial deposits rather than by water erosion.

NORTHERN HARDWOODS

The Northern Hardwoods is a diverse vegetation type characterized by the dominance of beech (*Fagus grandifolia*) and sugar maple (*Acer saccharum*). Associated overstory species include basswood (*Tilia americana*), white ash (*Fraxinus americana*), black cherry (*Prunus serotina*), and red oak (*Quercus rubra*). Ironwood (*Ostrya virginiana*), white birch (*Betula papyrifera*), and hemlock (*Tsuga canadensis*) can be found less often.

The Mainland Northern Hardwoods subtypes are as follows:

Beech-Maple-Ash

Maple-Ash-Basswood

Beech-Maple-Ash-Oak

Maple

Beech-Maple-Birch-Hemlock

The overstory composition of some Northern Hardwoods forests on the Mainland has been altered by selective timber cutting and natural processes such as the severe decline of American elm (*Ulmus americana*) due to Dutch elm disease. These alterations may mask the potential natural vegetation of a given area. The diversity and abundance of herbs throughout the Northern Hardwoods, however, is probably influenced to a large extent by soil moisture conditions.

Beech-Maple-Ash

This subtype is predominant on the moraines in the Glen Lake section. The overstory is composed largely of sugar maple, beech, and white ash. Other common canopy species include basswood, hemlock and ironwood. Ironwood and hemlock are most common as sub-canopy species. The understory is mainly composed of sugar maple and beech. In the spring the herbaceous flora is rich with *Claytonia virginina*, *Dentaria canadensis*, *D. diphylla*, *Dicentra cucullaria*, *Erythronium americanum*, and several *Viola* species. These early species finish flowering and may even disappear completely soon after the emerging leaves of the overstory begin to shade the forest floor. Common herbs throughout the rest of the growing season include *Actaea pachypoda*, *Allium tricoccum*, *Arisaema triphyllum*, *Dryopteris intermedia*, *D. marginalis*, *Maianthemum canadense*, *Osmorhiza claytonii*, *Polygonatum pubescens*, *Solidago flexicaulis*, *Trillium grandiflorum*, *Viola canadensis*, and *Galium* spp. The richest assemblages of herbs occur at the tops of the highest moraines (Empire Twp. Sec. 16 S 1/2 NW 1/4) and in the forests nearest Lake

Michigan such as those near the Scenic Drive and Empire Bluffs trail. In other places the herb layer is sparse especially after the spring ephemerals disappear.

Maple-Ash-Basswood

This subtype occurs on the wooded dunes along the lake bluff between Empire Bluffs and Aral. Sugar maple, white ash, and basswood are the dominant overstory species. Ironwood is a subdominant species and beech is generally absent. Understory species are usually saplings of the overstory members, but sometimes red elderberry (*Sambucus pubescens*) and yew (*Taxus canadensis*) occur to a limited extent. The largest mainland stand of yew occurs along the Empire Bluffs trail. Herbaceous layer resembles that of the Maple-Beech-Ash subtype although *Aquilegia canadensis*, *Caulophyllum thalictroides*, *Smilacina racemosa*, and *Uvularia grandifolia* are more common.

Beech-Maple-Ash-Oak

This subtype is most common on the moraines in the Good Harbor section. These areas tend to be slightly drier than the Maple-Beech-Ash subtype and red oak is a common overstory species. Associated species include hemlock, basswood, ironwood, and black cherry. Understory species are mainly beech, maple, ironwood, and some hemlock. Herbs are sparse, but species composition is similar to the Maple-Beech-Ash subtype. The most common herbs in this subtype include *Allium tricoccum*, *Maianthemum canadense*, *Mitchella repens*, *Osmorhiza claytonii*, *Polygonatum pubescens*, *Trillium grandiflorum*, and *Viola pubescens*.

Maple

The forest stands of this subtype, most common in the northern part of the Platte section, have been selectively influenced by man for the production of maple syrup. Sugar maples predominate although in many places are associated with some white ash, black

cherry, and beech. Hemlock is a sub-canopy species and also part of the understory. Herbs tend to be sparse with the most common including *Actaea pachypoda*, *Allium tricoccum*, *Carex plantaginea*, *Dryopteris intermedia*, *Maianthemum canadense*, *Osmorhiza claytonii*, *Polygonatum pubescens*, *Trillium grandiflorum*, *Viola canadensis*, *V. pubescens*, and other *Carex* species. An exception to this trend is the sugarbush near the intersection of Aral and Norcronk Rds. where the herbs are just as varied as the rich Maple-Beech-Ash areas.

Beech-Maple-Birch-Hemlock

This subtype is generally found in coastal areas. It is characterized by beech, sugar maple, hemlock and white birch. Other canopy species include white ash, ironwood and black cherry. The sapling layer is mainly composed of beech, hemlock, ironwood, and maple, but maple-leaved viburnum (*Viburnum acerifolium*) is occasionally found. Common herbs include *Aralia nudicaulis*, *Erythronium americanum*, *Maianthemum canadense*, *Osmorhiza claytonii*, *Polygonatum pubescens*, *Trillium grandiflorum*, and some *Carex* species.

COASTAL FOREST

The Coast Forest occupies much of the Platte section and also occurs along Sleeping Bear Bay and Good Harbor Bay. It is characteristic of the post-Nipissing lake plain which formed as the level of Lake Nipissing (5000 BP) dropped 25 ft. to the present level of Lake Michigan.

Oak-Pine

This subtype occurs on the sandy ridges and some parabolic dunes of coastal areas. It is characterized by jack pine (*Pinus banksiana*), white pine (*P. strobus*), red pine (*P. resinosa*), white oak (*Quercus alba*), red oak, and bigtooth aspen (*Populus grandidentata*). Common understory species include white pine, blueberry (*Vaccinium angustifolium*),

huckleberry (*Gaylussacia baccata*), and some red maple. Common herbs include *Cypripedium acaule*, *Epigaea procumbens*, *Gaultheria procumbens*, *Maianthemum canadense*, *Melampyrum lineare*, *Oryzopsis asperifolia*, *Pteridium aquilinum*, *Trientalis borealis*, and a few *Carex* species.

Birch-Maple-Aspen

This subtype occurs near low moist sites and old beach pools between old beach ridges in the Platte section, near the Crystal River and Shalda Creek, and along the beach ridges bordering Sleeping Bear Bay and Good Harbor Bay. Red maple, white birch, bigtooth aspen are dominant in wetter areas, although a few scattered oaks and pine occur in drier sites. Herbs include *Aralia nudicaulis*, *Aster macrophyllus*, *Gaultheria procumbens*, *Linnaea borealis*, *Maianthemum canadense*, *Melampyrum lineare*, *Mitchella repens*, *Oryzopsis asperifolia*, *Pedicularis canadensis*, *Pteridium aquilinum*, *Trientalis borealis*, and *Vaccinium angustifolium*. Along Sleeping Bear Bay small stands of the Coastal Forest are found scattered as small islands in the Glen Haven area. Trees here are mainly white birch, cedar (*Thuja occidentalis*), and balsam fir (*Abies balsamea*).

In large areas in the Platte Section and in some areas along Good Harbor Bay, the Coastal Forest is very mixed in its composition. This predominately occurs in areas with repeating dune swales. Within the swales the Birch-Maple-Aspen subtype predominates and conditions may be so wet that alder thickets and open pools may be found. Often the dry oak-pine subtype borders directly on these wet areas.

OAK-ASPEN

This vegetation type, characterized by bigtooth aspen and red oak, occurs mainly on the south and west facing slopes of the moraines in the Good Harbor section. Red maple, beech, and white pine are often present. Understory species generally include sugar maple and beech saplings with some witch-hazel (*Hamamelis virginiana*), striped maple (*Acer pennsylvanicum*), and maple-leaved viburnum. The most common herbs are

Aralia nudicaulis, *Maianthemum canadense*, *Mitchella repens*, *Pteridium aquilinum*, and a few *Carex* species. These areas may eventually become Northern Hardwoods, but greater solar exposure on these drier south- and west-facing slopes has delayed the secondary succession of these areas. General Land Office Records from 1850 (available at the Lands Division, Department of Natural Resources, Lansing) show that the presettlement forests at these sites were predominately sugar maple, beech, and hemlock with scattered oak, pine, and aspen. Perhaps the slightly drier slopes favored the latter species, but the essential character of these forests was Northern Hardwoods.

BIRCH-ASPEN

This relatively small vegetation type occurs in successional young areas (old fields and cut-over forests) which will probably develop into forests similar to those adjacent to these stands. Overstory species are mainly white birch and bigtooth aspen. Herbs vary from site to site, but the most common are *Maianthemum canadense*, *Mitchella repens*, *Pteridium aquilinum*, and *Galium* sp.

DUNES

Dune vegetation occurs on the coastal areas along Platte Bay, Sleeping Bear Bay, and Good Harbor Bay, and on dunes perched atop moraines at Empire Bluffs, the Sleeping Bear Plateau, and Pyramid Pt. Coastal dunes generally show a gradual transition from an open, grassy area closest to Lake Michigan to a shrubby zone before reaching the bordering forest. Perched dunes show no such zonation, but shrubby areas and even trees have taken hold on these dunes in protected sites. The bordering forests are being invaded by sand where the dunes are actively moving. The floristic composition of the different dune areas is generally the same. Even the sparse vegetation of the bluffs associated with the perched dunes has many of the same species. Common grasses include *Agropyron dasystachyum*, *Ammophila breviligulata*, *Andropogon scoparius*, *Calamovilfa longifolia*, and

Elymus canadensis. Other herbs include *Arabis lyrata*, *Artemisia caudata*, *Asclepias syriaca*, *Cakile edentula*, *Campanula rotundifolia*, *Coreopsis lanceolata*, *Equisetum hyemale*, *Lathyrus japonicus*, *Lilium philadelphicum*, *Lithospermum caroliniense*, *Oenothera oaksiana*, *Senecio pauperculus*, *Smilacina stellata*, and *Zigadenus glaucus*. Shrubby species include bearberry (*Arctostaphylos uva-ursi*), red osier (*Cornus stolonifera*), common juniper (*Juniperus communis*), trailing juniper (*J. horizontalis*), and sand cherry (*Prunus pumila*). Common vines include poison ivy (*Toxicodendron radicans*) and grape (*Vitis riparia*). Although forest tree species may occur on some sites on the dunes, trees commonly occurring on the Mainland dunes are cottonwood (*Populus deltoides*), balsam poplar, (*P. balsamifera*), and jack pine.

Along the coastal dunes, pools and low moist areas have developed. Some species occurring in and around these areas include *Salix cordata*, *S. discolor*, *Carex buxbaumii*, *C. interior*, *C. viridula*, *Eleocharis elliptica*, *Hieracium piloselloides*, *Lathyrus japonicus*, *Juncus balticus*, *Senecio pauperculus*, *Utricularia cornuta*, and *Zigadenus glaucus*. The most extensive collection of these pools occurs along Platte Bay south of the Platte River.

The dunes are the home of Pitcher's thistle (*Cirsium pitcheri*) and broom-rape (*Orobanche fasciculata*), species listed as threatened in Michigan (Beaman et al., 1985). Both species were readily found in all dune areas. Another threatened species, the grass *Bromus pumpellianus*, was found only on the perched dunes of Pyramid Pt.

One species which merits special monitoring is baby's-breath (*Gypsophila paniculata*). This introduced weed may be invading the dunes from the Platte Section. On the Mainland it is most common on the dunes near the Sleeping Bear Cove subdivision (Lake Twp., Sec. 21). It now covers the dunes at Pt. Betsie (south of the Lakeshore) and it may only be a matter of time before the Mainland dunes are covered, too.

The most famous dune in the Lakeshore is the Sleeping Bear resting 400 ft. above Lake Michigan near the bluff edge of the moraine which bears the same name. The dune has been a landmark since presettlement times. Gates (1950) began the documentation of

the slow disappearance of this dune which he believes was initiated by tree cutting by surveyors. This cutting exposed open sand to the wind and erosion was accelerated. In 1935 Gates measured the dune's height to be 159 ft. above the plateau. By 1961 the dune had shrunk to a height of 132 ft above the plateau, a drop of 102 ft from the 1906 Army Corps of Engineers measurement of 234 ft. (Gillis and Bakeman, 1963). Although no measurements have been published since 1961, it is likely that the erosion of this dune has continued.

JACK PINE STANDS

Jack pine and occasionally red and white pine characterize these stands which are most fully developed on the dunes along Platte Bay. Another stand occurs near Sleeping Bear Pt. Some have open canopies with a few species dune species such as *Andropogon scoparius*, *Arctostaphylos uva-ursi*, *Lithospermum caroliniense*, *Shepherdia canadensis*, and *Zigadenus glaucus*. In moister, denser stands, cedar occurs in the overstory and herbs such as *Carex eburnea*, *Chimaphila umbellata*, *Corallorhiza striata*, *Cypripedium acaule*, *Goodyera oblongifolia*, *Linnaea borealis*, and *Pyrola secunda*. *Cypripedium arietinum* is relatively abundant in some of these stands.

FIELDS

The Mainland fields have been ranked according to the relative amount of woody vegetation cover. The following scale is used:

- F-0 Actively cultivated, mowed, grazed, or maintained as orchard.
- F-1 Woody cover < 5%
- F-2 Woody cover 5-25%
- F-3 Woody cover 25-50%
- F-4 Woody cover 50-75%

This scale is slightly different from the one used for the Manitou Islands (Hazlett and Vande Kopple, 1983). On the Manitous, *Juniperus communis* was given prime consideration. On the Mainland, however, it only occurs to a small extent before choke cherry, sumac, and blackberry invade followed by red maple, white ash, red oak, bigtooth aspen, and trembling aspen (*Populus tremuloides*). Trees in F-3 fields are usually at least 15 ft tall. In abandoned fields common herbs include *Asclepias syriaca*, *Bromus inermis*, *Centaurea maculosa*, *Daucus carota*, *Erigeron annuus*, *E. strigosus*, *Fragaria virginiana*, *Hieracium piloselloides*, *Hypericum perforatum*, *Medicago lupulina*, *Phleum pratense*, *Rumex acetosella*, *Solidago* spp., *Verbascum thapsus*, and *Vicia villosa*.

Most of the agricultural activity on the Mainland occurs on private land in the northern part of the Platte section. A few orchards, however, occur at the northeastern-most part of the Mainland. Some fields in the Pt. Oneida area are mowed annually for hay. Cultivated species include corn, wheat, rye, and alfalfa. Cherries are the predominant orchard crop although apples, peaches, and plums are also grown.

CONIFER PLANTATIONS

Several conifer plantations are scattered across the Mainland. Trees planted in these groves include Austrian pine (*Pinus nigra*), scotch pine (*P. sylvestris*), white pine, red pine, Norway spruce (*Picea abies*), white spruce (*P. glauca*), and Douglas fir (*Pseudotsuga menziesii*). These areas are generally too dense to have much herbaceous cover, but *Dryopteris intermedia*, *D. marginalis*, *Galium* spp., *Hieracium* spp., *Maianthemum canadense*, and *Pteridium aquilinum* have been found in some areas. The invasion of deciduous species is evidenced by white ash, sugar maple, red oak, and beech saplings.

ROADSIDES

The roadside flora on the Mainland is comprised mainly of European weeds such as *Dactylis glomerata*, *Centaurea maculosa*, *Silene vulgaris*, *Crysanthemum leucanthemum*, and

Bromus inermis which do not differ much from those found in open fields. Species most common as roadside weeds include *Ambrosia artemisiifolia*, *Euphorbia esula*, *E. cyparissias*, *E. glyptosperma*, *Grindella squarosa*, and *Myrabilis nyctaginea*. Box elder (*Acer negundo*) has become established in a few places along roadsides, possibly as an escape from trees planted as ornamentals.

WETLANDS

Several wetlands bordering aquatic habitats were briefly reviewed during the course of this terrestrial vegetation study. These will be examined in greater detail in a future aquatic study of the Lakeshore.

Bogs

Bogs are usually those wetlands which have formed in low basins which have no drainage outlet. The water has a low pH and *Sphagnum* moss is abundant. Leatherleaf (*Chamaedaphne calyculata*) is a common shrub. Larch (*Larix laricina*) and black spruce (*Picea mariana*) are common trees. The best developed mainland bog occurs between M-22 and Hyland Rd. (Glen Arbor Twp., Sec. 13 W 1/2). Here the basin is largely dominated by larch and white pine. Black spruce is most common as young understory trees. Shrubs include leatherleaf, velvet blueberry (*Vaccinium myrtilloides*), bog laurel (*Andromeda glaucophylla*), and Labrador tea (*Ledum groenlandicum*). Michigan holly (*Ilex verticillata*) borders the edges. A small pond remains at the southern edge of this bog. Herbs in this bog include *Drosera rotundifolia*, *Eriophorum spissum*, *Gaultheria hispidula*, *Sarracenia purpurea*, *Smilacina trifoliata*, and *Vaccinium macrocarpon*. Other wetlands which come closest to resembling this vegetation type occur in the Pt. Oneida area and in the Bow Lakes section.

Cedar Swamps

The most extensive cedar swamp system borders Otter Creek. Smaller areas occur along the Crystal River and Shalda Creek. Cedar is the dominant species with white pine, white birch, and balsam fir as associates. In some sites black spruce and larch also occur. Balsam fir often becomes established in the gaps created by blowdowns in dense cedar stands. More open areas allow alder (*Alnus rugosa*), black ash (*Fraxinus nigra*), cedar, and red maple saplings to grow. The herbs are quite diverse from area to area. The most common include *Arisaema triphyllum*, *Atherium filix-femina*, *Botrychium virginianum*, *Caltha palustris*, *Circaea alpina*, *Clintonia borealis*, *Coptis trifoliata*, *Cornus canadensis*, *Dryopteris cristata*, *D. intermedia*, *Gaultheria hispidula*, *Geum rivale*, *Gymnocarpium dryopteris*, *Maianthemum canadense*, *Mitchella repens*, *Mitella nuda*, *Osmunda cinnamomea*, *O. regalis*, *Rubus hispidus*, *Trientalis borealis*, *Viola blanda*, and many *Carex* species.

Black Ash Swamps

These areas usually occur in low poorly-drained sites bordering lakes and are found on the Mainland near Tucker Lake, Shell Lake, Narada Lake, School Lake, and Glen Lake. Black Ash is common in the overstory with cedar, hemlock, white birch, and red maple. These woods tend to be more open than cedar swamps and allow for a more diverse understory in which balsam fir, black ash, and hemlock are most common. Other understory species include mountain maple (*Acer spicatum*), silky dogwood (*Cornus ammomum*), and cedar. As is the case with the cedar swamps, herbs tend to be quite diverse. The most common of these include *Aralia nudicaulis*, *Atherium filix-femina*, *Dryopteris intermedia*, *Dryopteris spinulosa*, *Epilobium ciliatum*, *Geum allepicum*, *Geum canadense*, *Lycopus uniflorus*, *Onoclea sensibilis*, *Osmunda regalis*, *Scutellaria galericulata*, *Thelypteris palustris*, and *Carex* species.

Alder thickets

These areas are quite wet. Alder and willow (*Salix* spp.) form a very dense shrub zone. Other woody species include *Cornus rugosa*, *C. stolonifera*, and *Ilex verticillata*.

Herbs are much the same as the cedar swamps and black ash swamps including *Glyceria striata*, *Iris virginica*, *Lycopus uniflorus*, *Lysimachia thyrsiflora*, *Onoclea sensibilis*, *Osmunda cinnamomea*, *O. regalis*, *Rubus hispidus*, *Scutellaria galericulata*, *Thelypteris palustris*, *Viola cucullata*, and *Carex* species.

Marshes

Marshes are wetlands with predominately herbaceous cover. Such areas are most common along the Platte River, near the mouth of Otter Creek, by Round Lake, and the Day Mill Pond. Species occurring in these places include *Asclepias incarnata*, *Calamagrostis canadensis*, *Campanula aparinoides*, *Cirsium arvense*, *Cladium mariscoides*, *Eupatorium maculatum*, *E. perfoliatum*, *Impatiens capensis*, *Phragmites australis*, *Thelypteris palustris*, *Triadenum fraseri*, *Typha latifolia*, and *Urtica dioica*, as well as *Scirpus* and *Carex* species.

PERMANENT PLOTS

A few Mainland permanent plots were established, away from heavily used areas, to gather data at selected sites. These plots were established primarily to allow the observation of any natural vegetation changes at a specific site rather than to quantitatively describe the vegetation composition. Locations of these plots are shown in Figure 2. Data sheets are included in Appendix C.

BTH Nos. 24. Matelski Field

This plot, now in an open field, affords the opportunity to observe old field succession as this field is allowed to grow in. Its floristic composition is most similar to the Carlson Farm Deer Exclosure plot and its control (BTH Nos. 3 and 4) on North Manitou.

BTH Nos. 25 and 27. Pine Haven and Crystal River

Both of these plots are situated on old beach ridges. The Pine Haven plot is drier allowing pines to predominate. Balsam fir is most common in the understory. Trees outside this plot which were not sampled include red oak and red maple. The moister soil of the Crystal River plot has favored hardwoods in the overstory. Balsam fir and white pine are most common in the understory. Hemlock is more common at this site rather than at Pine Haven. The soil nutrients, however, may be one limiting factor for the development of the herbaceous layer. The herbs of this plot are not as rich as some northern hardwood plots and tend to include drier site species such as *Pteridium aquilinum* and *Trientalis borealis*. This plot is most similar to Burdicks Corners plot (BTH No. 17) on South Manitou.

BTH No. 26. Thorson Rd.

As stated earlier, this vegetation type is most prominent on the south and west facing hills of glacial moraines on the Mainland. The aspect of the slope may have delayed the return of Northern Hardwood forests after lumbering. Long term monitoring of this plot may note whether the Northern Hardwoods eventually occur at this spot or, that for these sites, the Oak-Aspen forest is the climax.

BTH Nos. 28 and 32. Elm Woods and Alligator Hill.

These sites will probably show the largest amount of change in forest composition in the next 25 years. American elm in plot 28 will probably be replaced by more sugar maple, white ash, and perhaps some basswood. The Alligator Hill plot appears to be a transition from Oak-Aspen to Northern Hardwoods. Red oak and big-tooth aspen will probable decline while beech and sugar maple will continue to increase in importance.

BTH Nos. 29, 30, 31, 33. Burnam Rd., William Casier, Turkey Farm, and Empire Bluffs.

A view of the diversity of the Northern Hardwoods is afforded by these plots. *Fagus grandifolia* and *Acer saccharum* are usually the dominant species. The low importance of *A. saccharum* in the Burnham Rd. plot is probably a result of the placement of the plot rather than the actual importance of the species. *Tsuga canadensis* occurs outside this plot. *Fraxinus americana*, *Tilia americana*, and *Tsuga canadensis* occur outside of the Turkey Farm plot. Generally speaking those northern Hardwood stands which are closer to Lake Michigan (Nos. 31 and 33) or are at higher elevations (No. 30) have a richer herb layer. This may be do in part to subtle differences in the glacial geology of these sites.

FRAGILE HABITATS

Dunes are the most conspicuous and most visited areas within the Lakeshore. The dune communities which have developed on them are, perhaps, the most fragile habitats covered in this study. Human impact on dune vegetation on beaches and along dune trails is clearly evident and long lasting. Old roads are clearly visible on the Sleeping Bear plateau from the dune rides which ended in 1977 after approximately 40 years of operation. The Park Service should continue its enforcement of non-motorized recreational use of dune areas. The unspoiled character of the dunes to the south of the Platte River could be maintained by keeping them remote.

The Bow Lakes section is floristically diverse due in part to the kettle topography. Rich hardwoods surround small pools in the interior, the Bow Lakes have fen-like vegetation on their south margin, and a *Sphagnum* bog can be found in the southern part of the tract. Some relatively young woods can be found on the east side of the central valley and near the bog. Currently, the area is protected by its obscurity. Minimal development should be planned for this area to keep it from being spoiled through over-use.

The Otter Creek area including the Marl Springs is another floristically diverse area which should be protected. A comprehensive description of this area will be included in a future aquatic study of the Lakeshore.

SPECIAL STATUS SPECIES

Ten species collected during the field investigation have either threatened or special concern status as designated by the State of Michigan. One of these species, Pitcher's thistle (*Cirsium pitcheri*), is also a candidate for the federal list of threatened species. Criteria for determining if a species is threatened in Michigan have been set forward by Beaman, et al. (1985). Those threatened species occurring on the Mainland have a limited state-wide distribution (generally five counties or less) and are either rare in the Great Lakes region, disjuncts of phytogeographic significance, or are ecologically restricted to a vulnerable habitat such as dunes. Special concern species are uncommon, yet are more widespread than threatened species. State threatened species occurring in the Mainland flora are Pitcher's thistle, broom-rape (*Orobanche fasciculata*), ginseng (*Panax quinquefolius*) pine-drops (*Pterospora andromedea*), three-birds orchid (*Triphora trianthophora*), and a grass (*Bromus pumpellianus*). Three Michigan special concern species within the study area include ram's-head lady-slipper (*Cypripedium arietinum*), spotted wintergreen (*Chimaphila maculata*), and a sedge (*Carex concinna*). The dunewort (*Botrychium* sp. nov.), a possible candidate for threatened status, also occurs on the Mainland. Chestnut (*Castanea dentata*) was found in one location and is listed as endangered (where native in southeastern Michigan). Mainland distribution maps (Appendix D) are primarily based on my field notes and collections and on Michigan Natural Features Inventory (MNFI) records. State distribution inset maps of most species were supplied by the MNFI. Others were taken from Voss (1972).

PITCHER'S THISTLE
Cirsium pitcheri Torr. (T. & G.)

MI THREATENED
 US PROPOSED THREATENED

This Great Lakes endemic is limited to the sand dunes of Lakes Michigan, Huron, and Superior. The species is doing very well on the Mainland. Loveless (1984) conducted most of her field research on the population biology of the species within the Lakeshore. Electrophoretic evidence from her research indicates that this thistle is most closely related to *Cirsium canescens*, a prairie species from western Nebraska.

PUMPELLY'S BROME GRASS
Bromus pumpellianus Scribner

MI THREATENED

This species is a western disjunct from the Rockies and Black Hills with its main range in Alaska and northwest Canada (Voss, 1972). Its distribution in Michigan is scant. Its primary habitat is sand dunes and was only found on the Mainland on the perched dunes of Pyramid Pt.

BROOM-RAPE
Orobanche fasciculata Nutt.

MI THREATENED

This species, at its easternmost edge of its range, is parasitic on wormwood (*Artemisia caudata*), and in Michigan it is only found on the sand dunes of Lake Michigan (Guire and Voss, 1963). On the Mainland it was readily found on both coastal and perched dunes.

GINSENG
Panax quinquefolius L.

MI THREATENED

This species, originally widespread in the deciduous forests of the eastern United States and adjacent Canada is threatened with extirpation throughout much of its range due to intense collection for commercial pharmaceutical purposes. The root is eagerly sought as a general cure-all and aphrodisiac. On the Mainland this species has been found

in rich Northern Hardwoods near Lake Michigan. The species would best be protected by keeping the locations of these populations from the general public.

PINE-DROPS

MI THREATENED

Pterospora andromedea Nutt.

This species has a limited range in Michigan and the Great Lakes region and is restricted to dry pine land or sometimes moister woods (Marquis and Voss, 1981). The main range of this saprophyte is in the West with disjunct populations in the Great Lakes and St. Lawrence Regions. In Michigan the species often occurs in shoreline areas and is known for its infrequent occurrence and variable abundance from year to year. On the Mainland it has been documented in the coastal pine forest along Good Harbor Bay. Overlease and Overlease (1985a, 1986) note this species occurring with ram's-head lady-slipper in the jack pine stands along Platte Bay near Aral, however, it was "last seen at this station in 1966".

THREE-BIRDS ORCHID

MI THREATENED

Triphora trianthophora (Sw.) Rydb.

This orchid population was discovered in 1974 by John M. Van Arsdale, science teacher in the Saginaw Valley School System. It is well north of its main southern range, and the south facing slope on which it occurs may aid in providing a compensated site. Fred Case (pers. comm.) suggests that the ameliorating effect of Lake Michigan could account for the persistence of this orchid here, and that its occurrence could reflect an eastward migration from Wisconsin rather than a northward migration from areas to the south. The population size has varied widely from year to year ranging from 7-200 (Van Arsdale, 1982). Approximately 30 blooming plants were observed in 1985. Overlease and Overlease (1985a) mention a personal communication from H. Gall describing this species as occurring at the "foot of bluff near Aral, no specimen collected".

Carex concinna R. Brown

MI SPECIAL CONCERN

This sedge tends to be very local on the edges of cedar and balsam thickets near gravelly calcareous shores of the northern edges of Lakes Michigan and Huron (Voss, 1972). It was found south of Sleeping Bear Pt. on a "dry gravelly ridge through *Thuja* forest at base of dunes. Scarce." (*Reznicek 7350*; MICH).

SPOTTED WINTERGREEN

MI SPECIAL CONCERN

Chimaphila maculata (L.) Pursh

This southern species is generally found in dry oak and pine woods, but occasionally may occur in hardwoods. In western Michigan it is usually found on dry sandy soil often associated with sand dunes. A surprising site for this species was near some very wet woods south of M-22 near the Platte plains near Saffron Rd. in the Platte section. Overstory species here are predominately white birch, hemlock, and red maple with some balsam fir, red oak, and black cherry. Associated herbaceous species include *Maianthemum canadense*, *Mitchella repens*, and *Trientalis borealis*. This small population is a new record for this species in Benzie County.

RAM'S-HEAD LADY-SLIPPER

MI SPECIAL CONCERN

Cypripedium arietinum R. Brown

This orchid is the smallest native lady-slipper in Michigan. It grows best (Voss, 1972) on low dunes in partial shade of fringing conifers. On the Mainland this species is relatively abundant in the jack pine stands along Platte Bay. It was also found to a lesser extent in the coastal pine forest along Good Harbor Bay.

CHESTNUT

MI ENDANGERED

Castanea dentata (Marsh.) Borkh.

Although not native to this part of Michigan, the occurrence of this species should be noted. Only one small tree was found on the Mainland near the remains of an old overgrown orchard near the base of Alligator Hill north of the Glen Lake public access. This tree was probably planted in association with the orchard, a common practice as

attested by the regular occurrence of chestnuts at the sites of old farms and orchards along Lake Michigan (Brewer, 1982).

SLEEPING BEAR DUNEWORD
Botrychium sp. nov.

POSSIBLE MI THREATENED

In 1982 Joseph Beitel, a University of Michigan Botany graduate student, first found this fern on the dunes at Pyramid Pt. Specimens were collected for Drs. Warren H. and Florence S. Wagner, University of Michigan, who were working on a monograph of the genus. In 1984 a larger population was found by Dr. A. A. Rezincek, also of the University of Michigan, on the protected dunes near Sleeping Bear Pt. During the course of this Mainland vegetation study additional populations were found within the National Lakeshore on the Sleeping Bear Plateau, Empire Bluffs, and South Manitou Island. In all cases these populations were growing on, or in sands originally from, perched dunes. In June 1985, I guided the Wagners to these new locations. A few days later the three of us explored the Grand Sable Dunes of Pictured Rocks National Lakeshore and found the dune moonwort, dunewort for short, on the perched dunes of Lake Superior. A new station on a perched dune in Benzie County south of Frankfort was found in late June 1985. By mid July these 1-2" tall ferns have disappeared. The taxonomic rank (ie. species or subspecies) of this fern has not yet been worked out. Currently the dunewort has no state designation, but if it were listed, would probably be considered threatened due to its limited range and restricted perched dune habitat. Preliminary investigations by the Wagners suggest that it is most closely related to a western prairie species, a pattern common among dune plants of the Great Lakes.

RECOMMENDATIONS AND CONCLUSIONS

1. The composition of mainland forests and the natural succession of fields is strongly influenced by the region's varied glacial and postglacial geology. The Coastal Forest predominately occurs on the post-Nipissing dunes and relict beach ridges, while the

Northern Hardwoods are characteristically associated with moraines. The potential natural vegetation of a given area may be masked by selective timber cutting practices and natural processes such as the severe decline of American elm (*Ulmus americana*) due to Dutch elm disease. The unmanaged open fields should succeed to forests with a composition similar to adjacent woods. The succession of some old fields might need to be suspended to maintain the habitat for known localities of rare plants such as moonwort (*Botrychium lunaria*) which will disappear if the fields are allowed to continue to become forest.

2. The Mainland portion of Sleeping Bear Dunes National Lakeshore is subject to intense, yet uneven recreational use. Many fragile, yet floristically diverse areas have remained unspoiled by their inaccessibility or obscurity.

a) If the Bow Lakes section is to be made accessible to the public, its development should be kept to a minimum.

b) The dunes south of the Platte River and the Otter Creek drainage system from Otter Lake to the Otter Creek bridge at Aral should remain free from additional development.

3. Development should be diverted from documented locations of special status species indicated on the distribution maps of Appendix D.

4. Although this study did not directly measure the human impact on areas of intense recreational use (e.g. dunes and beaches), the Park Service should continue to seek ways of minimizing this impact. Changes from year to year might be noted using comparative aerial photographs. The USCS office in Lake Leelanau orders annual coverage of the county on 35mm slides. Perhaps the previous year's coverage of the Lakeshore might be acquired before it is discarded when replaced by the slides of the current year's overflight. Visitor use trends in areas such as on the Sleeping Bear Plateau and at Sleeping Bear Pt. could easily be observed, especially as the slide collection grows over time.

5. The Mainland permanent plots should be revisited at least every 10 years, perhaps every 5, to record tree basal area, count understory species, and record ground layer species.

6. The impact of deer on the mainland vegetation, most notably the forests, could be observed by constructing mainland deer exclosures.

7. Additional information on the special character and special status species of aquatic and wetland habitats will be forthcoming in an aquatic vegetation study of the Lakeshore.

CATALOGUE OF VASCULAR PLANTS

The following list of 98 families, 354 genera, and 704 species was derived primarily from extensive documentation during the field investigation. Unless specifically noted, all species listed and numbered represent my collections which have been deposited at the University of Michigan Herbarium (MICH). Some specimens have been added to the herbarium of Sleeping Bear Dunes National Lakeshore. SI denotes sight records. Cards used in the preparation of Michigan Flora, Parts 1 and 2 (Voss, 1972, 1985) were consulted for collection data on species not encountered during this study. The herbarium at Cranbrook Institute of Science (BLH) was examined for specimens collected by Paul W. Thompson, and label data was copied for dicots not covered by Voss (1985). Species listed by Overlease and Overlease (1985a, 1985b, 1986) which were not found during this study are also indicated ({O}). Voucher specimens for these species are probably in the Overlease personal herbarium.

Nomenclature generally follows Mickel (1979) for ferns and fern allies, and Gleason and Cronquist (1963) for those groups not covered by Voss (1972, 1985). Abundance estimates follow Voss (1972). The families within each major group and then the species within each family are listed in alphabetical order. Common names have also been included. The largest family in the Mainland flora, the Compositae is represented by 63 species. *Carex*, the largest genus, has 45 species.

PTERIDOPHYTES (Clubmosses, Horsetails, and Ferns)

Lycopodiaceae (CLUBMOSS FAMILY)

Lycopodium annotinum L. STIFF CLUBMOSS

Frequent. Cedar swamps and Coastal Forest. 2516, 3039.

Lycopodium clavatum L.

Frequent. Coastal Forest. 3452, 3503, 3620.

Lycopodium complanatum L. NORTHERN RUNNING-PINE

Occasional. Coastal Forest. 2756.

Lycopodium dendroideum Michaux

Frequent. Northern Hardwoods and Coastal Forest. 3280.

Lycopodium lucidulum L. SHINING CLUBMOSS

Frequent. Cedar swamps and Northern Hardwoods. 2789, 3600, 3616.

Lycopodium obscurum L. TREE CLUBMOSS

Frequent. Northern Hardwoods and Coastal Forest. 2080, 2129, 3270.

Lycopodium tristachyum Pursh GROUND CEDAR

Occasional. Coastal Forest. 3670.

Selaginaceae (SELAGINELLA FAMILY)

Selaginella rupestris (L.) Spring ROCK SPIKEMOSS

Local. Coastal dunes near woods border along Good Harbor Bay and on relict beach ridges near Peterson Beach and Bass Lake. 2938, 3037.

Equisetaceae (HORSETAIL FAMILY)

Equisetum arvense L. FIELD HORSETAIL

Common. Old fields, roadsides, cedar swamps, and dunes. 3035, 3609, 3619, 3650.

Equisetum x ferrisii Clute

Occasional. Sandy fields. 3230.

Equisetum fluviatile L. WATER HORSETAIL

Occasional. Wetlands in standing water. 3438.

Equisetum hyemale L. SCOURING-RUSH

Common. Roadsides, dunes, wetlands. 2832, 3250, 3499, 3536, 3643.

Equisetum scirpoides Michaux DWARF SCOURING-RUSH

Occasional. Cedar swamps. 3274.

Equisetum sylvaticum L. WOODLAND HORSETAIL

Occasional. Cedar swamps. 3614.

Equisetum variegatum Schleich

Frequent. Jack pine stands. 3479, 3493.

Ophioglossaceae (ADDER'S TONGUE FAMILY)

Botrychium dissectum Sprengel DISSECTED GRAPE-FERN

Local. Along trail off Co. 675, perhaps more common. 3602.

Botrychium lunaria (L.) Sw. MOONWORT

Local. Old orchard along Empire Bluffs trail. 3261.

Botrychium matricariifolium (Doll) A. Braun DAISY-LEAVED GRAPE-FERN

Common. Old fields succeeding to forest. 2323, 2338, 2387, 3164, 3172, 3189, 3192, 3194, 3231, 3266b.

Botrychium minganense Victorin

Occasional in old orchards and old fields. 3260, 3267.

Botrychium multifidum (Gmel.) Rupr. LEATHERY GRAPE-FERN

Occasional. Oak-Aspen woods and some Northern Hardwoods. 2735, 3529.

Botrychium simplex E. Hitch. LITTLE GRAPE-FERN

Frequent. Old fields. 3232, 3266a, 3405.

Botrychium virginianum (L.) Sw. RATTLESNAKE FERN

Common. Cedar swamps and Northern Hardwoods. 2829, 2838.

Botrychium sp. nov. SLEEPING BEAR DUNEWORD

Local. Perched dunes of Empire Bluffs, Sleeping Bear plateau, and Pyramid Pt. 3028, 3184, 3193, 3195, 3196.

Ophioglossum vulgatum L. ADDER'S TONGUE

Occasional in wet fields. 3402, 3578.

Osmundaceae (ROYAL FERN FAMILY)

Osmunda cinnamomea L. CINNAMON FERN

Frequent. Cedar swamps and wetlands. 2274, 2570, 3512.

Osmunda claytoniana L. INTERRUPTED FERN

Local. Wetlands. 3518, 3667.

Osmunda regalis L. ROYAL FERN

Frequent. Cedar swamps and wetlands. 2571, 2870.

Polypodiaceae (FERN FAMILY)

Adiantum pedatum L. MAIDENHAIR FERN

Frequent. Northern Hardwoods. 2744, 2792.

Asplenium platyneuron (L.) Oakes ex Eaton EBONY SPLEENWORT

Local. Old orchard along Empire Bluffs trail and old field near N. Bar Lake overlook on Scenic Drive. 3406.

Athyrium filix-femina (L.) Roth LADY FERN

Frequent. Cedar swamps and Northern Hardwoods. 2865.

Athyrium pycnocarpon (Sprengel) Tidestrom GLADE FERN

Local. Glacial kettle hole, Empire Twp., Sec. 15. 2971.

Athyrium thelypteroides (Michaux) Desv. SILVERY SPLEENWORT

Local. Glacial kettle hole, Empire Twp., Sec. 15. and morainal hills east of Round Lake. 2972, 3540.

- Cystopteris bulbifera* (L.) Bernh. BULBLET FERN
Frequent. Rich Northern Hardwoods. 4409.
- Cystopteris tenuis* (Michaux) Desv. FRAGILE FERN
Occasional. Rich Northern Hardwoods. 2791, 3645.
- Dryopteris cristata* (L.) A. Gray CRESTED SHIELD-FERN
Frequent. Cedar swamps and wetlands. 2820, 3219, 3625.
- Dryopteris intermedia* (Muhl. ex Willd.) A. Gray EVERGREEN WOOD-FERN
Frequent. Northern Hardwoods. 2844.
- Dryopteris marginalis* (L.) A. Gray MARGINAL WOOD-FERN
Common. Northern Hardwoods. 2742, 2787.
- Dryopteris spinulosa* (O. F. Muell.) Watt. SPINULOSE WOOD-FERN
Frequent. Northern Hardwoods. 4051.
- Dryopteris* x *triploidea* Wherry
Occasional. Northern Hardwoods. 3946.
- Gymnocarpium dryopteris* (L.) Newm. OAK FERN
Frequent. Cedar swamps and black ash swamps. 4321.
- Matteuccia struthiopteris* (L.) Todaro OSTRICH FERN
Local. Wet woods north of Round Lake. 2927.
- Onoclea sensibilis* L. SENSITIVE FERN
Common. Cedar swamps and wetlands. 2869.
- Polypodium virginianum* L. COMMON POLYPODY
Local. Wooded bluffs north of Aral. 2837.
- Polystichum lonchitis* (L.) Roth NORTHERN HOLLY-FERN
Local. Wooded bluff near Pyramid Pt. 3906.
- Pteridium aquilinum* (L.) Kuhn. BRACKEN FERN
Common. Old fields, oak-pine woods, and coastal forests. 4726.
- Thelypteris hexagonopteris* (Michaux) Weath BROAD BEECH-FERN
Local. Northern Hardwoods west of M-22 north of Long Lake Rd. 2978.
- Thelypteris palustris* Schott. MARSH FERN
Common. Cedar swamps and wetlands. 2866, 3505.
- Woodwardia virginica* (L.) J. E. Smith VIRGINIA CHAIN-FERN
Local. Wet woods bordering bog-like area Port Oneida. 2818.

GYMNOSPERMS

Cupressaceae (CYPRESS FAMILY)

Juniperus communis L. COMMON JUNIPER

Common. Dunes and old fields. 3932.

Juniperus horizontalis L. CREEPING JUNIPER

Frequent. Dunes. 3931.

Thuja occidentalis L. WHITE CEDAR

Common. Cedar swamps, wetlands, and Coastal Forest. 2830, 3504.

Pinaceae (PINE FAMILY)

Abies balsamea (L.) Miller BALSAM FIR

Common. Cedar swamps. SI.

Larix laricina (DuRoi) K. Koch LARCH

Common. Bogs, and cedar swamps. 2425.

Picea mariana (Miller) BSP. BLACK SPRUCE

Occasional. Bogs and wet dune swales. 3449.

Pinus banksiana Lamb. JACK PINE

Common. Jack Pine stands and Coastal Forest. 2061.

Pinus resinosa Aiton RED PINE

Common. Coastal Forests, and Jack Pine stands. 3474.

Pinus strobus L. WHITE PINE

Common. Coastal Forests, cedar swamps, Oak-Aspen woods, and some Northern Hardwoods. 3502.

Tsuga canadensis (L.) Carr. HEMLOCK

Common. Rich Northern Hardwoods. SI

Taxaceae (YEW FAMILY)

Taxus canadensis Marsh. YEW

Local in Northern Hardwoods behind dune front. Most abundant near the end of Empire Bluffs trail. 4405.

MONOCOTYLEDONS

Alismataceae (WATER-PLANTAIN FAMILY)

Sagittaria latifolia Willd. DUCK-POTATO

Local. Wetlands. 2649.

Amaryllidaceae (AMARYLLIS FAMILY)

Narcissus poeticus L. NARCISSUS

Locally persisting, but perhaps spreading slightly at old homesites and along roadsides. 2094.

Narcissus pseudo-narcissus L. DAFODILL

Locally persisting, but perhaps spreading slightly at old homesites and along roadsides. 2068.

Araceae (ARUM FAMILY)

Arisaema triphyllum (L.) Schott. JACK-IN-THE-PULPIT

Frequent. Cedar swamps, and rich Northern Hardwoods. 2211, 2163

Commelinaceae (SPIDERWORT FAMILY)

Tradescantia ohioensis Raf.

Locally spreading behind Cleveland Twp. Cemetery. 2438.

Tradescantia virginiana L.

Local. Scarcely spreading from former house sites along roads. 2594, 3431.

Cyperaceae (SEDGE FAMILY)

Carex aquatilis Wahl.

Occasional. Wetlands. 2396.

Carex arctata Boott

Occasional. Coastal Forest and Oak-Aspen Woods. 2134, 2157b.

Carex aurea Nutt.

Occasional. Dune swales. 2347.

Carex bebbii (Bailey) Fern.

Roadside near Shalda. (PWT, L-3435).

Otter Creek. {O}.

Carex brunescens (Pers.) Poiret

Occasional. Northern Hardwoods. 3166.

Carex buxbaumii Wahl.

Occasional. Dunes pools. 3429.

Carex canescens L.

Occasional. Bogs. 2229.

Carex castanea Wahl.

Frequent. Cedar swamps. 2275, 3242.

Carex communis Bailey

Common. Coastal Forest, Oak-Aspen woods, and some Northern Hardwoods. 2115, 2135, 2153, 2300.

- Carex comosa* Boott
Occasional. Dune swales. 3437.
- Carex concinna* R. Br.
Sleeping Bear Pt. (Reznicek 7350, MICH)
- Carex crinita* Lam.
Occasional. Wetlands. 3417.
- Carex cumulata* (Bailey) Fern.
Occasional. Bogs. 2822.
- Carex disperma* Dewey
Common. Cedar swamps. 2265, 2482, 3239.
- Carex eburnea* Boott
Common. Cedar swamps and jack pine stands. 2062, 2143.
- Carex flava* L.
Common. Wetlands. 2236, 2346, 2391, 2486, 3243.
- Carex garberi* Fern.
Common. Dune pools and jack pine stands. 2218, 3059.
- Carex gracillima* Schw.
Occasional. Wetlands. 3418.
- Carex hystericina* Willd.
Common. Cedar swamps and wetlands. 2206, 2261, 2392, 2858, 2861.
- Carex interior* Bailey
Common. Coastal Forest, dunes, and dune swales. 2174, 2205, 2237, 2377b, 2397.
- Carex intumescens* Rudge.
Frequent. Wetlands and moist woods. 2266, 3269, 3419.
- Carex lacustris* Willd.
Occasional. Wetlands. 3414.
- Carex laevinvaginata* (Kuk) Mack.
Occasional. Cedar swamps. 3246.
- Carex lanuginosa* Micx.
Occasional. Roadsides. 3460.
- Carex lasiocarpa* Ehrh.
Occasional. Wetlands. 2398.
- Carex laxiflora* Lam.
Occasional. Oak-Aspen Woods and some Northern Hardwoods. 2157a.
- Carex leptalea* Wahl.
Occasional. Cedar swamps. 2189, 2490.

- Carex leptonevia* Fern.
Occasional. Wetland woods and some Northern Hardwoods. 2158, 2185.
- Carex lupulina* Willd.
Occasional. Wetlands. 3414.
- Carex muhlenbergii* Willd.
Frequent. Fields and dunes. 2245, 2360, 3225.
- Carex oligosperma* Michx.
Occasional. Bogs. 2228.
- Carex pallescens* L.
Occasional. Cedar swamps. 3240
- Carex pensylvanica* Lam.
Common. Dry Coastal Forests. 2286, 3031, 3436.
- Carex plantaginea* Lam.
Frequent. Northern Hardwoods. 2026, 2076, 2295, 2327.
- Carex projecta* Mack.
Occasional. Wetlands. 3415.
- Carex psuedocyperus* L.
Occasional. Cedar swamps. 2864.
- Carex retrorsa* Schw.
Occasional. Wetlands. 3571.
- Carex rosea* Willd.
Frequent. Wetland woods, cedar swamps, and some Northern Hardwoods. 2152, 3241, 3416.
- Carex rugosperma* Mack.
Shalda pine plains Good Harbor Bay. (PWT, L-3418).
- Carex scoparia* Willd.
Occasional. Wetlands. 3573.
- Carex stipata* Willd.
Frequent. Coastal Forest. 2204, 2366, 3435.
- Carex stricta* Lam.
Occasional. Cedar swamps. 3248.
- Carex trisperma* Dewey
Occasional. Bogs and wetland woods. 2225, 3539.
- Carex viridula* Michaux
Common. Jack pine stands, dune pools, and some dune swales. 2219, 3228.

- Carex vulpinoidea* Michaux
Occasional. Cedar swamps. 2856.
- Cladium mariscoides* (Muhl.) Torrey
Occasional. Wetlands. 2394, 2610, 2637.
- Cyperus filiculmis* Vahl.
Local. Field near Visitor Center, perhaps more common. 2738.
- Cyperus schweinitzii* Torrey
Occasional. Roadsides and dunes. 2582, 3682.
- Eleocharis elliptica* Kunth
Common. Dune pools and dune swales. 2069, 2345, 2399.
- Eleocharis erythropoda* Steudel
Local. Jack pine stands. 3494.
- Eriophorum spissum* Fern.
Local. Bogs. 2226b.
- Eriophorum virginicum* L.
Occasional. Bogs. 2440.
- Eriophorum viridi-carinatum* (Engelm.) Fern.
Local. Fen-like areas. 2395, 2487.
- Scirpus acutus* Bigelow
Occasional. Wetlands. 2393.
- Scirpus americanus* Pers.
Occasional. Wetlands. 2656.
- Scirpus atrovirens* Willd.
Common. Wetlands and dune swales. 2511, 2573, 3411.
- Scirpus cyperinus* (L.) Kunth
Frequent. Wetlands. 2816.
- Gramineae (GRASS FAMILY)
- Agropyron dasystachyum* (Hooker) Scribner
Frequent. Dunes. 2242, 2452b.
- Agropyron repens* (L.) Beauv. QUACKGRASS
Common. Roadsides. 2584, 3397, 3450, 3451, 3587.
- Agropyron trachycaulum* (Link) Malte. WHEATGRASS
Occasional. Old fields. 2296.
- Agrostis hyemalis* (Walt.) BSP.
N. of Highway 22, E. Benzie St. Pk. on logger Rd. toward Lake Michigan. (M. T. Hall, Oct 7, 1958).

- Agrostis perennans* (Walt.) Tuckerm. UPLAND BENT
Frequent. Wetlands. 3567, 3659b.
- Ammophila breviligulata* Fern. BEACH GRASS
Common. Dunes. 2627, 3497.
- Andropogon gerardii* Vitman BIG BLUESTEM
Occasional. Along Lake Michigan Rd. (Benzie Co.) and on dunes at Aral and Good Harbor Bay. 2828, 2936, 3488.
- Andropogon scoparius* Michaux LITTLE BLUESTEM
Common. Dunes. 2834, 3496.
- Arrhenatherum elatius* (L.) Presl. TALL OATGRASS
Local. Along M-22 near Trail End Rd. and Swedish Mission Cemetery. 2592, 2615.
- Avena sativa* L. OATS
Local. Day Forest Rd. near M-109. 2661.
- Brachyelytrum erectum* (Roth) Beauv.
Local. Northern Hardwoods along Echo Valley Rd. Perhaps more common. 2538.
- Bromus inermis* Leysser SMOOTH BROME
Common. Old fields and roadsides. 2316, 2444, 2670.
- Bromus mollis* L.
Platte River Point Rd., north side about 1/2 way from Route 22 to Point. {O}.
- Bromus pumpellianus* Scribner
Local. Dunes of Pyramid Pt. 3396.
- Bromus tectorum* L. DOWNY CHESS
Occasional. Roadsides and disturbed areas. 2400, 2607.
- Calamagrostis canadensis* (Michaux) Beauv. BLUE-JOINT
Common. Wetlands. 3410, 3440.
- Calamagrostis inexpansa* Gray
Dunes of Glen Haven. (J. H. Ehler, 5609).
- Calamovilfa longifolia* (Hooker) Scribner
Common. Dunes. 2626, 2764.
- Cinna latifolia* (Goepp.) Griseb.
Frequent. Wetlands. 2640.
- Dactylis glomerata* L. ORCHARD GRASS
Common. Old fields and roadsides. 2334, 3427.
- Danthonia spicata* (L.) R. & S. OATGRASS
Common. Old fields. 3517.

- Deschampsia flexuosa* (L.) Beauv.
Frequent. Coastal Forest. SI.
- Digitaria saguinalis* (L.) Scop.
Local. Roadsides near corn fields along Norcronk Rd. 2665.
- Echinochloa crusgali* (L.) Beauv. BARNYARD GRASS
Occasional. Disturbed areas. 3876.
- Echinochloa muricata* (Beauv.) Fern.
Local. Wet edge of Lutheran Cemetery. Perhaps more common. 2621.
- Elymus arenarius* L.
Rare. Small population on dunes of Platte Bay south of Platte River. 3467.
- Elymus canadensis* L.
Frequent. Dunes and roadsides. 2559, 2662.
- Eragrostis cilianensis* (All.) Mosher STINK GRASS
Occasional. Disturbed areas and roadsides. 2605, 2963.
- Eragrostis poaeoides* R. & S.
Old cottage site, Otter Lake. {O}.
- Eragrostis spectabilis* (Pursh) Steudel TUMBLE GRASS
Occasional. Roadsides. 2739.
- Festuca occidentalis* Hook.
Oak-pine forest, swale, north side Platte River Point Rd. 1/2 way from Route 22 to Point. {O}.
- Festuca rubra* L.
Oak-pine stand just north of Platte River Campground. {O}.
- Festuca saximontana* Rydb.
Occasional. Dunes and roadsides. 2377, 2569.
- Glyceria striata* (Lam.) Hitch. FOWL MANNA GRASS
Common. Cedar swamps and wetlands. 2518, 2859, 2896, 2997, 3420, 3434, 3509.
- Hierochloa odorata* (L.) Beauv. SWEET GRASS
Local. Wet field near Day Forest Rd. 3049.
- Hystrix patula* Moench. BOTTLEBRUSH GRASS
Occasional. Rich Northern Hardwoods often near dunes. 2406, 2533.
- Koeleria macrantha* (Ledeb.) Schultes JUNE GRASS
Frequent. Dunes. 2609, 2625.
- Melica smithii* (Gray) Vasey
Common. Northern Hardwoods. 2182, 2322, 2354, 2408, 2477, 3624.

Millium effusum L.

Frequent. Northern Hardwoods. 2214, 2298, 2330.

Oryzopsis asperifolia Michaux

Common. Coastal Forest and Northern Hardwoods. 2215, 2238.

Oryzopsis pungens (Sprengel) Hitchc.

Local. Coastal Forest near Good Harbor Bay. Perhaps more common. 2426a.

Oryzopsis racemosa (Sm.) Hitchc.

Frequent. Coastal Forests. 2059, 3520, 3880.

Panicum capillare L.

Roadside, Platte River Point Rd. {O}.

Panicum commonsianum Ashe

Shalda pine plains near Lake Michigan. (PWT, L-3231).

Roadside, open dunes area, just north of Platte River Campground. {O}.

Panicum depauperatum Muhl.

Oak-pine forest just north of Platte River Campground. {O}.

Panicum implicatum Britton

Occasional. Open fields. 2503.

Panicum praecocius Hitchc. & Chase

Local. Sedge mat a south end of Bow Lake. 2390.

Panicum xanthophysum Gray

Open oak woods near Pyramid Pt. (PWT, L-3057).

Panicum virgatum L. SWITCH GRASS

Occasional. Disturbed ground and dunes. 2604, 2631, 2762.

Phalaris arundinacea L. REED CANARY GRASS

Occasional. Roadsides. 2528, 2562, 2653.

Phleum pratense L. TIMOTHY

Common. Old fields and roadsides. 2409, 2442.

Poa alsodes Gray

Occasional. Old fields and trail sides. 2184, 2407, 3222, 3641.

Poa compressa L. CANADA BLUEGRASS

Common. Old fields. 2317, 3229.

Poa nemoralis L.

Occasional. Northern Hardwoods. 2326.

Poa pratensis L.

Frequent. Old fields and roadsides. 2441.

Poa saltuensis Fern. & Weig.

Rich hardwoods, Aral. {O}.

Schizachne purpurascens (Torrey) Swallen FALSE MELIC
Local. Coastal Forest near Crystal River. Perhaps more common. 3165.

Setaria viridis (L.) Beauv. GREEN FOXTAIL
Frequent. Roadsides. 2619, 2666, 3469.

Secale cereale L. RYE
Occasional. Roadsides and disturbed sites. 2292, 2293.

Sporobolus cryptandrus (Torrey) Gray
Local. Trail End Rd. 2593.

Sporobolus vaginiflorus (Torrey) Wood
Dry roadside near Pyramid Pt. (PWT, L-3338)

Iridaceae (IRIS FAMILY)

Iris versicolor L. WILD BLUE FLAG
Common. Wetlands. 2289, 2340.

Iris virginica L. SOUTHERN BLUE FLAG
Occasional. Wetlands. 2367.

Sisyrinchium montanum Greene BLUE-EYED GRASS
Local. Old field at end of Greenan Rd. 3960.

Juncaceae (RUSH FAMILY)

Juncus dudlei Wieg.
Occasional. Moist woods. 2542.

Juncus effusus L.
Occasional. Wetlands. 2512.

Juncus tenuis Willd.
Occasional. Wetlands. 3412.

Luzula multiflora (Retz.) Lej.
Local. Trail east of Bass Lake, perhaps more common. 2264.

Juncaginaceae (ARROW-GRASS FAMILY)

Scheuchzeria palustris L.
Local. Bogs. 2900.

Liliaceae (LILY FAMILY)

Allium cepa L. ONION
Local. Escape along Thorson Rd. 3432.

Allium tricoccum Aiton WILD LEEKS
Common. Northern Hardwoods. 2526b, 2549, 4286.

- Asparagus officinalis* L. GARDEN ASPARAGUS
Frequent. Roadside and old field escape, but often persisting in old garden plots.
2532, 2796.
- Clintonia borealis* (Aiton) Raf. CORN-LILY
Frequent. Northern Hardwoods and Coastal Forests. 2630, 2786.
- Convallaria majalis* L. LILY-OF-THE-VALLEY
Local. Persisting in areas where planted, but sometimes spreading. 2148, 2200.
- Erythronium americanum* Ker. ADDER'S TONGUE
Common. Northern Hardwoods. 2032, 2049.
- Hemerocallis fulva* (L.) L. ORANGE DAY-LILY
Frequently persisting at former house sites but occasionally established along roadsides. 2773.
- Hemerocallis lilio-asphodelus* L. YELLOW DAY-LILY
Locally persisting at former house sites but established along M-109 near Glen Lake beach. 2339, 2405.
- Lilium philadelphicum* L. WOOD LILY
Common. Dunes. 2415, 2453.
- Maianthemum canadense* Desf. CANADA MAYFLOWER
Common. Cedar swamps, Oak-Aspen woods, and Northern Hardwoods. 2186, 2244.
- Medeola virginiana* L. INDIAN CUCUMBER-ROOT
Local. Hill west of Round Lake and wooded bluff near Dune Valley Rd. 2466, 3159.
- Muscari atlanticum* Boiss & Reuter
Locally persisting at former house sites where sometimes spreading, and also along roadsides. 2083.
- Ornithogalum umbellatum* L.
Local escape along M-109 near M-22 and persisting at former house site on Otter Lake. 2268, 2299.
- Polygonatum pubescens* (Willd.) Pursh HAIRY SOLOMON'S SEAL
Frequent. Northern Hardwoods.
2249, 2333.
- Smilacina racemosa* (L.) Desf. FALSE SPIKENARD
Frequent. Northern Hardwoods. 2743, 2790.
- Smilacina stellata* (L.) Desf. STARRY FALSE SOLOMON'S SEAL
Common. Stabilized dunes. 2128, 2424.
- Smilacina trifolia* (L.) Desf.
Local. Bog-like areas. 2172, 3170.

Streptopus roseus Michaux ROSE MANDARIN

Occasional. Northern Hardwoods. 3947.

Trillium grandiflorum (Michaux) Salisb. COMMON TRILLIUM

Common. Northern Hardwoods and cedar swamps. 2033, 2054.

Uvularia grandiflora Sm. BELLWORT

Occasional. Northern Hardwoods. 2248, 3042.

Zigadenus glaucus (Nutt.) Nutt. WHITE CAMAS

Frequent. Dunes. 2496, 3548.

Orchidaceae (ORCHID FAMILY)

Aplectrum hyemale (Willd.) Torrey PUTTY-ROOT

Frequent. Rich Northern Hardwoods. 3185.

Corallorhiza maculata Raf. SPOTTED CORAL-ROOT

Frequent. Jack Pine stands and Northern Hardwoods. 2839, 3495, 3541.

Corallorhiza striata Lindley STRIPED CORAL-ROOT

Frequent. Cedar swamps and Jack Pine stands. 2220.

Corallorhiza trifida Chat. EARLY CORAL-ROOT

Local. Cedar swamps. 2523, 3169.

Cypripedium acaule Aiton STEMLESS LADY-SLIPPER

Common. Coastal Forest and Jack Pine stands. 2280.

Cypripedium arietinum R. Br. RAM'S-HEAD LADY-SLIPPER

Local in Jack Pine stands along Platte Bay and in Coastal Forest of Good Harbor Bay. 2222, 3473.

Cypripedium calceolus L. YELLOW LADY-SLIPPER

Local. Near outlet of Otter Lake and behind dune front at Sleeping Bear Plateau and Pyramid Pt. 2258, 2273.

Cypripedium reginae Walt. SHOWY LADY-SLIPPER

Local. Otter Creek, Hidden Lake and wetland east of Little Traverse Lake. 2423.

Epipactis helleborine (L.) Crantz. HELLEBORINE

Frequent. Northern Hardwoods. 2674, 3521.

Goodyera oblongifolia Raf. GIANT RATTLESNAKE-PLANTAIN

Frequent. Coastal Forests and Oak-Aspen areas. 3528, 3601.

Habenaria clavellata (Michaux) Sprengel CLUB-SPUR ORCHID

Local. Otter Creek cedar swamp, perhaps more common. 3608.

Habenaria dilatata (Pursh) Hooker BOG-CANDLE

Local. Fen area in Otter Creek cedar swamp. 2522.

Habenaria hyperborea (L.) R. Br. TALL NORTHERN BOG ORCHID

Frequent. Cedar swamps. 2481, 2629, 3611.

- Habenaria obtusata* (Pursh) Richardson BLUNT-LEAF ORCHID
Local. Cedar swamps of Otter Creek and Crystal River. 2524, 2544.
- Habenaria orbiculata* (Pursh) Torrey ROUND-LEAVED ORCHID
Occasional. Rich Northern Hardwoods. 2329, 3472.
- Habenaria viridis* (L.) R. Br. BRACKETED ORCHID
Occasional. Northern Hardwoods. 2325.
- Liparis loeselii* (L.) Richard FEN ORCHID
Local. Cedar swamps of Otter Creek and Shalda Creek. 2880, 3276.
- Listera convallarioides* (Sw.) Torrey BROAD-LEAVED TWAYBLADE
Local. Cedar swamp bordering Crystal River. 2545.
- Spiranthes romanzoffiana* Cham. NODDING LADIES'-TRESSES
Local. Hidden Lake. Probably more common. 2872.
- Spiranthes lacera* (Raf.) Raf. SLENDER LADIES'-TRESSES
Occasional. Coastal Forest and Jack pine stands of Platte District. 2884, 3490.
- Triphora trianthophora* (Sw.) Rydb. THREE BIRDS ORCHID
Local. Alligator Hill. 3881.

Sparganiaceae (BUR-REED FAMILY)

- Sparganium minimum* (Hartman) Fries
Local. Swales of Coastal Forest south of Platte River. 3453.

Typhaceae (CAT-TAIL FAMILY)

- Typha angustifolia* L. NARROW LEAVED CAT-TAIL
Local. Roadside ditch near Round Lake. 3543.
- Typha latifolia* L. COMMON CAT-TAIL
Common. Wetlands. 2565, 3426.

DICOTYLEDONS

Aceraceae (MAPLE FAMILY)

- Acer negundo* L. BOX ELDER
Ornamental, but occasionally escaping along roadsides. 2183, 3676, 3683.
- Acer pensylvanicum* L. STRIPED MAPLE
Frequent. Oak-Aspen woods. 2085.
- Acer rubrum* L. RED MAPLE
Common. Wetlands, Oak-Aspen woods, and some Northern Hardwoods. 2041, 2123, 3175.

Acer saccharum Marsh. SUGAR MAPLE
Abundant. Northern Hardwoods. 2154, 2908, 3872.

Acer spicatum Lam. MOUNTAIN MAPLE
Frequent. Wetland woods. 2165, 2279.

Amaranthaceae (AMARANTHUS FAMILY)

Amaranthus albus L. TUMBLEWEED
Occasional. Disturbed areas and roadsides. 2601, 2966.

Amaranthus blitoides S. Watson
Roadside south of Empire. (PWT, L-1249).

Amaranthus powellii S. Watson
Common. Disturbed areas and roadsides. 2600, 2623, 2918, 2964.

Amaranthus retroflexus L.
Shalda field. (PWT, L-1227).

Anacardiaceae (CASHEW FAMILY)

Rhus x pulvinata Greene
Local. Roadside; M-22 near Lutheran Church. 3524.

Rhus typhina L. STAGHORN SUMAC
Common. Old fields. 2558, 2734.

Toxicodendron radicans (L.) Kuntze POISON IVY
Common. Dunes and fields. SI.

Apocynaceae (DOGBANE FAMILY)

Apocynum androsaemifolium L. SPREADING DOGBANE
Occasional. Old fields and roadsides. 2587, 2634, 3278.

Vinca minor L. COMMON PERIWINKLE
Frequent. Escape at old house sites. 2120.

Aquifoliaceae (HOLLY FAMILY)

Ilex verticillata (L.) Gray MICHIGAN HOLLY
Frequent. Wetlands. 3019, 3441.

Nemopanthus mucronata (L.) Trel. MOUNTAIN-HOLLY
Local. Bogs. 2854.

Araliaceae (GINSENG FAMILY)

Aralia hispida Vent. BRISTLY SARSAPARILLA
Local. Old field east of Otter Lake. 2891.

Aralia nudicaulis L. WILD SARSAPARILLA
Common. Northern Hardwoods and Coastal Forest. 2442, 2276.

Aralia racemosa L.

Frequent. Northern Hardwoods. 4285.

Panax quinquefolius L. GINSENG

Local. Northern Hardwoods. SI.

Asclepiadaceae (MILKWEED FAMILY)

Asclepias incarnata L. SWAMP MILKWEED

Occasional. Wetlands. 2500, 3483.

Asclepias syriaca L. COMMON MILKWEED

Common. Old fields and roadsides. 2554, 2642.

Asclepias tuberosa L. BUTTERFLY WEED

Occasional. Roadsides. 2451, 2502, 3457.

Asclepias verticillata L. WHORLED MILKWEED

Local. Roadside along M-109 north of Visitor Center. 2974.

Asclepias viridiflora Raf. GREEN MILKWEED

Occasional. Dunes of Sleeping Bear plateau and near Aral. 3498.

Balsamaceae (TOUCH-ME-NOT FAMILY)

Impatiens capensis Meerb. SPOTTED TOUCH-ME-NOT

Common. Wetlands. 2793, 2983, 3026.

Berberidaceae (BARBERRY FAMILY)

Berberis thunbergii DC. JAPANESE BARBERRY

Local. Wet woods southeast of intersection of M-109 and Day Forest Rd. 3421.

Berberis vulgaris L. COMMON BARBERRY

Local. Along M-109 near D. H. Day Campground. 2221.

Caulophyllum thalictroides (L.) Michaux BLUE COHOSH

Occasional. Northern Hardwoods. 2907, 3466.

Betulaceae (BIRCH FAMILY)

Alnus rugosa (DuRoi) Sprengel SPECKLED ALDER

Abundant. Wetlands, cedar swamps, and swales of coastal forest. 2776.

Betula alleghaniensis Britton YELLOW BIRCH

Frequent. Wetland woods. 2445, 3586, 2893.

Betula papyrifera Marsh. WHITE BIRCH

Common. Northern Hardwoods, cedar swamps, Oak-Aspen woods. 2058, 3464.

Betula pumila L. BOG BIRCH

Occasional. Wet swales of Coastal Forest. 3448.

Corylus cornuta Marsh. BEAKED HAZELNUT
South of Empire near Co. line. (PWT, L-1253).

Ostrya virginiana (Miller) K. Koch IRONWOOD
Common. Northern Hardwoods, Oak-Aspen woods, and Coastal Forest. 2740,
2761.

Boraginaceae (FORGET-ME-NOT FAMILY)

Cynoglossum boreale Fern. NORTHERN WILD COMFREY
Occasional. Cedar swamps and moist Coastal Forest. 2267, 3168.

Cynoglossum officinale L. COMMON HOUND'S-TONGUE
Occasional. Disturbed sites. 2378.

Echium vulgare L. BLUEWEED
Occasional. Roadsides and disturbed sites. 2436, 2783, 3377.

Lappula echinata Gilib.
Shaded sawmill site, Aral. {O}.

Lithospermum carolinense (Walt.) MacMill. PUCCOON
Common. Dunes. 2217, 2239.

Myosotis arvensis (L.) Hill
Occasional. Wet disturbed areas. 2113, 2121, 3938.

Campanulaceae (HAREBELL FAMILY)

Campanula aparinoides Pursh MARSH BELLFLOWER
Frequent. Wetland borders. 2575, 2831, 3519.

Campanula rotundifolia L. HAREBELL
Common. Dunes. 2361, 2468.

Caprifoliaceae (HONEYSUCKLE FAMILY)

Diervilla lonicera Mill. BUSH HONEYSUCKLE
Occasional. Northern Hardwoods. 2534, 2915.

Linnaea borealis L. TWINFLOWER
Common. Coastal Forest. 2309, 2375.

Lonicera canadensis Marsh. FLY HONEYSUCKLE
Occasional. Northern Hardwoods. 2038.

Lonicera dioica L. WILD HONEYSUCKLE
Occasional. Northern Hardwoods. 3958.

Lonicera hirsuta Eat. HAIRY HONEYSUCKLE
Frequent. Coastal Forest. 4347.

Lonicera spp. HONEYSUCKLE

Frequently planted as an ornamental and occasionally escaping to fields and roadsides. SI.

Sambucus canadensis L. COMMON ELDER

Frequent. Wetlands and wet roadsides. 2556, 3392, 3404.

Sambucus pubens Michaux

Frequent. Northern Hardwoods, occasionally reaching maturity. 3939.

Symphoricarpos albus (L.) Blake. SNOWBERRY

Common. Coastal Forest. 2953.

Triosteum perfoliatum L. WILD COFFEE

Local. Bow Lakes section. 2348.

Viburnum acerifolium L. MAPLE-LEAVED VIBURNUM

Common. Northern Hardwoods. 2301, 2331, 2371.

Viburnum lentago L. NANNYBERRY

Occasional. Wet Coastal Forest. 3177, 3442.

Viburnum opulus L. Highbush Cranberry

Frequent. Wet roadsides and persistent as ornamental. 2178, 2208, 2269, 2933, 3178.

Caryophyllaceae (PINK FAMILY)

Agrostemma githago L. CORN-COCKLE

Local. Old fields near Stormer Rd. and Day Forest Rd. 2552, 3428.

Arenaria serpyllifolia L. THYME-LEAVED SANDWORT

Common. Disturbed areas. 2104, 2150.

Arenaria stricta Michaux ROCK SANDWORT

Common. Dunes. 2241, 2282.

Cerastium fontanum Baumg. COMMON MOUSE-EARED CHICKWEED

Common. Old fields and disturbed areas. 2103, 2736, 2781.

Cerastium tomentosum L. SNOW-IN-SUMMER

Occasional. Escape along roadsides. 2146, 2196.

Dianthus armeria L. DEPTFORD PINK

Frequent. Old fields. 3399, 3463.

Dianthus barbatus L. SWEET WILLIAM

Occasional. Escape along roadsides. 2404, 2449.

Dianthus deltoides L.

Local. Old field at start of Pyramid Pt. trail. 2321.

Dianthus plumarius L. GARDEN PINK

Occasional. Escape along roadsides. 2459, 3258, 3277.

Gypsophila paniculata L. BABY'S-BREATH
Occasional. Roadside escape and sometimes on dunes. 2473, 2589, 3551.

Lychnis coronaria (L.) Desr. MULLEN PINK
Occasional. Roadsides and disturbed places. 2508, 2529.

Saponaria officinalis L. BOUNCING BET
Common. Old fields and roadsides. 2586, 2645.

Silene antirrhina L. SLEEPY CATCHFLY
Occasional. Coastal Forest. 2504.

Silene armeria L. SWEET-WILLIAM CATCHFLY
Local. Trail to Lake Michigan from cabin at end of Cooper Rd. 3456.

Silene pratensis (Rafn) Godron & Gren. WHITE CAMPION
Frequent. Old fields. 2314, 2384.

Silene vulgaris (Moench) Garke. BLADDER CAMPION
Common. Old fields and roadsides. 2357, 2413.

Stellaria graminea L. COMMON STICHWORT
Local. Old field near Pyramid Pt. trail parking area. 2250.

Stellaria media (L.) Vill. COMMON CHICKWEED
Common. Trails and roadsides. 2386, 2536, 3664.

Celastraceae (Staff-tree Family)

Celastrus scandens L. BITTERSWEET
Local. Dunes/woods border near Platte Pt. and old field near Maple Grove Cemetery. 3666, 3863.

Chenopodiaceae (GOOSEFOOT FAMILY)

Chenopodium album L. LAMB'S QUARTERS
Common. Disturbed sites. 2598, 2672, 2800.

Chenopodium capitatum (L.) Asch. STRAWBERRY BLITE
Local. Roadsides; along Day Forest Rd. and Little Traverse Lake Rd. 2452a.

Corispermum hyssopifolium L. BUGSEED
Occasional. Dunes. 2811.

Cycloma atriplicifolium (Sprengel) Coulter WINGED PIGWEED
Common. Disturbed sites. 2923, 2959.

Salsola kali L.
Open beach, Aral. {O}.

Cistaceae (ROCKROSE FAMILY)

Helianthemum canadense (L.) Michaux
Occasional. Coastal Forest. 2418

Hudsonia tomentosa Nutt. BEACH HEATH
Frequent. Dunes. 2287, 2363.

Compositae (COMPOSITE FAMILY)

Achillea millefolium L. COMMON YARROW
Common. Old fields and roadsides. 2555, 2507, 2960.

Ambrosia artemisiifolia L. COMMON RAGWEED
Common. Disturbed areas and roadsides. 2914, 2967.

Ambrosia psilostachya DC.
Common. Old fields and roadsides. 3684, 3860.

Anaphalis margaritacea (L.) Benth. & Hooker PEARLY EVERLASTING
Common. Old fields and roadsides. 2937, 3007.

Antennaria neglecta Greene FIELD PUSSYTOES
Common. Old fields. 2088, 2191, 3050.

Antennaria plantaginifolia (L.) Richards.
Common. Old fields. 3044.

Arctium minus Schlk. COMMON BURDOCK
Frequent. Disturbed sites and roadsides. 2746, 2911.

Artemisia caudata Michaux TALL WORMWOOD
Common. Dunes. 2767, 2835.

Artemisia vulgaris L. MUGWORT
Local. Escape along M-22 near Deadstream Rd., and along Thorson Rd. 3649.

Aster laevis L.
Common. Dunes and roadsides. 2814, 3008, 3013, 3639, 3857, 3884.

Aster lateriflorus (L.) Britton
Occasional. Roadsides. 2984.

Aster macrophyllus L. LARGE LEAVED ASTER
Common. Coastal Forest. 2763, 2836, 3865.

Aster pucineus L.
Local. Roadside near Round Lake, perhaps more common. 2982.

Aster sagittifolius Willd.
Dry soil near Crystal River, Glen Arbor Twp. Sec. 13. (PWT, L-1124).

Aster simplex Willd. PANICLED ASTER
Common. Old fields and roadsides. 2944, 2985, 3004, 3864, 3882, 3889.

Bidens connatus Muhl. BUR MARIGOLD
Frequent. Wetlands. 2996.

Centaurea diffusa Lam.
Frequent. Old fields and roadsides. 2572, 2664, 2671, 2810.

Centaurea maculosa Lam. SPOTTED KNAPWEED
Common. Old fields and roadsides. 2585, 2632.

Chrysanthemum leucanthemum Local. OX-EYE DAISY
Common. Old fields and roadsides. 2231, 2335.

Cichorium intybus L. COMMON CHICORY
Occasional. Old fields and roadsides. 2548, 2577.

Cirsium arvense (L.) Scop. CANADA THISTLE
Common. Wetlands. 2658, 2563, 3613.

Cirsium pitcheri (Torr.) T. & G. PITCHER'S THISTLE
Common. Dunes. 2628, 3480.

Cirsium vulgare (Savi) Tenore BULL THISTLE
Common. Old fields and roadsides. 2564, 2635, 3590.

Conyza canadensis (L.) Cronq. HOG WEED
Occasional. Old fields and roadsides. 2795, 2965.

Coreopsis lanceolata L. LANCE-LEAVED COREOPSIS
Common. Dunes. 2359, 2501.

Erechites hieracifolia (L.) Raf.
Cleared area in Good Harbor ravine. (PWT, L-1660).

Erigeron annuus (L.) Pers.
Common. Old fields and roadsides. 2476, 2513, 2655, 2798, 2951, 3887.

Erigeron strigosus Muhl.
Common. Old fields and roadsides. 2421, 2590, 2737, 3400, 3636.

Eupatorium maculatum L. JOE-PIE WEED
Frequent. Wetlands. 2888, 3544.

Eupatorium perfoliatum L. BONESET
Frequent. Wetlands. 2871, 3545.

Grindelia squarrosa (Pursh) Dunal CURLYCUP GUMWEED
Local. Old fields and roadsides Port Oneida area and along M-109 near Day
Forest Rd. 2643, 3012.

Helianthus divaricatus L.
Local. Roadside near Bass Lake. 2958.

- Helianthus hirsutus* Raf.
Local. Roadside near corner of Esch Rd. and M-22. 3024.
- Hieracium aurantiacum* L. ORANGE HAWKWEED
Common. Old fields and roadsides. 2230, 2320.
- Hieracium canadense* Michaux
Occasional. Disturbed sites and roadsides. 2780, 2813, 2889.
- Hieracium piloselloides* Vill. KING DEVIL
Common. Old fields and roadsides. 2318, 2235.
- Hieracium scabrum* Michaux
Roadside, Aral. {O}.
- Hieracium venosum* L. RATTLESNAKE WEED
Occasional. Dune edges and Coastal Forest. 2362, 2595.
- Inula helenium* L.
Aral. {O}.
- Krigia virginica* (L.) Willd. DWARF DANDELION
Frequent. Sandy areas in Coastal Forest. 2344, 2420.
- Lactuca canadensis* L. TALL BLUE LETTUCE
Frequent. Coastal Forest. 2757, 3501, 3674.
- Matricaria matricarioides* (Less) Porter PINEAPPLE WEED
Occasional. Disturbed roadsides. 3520.
- Prenanthes alba* L. WHITE LETTUCE
Frequent. Coastal Forest. 2887, 2949, 3671.
- Rudbeckia hirta* L. BLACK-EYED SUSAN
Frequent. Old fields and roadsides. 2443, 2785.
- Senecio pauperculus* Michaux BALSAM RAGWORT
Common. Dunes and some old fields. 2389, 2463, 3234.
- Solidago caesia* L. BLUE STEM GOLDENROD
Common. Old fields and roadsides. 2979, 3010, 3866, 3886.
- Solidago canadensis* L. CANADA GOLDENROD
Common. Old fields and roadsides. 2917, 2976, 3005, 3021, 3856, 3885, 3888.
- Solidago flexicaulis* L. ZIG-ZAG GOLDENROD
Common. Northern Hardwoods and Coastal Forest. 2926.
- Solidago gigantea* Aiton
Occasional. Old fields and roadsides. 3635, 3869.
- Solidago graminifolia* (L.) Salisb. GRASS-LEAVED GOLDENROD
Frequent. Wet swales and roadside ditches. 2824, 2943, 3644.

- Solidago hispida* Muhl. HAIRY GOLDENROD
Occasional. Old fields and roadsides. 3883.
- Solidago nemoralis* Aiton GRAY GOLDENROD
Common. Dunes, old fields and roadsides. 2995, 3006, 3020.
- Solidago rugosa* Mill. PYRAMID GOLDENROD
Occasional. Old fields. 2890, 3022.
- Solidago spathulata* DC.
Frequent. Dunes. 2941, 2955, 3009, 3640.
- Solidago uliginosa* Nutt.
Common. Wetlands. 2877.
- Solidago ulmifolia* Muhl.
Local. Otter Creek cedar swamp, perhaps more common. 3607.
- Sonchus uliginosus* Bieb.
Frequent. Roadsides. 2591, 2669, 2840.
- Tanacetum vulgare* L. COMMON TANSY
Local. Persisting in field north of Sunset Trail. 2799.
- Taraxacum officinale* Weber DANDELION
Common. Trails, roadsides, fields, and dunes. 2037, 2124.
- Tragopogon dubius* Scop.
Common. Old fields and roadsides. 2259, 2403.
- Tragopogon porrifolus* L. SALIFY
Grassy roadside along M-22 near Good Harbor-Cedar Rd. (Rt. 651). (PWT, L-859).
- Tragopogon pratensis* L.
Local. Roadside near intersection of M-22 and M-109. 2401.
- Convolvulaceae (MORNING GLORY FAMILY)
- Convolvulus arvensis* L. FIELD BINDWEED
Occasional. Old fields and disturbed sites. 2524.
- Convolvulus sepium* L.
Occasional. Old fields. 2526a, 2809.
- Cornaceae (DOGWOOD FAMILY)
- Cornus alternifolia* L. f. PAGODA DOGWOOD
Frequent. Coastal Forest and some Northern Hardwoods. 2332, 2376.
- Cornus amomum* Miller SILKY DOGWOOD
Frequent. Wetlands. 2514, 3443.
- Cornus canadensis* L. BUNCHBERRY
Common. Cedar swamps. 2263, 2895, 3568.

Cornus rugosa Lam. ROUND-LEAVED DOGWOOD
Common. Coastal Forest. 2368, 3486.

Cornus stolonifera Michaux RED-OSIER
Common. Dunes and Coastal Forest. 2171, 2203, 2942, 3179.

Crassulaceae (ORPINE FAMILY)

Sedum acre L. MOSSY STONECROP
Occasional. Roadsides. 2288, 2515.

Sedum album L.
Occasional. Disturbed sites. 2437, 2613, 3459.

Sedum sarmentosum Bunge
Local. Former house site on Lake Michigan east of Platte Pt. 3665.

Sedum telephium L. LIVE-FOREVER
Occasional. Old homesites and roadsides. 3657, 3859.

Cruciferae (MUSTARD FAMILY)

Alyssum alyssoides L. PALE ALYSSUM
Frequent. Roadsides. 2107, 2118.

Arabidopsis thaliana (L.) Heyn.
Occasional. Sandy fields. 2096, 3268.

Arabis divaricarpa A. Nelson
Local. Woodlot off Co. 651, perhaps more common. 3523.

Arabis drummondii Gray
Common. Old fields and roadsides. 2086, 2209, 3038, 3223.

Arabis glabra (L.) Benth. TOWER MUSTARD
Day Forest Hill. (PWT, L-1859).
Village site, Aral. {O}.

Arabis holboellii Hornem.
Local. Good Harbor Bay and Glen Haven. 2095, 3655.

Arabis lyrata L. SAND CRESS
Common. Dunes. 2034, 2125.

Barbarea vulgaris R. Br. YELLOW ROCKET
Frequent. Disturbed sites and roadsides. 2109, 2122, 2167.

Berteroa incana (L.) DC. HOARY ALYSSUM
Common. Old fields and roadsides. 2149, 2313, 3604.

Brassica kaber (DC.) Wheeler CHARLOCK
Local. Disturbed site Port Onieda, perhaps more common. 3877.

- Brassica nigra* (L.) Koch
Local. Roadside Fisher Rd., perhaps more common. 2173.
- Brassica rapa* L. FIELD MUSTARD
Shalda, Good Harbor. (PWT, L-1714)
- Cakile edentula* (Bigelow) Hooker SEA-ROCKET
Common. Dunes. 2771, 2875.
- Capsella bursa-pastoris* (L.) Medic. SHEPHERD'S PURSE
Common. Old fields and roadsides. 2108, 3029.
- Cardamine pensylvanica* Willd.
Occasional. Wetland woods. 2166.
- Dentaria diphylla* Michaux TWO-LEAVED TOOTHWORT
Common. Northern Hardwoods. 2144, 2212.
- Dentaria laciniata* Michaux CUT-LEAVED TOOTHWORT
Occasional. Northern Hardwoods. 2145.
- Descuriania pinnata* (Walt.) Britton TANSY MUSTARD
Local. Parking area Empire Bluffs. 3052.
- Erysimum cheiranthoides* L. WORMSEED MUSTARD
Common. Disturbed sites and roadsides. 2733, 2924, 2968, 2990, 3190.
- Hesperis matronalis* L. DAME'S ROCKET
Occasional. Roadside escape. 2175, 3470.
- Lepidium campestre* (L.) R. Br.
Common. Old fields and roadsides. 2106, 2117, 3236, 3252.
- Lepidium densiflorum* Schrader
Frequent. Disturbed sites. 2920, 3591.
- Lepidium virginicum* L.
Local. Sleeping Bear Inn, perhaps more common. 3678.
- Lunaria annua* L. MONEY-PLANT
Local. Roadside escape near Inspiration Pt. 2084.
- Nasturtium officinale* R. Br. WATERCRESS
Frequent. Wet ditches and wetlands. 2470, 2981, 3249.
- Rorippa palustris* (L.) Besser FIELD MUSTARD
Occasional. Wetlands. 2651, 2499.
- Sisymbrium altissimum* L. HEDGE MUSTARD
Common. Old fields and roadsides. 2207, 2315, 2356.
- Sisymbrium officinale* (L.) Scop. HEDGE MUSTARD
Good Harbor Bay. (PWT, L-364).

Droseraceae (SUNDEW FAMILY)

Drosera rotundifolia L. ROUND-LEAVED SUNDEW

Local. Bogs. 2852, 3617.

Elaeagnaceae (OLEASTER FAMILY)

Elaeagnus umbellata Thunb. AUTUMN-OLIVE

Local. Escape along Wheeler Rd. also ornamental. 3257.

Shepherdia canadensis (L.) Nutt. BUFFALOBERRY

Common. Dunes and shores. 2874, 3478.

Ericaceae (HEATH FAMILY)

Andromeda glaucophylla Link. BOG ROSEMARY

Local. Bogs. 2223.

Arctostaphylos uva-ursi (L.) Sprengel BEARBERRY

Common. Dunes and jack pine stands. 2060, 3653.

Chamaedaphne calyculata (L.) Moench. LEATHERLEAF

Common. Bogs and dune swales. 2077, 2169, 2343.

Chimaphila maculata (L.) Pursh. SPOTTED WINTERGREEN

Rare. Small population south of M-22 west of Saffron Rd. 3669.

Chimaphila umbellata (L.) Bart. PRINCE'S PINE

Occasional. Coastal Forest. 3933.

Epigaea repens L. TRAILING ARBUTUS

Occasional. Coastal Forest. 2042, 2064.

Gaultheria hispidula (L.) Muhl. CREEPING SNOWBERRY

Frequent. Cedar swamps and bogs. 2851, 2894.

Gaultheria procumbens L. WINTERGREEN

Frequent. Coastal Forest. 2754.

Gaylussacia baccata (Wang.) K. Koch. BLACK HUCKLEBERRY

Common. Coastal Forest. 2202a.

Kalmia polifolia Wang. BOG-LAUREL

Local. Bogs. 2224.

Ledum groenlandicum Oeder. LABRADOR TEA

Occasional. Bogs and Coastal Forest swales. 2202b, 2853, 3279.

Monotropa hypopithys L. PINE SAP

Occasional. Coastal Forest and some Northern Hardwoods. 2303, 2525.

Monotropa uniflora L. INDIAN PIPE

Frequent. Coastal Forest, Oak-Aspen woods, and Northern Hardwoods. 2641, 2755.

- Pterospora andromedea* Nutt. PINEDROPS
Local. Dunes at Good Harbor Bay. 3515.
- Pyrola asarifolia* Michaux PINK PYROLA
Frequent. Cedar swamps. 2488, 3217.
- Pyrola elliptica* Nutt. SHINLEAF
Occasional. Moist Coastal Forest. 2517, 3251.
- Pyrola rotundifolia* L.
Occasional. Coastal Forest. 2373.
- Pyrola secunda* L. ONE-SIDED PYROLA
Occasional. Jack pine stands. 3500.
- Pyrola virens* Schweigg.
Frequent. Moist Coastal Forest. 2422, 2521, 3444.
- Vaccinium angustifolium* Aiton LOW SWEET BLUEBERRY
Common. Coastal Forest and bogs. 2063, 2817.
- Vaccinium myrtilloides* Michaux VELVET LEAF BLUEBERRY
Frequent. Bogs and some Coastal Forests. 2823, 3506.
- Vaccinium oxycoccus* L. CRANBERRY
Local. Bogs. 2226, 2519.

Euphorbiaceae (SPURGE FAMILY)

- Euphorbia cyparissias* L. CYPRESS SPURGE
Occasional. Roadsides. 2111, 2193.
- Euphorbia esula* L. LEAFY SPURGE
Frequent. Roadsides. 2119, 2139, 3253.
- Euphorbia glyptosperma* Engelm.
Frequent. Roadsides. 2606, 2667, 2961.
- Euphorbia polygonifolia* L. SEASIDE SPURGE
Lake Michigan beach near Pyramid Pt. (PWT, L-423).
Sand dunes, Aral. {O}.

Fagaceae (BEECH FAMILY)

- Castanea dentata* (Marsh.) Borkh. CHESTNUT
Local. One tree on Alligator Hill behind sand pit across from Glen Lake access.
2751.
- Fagus grandifolia* Ehrh. BEECH
Abundant. Northern Hardwoods and some Coastal Forests. 2467, 2732, 2975.
- Quercus alba* L. WHITE OAK
Frequent. Coastal Forest and Oak-Aspen woods. 2885, 3934.

Quercus coccinia Moench. SCARLET OAK

Occasional. Wooded dunes of Platte Bay. 2994.

Quercus rubra L. RED OAK

Abundant. Coastal Forest, Oak-Aspen woods, and Northern Hardwoods. 2752, 2759, 2952, 2986, 3588.

Quercus velutina Lam. BLACK OAK

Occasional. Wooded dunes of Platte Bay. 2939, 2940.

Fumariaceae (FUMITORY FAMILY)

Corydalis aurea Willd.

Local. Disturbed trail in woods near Hidden Lake. 3907.

Corydalis sempervirens (L.) Pers.

Roadside, Platte River Campground. {O}.

Dicentra canadensis (Goldie) Walp. SQUIRREL CORN

Common. Northern Hardwoods. 2028, 2046.

Dicentra cucullaria (L.) Bernh. DUTCHMAN'S BREECHES

Common. Northern Hardwoods. 2031, 2047.

Gentianaceae (GENTIAN FAMILY)

Bartonia virginiana (L.) BSP.

Local. Wet woods south of bog-like area Port Oneida. 2815.

Gentiana procera Holm. FRINGED GENTIAN

Local. Dune pools near Glen Haven. 3015.

Halenia deflexa (Sm.) Griseb.

Occasional. Coastal Forest near Otter Creek. 2882.

Menyanthes trifoliata L. BUCKBEAN

Local. Bogs. 3171.

Geraniaceae (GERANIUM FAMILY)

Erodium cicutarium L'Her.

Local. Disturbed ground at old house site, perhaps more common. 4381.

Geranium pusillum L.

Frequent. Disturbed sites. 2597, 2946, 3681.

Geranium robertianum L. HERB-ROBERT

Common. Northern Hardwoods. 2213, 2161.

Geranium sanguineum L.

Local. Slightly spreading near Otter Lake boat launch. 3959.

Grossulariaceae (GOOSEBERRY FAMILY)

Ribes americanum Miller WILD BLACK CURRANT

Local. Day Mill Pond area, perhaps more common in wetland areas. 3425, 3656.

Ribes cynosbati L. WILD GOOSEBERRY

Occasional. Northern Hardwoods. 2074, 2929.

Ribes glandulosum Graver

Otter Creek. {O}.

Ribes odoratum Wendl. f. BUFFALO CURRANT

Local. Persisting at former home sites, but spreading slightly. 2114, 3046.

Ribes triste L. SWAMP RED CURRANT

Local. Marl Springs area east of Otter Creek, perhaps more common. 2492.

Hamamelidaceae (WITCH-HAZEL FAMILY)

Hamamelis virginiana L. WITCH-HAZEL

Frequent. Coastal Forest and Oak-Aspen woods. 2310, 2753.

Hydrophyllaceae (WATERLEAF FAMILY)

Hydrophyllum canadense L.

Occasional. Northern Hardwoods. 3163.

Hydrophyllum virginianum L.

Frequent. Northern Hardwoods. 2253, 3161.

Hypericaceae (ST. JOHN'S-WORT FAMILY)

Hypericum canadense L.

Local. Wet swale near corner of Thorson Rd. and M-22, perhaps more common. 3654.

Hypericum kalmianum L. KALM'S ST. JOHN'S-WORT

Frequent. Wet coastal swales. 2611.

Hypericum perforatum L. COMMON ST. JOHN'S-WORT

Common. Old fields and roadsides. 2446, 2457.

Triadenum fraseri (Spach.) Gl.

Occasional. Wetlands. 2652, 2819.

Juglandaceae (WALNUT FAMILY)

Juglans nigra L. BLACK WALNUT

Frequent. Planted by farms, but escaping to sandy fields near Long Lake Rd., and along Westman Rd. 2922, 3003, 3484, 3534.

Labiatae (MINT FAMILY)

- Agastache scrophulariaefolia* (Willd.) Kuntze
Occasional. Old fields and roadsides. 3531, 3579, 3659.
- Glechoma hederacea* L. GILL-OVER-THE-GROUND
Frequent. Disturbed areas. 2025, 2240, 3217.
- Leonurus cardiaca* L. COMMON MOTHERWORT
Frequent. Shaded roadsides and trails. 2673, 2747.
- Lycopus uniflorus* Michaux
Common. Cedar swamps and wetland woods. 2883, 2862, 3510, 3570, 3612.
- Mentha arvensis* L.
Frequent. Wetlands and roadside ditches. 2899, 2950, 3549.
- Monarda fistulosa* L. WILD BERGAMOT
Occasional. Roadsides and disturbed areas. 2560, 2797, 3485.
- Monarda punctata* L. HORSEMINT
Frequent. Dunes. 2608, 2624.
- Nepeta cataria* L. CATNIP
Frequent. Roadsides. 2550.
- Prunella vulgaris* L. SELF-HEAL
Frequent. Roadsides and disturbed areas. 2471, 2509.
- Pycnanthemum virginianum* (L.) Durand & Jackson
Field near Prouse's Lake. (PWT, L-915).
- Satureja acinos* (L.) Scheele
Common. Roadsides and disturbed areas. 2370, 2551, 2612, 3018.
- Satureja vulgaris* (L.) Fritch. BASIL
Frequent. Roadsides and disturbed areas. 2372, 3398.
- Scutellaria galericulata* L. COMMON SKULLCAP
Frequent. Cedar swamps and wetlands. 2484, 2650, 3439.

Leguminosae (BEAN FAMILY)

- Desmodium canadense* (L.) DC.
Local. Field near Long Lake Rd. 3538.
- Lathyrus japonicus* Willd. BEACH PEA
Common. Shores and dunes. 2769, 2833.
- Lathyrus latifolius* L. EVERLASTING PEA
Frequent. Roadsides. 2402, 2531, 3471, 3482.
- Lathyrus ochroleucus* Hooker. PALE VETCHLING
Local. Woods near Glen Lake beach. 2505.

Lathyrus palustris L. MARSH PEA

Occasional. Wetlands. 2485.

Lathyrus sylvestris L. EVERLASTING PEA

Occasional. Old fields and roadsides. 2646, 2801.

Lotus corniculata L. BIRDFOOT TREFOIL

Local. Roadside; M-22 east of Port Oneida Rd. 3156.

Medicago lupulina L. BLACK MEDIC

Frequent. Old fields and roadsides. 2283, 2294.

Medicago sativa L. ALFALFA

Common. Old fields and roadsides; planted in some fields. 2561, 2647.

Medicago varia Martyn YELLOW ALFALFA

Local. In field off Thorson Rd. and along Benzie/Leelanau Co. line road. 2648, 3675.

Melilotus alba Desr. WHITE SWEET CLOVER

Common. Old fields and roadsides. 2474, 2749.

Melilotus officinalis (L.) Desr. YELLOW SWEET CLOVER

Common. Old fields and roadsides. 2272, 2358, 2475.

Robinia hispida L.

M-22 at Aral Rd. (PWT, LB-2293)

Robinia psuedoacacia L. BLACK LOCUST

Frequent. Spreading from old house sites. 2945, 3558.

Trifolium arvense L. RABBITFOOT CLOVER

Local. Old fields near Sunset Trail and Thorson Rd., perhaps more common. 2802.

Trifolium aureum Poll. HOP CLOVER

Occasional. Old fields. 3576, 4303.

Trifolium pratense L. RED CLOVER

Common. Old fields and roadsides. 2311.

Trifolium repens L. WHITE CLOVER

Common. Old fields and roadsides. 2257, 2312, 2574, 2657, 2803.

Vicia tetrasperma (L.) Schreber SPARROW VETCH

Local. Old orchard near Sunset Trail. 2807.

Vicia villosa Roth

Common. Old fields and roadsides. 3942.

Lentibulariaceae (BLADDERWORT FAMILY)

Utricularia cornuta Michaux
Local. Dune pools. 2766.

Lobeliaceae (LOBELIA FAMILY)

Lobelia cardinalis L. CARDINAL FLOWER
Occasional. Wetlands. 2867, 2930.

Lobelia inflata L. INDIAN TOBACCO
Occasional. Moist, slightly disturbed areas. 2897, 2910.

Lobelia kalmii L. KALM'S LOBELIA
Frequent. Dune pools and shores. 2765, 3014, 3167.

Lythraceae (LOOSESTRIFE FAMILY)

Decodon verticillatus (L.) Ell. SWAMP LOOSESTRIFE
Frequent. Wetlands. 2850.

Lythrum salicaria L. PURPLE LOOSESTRIFE
Frequent. Wetlands and roadside ditches. 2676.

Malvaceae (MALLOW FAMILY)

Alcea rosea L. HOLLY-HOCK
Local. Roadside escape and persistent at old house sites. 2616, 2772.

Malva moschata L. MUSK MALLOW
Local. M-22 near Day Mill Pond, perhaps more common. 2461.

Malva neglecta Wallr. COMMON MALLOW
Occasional. Roadsides and disturbed sites. 3183, 3663, 3679.

Moraceae (MULBERRY FAMILY)

Cannabis sativa L. HEMP
Local. Bow Lakes. 3481.

Humulus lupulus L. HOPS
Occasional. Old fields near old home sites. 2827, 2921.

Morus alba. L.
Occasional. Ornamental and roadside escape. 2925, 3862.

Myricaceae (BAYBERRY FAMILY)

Myrica gale L. SWEET GALE
Frequent. Dune swales and shores of lakes and streams. 2199, 2543.

Nyctaginaceae (FOUR-O'CLOCK FAMILY)

Mirabilis hirsuta (Pursh) MacM.
Sleeping Bear field. (PWT, L-1601).

Mirabilis nyctaginea (Michaux) MacM. WILD FOUR-O'CLOCK
Local. Roadside; M-22 near Sutter Rd. 2472.

Oleaceae (OLIVE FAMILY)

Fraxinus americana L. WHITE ASH
Common. Northern Hardwoods. 3589.

Fraxinus nigra Marsh. BLACK ASH
Common. Wetland woods. SI.

Syringa vulgaris L. LILAC
Common. Ornamental persisting at old home sites and slightly spreading. 2102,
3648.

Onagraceae (EVENING PRIMROSE FAMILY)

Calylophus serrulatus (Nutt.) Raven
Local. Old field at end of Greenam Rd. 2663.

Circaea alpina L. DWARF ENCHANTER'S NIGHTSHADE
Common. Cedar swamps and wetlands. 2479, 2860.

Circaea lutetiana L.
Frequent. Moist Northern Hardwoods and wetlands. 2478, 2535, 2636, 3422.

Epilobium angustifolium L. FIREWEED
Local. Roadside ditch along M-22 near Long Lake Rd. 3546.

Epilobium coloratum Biehler
Local. Otter Creek cedar swamp. 3615.

Epilobium ciliatum Raf.
Common. Wetlands. 3511, 3550, 3622, 3677.

Epilobium leptophyllum Raf.
Occasional. Wetlands. 2873, 2878.

Epilobium parviflorum Shreber
Local. Cedar swamp near Shalda Creek west of Co. 669. 2863.

Oenothera clelandii Deitrich, Raven, & L. Wagner
Local. Along School Lake Rd. 3527.

Oenothera laciniata Hill
Local. Along Day Forest Rd. 3220.

Oenothera oakesiana (A. Gray) Watson & Coulter
Common. Dunes and roadsides. 2931, 3462, 3487, 3610.

Oenothera parviflora L.

Local. Old field near Lutheran Cemetery, perhaps more common. 2957.

Oenothera pilosella Raf.

Local. Open relict beach ridges near Peterson Beach. 2291.

Oenothera rhombipetala T. & G.

Local. Old field near Old Indian trail parking. 2588.

Orobanchaceae (BROOM-RAPE FAMILY)

Conopholis americana (L.) Wallr. SQUAWROOT

Frequent. Oak-Aspen woods and some Northern Hardwoods. 2304.

Epifagus virginiana (L.) Bart. BEECH-DROPS

Frequent. Northern Hardwoods and some moist Coastal Forests. 3017.

Orobanche fasciculata Nutt. BROOM-RAPE

Frequent. Dunes. 2462, 2464.

Oxalidaceae (WOOD-SORREL FAMILY)

Oxalis acetosella L.

Local. Wet woods south of M-22 west of Saffron Rd. 3668.

Oxalis fontana Bunge

Common. Shaded fields and roadsides. 2617, 2745, 2774, 3584, 3658.

Oxalis stricta L.

Common. Open fields and roadsides. 2197, 2297, 2603, 3181, 3638, 3661.

Papaveraceae (POPPY FAMILY)

Papaver orientale L. ORIENTAL POPPY

Occasional. Persisting as an ornamental, but slightly spreading in some sites. 2383, 3259, 3395.

Sanguinaria canadensis L. BLOODROOT

Occasional. Northern Hardwoods. SI.

Phrymaceae (LOPSEED FAMILY)

Phryma leptostachya L. LOPSEED

Local. Along Echo Valley Rd. and Pyramid Pt. trail near bluff edge. 2537, 3555.

Phytolaccaceae (POKEWEED FAMILY)

Phytolacca americana L. POKEWEED

Occasional. Disturbed sites and roadsides. 2988, 3011.

Plantaginaceae (PLANTAIN FAMILY)

Plantago lanceolata L. ENGLISH PLANTAIN
Common. Old fields and roadsides. 2260, 2469, 2583.

Plantago major L.
Common. Old fields and roadsides. 2510, 2581, 3525.

Plantago rugelii Decne. PALE PLANTAIN
Local. Near Otter Lake, perhaps more common. 3621.

Polemoniaceae (PHLOX FAMILY)

Phlox divaricata L.
South end Sleeping Bear woods. (PWT, 1860).

Phlox subulata L. MOSS-PINK
Local. Escape near Maple Grove Cemetery and Trail End Rd. 2147, 2198.

Polygalaceae (MILKWORT FAMILY)

Polygala paucifolia Willd. FLOWERING WINTERGREEN
Common. Coastal Forest and some Oak-Aspen woods. 2087, 2132.

Polygonaceae (SMARTWEED FAMILY)

Polygonella articulata (L.) Meisner JOINTWEED
Local. Open relict beach ridges near Peterson Beach. 2993.

Polygonum amphibium L. WATER SMARTWEED
Occasional. Wetlands. 3454.

Polygonum aviculare L. KNOTWEED
Frequent. Roadsides and disturbed sites. 2580, 3605.

Polygonum cilinode Michaux FRINGED FALSE BUCKWHEAT
Occasional. Roadsides and disturbed sites. 2970, 3468.

Polygonum convolvulus L. BLACK BINDWEED
Common. Roadsides and disturbed sites. 2602, 2618, 2804, 2808.

Polygonum hydropiperoides Michaux MILD WATER-PEPPER
Local. Former house site at Pt. Oneida, perhaps more common. 3875.

Polygonum persicaria L. LADY'S THUMB
Occasional. Wetlands and moist woods. 2902, 2969.

Rumex acetosella L. SHEEP SORREL
Common. Old fields and roadsides. 2155, 2278.

Rumex crispus L. SOUR DOCK
Frequent. Wetlands. 3513.

Rumex obtusifolius L. BITTER DOCK
Occasional. Roadsides. 2527b, 2672.

Portulacaceae (PURSELANE FAMILY)

Claytonia caroliniana Michaux CAROLINA SPRING BEAUTY
Common. Northern Hardwoods. 2029, 2045.

Portulacca oleracea L. COMMON PURSELANE
Common. Disturbed sites and roadsides. 2919, 2962.

Primulaceae (PRIMROSE FAMILY)

Lysimachia terrestris (L.) BSP. SWAMP CANDLE
Local. Bogs. 2821.

Lysimachia thyrsiflora L. TUFTED LOOSESTRIFE
Frequent. Wetlands. 2284, 2365, 3273, 3423.

Trientalis borealis Raf. STAR FLOWER
Frequent. Coastal Forest and some Oak-Aspen woods. 2133, 2170.

Ranunculaceae (BUTTERCUP FAMILY)

Actaea pachypoda Ell. WHITE BANE BERRY
Frequent. Northern Hardwoods. 2788, 2841.

Anemone canadensis L. CANADA ANEMONE
Local. Bow Lakes section, perhaps more common. 3186.

Anemone cylindrica Gray THIMBLEWEED
Frequent. Woods borders and fields. 2369, 3401, 3465.

Anemone multifida Poiret RED ANEMONE
Common. Dunes. 4249.

Anemone quinquefolia L. WOOD ANEMONE
Local. Northern Hardwoods at north end of N. Bar Lake Rd. 2037b.

Anemone virginiana L. THIMBLEWEED
Frequent. Open wet areas. 2216, 2352.

Aquilegia canadensis L. WILD COLUMBINE
Frequent. Coastal Forest and woods bordering dunes. 2140, 2187.

Caltha palustris L. MARSH MARIGOLD
Frequent. Cedar swamps and wetland woods. 2067, 2168.

Clematis virginiana L.
Local. Marl Springs area east of Otter Creek. 3245.

Coptis trifolia (L.) Salisb. GOLDTHREAD
Frequent. Cedar swamps and wetland woods. 2070, 2234.

Hepatica acutiloba DC. SHARP-LEAVED HEPATICA
Common. Northern Hardwoods. 2027, 2043.

Hepatica americana (DC.) Ker. ROUND-LEAVED HEPATICA
Frequent. Coastal Forest and Oak-Aspen woods. 2036, 3237.

Ranunculus abortivus L. KIDNEY LEAF BUTTERCUP
Frequent. Northern Hardwoods. 2048, 3047.

Ranunculus acris L. COMMON BUTTERCUP
Common. Old fields and roadsides. 2151, 2195, 2980.

Ranunculus recurvatus Poir. HOOKED CROWFOOT
Frequent. Wetlands and wetland woods. 2112, 2162, 2901.

Thalictrum dioicum L. EARLY MEADOWRUE
Occasional. Northern Hardwoods. 2035.

Rhamnaceae (BUCKTHORN FAMILY)

Ceanothus americanus L. NEW JERSEY TEA
Local. Dry Coastal Forest north of Platte River. (3458) and Good Harbor Bay
(PWT, L-421).

Ceanothus herbaceus Raf. NEW JERSEY TEA
Local. Roadside; Lake Michigan Rd. near end of Co. 669. 2364.

Rosaceae (ROSE FAMILY)

Agrimonia striata Michaux
Frequent. Moist shady areas. 2905, 3016, 3393.

Amelanchier arborea (Michaux f.) Fern.
Black spruce bog near Crystal River. (PWT, L-758).

Amelanchier interior Nielsen
Frequent. Coastal Forest and some Northern Hardwoods. 2075, 2127, 3032.

Amelanchier laevis Weig.
Occasional. Coastal Forest. 2040.

Amelanchier sanguinea (Pursh) DC.
Frequent. Coastal Forest. 2065, 3034.

Amelanchier spicata (Lam.) K. Koch
Occasional. Empire Bluffs and Coastal Forest. 3036.

Aronia prunifolia (Marsh.) Rehder CHOKEBERRY
Frequent. Wetland borders. 2825, 3155, 3445.

Crataegus holmesiana Ashe
Occasional. Field edges along Norcronk Rd. 3000.

Crataegus punctata Jacq.

Field south of Empire. (PWT, L-860, L-1252, L-1274).

Crataegus sp.

Local. Moist open woods. 3176, 3672.

Fragaria virginiana Mill. WILD STRAWBERRY

Common. Old fields, Coastal Forest and some dunes. 2039, 2190, 3542, 3910.

Geum aleppicum Jacq.

Common. Wetlands and wetland woods. 2417, 2455, 3394, 3424.

Geum canadense Jacq.

Common. Wetlands and wetland woods. 2353, 2412, 2456, 3514.

Geum rivale L.

Occasional. Wetlands. 2262, 3272.

Malus pumila Miller APPLE

Occasional. Roadside escape. Persistent at old home sites and extensively cultivated. 2999, 3569, 3651.

Potentilla anserina L. SILVERWEED

Occasional. Moist shores. 2448, 2579.

Potentilla argentea L. SILVERY CINQUEFOIL

Frequent. Old fields and roadsides. 2232, 2599.

Potentilla fruticosa L. SHRUBBY CINQUEFOIL

Frequent. Wetland borders. 2879, 2947.

Potentilla recta L. SULFUR CINQUEFOIL

Common. Old fields and roadsides. 2319, 2385, 2912.

Prunus mahaleb L. PERFUMED CHERRY

Occasional. Established escape near Glen Haven and persisting in some old fields. 3048.

Prunus pensylvanica L. f. PIN CHERRY

Common. Old fields and some roadsides. 2089, 2116, 2775.

Prunus pumila L. SAND CHERRY

Common. Dunes. 2126, 2954.

Prunus serotina Ehrh. BLACK CHERRY

Common. Northern Hardwoods. 2741.

Prunus virginiana L. CHOKE CHERRY

Common. Old fields and some roadsides. 2760, 3566, 3646.

Rosa acicularis Lindley

Local. Along Lake Michigan Rd. near Platte Pt. 3236.

- Rosa blanda* Aiton WILD ROSE
Local. Dunes of Empire Bluffs, perhaps more common. 2495.
- Rosa carolina* L. PASTURE ROSE
Local. Dunes of Sleeping Bear Plateau, perhaps more common. 2380.
- Rosa palustris* Marsh. PASTURE ROSE
Frequent. Moist woods and some wetlands. 2341, 2567, 2654.
- Rubus alleghaniensis* Porter COMMON BLACKBERRY
Occasional. Old fields. 3618.
- Rubus flagellaris* Willd. NORTHERN DEWBERRY
Frequent in cedar swamps and Coastal Forest. 2342, 2416, 3247.
- Rubus hispidus* L. SWAMP DEWBERRY
Frequent. Wetland woods. 2164, 3574.
- Rubus occidentalis* L. BLACK RASPBERRY
Occasional. Old fields. 3642.
- Rubus odoratus* L. FLOWERING RASPBERRY
Local. Coastal Forest south of M-109 east of Stocking Rd. 2374.
- Rubus setosus* Bigelow
Occasional. Old fields. 3221, 3554.
- Rubus strigosus* Michaux WILD RED RASPBERRY
Frequent. Old fields and some roadsides. 2566, 2638, 3530, 3556.
- Sorbaria sorbifolia* (L.) A. Br. FALSE SPIREA
Local. Established at Aral and along Scenic Drive. 2998, 3408.
- Sorbus decora* (Sarg.) Shneider
Wooded slope, Sleeping Bear. (PWT, L-697)
- Spiraea alba* DuRoi MEADOWSWEET
Frequent. Wetland borders. 2568, 3553.
- Spiraea x vanhouttei* (Briot) Carr. BRIDAL-WREATH
Local. Escape near Swedish Mission Cemetery, but usually persisting as ornamental. 2252, 3153.

Rubiaceae (MADDER FAMILY)

- Galium aparine* L. CLEAVERS
Frequent. Northern Hardwoods. 2051, 3255.
- Galium lanceolatum* Torr. WILD LICORICE
Occasional. Northern Hardwoods. 2328, 2388.
- Galium palustre* L.
Frequent. Wetland woods. 2447, 2454.

- Galium pilosum* Aiton
Occasional. Coastal Forest, jack pine stands, and some Oak-Aspen woods. 2855, 2881, 3492.
- Galium triflorum* Michaux SWEET SCENTED BEDSTRAW
Frequent. Northern Hardwoods and cedar swamps. 2324, 3275.
- Galium verum* L. YELLOW BEDSTRAW
Local. Wet, gravelly old field between M-22 and Long Lake. 3227.
- Houstonia longifolia* Gaertn.
Occasional. Coastal Forests of Platte District. 2285.
- Mitchella repens* L. PARTRIDGEBERRY
Frequent. Cedar swamps, and Northern Hardwoods. 2450, 2520.
- Salicaceae (WILLOW FAMILY)
- Populus alba* L. WHITE POPLAR
Local. Spreading from established trees at former home sites. 3180.
- Populus balsamifera* L. BALSAM POPLAR
Frequent. Dunes. 2768, 3652.
- Populus deltoides* Marsh. COTTONWOOD
Common. Dunes, wetland borders, and some old fields. 2382, 2777.
- Populus grandidentata* Michaux BIG-TOOTH ASPEN
Common. Oak-Aspen woods, Coastal Forest, and old fields. 2137, 3235.
- Populus nigra* L. LOMBARDY POPLAR
Local. Spreading from former house sites and established on foredunes. 2254, 3861.
- Populus tremuloides* Michaux QUAKING ASPEN
Common. Old fields, Coastal Forest, and Oak-Aspen woods. 2778, 2826.
- Salix amygdaloides* Andersson PEACH-LEAVED WILLOW
Local. Moist woods west of Baker Rd., perhaps more common. 3575.
- Salix bebbiana* Sarg. BEAKED WILLOW
Frequent. Swales of Coastal Forest. 2934.
- Salix candida* Willd. SAGE WILLOW
Occasional. Wet swales. 3446, 3581.
- Salix cordata* Michaux SAND-DUNE WILLOW
Frequent. Dunes and some roadsides. 2057, 2916.
- Salix discolor* Muhl. PUSSY WILLOW
Frequent. Bogs, dunes, and wet fields. 2056, 2079, 3547.
- Salix eriocephala* Michaux
Local. Wet field between M-22 and Long Lake, perhaps more common. 3256.

Salix exigua Nutt. SANDBAR WILLOW
Common. Wetlands. 2935.

Salix lucida Muhl. SHINING WILLOW
Good Harbor Bay. (PWT, L-272).

Salix myricoides Muhl. BLUELEAF WILLOW
Frequent. Wetlands. 3033, 3173, 3582.

Salix petiolaris J. E. Smith SLENDER WILLOW
Common. Wetlands. 2078, 2779, 3174, 3580.

Salix sericea Marsh. SILKY WILLOW
Occasional. Dune swales and some dunes. 2379, 3447.

Santalaceae (SANDALWOOD FAMILY)

Comandra umbellata (L.) Nutt. BASTARD TOADFLAX
Occasional. Coastal Forest. 2270.

Geocaulon lividum (Richardson) Fern.
Mouth of Platte River. (M. Gall, 1891 {O})

Sarraceniaceae (PITCHER-PLANT FAMILY)

Sarracenia purpurea L. PITCHER PLANT
Local. Bogs. 2439, 2483.

Saxifragaceae (SAXIFRAGE FAMILY)

Chrysosplenium americanum Schw. GOLDEN SAXIFRAGE
Frequent. Wetland woods. 2160, 2480.

Mitella diphylla L. BISHOP'S CAP
Frequent. Northern Hardwoods. 2044, 2246.

Mitella nuda L. NAKED MITERWORT
Common. Cedar swamps and wetland woods. 2098, 2233.

Parnassia glauca Raf. GRASS-OF-PARNASSUS
Local. Fen-like area in cedar swamp west of Otter Creek. 2876.

Tiarella cordifolia L. FOAM FLOWER
Frequent. Northern Hardwoods and some cedar swamps. 2081, 2101, 2159,
3162.

Scrophulariaceae (FIGWORT FAMILY)

Linaria canadensis (L.) Dum.
Platte Plains swale. (PWT, LB-2298).
Open dunes north of Platte River Campground. {O}.

Linaria vulgaris Hill BUTTER AND EGGS
Occasional. Old fields. 2956.

Melampyrum lineare Desr. COW-WHEAT
Frequent. Coastal Forest. 2557, 3516.

Mimulus glabratus HBK.
Local. Marl Springs east of Otter Creek. 3626.

Mimulus ringens L.
Local. Shores of Crystal River. 2541.

Pedicularis canadensis L. WOOD BETONY
Frequent. Coastal Forest and Oak-Aspen woods. 2100, 2227.

Scrophularia lanceolata Pursh HARE FIGWORT
Local. Old field off Norcronk Rd. and trail on bluff south of D. H. Day
Campground. 2411, 4184.

Verbascum blattaria L. MOTH MULLEIN
Occasional. Roadsides. 2465, 2530.

Verbascum thapsus L. COMMON MULLEIN
Common. Old fields and roadsides. 2578, 2748.

Veronica americana (Raf.) Schw. AMERICAN BROOKLIME
Local. Otter Creek cedar swamp, perhaps more common. 2489.

Veronica arvensis L. CORN SPEEDWELL
Frequent. Disturbed sites and roadsides. 2097, 2105.

Veronica longifolia L.
Local. Wet field west of Tucker Lake. 4246.

Veronica officinalis L. COMMON SPEEDWELL
Frequent. Trails, disturbed sites, and roadsides. 2381, 2302, 2337.

Simarubaceae (QUASSIA FAMILY)

Ailanthus altissima (Mill.) Swingle TREE-OF-HEAVEN
Occasional. Persisting and spreading from former home sites. 3467, 3533, 3557.

Solanaceae (NIGHTSHADE FAMILY)

Physalis heterophylla Nees. CLAMMY GROUNDCHERRY
Frequent. Old fields. 2493, 2494, 3532.

Physalis longifolia Nutt.
Occasional. Old fields. 2782, 2849.

Solanum carolinense L. HORSE NETTLE
Local. Field off Echo Valley Rd. 2540.

Solanum dulcamara L. NIGHTSHADE

Occasional. Wetlands and some old field borders. 2620, 2932, 3254.

Solanum nigrum L.

Frequent. Disturbed sites and roadsides. 2991, 3585, 3680.

Thymelaeaceae (MEZEREUM FAMILY)

Dirca palustris L. LEATHERWOOD

Local. Northern Hardwoods south of Glen Haven, Bow Lakes section, and near intersection of Aral and Norcronk Rds. 2351, 2909.

Tiliaceae (BASSWOOD FAMILY)

Tilia americana L. BASSWOOD

Common. Northern Hardwoods. 2614, 2913.

Ulmaceae (ELM FAMILY)

Ulmus americana L. AMERICAN ELM

Frequent. Northern Hardwoods near dunes, wetland woods, and Bow Lakes section. 2845, 2904, 3040, 3187, 3507.

Ulmus pumila L. SIBERIAN ELM

Local. Spreading in field south of Narada Lake. 4685.

Ulmus rubra Muhl. SLIPPERY ELM

Occasional. Bow Lakes section and some roadsides. 3188, 3633.

Umbelliferae (PARSLEY FAMILY)

Anthriscus sylvestris (L.) Hoffm. CERVIL

Local. Roadside ditch Co. 651 near M-22. 3256.

Daucus carota L. WILD CARROT

Common. Old fields and roadsides. 2553, 2644.

Heracleum maximum Bart. COW-PARSNIP

Frequent. Northern Hardwoods. 2308, 3407.

Osmorhiza chilensis H. & A.

Occasional. Northern Hardwoods near base of north-facing bluffs. 2138, 4181.

Osmorhiza claytonii (Michaux) Clarke

Common. Northern Hardwoods. 2210, 2251.

Pastinaca sativa L. WILD PARSNIP

Local. Near intersection of Aral and Norcronk Rds. 2410.

Sanicula marilandica L.

Occasional. Northern Hardwoods and cedar swamps. 2281, 2491, 3244.

Sanicula trifoliata Bickm.

Occasional. Northern Hardwoods. 2497, 3508.

Taenidia integerrima (L.) Drude YELLOW PIMPERNEL
 Roadside, road to Platte Point. {O}.
 Pine-oak stage along Lake Michigan near Pyramid Pt. (PWT L-428)

Urticaceae (NETTLE FAMILY)

Boehmeria cylindrica (L.) Sw. FALSE NETTLE
 Frequent. Wetlands. 2639, 3409.

Laportea canadensis (L.) Wedd. WOOD NETTLE
 Occasional. Disturbed shady woods. 2527a, 2973.

Urtica dioica L. STINGING NETTLE
 Frequent. Wetlands. 2660, 2903, 3002, 3025.

Verbenaceae (VERVAIN FAMILY)

Verbena simplex Lehm.
 Occasional. Roadsides. 2498.

Verbena stricta Vent. HOARY Vervain
 Frequent. Roadsides. 2458, 2546, 3430.

Violaceae (VIOLET FAMILY)

Viola adunca J. E. Smith
 Frequent. Coastal Forest. 2066, 2141.

Viola arvensis Murray FIELD PANSY
 Occasional. Old fields. 3043, 3216, 3157.

Viola blanda Willd. SWEET WHITE VIOLET
 Common. Cedar swamps. 2071, 2243.

Viola canadensis L. CANADA VIOLET
 Common. Northern Hardwoods. 2030, 2053.

Viola conspersa Reichneb. DOG VIOLET
 Common. Coastal Forest and some Northern Hardwoods. 2073, 2090, 3030.

Viola cucullata Aiton MARSH VIOLET
 Frequent. Wetlands and cedar swamps. 2082, 2110, 2192.

Viola nephrophylla Greene
 Local. Marl Springs east of Otter Creek, perhaps more common. 2099.

Viola pubescens Aiton YELLOW VIOLET
 Common. Northern Hardwoods. 2052, 2247.

Viola selkirkii Goldie GREAT-SPURRED VIOLET
 Frequent. Coastal Forest and some Northern Hardwoods. 2072, 2131.

Viscaceae (MISTLETOE FAMILY)

Arceuthobium pusillum Peck. DWARF MISTLETOE

Local. Black spruce bog near M-22 east of Glen Haven. 3218.

Vitaceae (GRAPE FAMILY)

Parthenocissus quinquefolia (L.) Planchon

Frequent. Moist woods and roadsides. 2843, 2928.

Vitis riparia Michaux RIVER-BANK GRAPE

Common. Dunes. 2256, 2758.

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LITERATURE CITED

- Bailey, L. H. 1949. Manual of Cultivated Plants. Macmillan & Co., New York. 1116 pp
- Beaman, J. H., E. A. Bourdo, F. W. Case, S. R. Crispen, D. Henson, R. W. Pippen, A. A. Reznicek, E. G. Voss, and P. W. Thompson, 1985. Endangered and threatened plants in Michigan. II. Third biennial review proposed list. Michigan Bot. 24: 99-116.
- Brewer, L. 1982. The present status and future prospect for the American chestnut in Michigan. Michigan Bot. 21: 117-128.
- Cowles, H. C. 1899. The ecological relations of the vegetation on the sand dunes of Lake Michigan. Bot. Gaz. 27: 95-117, 167-202, 281-308, 361-391.

- Curtis, J. T. 1959. *Vegetation of Wisconsin*. Univ. Wisconsin Press, Madison. 657 pp.
- Drexler, C. 1975. Geologic report on Sleeping Bear Dune National Lakeshore. 52 pp.
- Gates, F. C. 1950. The disappearing Sleeping Bear Dune. *Ecology* 31: 386-392.
- Gillis, W. T. and K. I. Bakeman. 1923. The disappearing Sleeping Bear sand dune. *Michigan Bot.* 2:45-54.
- Guire, K. E. and E. G. Voss. 1963. Distributions of distinctive shoreline plants in the Great Lakes Region. *Michigan Bot.* 2: 99-114.
- Hazlett, B. T. and R. J. Vande Kopple. 1984. The terrestrial vegetation and flora of North and South Manitou Islands, Sleeping Bear Dunes National Lakeshore, Leelanau County, Michigan. Univ. Michigan Bio. Sta. Tech. Rpt. 11 143 pp.
- Loveless, M. D. 1984. Population biology and genetic organization in *Cirsium pitcheri*, an endemic thistle. PhD. dissertation Univ. Kansas. 109 pp.
- Marquis, R. J. and E. G. Voss, 1981. Distributions of some western North American plants disjunct in the Great Lakes Region. *Michigan Bot.* 20: 53-82.
- Mickel, J. T. 1979. *How to Know the Ferns and Fern Allies*. W. C. Brown Co., Dubuque, Iowa. 229 pp.
- Overlease, W. and E. Overlease, 1985a. The flora of Benzie County. Part II: Gymnosperms and monocots.
- Overlease, W. and E. Overlease, 1985b. The flora of Benzie County. Part III: Choripetalous dicotyledons.
- Overlease, W. and E. Overlease, 1986. The flora of Benzie County. Part IV: Sympetalous dicotyledons.
- Thompson, P. W. 1967. *Vegetation and common plants of Sleeping Bear*. Cranbrook Inst. Sci Bull. 52. 47 pp.
- Van Arsdale, J. M. 1981. A new northern station for *Triphora trianthophora*. *Michigan Bot.* 21: 93, 94.
- Voss, E. G. 1972. *Michigan Flora Part 1 Gymnosperms and Monocots*. Cranbrook Inst. Sci Bull. 55 and Univ. Michigan Herbarium. 488 pp.
- Voss, E. G. 1985. *Michigan Flora Part 2 Dicots (Saururaceae-Cornaceae)*. Cranbrook Inst. Sci. Bull. 59 and Univ. Michigan Herbarium. 724 pp.
- Waterman, W. G. 1922. Development of plant communities of a sand ridge region in Michigan. *Bot. Gaz.* 74: 1-31.
- Waterman, W. G. 1926. Ecology of Glen Lake and Sleeping Bear Region. *Pap. Michigan Acad. Sci.* 6: 351-376.

Appendix A. Cultivated and persisting species.

A complete list of cultivated species on the Mainland was not attempted. Several cemeteries, private homes and vacation cottages still occur within the Lakeshore, and the landscape ornamentals and garden plants at these places were not investigated. The fields surrounding cemeteries and several former homesites, some where the buildings have been removed by the Park Service, were visited. Some cultivated species in the agricultural zones of the Mainland may have been overlooked. Nomenclature follows Bailey (1949) for those species not covered in the manuals used in the main plant list. Some species appear in both lists.

Cupressaceae (CYPRESS FAMILY)

Juniperus virginiana L. RED CEDAR
Ornamental. 3630.

Pinaceae (PINE FAMILY)

Picea abies (L.) Karsten NORWAY SPRUCE
Ornamental and conifer plantations. 3475, 3562.

Picea glauca (Moench) A. Voss WHITE SPRUCE
Ornamental and conifer plantations. 3561.

Picea pungens Engelm. COLORADO BLUE SPRUCE
Ornamental. 3647.

Pinus nigra L. AUSTRIAN PINE
Ornamental and conifer plantations. 3560.

Psuedostuga menzizii (Mirbel) Franco
Conifer plantations. 3182.

Amaryllidaceae (AMARYLLIS FAMILY)

Narcissus poeticus L. NARCISSUS
Locally persisting, but perhaps spreading slightly at old homesites and along roadsides. 2094.

Narcissus psuedo-narcissus L. DAFODILL
Locally persisting, but perhaps spreading slightly at old homesites and along roadsides. 2068.

Gramineae (GRASS FAMILY)

Triticum aestivum L. WHEAT
Cultivated in fields along M-22 between Aral and Esch Rd. 3262.

Zea mays L. CORN
Cultivated widely in fields at northern end of Benzie Co. SI.

Liliaceae (LILY FAMILY)

Asparagus officinalis L. GARDEN ASPARAGUS

Frequent. Roadside and old field escape, but often persisting in old garden plots. 2532, 2796.

Convallaria majalis L. LILY-OF-THE-VALLEY

Local. Persisting in areas where planted, but sometimes spreading. 2148, 2200.

Hemerocallis fulva (L.) L. ORANGE DAY-LILY

Frequently persisting at former house sites, but occasionally established along roadsides. 2773.

Hemerocallis lilio-asphodelus L. YELLOW DAY-LILY

Locally persisting at former house sites but established along M-109 near Glen Lake beach. 2339, 2405.

Lilium lancifolium Thunb. TIGER LILY

Local along Aral Rd. 2794.

Muscari botrioides (L.) Miller GRAPE-HYACINTH

Locally persisting at former house sites where sometimes spreading, and also along roadsides. 2083, 3045.

Ornithogalum umbellatum L. STAR-OF-BETHLEHEM

Local escape along M-109 near M-22 and persisting at former house site on Otter Lake. 2268, 2299.

Yucca filamentosa L. YUCCA

Ornamental persisting at former house sites. 3606.

Aceraceae (MAPLE FAMILY)

Acer negundo L. BOX ELDER

Ornamental, but occasionally escaping along roadsides. 2183, 3676, 3683.

Anacardiaceae (CASHEW FAMILY)

Cotinus coggygria Scop. SMOKE-BUSH

Local ornamental on Townline Rd. near M-22. 3522.

Apocynaceae (DOGBANE FAMILY)

Vinca minor L. COMMON PERIWINKLE

Frequent. Escape at old house sites. 2120.

Betulaceae (BIRCH FAMILY)

Betula pendula Roth. EUROPEAN WHITE BIRCH

Ornamental at former house sites. 3564, 3871.

Bignoniaceae (BIGNONIA FAMILY)

Catalpa speciosa Warder CATALPA
Ornamental, Thorson Rd. 3461.

Caprifoliaceae (HONEYSUCKLE FAMILY)

Lonicera sp. HONEYSUCKLE
Frequently planted as an ornamental and occasionally escaping to fields and roadsides.

Kolkwitzia amabilis Graebn. BEAUTY-BUSH
Ornamental. 2336.

Wiegela venusa Bailey
Ornamental. 3140.

Cornaceae (DOGWOOD FAMILY)

Cornus florida L. FLOWERING DOGWOOD
Ornamental. 3870.

Compositae (COMPOSITE FAMILY)

Tanacetum vulgare L. COMMON TANSY
Local. Persisting in field north of Sunset Trail. 2799.

Crassulaceae (ORPINE FAMILY)

Sedum sarmentosum Bunge
Local. Former house site on Lake Michigan east of Platte Pt. 3665.

Elaeagnaceae (OLEASTER FAMILY)

Elaeagnus umbellata Thunb. AUTUMN-OLIVE
Local. Escape along Wheeler Rd., also ornamental. 3257.

Ericaceae (HEATH FAMILY)

Vaccinium corymbosum L. Highbush BLUEBERRY
Persisting where once cultivated. 2277.

Fagaceae (BEECH FAMILY)

Castanea dentata (Marsh.) Borkh. CHESTNUT
Local. One small tree near overgrown orchard on Alligator Hill behind sand pit across from Glen Lake access. 2751.

Grossulariaceae (GOOSEBERRY FAMILY)

Ribes odoratum Wendl. f. BUFFALO CURRANT
Local. Persisting at former home sites, but spreading slightly. 2114, 3046.

Ribes rubrum L. RED CURRANT

Persisting at former home site off M-22 near Old Indian trail. 3224.

Juglandaceae (WALNUT FAMILY)

Juglans nigra L. BLACK WALNUT

Frequent. Planted by farms, but escaping to sandy fields near Long Lake Rd. and Westman Rd. 2922, 3003, 3484, 3534.

Lauraceae (LAUREL FAMILY)

Sassafras albidum (Nutt.) Nees. SASSAFRAS

Ornamental in field south of Burnham Rd. 3629.

Leguminosae (BEAN FAMILY)

Gleditsia triacanthos L. HONEY LOCUST

Ornamental. 3559.

Medicago sativa L. ALFALFA

Common. Old fields and roadsides; planted in some fields. 2561, 2647.

Robinia pseudoacacia L. BLACK LOCUST

Frequent. Spreading from old house sites. 2945, 3558.

Magnoliaceae (MAGNOLIA FAMILY)

Magnolia soulangeana Soul.

Ornamental. 2091.

Malvaceae (MALLOW FAMILY)

Alcea rosea L. HOLLY-HOCK

Local. Roadside escape and persistent at old house sites. 2616, 2772.

Moraceae (MULBERRY FAMILY)

Morus alba. L.

Occasional. Ornamental and roadside escape. 2925, 3862.

Oleaceae (OLIVE FAMILY)

Forsythia viridissima Lindley FORSYTHIA

Ornamental. 2093.

Syringa vulgaris L. LILAC

Common. Ornamental persisting at old home sites and slightly spreading. 2102, 3648.

Papaveraceae (POPPY FAMILY)

Papaver orientale L. ORIENTAL POPPY

Occasional. Persisting as an ornamental, but slightly spreading in some sites. 2383, 3259, 3395.

Polygonaceae (SMARTWEED FAMILY)

Polygonum cuspidatum Sieb. & Zucc. MEXICAN BAMBOO

Ornamental along Co. 669 near former house site on Bass Lake. 3583.

Rheum rhaponticum L. RHUBARB

Persisting at old house sites, probably not spreading. 2902, 2969.

Rosaceae (ROSE FAMILY)

Chaenomeles lagenaria Koidz. FLOWERING QUINCE

Ornamental. 2092.

Malus pumila Miller APPLE

Occasional. Roadside escape. Persistent at old home sites and extensively cultivated. 2999, 3569, 3651.

Prunus avium L. SWEET CHERRY

Extensively cultivated in orchards. SI.

Prunus persicaria (L.) Batsch PEACH

Persisting as an ornamental and planted in orchards. 3628.

Pyrus communis L. PEAR

Persisting as ornamental and planted in orchards. 3632.

Spiraea vanhouttei (Briot) Carr. BRIDAL-WREATH

Local. Escape near Swedish Mission Cemetery, but usually persisting as ornamental. 2252, 3153.

Salicaceae (WILLOW FAMILY)

Populus alba L. WHITE POPLAR

Local. Spreading from established trees at former home sites. 3180.

Populus nigra L. LOMBARDY POPLAR

Local. Spreading from former house sites and established on foredunes. 2254, 3861.

Salix babylonica L. WEEPING WILLOW

Ornamental. 3661, 3858.

Salix fragilis L. CRACK WILLOW

Occasional. Persisting at former homesites. 3565.

Saxifragaceae (SAXIFRAGE FAMILY)

Philadelphus coronarius L. MOCK ORANGE

Local. Persisting at former house site off Sutter Rd. 3233.

Philadelphus verrucosus Schrad.

Local. Persisting along Stormer Rd. 2460.

Simarubaceae (QUASSIA FAMILY)

Ailanthus altissima (Mill.) Swingle TREE-OF-HEAVEN

Occasional. Persisting and spreading from former home sites. 3467, 3533, 3557.

Ulmaceae (ELM FAMILY)

Ulmus pumila L. SIBERIAN ELM

Ornamental at former home sites. 2892, 3552.

Appendix B. Locations and descriptions of permanent plots.

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Table 1. Mainland Permanent Plots.

BTH no.	Name	Vegetation Type	Soil/slope	Township	Section
24	Matelski Field	Field	Ed/0-6%	Empire	18 NW1/4 NW1/4
25	Pine Haven	Coastal Forest	Dk/6-18%	Gln Arb	21 SW 1/4
26	Thorson Rd.	Northern Hardwoods	Ka/18-25%	Gln Arb	13 SW1/4 NW1/4
27	Crystal River	Coastal Forest	Ed/0-6%	Gln Arb	23 SE1/4 SE1/4
28	Elm Woods	Northern Hardwoods	Ka/12-18%	Empire	10 NE 1/4
29	Burnam Rd.	Northern Hardwoods	Ka/0-6%	Empire	9 SE1/4 NW1/4
30	Wm. Casier	Northern Hardwoods	Ea/6-12%	Empire	16 SE1/4 NW1/4
31	Turkey Farm	Northern Hardwoods	Ll/25-45%	Empire	6 NW1/4 NE1/4
32	Alligator Hill	Northern Hardwoods	Ka/0-6%	Empire	28 NE1/4 SW1/4
33	Empire Bluffs	Northern Hardwoods	Ll/0-6%	Empire	25 SW1/4 NE1/4

Soils: Dk, Deer Park sand; Ea, East Lake loamy sand; Ed, Eastport sand; Ka, Kalkaska sand; Ll, Leelanau-East Lake loamy sand.

Table 2. Specific locations of Mainland permanent plots.

BTH no.	Directions
24	S 30° W @ 250 ft. to NW corner of plot from bend in N. Bar Lake Rd. 0.3 mi. N of Voice Rd.
25	N 79° W @ 200 ft. to NE corner of plot from Pine St. 0.2 mi. N of M-109.
26	S 160 ft. to NE corner of plot from Thorson Rd. 0.5 mi from M-22.
27	Wly 725 ft. along trail from Crystal River dam, thence @ 145 ft. W to NE corner of plot.
28	NWly along trail @ 640 ft. from Co. 617, thence S 60 ft. to SE corner of plot.
29	N @ 90 ft. to SE corner of plot from Burnam Rd. 0.1 mi. W of Co. 677.
30	N 53° W 580 ft. to SE corner of plot from NW corner of orchard.
31	W @ 870 ft. along old Greenan Rd. from service entrance to Scenic Drive, thence S 190 ft. to NW corner of plot.
32	E 0.5 mi. along Alligator Hill trail from trailhead, thence S 120 ft. at trail intersection, thence 140 ft. to NW corner of plot.
33	W @ 0.3 mi. along Empire Bluffs trail from trailhead (almost to clearing), thence S 250 ft. to NE corner of plot.

Appendix C. Permanent plot data sheets.

BTH no. 24
Name Matelski Field

Empire Twp.
Date sampled 20 Aug. 1985

Overstory: Trees > 1" dbh

(sq. ft./acre)

Species	No. of stems	Mean dbh	Total basal area/species	Total basal area
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Understory: Trees and shrubs < 1" dbh and taller than 3.5'

Species	No. of stems
Juniperus communis	1
Prunus serotina	1

Ground Layer Species

Acer saccharum	Monarda punctata
Agropyron repens	Oxalis stricta
Ambrosia psilostachya	Panicum sp.
Centaurea maculosa	Physalis heterophylla
Erigeron sp.	Poa compressa
Hypericum perforatum	Prunus serotina
Lepidium sp.	Silene pratensis
	Solidago nemoralis

BTH no. 25
Name Pine Haven

Glen Arbor Twp.
Date sampled 20 Aug. 1985

Overstory: Trees > 1" dbh

(sq. ft./acre)

Species	No. of stems	Mean dbh	Total basal area/species	Total basal area
<i>Pinus strobus</i>	9	8.7	111.57	
<i>P. resinosa</i>	4	8.8	51.69	
<i>Betula papyrifera</i>	1	11.1	18.40	
<i>Tsuga canadensis</i>	2	5.3	8.57	
<i>Abies balsamea</i>	12	2.0	7.69	
<i>Prunus serotina</i>	1	2.0	.59	
<i>P. virginiana</i>	3	1.0	.49	

199.00

Understory: Trees and shrubs < 1" dbh and taller than 3.5'

Species	No. of stems
<i>Abies balsamea</i>	11
<i>Prunus virginiana</i>	10
<i>Betula papyrifera</i>	3
<i>Populus grandidentata</i>	1

Ground Layer Species

<i>Acer rubrum</i>	<i>Ostrya virginiana</i>
<i>Aralia racemosa</i>	<i>Pedicularis canadensis</i>
<i>Betula papyrifera</i>	<i>Polygala paucifolia</i>
<i>Carex</i> sp.	<i>Polygonatum pubescens</i>
<i>Epigaea repens</i>	<i>Pteridium aquilinum</i>
<i>Linnaea borealis</i>	<i>Satureja vulgaris</i>
<i>Maianthemum canadense</i>	<i>Symphoricarpus albus</i>
<i>Melampyrum lineare</i>	<i>Vaccinium angustifolium</i>
<i>Mitchella repens</i>	<i>V. myrtilloides</i>
<i>Oryzopsis asperifolia</i>	<i>Viola</i> sp.

BTH no. 26
Name Thorson Rd.

Glen Arbor Twp.
Date sampled 20 Aug. 1985

Overstory: Trees > 1" dbh

(sq. ft./acre)

Species	No. of stems	Mean dbh	Total basal area/species	Total basal area
Quercus rubra	12	6.5	83.32	
Populus grandidentata	3	8.0	29.89	
Acer rubrum	3	4.2	8.17	
Pinus strobus	4	3.2	7.75	

128.13

Understory: Trees and shrubs < 1" dbh and taller than 3.5'

Species	No. of stems
Pinus strobus	6
Fagus grandifolia	3
Acer rubrum	2
Quercus rubra	1

Ground Layer Species

Acer rubrum	Monotropa uniflora
Aralia nudicaulis	Poa compressa
Carex sp.	Pteridium aquilinum
Cypripedium acaule	Quercus rubra
Epigaea repens	Trientalis borealis
Fagus grandifolia	Vaccinium angustifolium
Gaultheria procumbens	Viburnum acerifolium
Juniperus communis	

BTH no. 27
Name Crystal River

Glen Arbor Twp.
Date sampled 20 Aug. 1985

Overstory: Trees > 1" dbh

(sq. ft./acre)

Species	No. of stems	Mean dbh	Total basal area/species	Total basal area
<i>Fagus grandifolia</i>	3	11.7	88.37	
<i>Acer rubrum</i>	17	3.6	39.36	
<i>Tsuga canadensis</i>	6	4.4	19.04	
<i>Betula papyrifera</i>	2	7.6	7.88	
<i>Abies balsamea</i>	1	1.2	.21	

154.86

Understory: Trees and shrubs < 1" dbh and taller than 3.5'

Species	No. of stems
<i>Pinus strobus</i>	14
<i>Abies balsamea</i>	2
<i>Acer pensylvanicum</i>	1
<i>A. rubrum</i>	1
<i>Tsuga canadensis</i>	1

Ground Layer Species

<i>Acer pensylvanicum</i>	<i>Monotropa uniflora</i>
<i>A. rubrum</i>	<i>Trientalis borealis</i>
<i>Carex sp.</i>	<i>Tsuga canadensis</i>
<i>Epiphagus virginiana</i>	<i>Pinus strobus</i>
<i>Fagus grandifolia</i>	<i>Pteridium aquilinum</i>
<i>Maianthemum canadense</i>	<i>Quercus rubra</i>

BTH no. 28
Name Elm Woods

Empire Twp.
Date sampled 20 Aug. 1985

Overstory: Trees > 1" dbh

(sq. ft./acre)

Species	No. of stems	Mean dbh	Total basal area/species	Total basal area
<i>Acer saccharum</i>	16	4.7	80.88	
<i>Ulmus americana</i>	5	5.3	24.65	
<i>Fraxinus americana</i>	1	10.2	15.45	
<i>Ulmus rubra</i>	1	5.9	5.16	
<i>Ostrya virginiana</i>	1	1.3	.25	
				126.39

Understory: Trees and shrubs < 1" dbh and taller than 3.5'

Species	No. of stems
<i>Acer saccharum</i>	1

Ground Layer Species

<i>Acer saccharum</i>	<i>Ribes cynosbati</i>
<i>Aralia nudicaulis</i>	<i>Sambucus pubens</i>
<i>Fraxinus americana</i>	<i>Solidago flexicaulis</i>
<i>Carex plantaginea</i>	<i>Trillium grandiflorum</i>
<i>Osmorhiza claytonii</i>	<i>Uvularia grandiflora</i>
<i>Polygonatum pubescens</i>	<i>Viola sp.</i>

BTH no. 29
Name Burnham Rd.

Empire Twp.
Date sampled 20 Aug. 1985

Overstory: Trees > 1" dbh

(sq. ft./acre)

Species	No. of stems	Mean dbh	Total basal area/species	Total basal area
<i>Fagus grandifolia</i>	8	6.6	66.44	
<i>Fraxinus americana</i>	2	13.2	52.16	
<i>Tilia americana</i>	1	16.3	39.45	
<i>Acer saccharum</i>	4	4.3	14.90	

172.95

Understory: Trees and shrubs < 1" dbh and taller than 3.5'

Species	No. of stems
<i>Acer saccharum</i>	5

Ground Layer Species

<i>Acer saccharum</i>	<i>Monotropa uniflora</i>
<i>Allium tricoccum</i>	<i>Ostrya virginiana</i>
<i>Carex</i> sp.	<i>Polygonatum pubescens</i>
<i>Fagus grandifolia</i>	<i>Prunus serotina</i>
<i>Fraxinus americana</i>	<i>Solidago</i> sp.
<i>Maianthemum canadense</i>	<i>Tilia americana</i>
<i>Mitchella repens</i>	<i>Viburnum acerifolium</i>

BTH no. 30
Name Wm. Casier

Empire Twp.
Date sampled 20 Aug. 1985

Overstory: Trees > 1" dbh

(sq. ft./acre)

Species	No. of stems	Mean dbh	Total basal area/species	Total basal area
<i>Fagus grandifolia</i>	2	19.8	116.54	
<i>Acer saccharum</i>	4	5.4	34.86	
<i>Fraxinus americana</i>	1	13.2	25.86	
<i>Ostrya virginiana</i>	1	1.7	.43	

177.69

Understory: Trees and shrubs < 1" dbh and taller than 3.5'

Species	No. of stems
<i>Fagus grandifolia</i>	20
<i>Acer saccharum</i>	4
<i>Ostrya virginiana</i>	1

Ground Layer Species

<i>Acer saccharum</i>	<i>Osmorhiza claytonii</i>
<i>Actaea pachypoda</i>	<i>Ostrya virginiana</i>
<i>Allium tricoccum</i>	<i>Polygonatum pubescens</i>
<i>Caulophyllum thalictroides</i>	<i>Ribes cynosbati</i>
<i>Circaea leutiana</i>	<i>Tilia americana</i>
<i>Fagus grandifolia</i>	<i>Trillium grandiflorum</i>
<i>Maianthemum canadense</i>	<i>Viola canadensis</i>

BTH no. 31
Name Turkey Farm

Empire Twp.
Date sampled 20 Aug. 1985

Overstory: Trees > 1" dbh

(sq. ft./acre)

Species	No. of stems	Mean dbh	Total basal area/species	Total basal area
<i>Fagus grandifolia</i>	9	8.6	146.48	
<i>Acer saccharum</i>	7	5.4	67.16	
				213.64

Understory: Trees and shrubs < 1" dbh and taller than 3.5'

Species	No. of stems
<i>Fagus grandifolia</i>	18
<i>Acer saccharum</i>	11
<i>Viburnum acerifolium</i>	2
<i>Ostrya virginiana</i>	1

Ground Layer Species

<i>Acer saccharum</i>	<i>Maianthemum canadense</i>
<i>Allium tricoccum</i>	<i>Osmorhiza pubescens</i>
<i>Aralia nudicaulis</i>	<i>Polygonatum pubescens</i>
<i>Carex plantaginea</i>	<i>Ribes cynosbati</i>
<i>Dryopteris marginalis</i>	<i>Trillium grandiflorum</i>
<i>Fagus grandifolia</i>	<i>Uvularia grandiflora</i>
<i>Fraxinus americana</i>	<i>Viola pubescens</i>
<i>Galium sp.</i>	<i>Viola sp.</i>
<i>Hepatica acutiloba</i>	

BTH no. 32
Name Alligator Hill

Empire Twp.
Date sampled 20 Aug. 1985

Overstory: Trees > 1" dbh

(sq. ft./acre)

Species	No. of stems	Mean dbh	Total basal area/species	Total basal area
<i>Quercus rubra</i>	1	19.6	57.04	
<i>Acer saccharum</i>	6	5.5	43.09	
<i>Populus</i>				
<i>grandidentata</i>	1	17.0	42.92	
<i>Prunus serotina</i>	3	8.5	33.94	
<i>Fagus grandifolia</i>	2	8.9	24.77	
<i>Ostrya virginiana</i>	3	3.1	4.35	
<i>Tsuga canadensis</i>	1	1.1	.18	

206.30

Understory: Trees and shrubs < 1" dbh and taller than 3.5'

Species	No. of stems
<i>Ostrya virginiana</i>	4
<i>Fagus grandifolia</i>	3
<i>Acer saccharum</i>	1

Ground Layer Species

<i>Acer saccharum</i>	<i>Maianthemum canadense</i>
<i>Betula papyrifera</i>	<i>Mitchella repens</i>
<i>Carex</i> sp.	<i>Oryzopsis asperifolia</i>
<i>Fagus grandifolia</i>	<i>Polygonatum pubescens</i>
<i>Fraxinus americana</i>	<i>Prunus serotina</i>

BTH no. 33
Name Empire Bluffs

Empire Twp.
Date sampled 20 Aug. 1985

Overstory: Trees > 1" dbh

(sq. ft./acre)

Species	No. of stems	Mean dbh	Total basal area/species	Total basal area
<i>Acer saccharum</i>	3	15.8	125.05	
<i>Fagus grandifolia</i>	2	5.4	24.77	
<i>Fraxinus americana</i>	1	8.2	9.98	
<i>Ulmus rubra</i>	1	6.1	5.52	
<i>Prunus serotina</i>	1	4.2	2.63	

167.95

Understory: Trees and shrubs < 1" dbh and taller than 3.5'

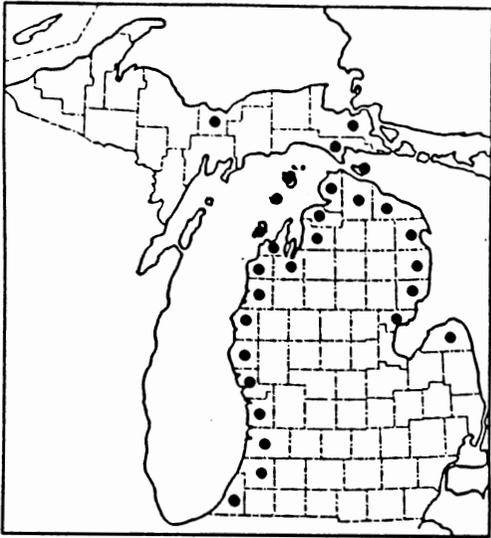
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<i>Prunus virginiana</i>	62
<i>Fagus grandifolia</i>	61
<i>Ostrya virginiana</i>	4
<i>Acer saccharum</i>	1
<i>Prunus serotina</i>	1

Ground Layer Species

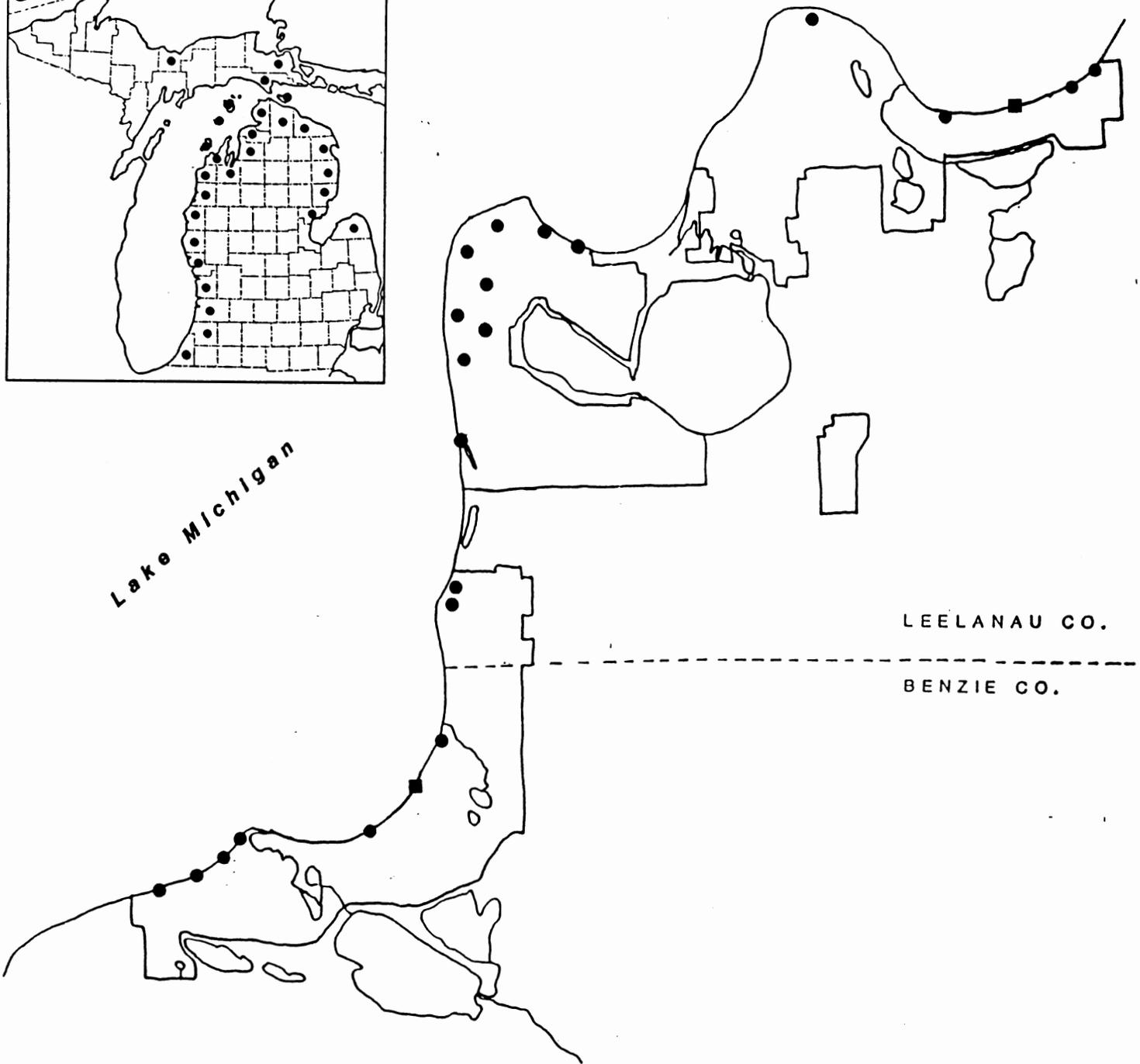
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<i>Allium tricoccum</i>	<i>Polygonatum pubescens</i>
<i>Arisaema triphyllum</i>	<i>Prunus virginiana</i>
<i>Caulophyllum thalictroides</i>	<i>Ribes cynosbati</i>
<i>Circaea leutiana</i>	<i>Sambucus pubens</i>
<i>Fagus grandifolia</i>	<i>Solidago flexicaulis</i>
<i>Fraxinus americana</i>	<i>Tilia americana</i>
<i>Galium aparine</i>	<i>Trillium grandiflorum</i>
<i>Hepatica acutiloba</i>	<i>Uvularia grandiflora</i>
<i>Maianthemum canadense</i>	<i>Viola canadensis</i>

Appendix D. Mainland distribution of special status species with Michigan distribution inserts.

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1. Pitcher's thistle.....	98
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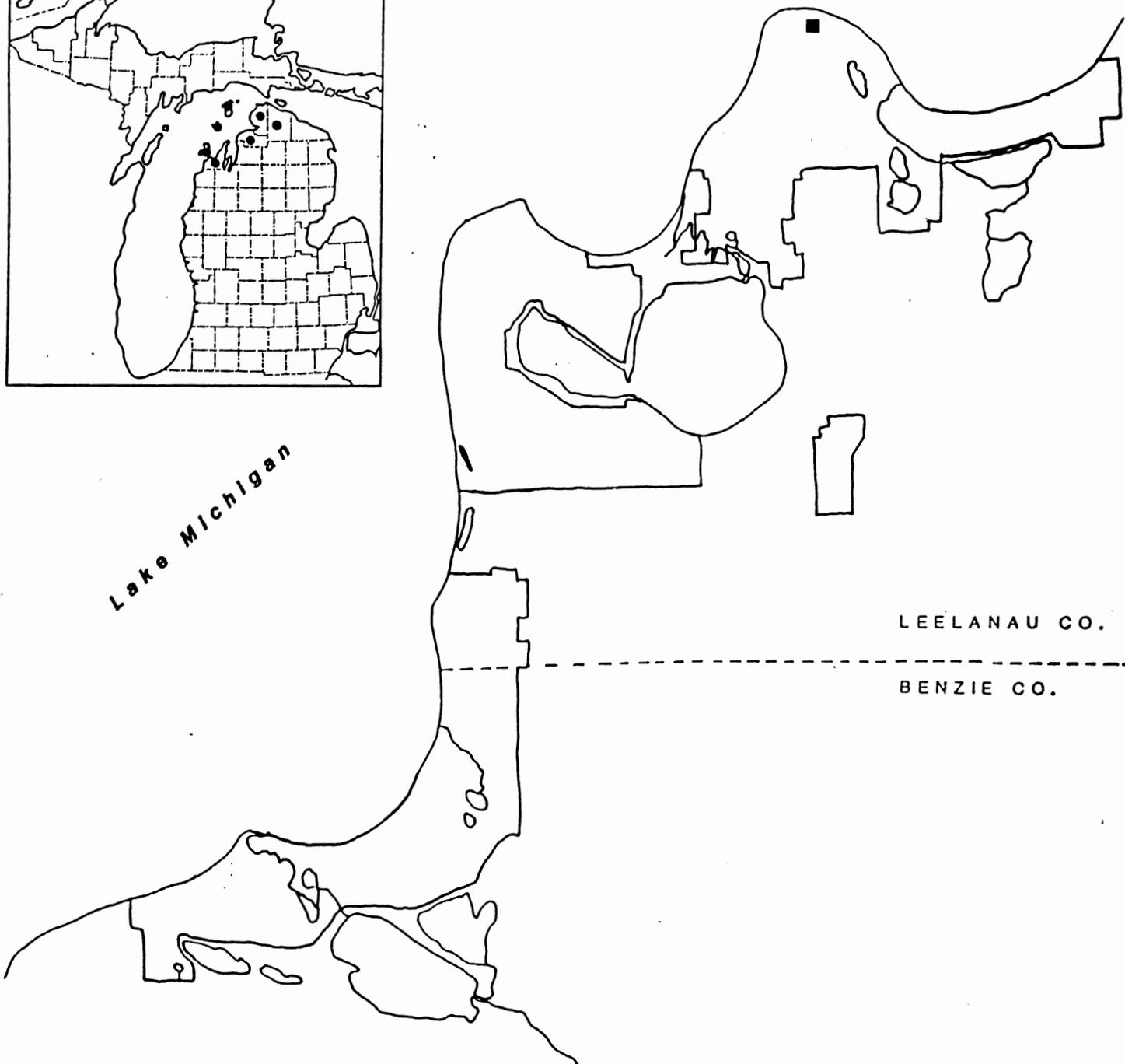
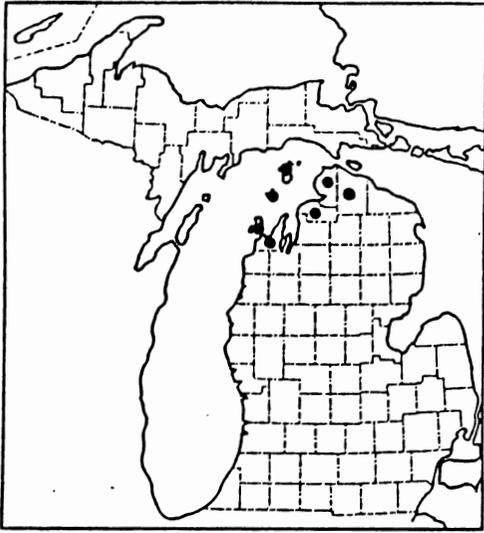
Lake Michigan



LEELANAU CO.

BENZIE CO.

Species: Cirsium pitcheri
 Common name: Pitcher's thistle
 Status: MI Threatened
 Proposed US Threatened
 Code: ■ BTH Collection
 ● BTH Observation

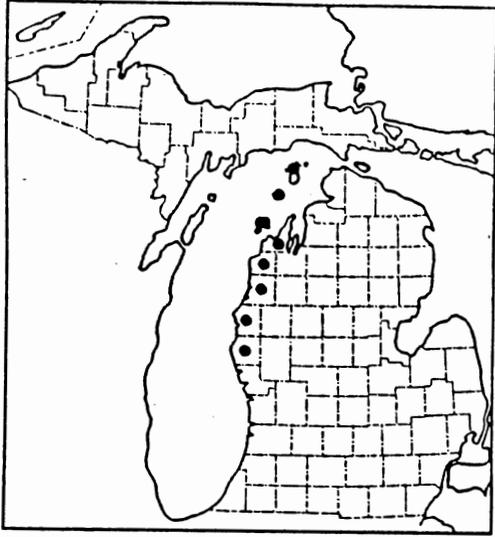


Lake Michigan

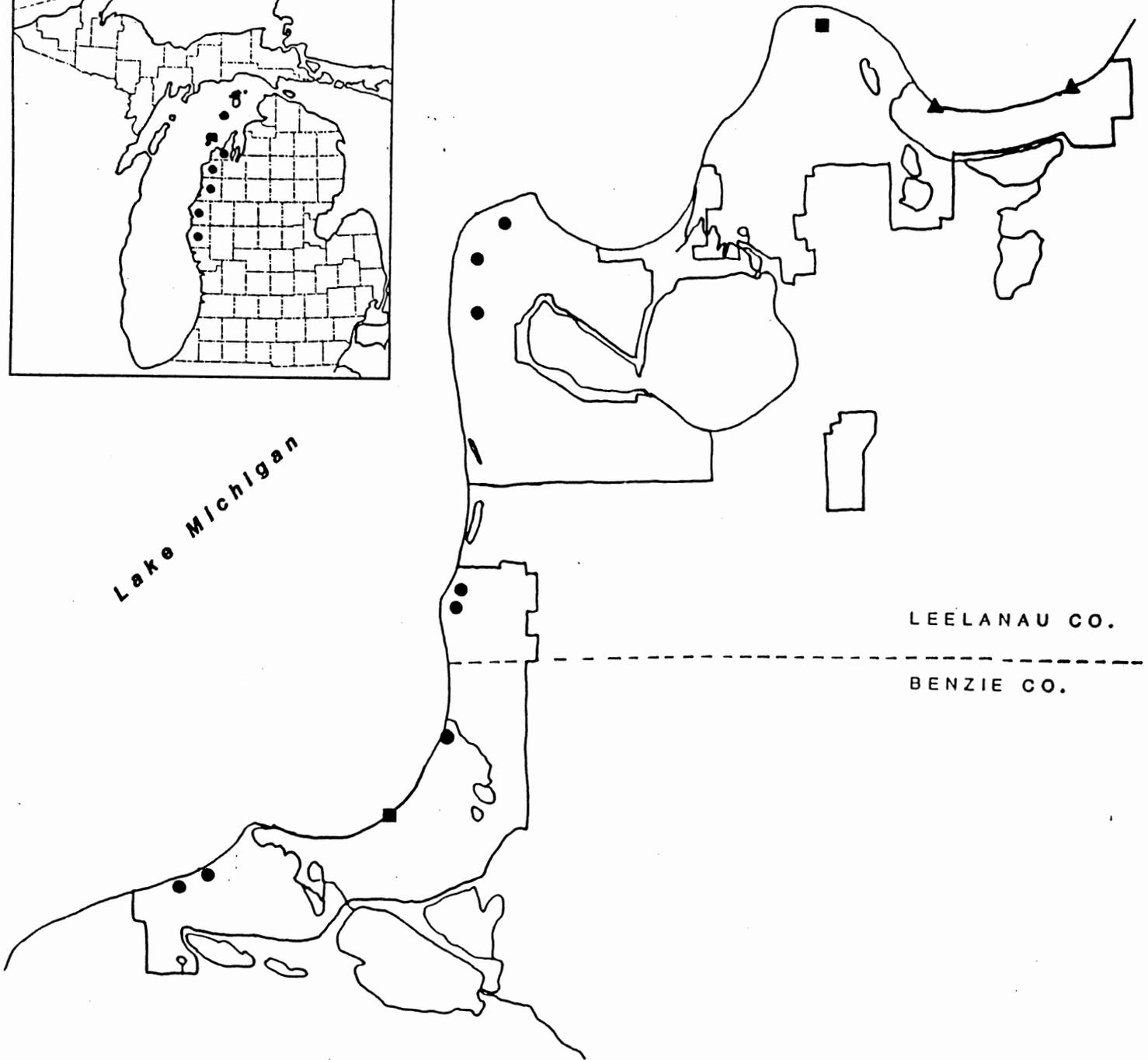
LEELANAU CO.

BENZIE CO.

Species: Bromus pumpellianus
Common name: Pumpelly's brome grass
Status: MI Threatened
Code: ■ BTH Collection



Lake Michigan



LEELANAU CO.

BENZIE CO.

Species: Orobanche fasciculata

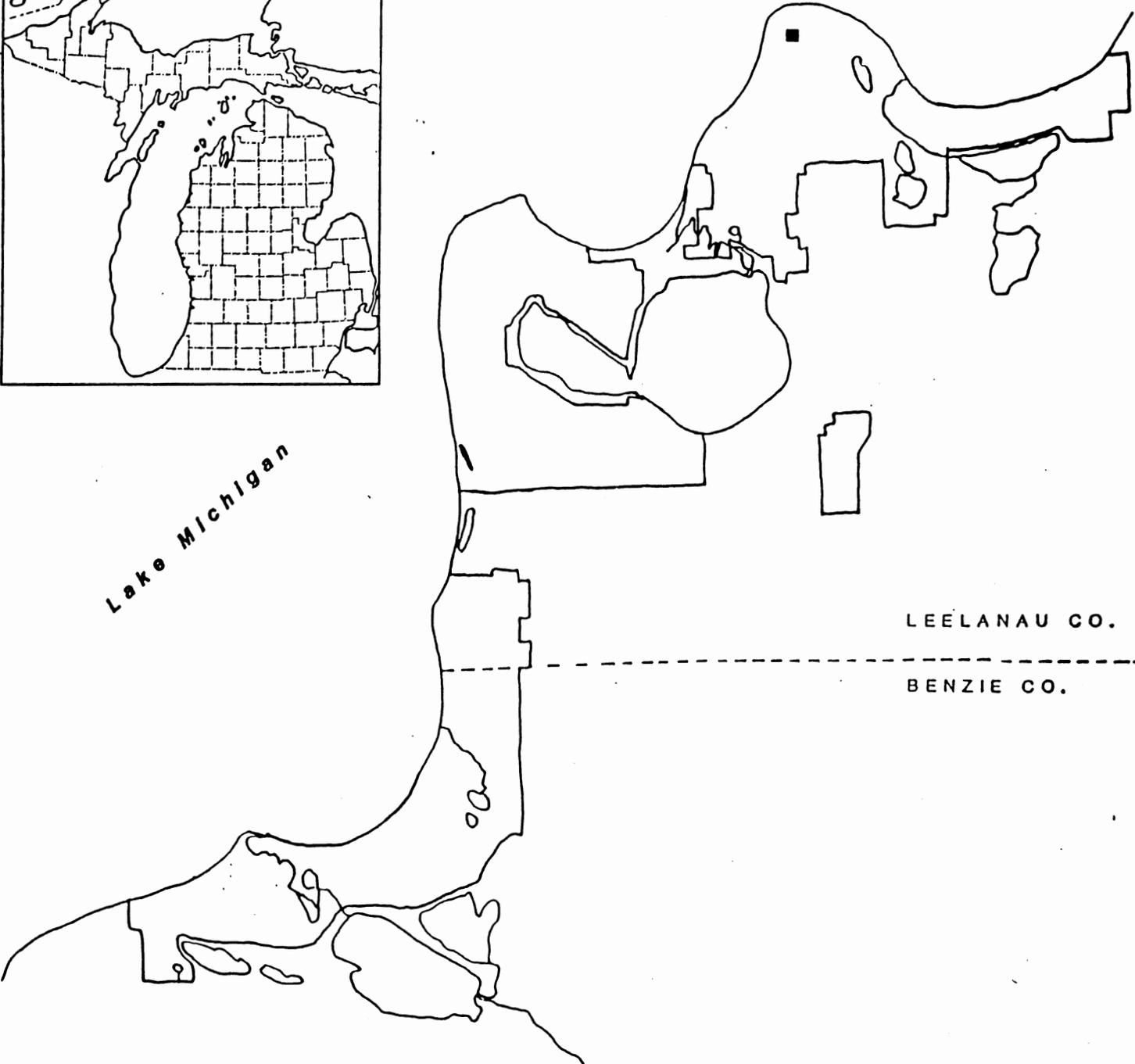
Common name: Broom-rape

Status: MI Threatened

Code: ■ BTH Collection

● BTH Observation

▲ MNFI Record

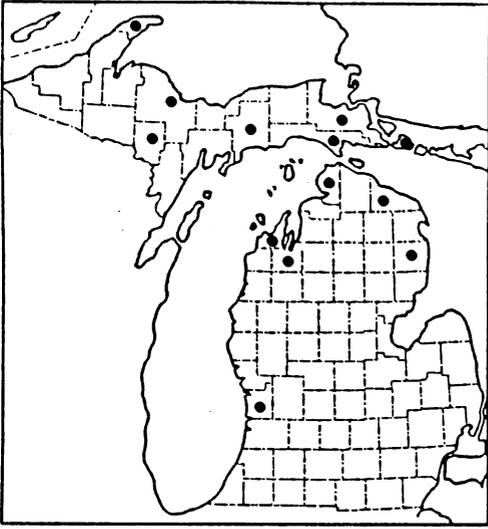


Lake Michigan

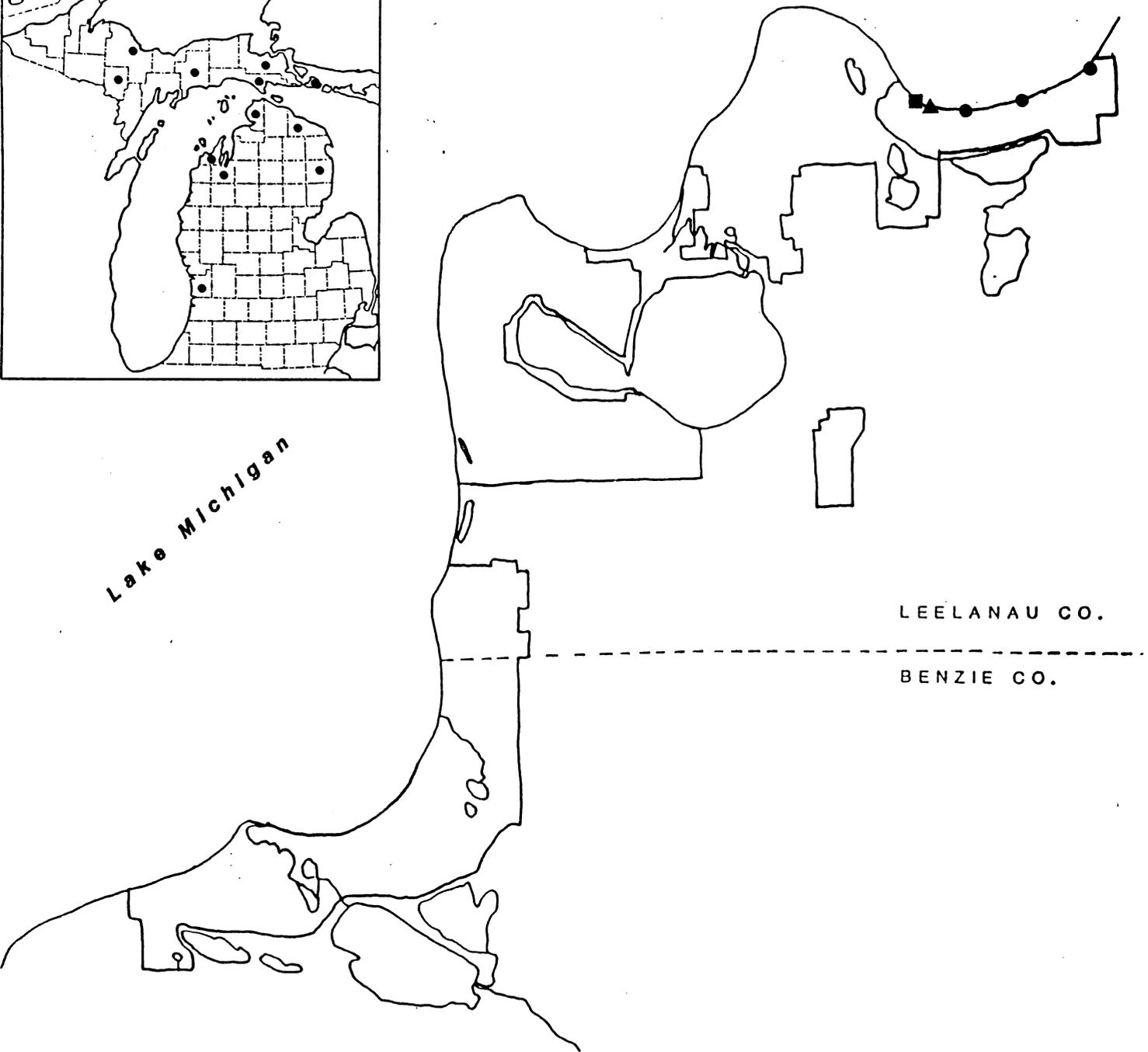
LEELANAU CO.

BENZIE CO.

Species: Panax quinquefolius
Common name: Ginseng
Status: MI Threatened
Code: ■ BTH Collection



Lake Michigan



LEELANAU CO.

BENZIE CO.

Species: Pterospora andromedea

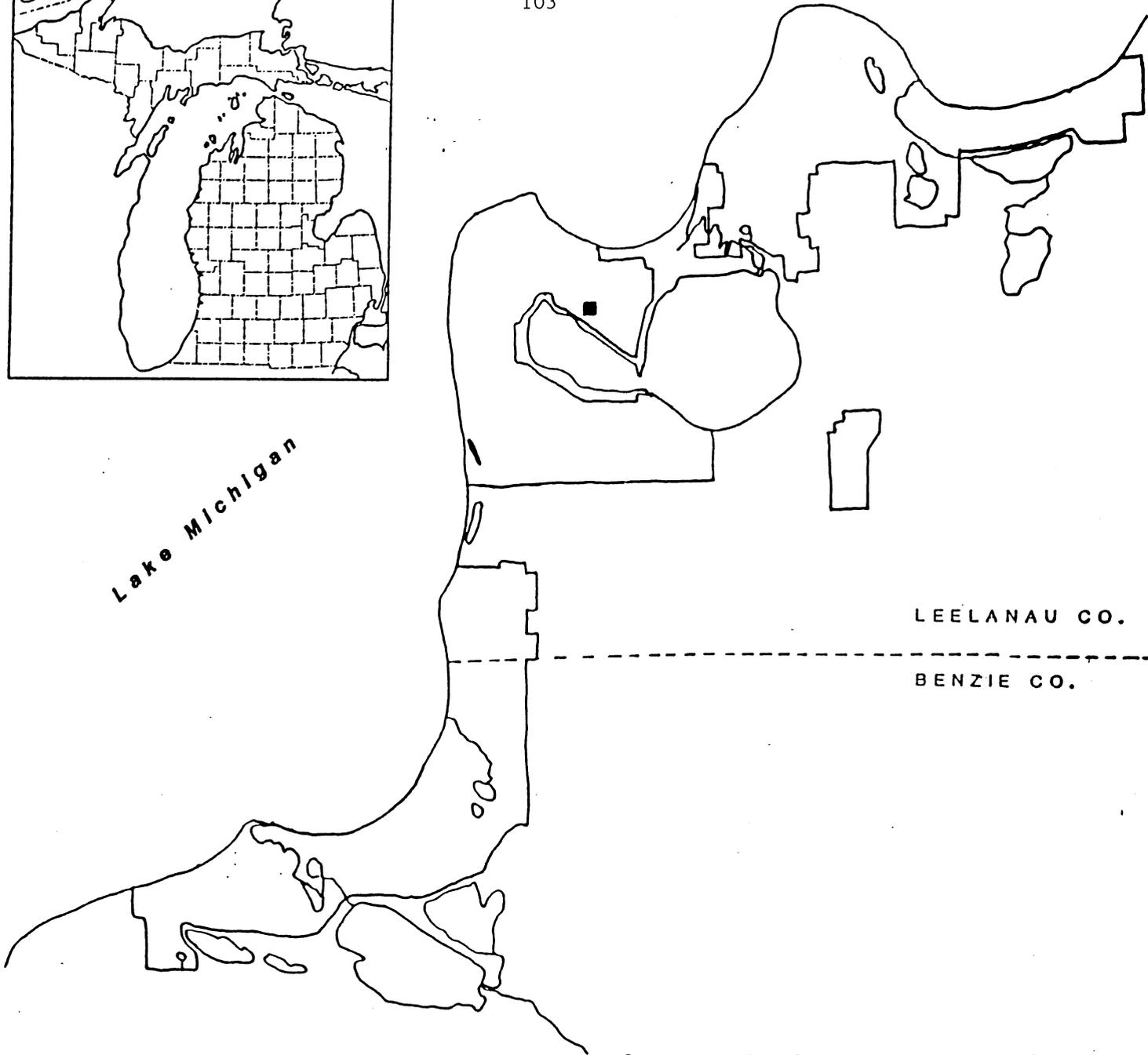
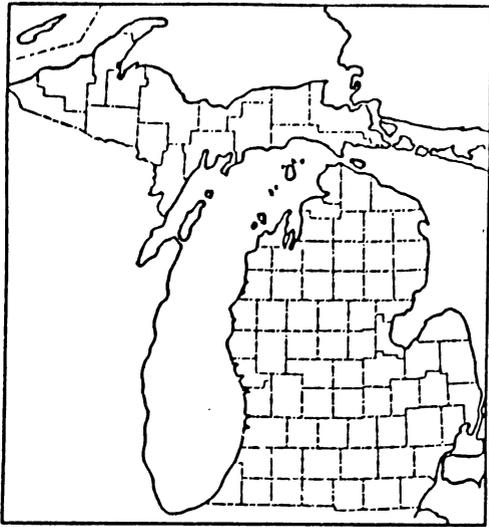
Common name: Pine-drops

Status: MI Threatened

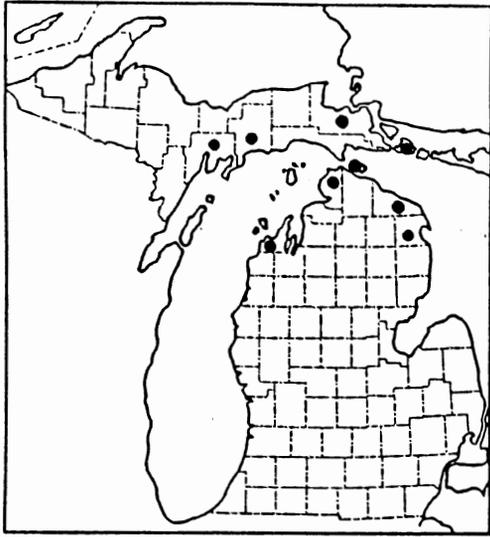
Code: ■ BTH Collection

● BTH Observation

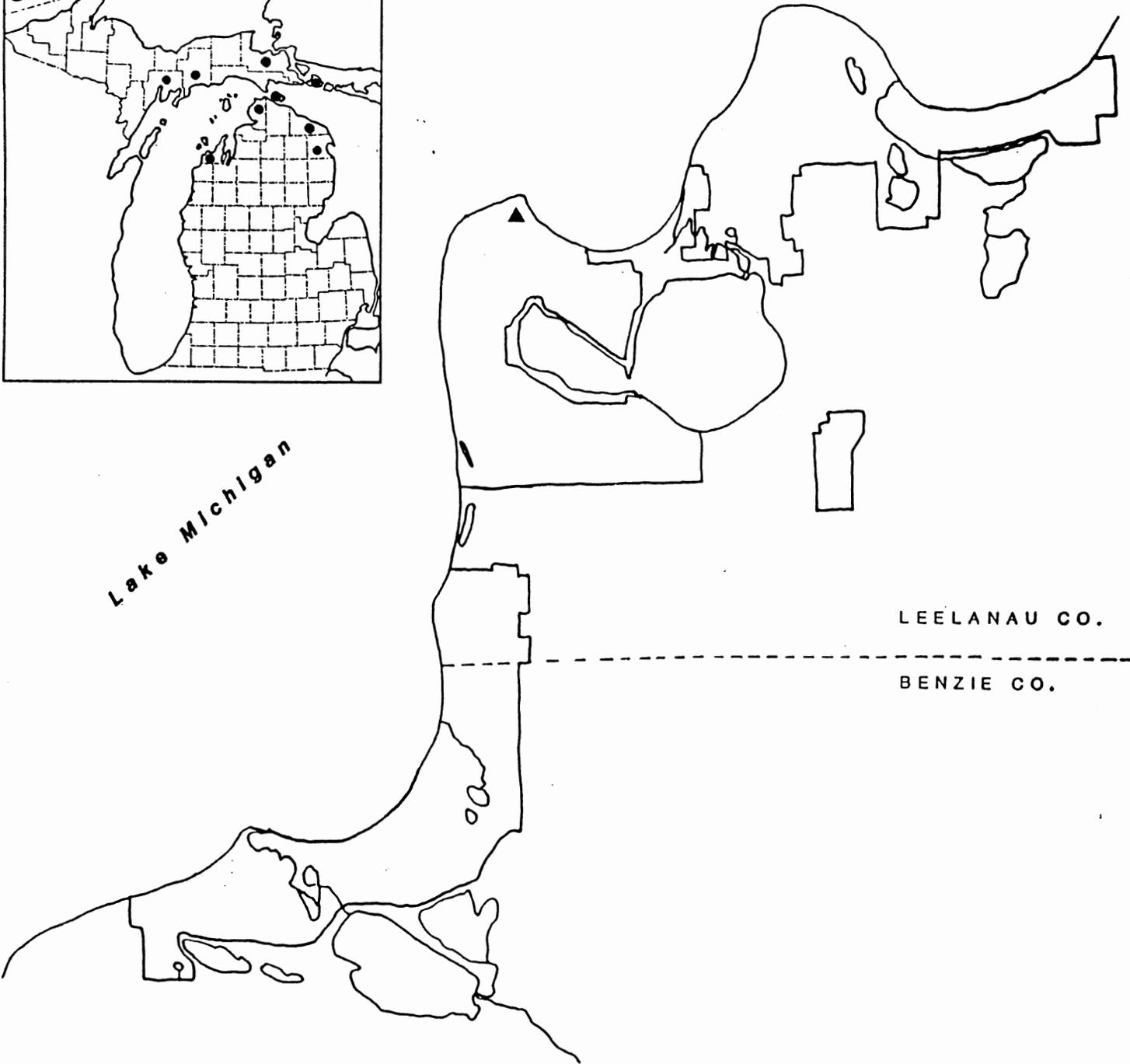
▲ MNFI Record



Species: Triphora trianthophora
Common name: Three-birds orchid
Status: MI Threatened
Code: ■ BTH Collection



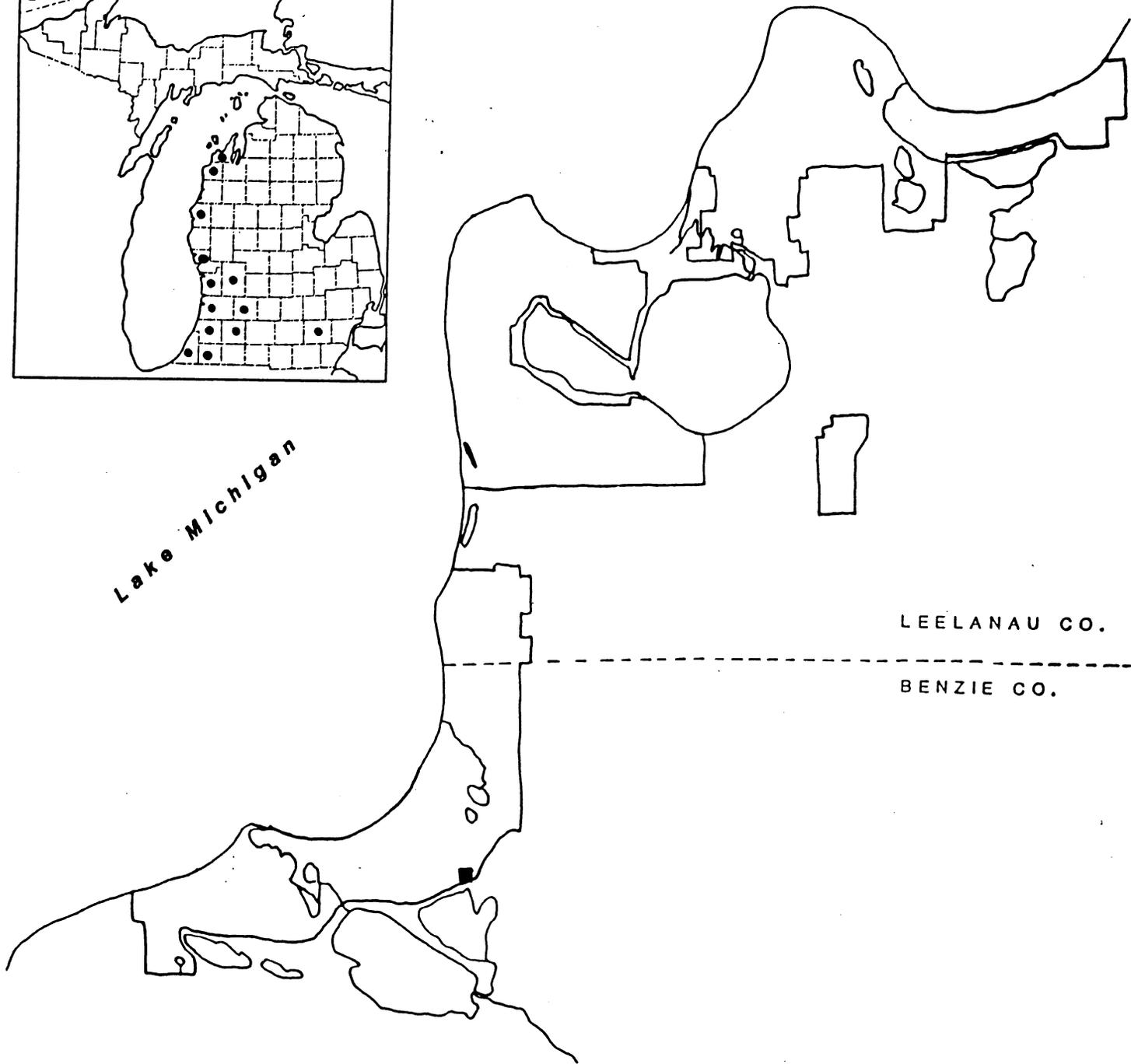
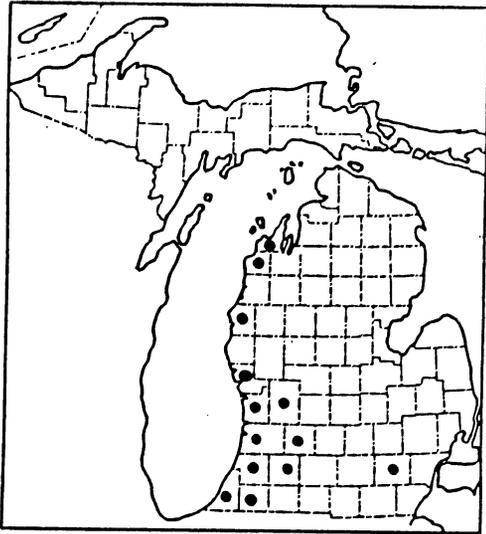
Lake Michigan



LEELANAU CO.

BENZIE CO.

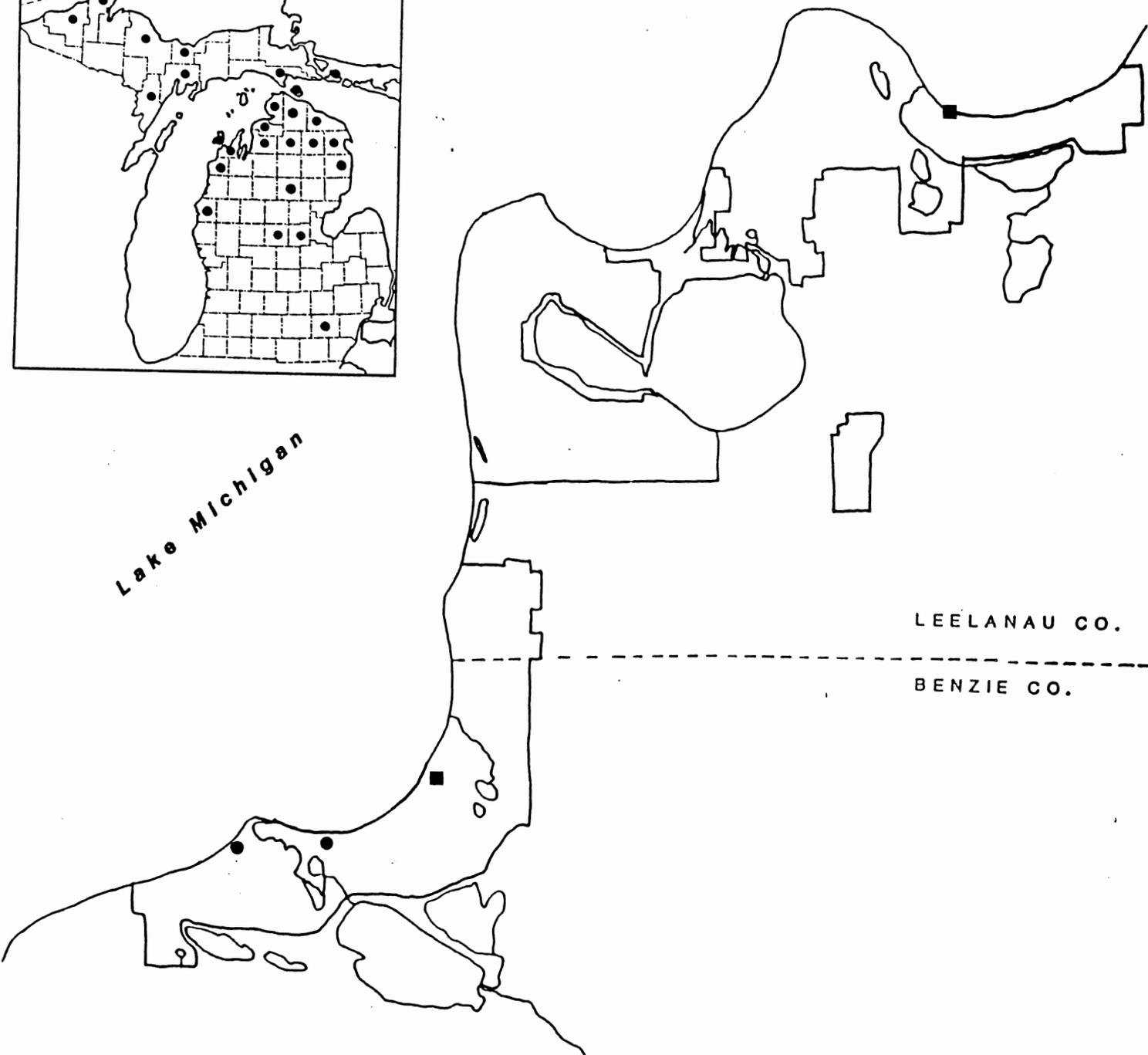
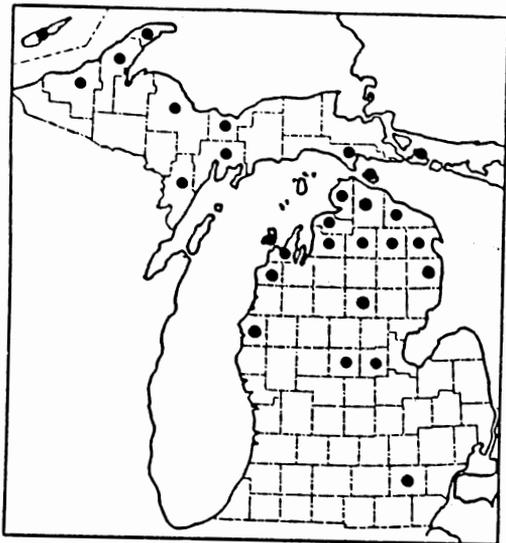
Species: Carex concinna
Status: MI Special Concern
Code: ▲ MNFI Record



LEELANAU CO.

BENZIE CO.

Species: Chimaphila maculata
Common name: Spotted wintergreen
Status: MI Special Concern
Code: ■ BTH Collection

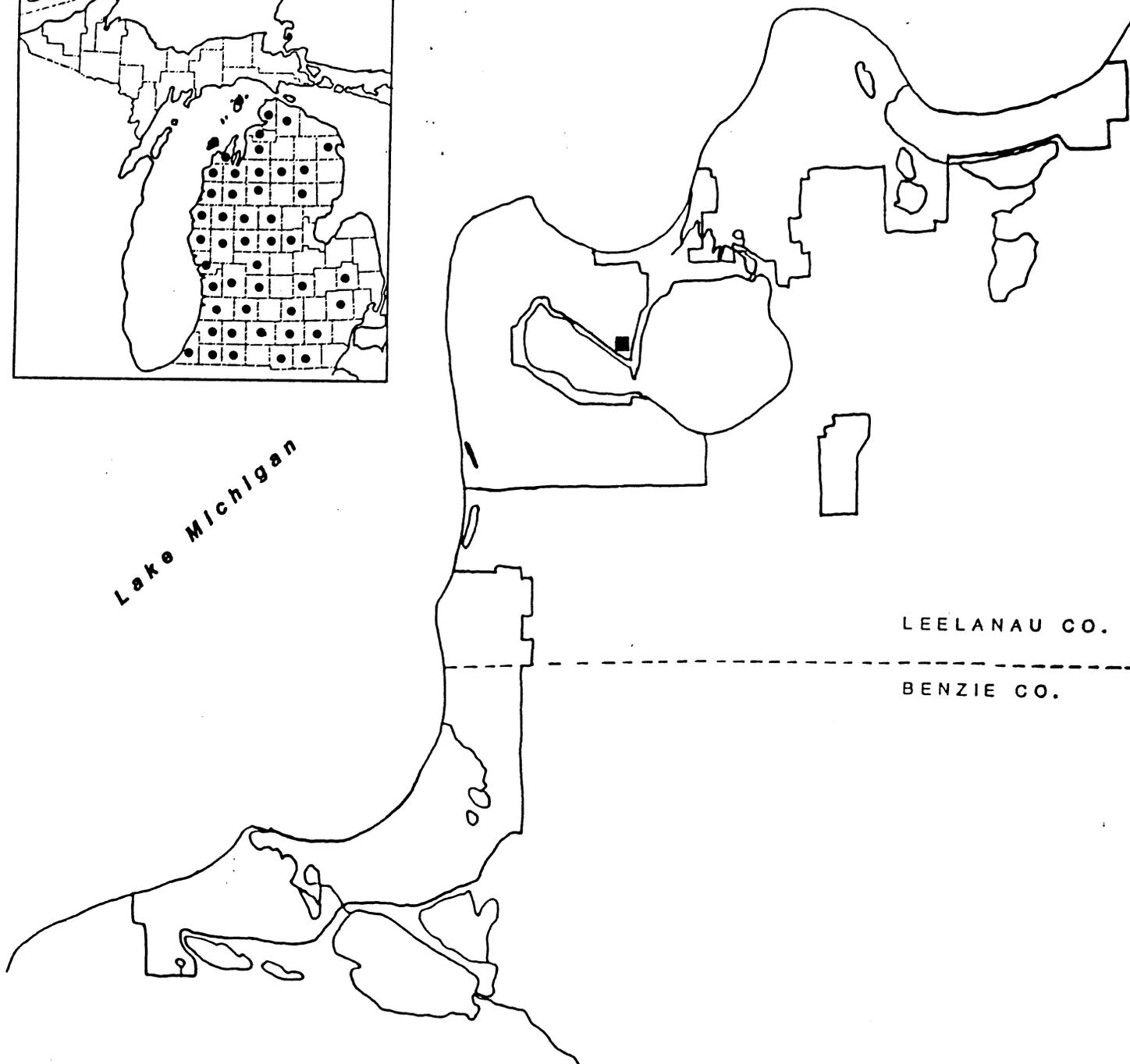
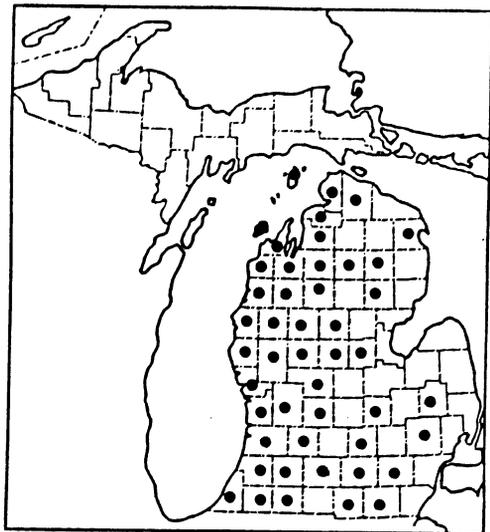


Lake Michigan

LEELANAU CO.

BENZIE CO.

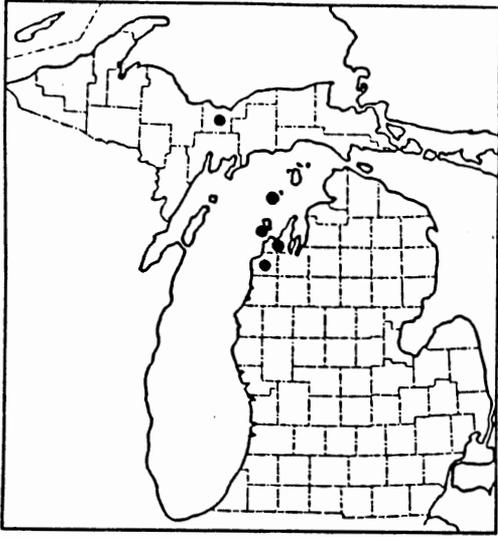
Species: Cypripedium arietinum
 Common name: Ram's-head lady-slipper
 Status: MI Special Concern
 Code: ■ BTH Collection
 ● BTH Observation



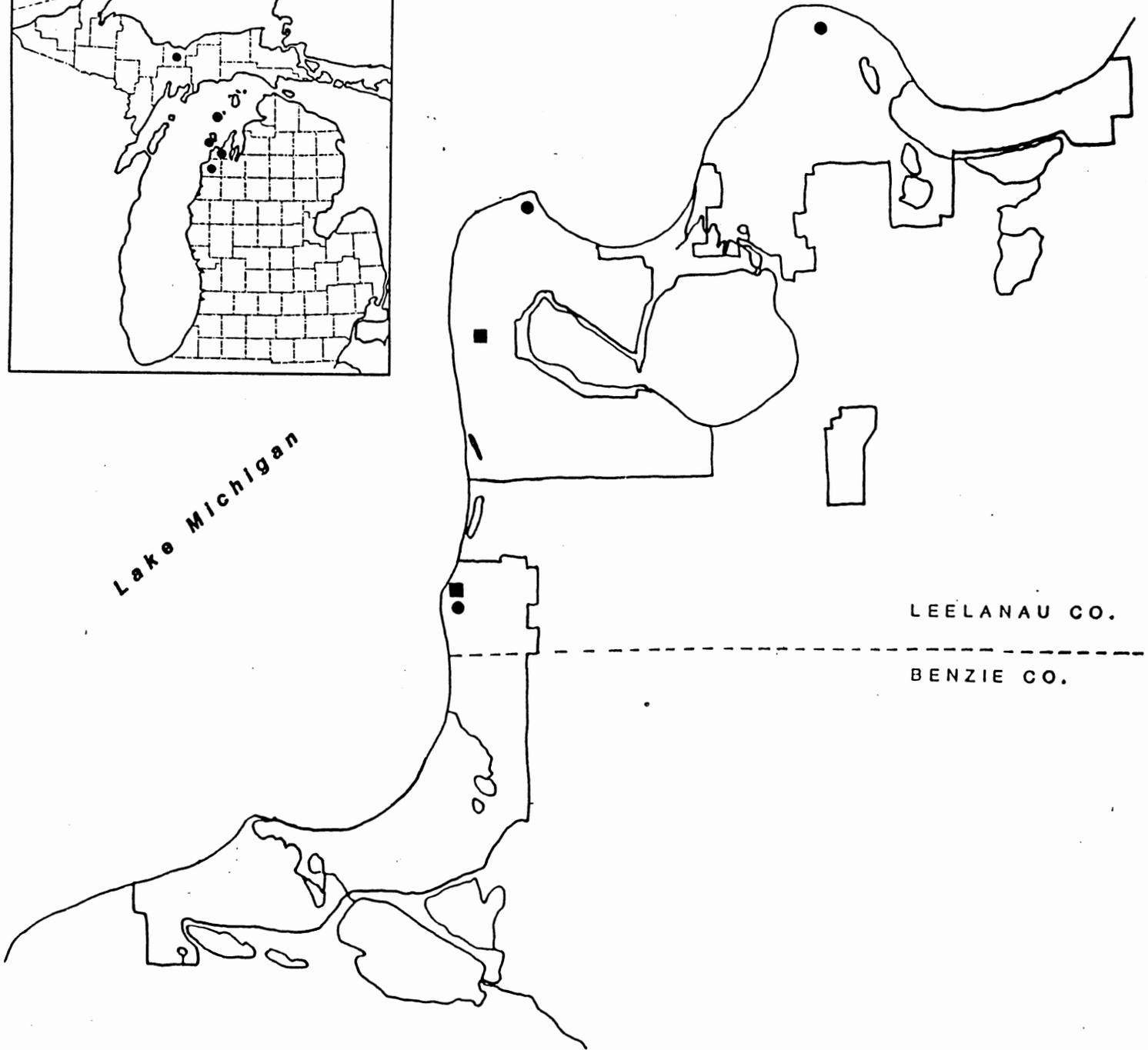
LEELANAU CO.

BENZIE CO.

Species: Castanea dentata
Common name: Chestnut
Status: MI Endangered (Native range)
Code: ■ BTH Collection



Lake Michigan



LEELANAU CO.

BENZIE CO.

Species: Botrychium sp. nov.
 Common name: Sleeping Bear dunewort
 Status: Possible MI Threatened
 Code: ■ BTH Collection
 ● BTH Observation

Appendix E. Common names for plants listed according to scientific name.

<i>Abies balsamea</i> (L.) Miller	BALSAM FIR
<i>Acer negundo</i> L.	BOX ELDER
<i>Acer pensylvanicum</i> L.	STRIPED MAPLE
<i>Acer rubrum</i> L.	RED MAPLE
<i>Acer saccharum</i> Marsh.	SUGAR MAPLE
<i>Acer spicatum</i> Lam.	MOUNTAIN MAPLE
<i>Achillea millefolium</i> L.	COMMON YARROW
<i>Actaea pachypoda</i> Ell.	WHITE BANE BERRY
<i>Adiantum pedatum</i> L.	MAIDENHAIR FERN
<i>Agropyron repens</i> (L.) Beauv.	QUACKGRASS
<i>Agropyron trachycaulum</i> (Link) Malte.	WHEATGRASS
<i>Agrostemma githago</i> L.	CORN-COCKLE
<i>Agrostis perennans</i> (Walt.) Tuckerm.	UPLAND BENT
<i>Ailanthus altissima</i> (Mill.) Swingle	TREE-OF-HEAVEN
<i>Alcea rosea</i> L.	HOLLY-HOCK
<i>Allium cepa</i> L.	ONION
<i>Allium tricoccum</i> Aiton	WILD LEEKS
<i>Alnus rugosa</i> (DuRoi) Sprengel	SPECKLED ALDER
<i>Alyssum alyssoides</i> L.	PALE ALYSSUM
<i>Amaranthus albus</i> L.	TUMBLEWEED
<i>Ambrosia artemisiifolia</i> L.	COMMON RAGWEED
<i>Ammophila breviligulata</i> Fern.	BEACH GRASS
<i>Anaphalis margaritacea</i> (L.) Benth. & Hooker	PEARLY EVERLASTING
<i>Andromeda glaucophylla</i> Link.	BOG ROSEMARY
<i>Andropogon gerardii</i> Vitman	BIG BLUESTEM
<i>Andropogon scoparius</i> Michaux	LITTLE BLUESTEM
<i>Anemone canadensis</i> L.	CANADA ANEMONE
<i>Anemone cylindrica</i> Gray	THIMBLEWEED
<i>Anemone multifida</i> Poiret	RED ANEMONE
<i>Anemone quinquefolia</i> L.	WOOD ANEMONE
<i>Anemone virginiana</i> L.	THIMBLEWEED
<i>Antenaria neglecta</i> Greene	FIELD PUSSYTOES
<i>Anthriscus sylvestris</i> (L.) Hoffm.	CERVIL
<i>Aplectrum hyemale</i> (Willd.) Torrey	PUTTY-ROOT
<i>Apocynum androsaemifolium</i> L.	SPREADING DOGBANE
<i>Aquilegia canadensis</i> L.	WILD COLUMBINE
<i>Arabis glabra</i> (L.) Benth.	TOWER MUSTARD
<i>Arabis lyrata</i> L.	SAND CRESS
<i>Aralia hispida</i> Vent.	BRISTLY SARSAPARILLA
<i>Aralia nudicaulis</i> L.	WILD SARSAPARILLA
<i>Arceuthobium pusillum</i> Peck.	DWARF MISTLETOE
<i>Arctium minus</i> Schlk.	COMMON BURDOCK
<i>Arctostaphylos uva-ursi</i> (L.) Sprengel	BEARBERRY
<i>Arenaria serpyllifolia</i> L.	THYME-LEAVED SANDWORT
<i>Arenaria stricta</i> Michaux	ROCK SANDWORT
<i>Arisaema triphyllum</i> (L.) Schott.	JACK-IN-THE-PULPIT
<i>Aronia prunifolia</i> (Marsh.) Rehder	CHOKEBERRY
<i>Arrhenatherum elatius</i> (L.) Presl.	TALL OATGRASS
<i>Artemisia caudata</i> Michaux	TALL WORMWOOD
<i>Artemisia vulgaris</i> L.	MUGWORT
<i>Asclepias incarnata</i> L.	SWAMP MILKWEED

- Asclepias syriaca* L. COMMON MILKWEED
Asclepias tuberosa L. BUTTERFLY WEED
Asclepias verticillata L. WHORLED MILKWEED
Asclepias viridiflora Raf. GREEN MILKWEED
Asparagus officinalis L. GARDEN ASPARAGUS
Asplenium platyneuron (L.) Oakes ex Eaton EBONY SPLEENWORT
Aster macrophyllus L. LARGE LEAVED ASTER
Aster simplex Willd. PANICLED ASTER
Athyrium filix-femina (L.) Roth LADY FERN
Athyrium pycnocarpon (Sprengel) Tidestrom GLADE FERN
Athyrium thelypteroides (Michaux) Desv. SILVERY SPLEENWORT
Avena sativa L. OATS
Barbarea vulgaris R. Br. YELLOW ROCKET
Berberis thunbergii DC. JAPANESE BARBERRY
Berberis vulgaris L. COMMON BARBERRY
Berteroa incana (L.) DC. HOARY ALYSSUM
Betula alleghaniensis Britton YELLOW BIRCH
Betula papyrifera Marsh. WHITE BIRCH
Betula pumila L. BOG BIRCH
Bidens connatus Muhl. BUR MARIGOLD
Boehmeria cylindrica (L.) Sw. FALSE NETTLE
Botrychium dissectum Sprengel DISSECTED GRAPE-FERN
Botrychium lunaria (L.) Sw. MOONWORT
Botrychium matricariifolium (Doll) A. Braun DAISY-LEAVED GRAPE-FERN
Botrychium multifidum (Gmel.) Rupr. LEATHERY GRAPE-FERN
Botrychium simplex E. Hitch. LITTLE GRAPE-FERN
Botrychium virginianum (L.) Sw. RATTLESNAKE FERN
Brassica kaber (DC.) Wheeler CHARLOCK
Brassica rapa L. FIELD MUSTARD
Bromus inermis Leysser SMOOTH BROME
Bromus tectorum L. DOWNY CHESS
Cakile edentula (Bigelow) Hooker SEA-ROCKET
Calamagrostis canadensis (Michaux) Beauv. BLUE-JOINT
Caltha palustris L. MARSH MARIGOLD
Campanula aparinoides Pursh MARSH BELLFLOWER
Campanula rotundifolia L. HAREBELL
Cannabis sativa L. HEMP
Capsella bursa-pastoris (L.) Medic. SHEPHERD'S PURSE
Castanea dentata (Marsh.) Borkh. CHESTNUT
Caulophyllum thalictroides (L.) Michaux BLUE COHOSH
Ceanothus americanus L. NEW JERSEY TEA
Ceanothus herbaceous Raf. NEW JERSEY TEA
Celastrus scandens L. BITTERSWEET
Centaurea maculosa Lam. SPOTTED KNAPWEED
Cerastium fontanum Baumg. COMMON MOUSE-EARED CHICKWEED
Cerastium tomentosum L. SNOW-IN-SUMMER
Chamaedaphne calyculata (L.) Moench. LEATHERLEAF
Chenopodium album L. LAMB'S QUARTERS
Chenopodium capitatum (L.) Asch. STRAWBERRY BLITE
Chimaphila maculata (L.) Pursh. SPOTTED WINTERGREEN
Chimaphila umbellata (L.) Bart. PRINCE'S PINE
Chrysanthemum leucanthemum Local. OX-EYE DAISY
Chrysosplenium americanum Schw. GOLDEN SAXIFRAGE
Cichorium intybus L. COMMON CHICORY

- Circaea alpina* L. DWARF ENCHANTER'S NIGHTSHADE
Cirsium arvense (L.) Scop. CANADA THISTLE
Cirsium pitcheri (Torr.) T. & G. PITCHER'S THISTLE
Cirsium vulgare (Savi) Tenore BULL THISTLE
Claytonia caroliniana Michaux CAROLINA SPRING BEAUTY
Clintonia borealis (Aiton) Raf. CORN-LILY
Comandra umbellata (L.) Nutt. BASTARD TOADFLAX
Conopholis americana (L.) Wallr. SQUAWROOT
Convallaria majalis L. LILY-OF-THE-VALLEY
Convolvulus arvensis L. FIELD BINDWEED
Conyza canadensis (L.) Cronq. HOG WEED
Coptis trifolia (L.) Salisb. GOLDTHREAD
Corallorhiza maculata Raf. SPOTTED CORAL-ROOT
Corallorhiza striata Lindley STRIPED CORAL-ROOT
Corallorhiza trifida Chat. EARLY CORAL-ROOT
Coreopsis lanceolata L. LANCE-LEAVED COREOPSIS
Corispermum hyssopifolium L. BUGSEED
Cornus alternifolia L. f. PAGODA DOGWOOD
Cornus amomum Miller SILKY DOGWOOD
Cornus canadensis L. BUNCHBERRY
Cornus rugosa Lam. ROUND-LEAVED DOGWOOD
Cornus stolonifera Michaux RED-OSIER
Corylus cornuta Marsh. BEAKED HAZELNUT
Cycloma atriplicifolium (Sprengel) Coulter WINGED FIGWEED
Cynoglossum boreale Fern. NORTHERN WILD COMFREY
Cynoglossum officinale L. COMMON HOUND'S-TONGUE
Cypripedium acaule Aiton STEMLESS LADY-SLIPPER
Cypripedium arietinum R. Br. RAM'S-HEAD LADY-SLIPPER
Cypripedium calceolus L. YELLOW LADY-SLIPPER
Cypripedium reginae Walt. SHOWY LADY-SLIPPER
Cystopteris bulbifera (L.) Bernh. BULBLET FERN
Cystopteris fragilis (L.) Bernh. FRAGILE FERN
Dactylis glomerata L. ORCHARD GRASS
Danthonia spicata (L.) R. & S. OATGRASS
Daucus carota L. WILD CARROT
Decodon verticillatus (L.) Ell. SWAMP LOOSESTRIFE
Dentaria diphylla Michaux TWO-LEAVED TOOTHWORT
Dentaria laciniata Michaux CUT-LEAVED TOOTHWORT
Descuriania pinnata (Walt.) Britton TANSY MUSTARD
Dianthus armeria L. DEPTFORD PINK
Dianthus barbatus L. SWEET WILLIAM
Dianthus plumarius L. GARDEN PINK
Dicentra canadensis (Goldie) Walp. SQUIRREL CORN
Dicentra cucularia (L.) Bernh. DUTCHMAN'S BREECHES
Diervilla lonicera Mill. BUSH HONEYSUCKLE
Dirca palustris L. LEATHERWOOD
Drosera rotundifolia L. ROUND-LEAVED SUNDEW
Dryopteris cristata (L.) A. Gray CRESTED SHIELD-FERN
Dryopteris intermedia (Muhl. ex Willd.) A. Gray EVERGREEN WOOD-FERN
Dryopteris marginalis (L.) A. Gray MARGINAL WOOD-FERN
Dryopteris spinulosa (O. F. Muell.) Watt. SPINULOSE WOOD-FERN
Echinochloa crusgali (L.) Beauv. BARNYARD GRASS
Echium vulgare L. BLUEWEED
Elaeagnus umbellata Thunb. AUTUMN-OLIVE

Epifagus virginiana (L.) Bart. BEECH-DROPS
Epigaea repens L. TRAILING ARBUTUS
Epilobium angustifolium L. FIREWEED
Epipactis helleborine (L.) Crantz. HELLEBORINE
Equisetum arvense L. FIELD HORSETAIL
Equisetum fluviatile L. WATER HORSETAIL
Equisetum hyemale L. SCOURING-RUSH
Equisetum scirpoides Michaux DWARF SOURING-RUSH
Equisetum sylvaticum L. WOODLAND HORSETAIL
Eragrostis cilianensis (All.) Mosher STINK GRASS
Eragrostis spectabilis (Pursh) Steudel TUMBLE GRASS
Erysimum cheiranthoides L. WORMSEED MUSTARD
Erythronium americanum Ker. ADDER'S TONGUE
Eupatorium maculatum L. JOE-PIE WEED
Eupatorium perfoliatum L. BONESET
Euphorbia cyparissias L. CYPRESS SPURGE
Euphorbia esula L. LEAFY SPURGE
Euphorbia polygonifolia L. SEASIDE SPURGE
Fagus grandifolia Ehrh. BEECH
Fragaria virginiana Mill. WILD STRAWBERRY
Fraxinus americana L. WHITE ASH
Fraxinus nigra Marsh. BLACK ASH
Galium aparine L. CLEAVERS
Galium lanceolatum Torr. WILD LICORICE
Galium triflorum Michaux SWEET SCENTED BEDSTRAW
Galium verum L. YELLOW BEDSTRAW
Gaultheria hispida (L.) Muhl. CREEPING SNOWBERRY
Gaultheria procumbens L. WINTERGREEN
Gaylussacia baccata (Wang.) K. Koch. BLACK HUCKLEBERRY
Gentiana procera Holm. FRINGED GENTIAN
Geranium robertianum L. HERB-ROBERT
Glechoma hederacea L. GILL-OVER-THE-GROUND
Grindelia squarrosa (Pursh) Dunal CURLYCUP GUMWEED
Gymnocarpium dryopteris (L.) Newm. OAK FERN
Gypsophila paniculata L. BABY'S-BREATH
Hamamelis virginiana L. WITCH-HAZEL
Hepatica acutiloba DC. SHARP-LEAVED HEPATICA
Hepatica americana (DC.) Ker. ROUND-LEAVED HEPATICA
Heracleum maximum Bart. COW-PARSNIP
Hesperis matronalis L. DAME'S ROCKET
Hieracium aurantiacum L. ORANGE HAWKWEED
Hieracium piloselloides Vill. KING DEVIL
Hieracium venosum L. RATTLESNAKE WEED
Hudsonia tomentosa Nutt. BEACH HEATH
Humulus lupulus L. HOPS
Hypericum kalmianum L. KALM'S ST. JOHN'S-WORT
Hypericum perforatum L. COMMON ST. JOHN'S-WORT
Ilex verticillata (L.) Gray MICHIGAN HOLLY
Impatiens capensis Meerb. SPOTTED TOUCH-ME-NOT
Juglans nigra L. BLACK WALNUT
Kalmia polifolia Wang. BOG-LAUREL
Krigia virginica (L.) Willd. DWARF DANDELION
Lactuca canadensis L. TALL BLUE LETTUCE
Laportea canadensis (L.) Wedd. WOOD NETTLE

- Lathyrus japonicus* Willd. BEACH PEA
Lathyrus latifolius L. EVERLASTING PEA
Lathyrus ochroleucus Hooker. PALE VETCHLING
Lathyrus palustris L. MARSH PEA
Lathyrus sylvestris L. EVERLASTING PEA
Ledum groenlandicum Oeder. LABRADOR TEA
Leonurus cardiaca L. COMMON MOTHERWORT
Linaria vulgaris Hill BUTTER AND EGGS
Linnaea borealis L. TWINFLOWER
Lithospermum caroliniense (Walt.) MacMill. PUCCOON
Lobelia cardinalis L. CARDINAL FLOWER
Lobelia inflata L. INDIAN TOBACCO
Lobelia kalmii L. KALM'S LOBELIA
Lonicera canadensis Marsh. FLY HONEYSUCKLE
Lonicera dioica L. WILD HONEYSUCKLE
Lonicera hirsuta Eat. HAIRY HONEYSUCKLE
Lotus corniculata L. BIRDFOOT TREFOIL
Lunaria annua L. MONEY-PLANT
Lychnis coronaria (L.) Desr. MULLEN PINK
Lycopodium annotinum L. STIFF CLUBMOSS
Lycopodium complanatum L. NORTHERN RUNNING-PINE
Lycopodium lucidulum L. SHINING CLUBMOSS
Lycopodium obscurum L. TREE CLUBMOSS
Lycopodium tristachyum Pursh GROUND CEDAR
Lysimachia terrestris (L.) BSP. SWAMP CANDLE
Lysimachia thyrsiflora L. TUFTED LOOSESTRIFE
Lythrum salicaria L. PURPLE LOOSESTRIFE
Maianthemum canadense Desf. CANADA MAYFLOWER
Malus pumila Miller APPLE
Malva moschata L. MUSK MALLOW
Malva neglecta Wallr. COMMON MALLOW
Matricaria matricarioides (Less) Porter PINEAPPLE WEED
Matteuccia struthiopteris (L.) Todaro OSTRICH FERN
Medeola virginiana L. INDIAN CUCUMBER-ROOT
Medicago lupulina L. BLACK MEDIC
Medicago sativa L. ALFALFA
Medicago varia Martyn YELLOW ALFALFA
Melampyrum lineare Desr. COW-WHEAT
Melilotus alba Desr. WHITE SWEET CLOVER
Melilotus officinalis (L.) Desr. YELLOW SWEET CLOVER
Menyanthes trifoliata L. BUCKBEAN
Mirabilis nyctaginea (Michaux) MacM. WILD FOUR-O'CLOCK
Mitchella repens L. PARTRIDGEBERRY
Mitella diphylla L. BISHOP'S CAP
Mitella nuda L. NAKED MITERWORT
Monarda fistulosa L. WILD BERGAMOT
Monarda punctata L. HORSEMINT
Monotropa hypopithys L. PINE SAP
Monotropa uniflora L. INDIAN PIPE
Myrica gale L. SWEET GALE
Narcissus poeticus L. NARCISSUS
Narcissus pseudo-narcissus L. DAFODILL
Nasturtium officinale R. Br. WATERCRESS
Nemopanthus mucronata (L.) Trel. MOUNTAIN-HOLLY

- Nepeta cataria* L. CATNIP
Onoclea sensibilis L. SENSITIVE FERN
Ophioglossum vulgatum L. ADDER'S TONGUE
Orobanche fasciculata Nutt. BROOM-RAPE
Osmunda cinnamomea L. CINNAMON FERN
Osmunda claytoniana L. INTERRUPTED FERN
Osmunda regalis L. ROYAL FERN
Ostrya virginiana (Miller) K. Koch IRONWOOD
Panax quinquefolius L. GINSENG
Panicum virgatum L. SWITCH GRASS
Papaver orientale L. ORIENTAL POPPY
Parnassia glauca Raf. GRASS-OF-PARNASSUS
Parthenocissus quinquefolia (L.) Planchon VIRGINIA CREEPER
Pastinaca sativa L. WILD PARSNIP
Pedicularis canadensis L. WOOD BETONY
Phalaris arundinacea L. REED CANARY GRASS
Phleum pratense L. TIMOTHY
Phlox subulata L. MOSS-PINK
Phryma leptostachya L. LOPSEED
Physalis heterophylla Nees. CLAMMY GROUNDCHERRY
Phytolacca americana L. POKEWEED
Picea mariana (Miller) BSP. BLACK SPRUCE
Pinus banksiana Lamb. JACK PINE
Pinus resinosa Aiton RED PINE
Pinus strobus L. WHITE PINE
Plantago lanceolata L. ENGLISH PLANTAIN
Plantago rugelii Decne. PALE PLANTAIN
Poa compressa L. CANADA BLUEGRASS
Polygala paucifolia Willd. FLOWERING WINTERGREEN
Polygonatum pubescens (Willd.) Pursh HAIRY SOLOMON'S SEAL
Polygonella articulata (L.) Meisner JOINTWEED
Polygonum amphibium L. WATER SMARTWEED
Polygonum aviculare L. KNOTWEED
Polygonum cilinode Michaux FRINGED FALSE BUCKWHEAT
Polygonum convolvulus L. BLACK BINDWEED
Polygonum hydropiperoides Michaux MILD WATER-PEPPER
Polygonum persicaria L. LADY'S THUMB
Polypodium virginianum L. COMMON POLYPODY
Polystichum lonchitis (L.) Roth NORTHERN HOLLY-FERN
Populus alba L. WHITE POPLAR
Populus balsamifera L. BALSAM POPLAR
Populus deltoides Marsh. COTTONWOOD
Populus grandidentata Michaux BIG-TOOTH ASPEN
Populus nigra L. LOMBARDY POPLAR
Populus tremuloides Michaux QUAKING ASPEN
Portulacca oleracea L. COMMON PURSELANE
Potentilla anserina L. SILVERWEED
Potentilla argentea L. SILVERY CINQUEFOIL
Potentilla fruticosa L. SHRUBBY CINQUEFOIL
Potentilla recta L. SULFUR CINQUEFOIL
Prenanthes alba L. WHITE LETTUCE
Prunella vulgaris L. SELF-HEAL
Prunus mahaleb L. PERFUMED CHERRY
Prunus pensylvanica L. f. PIN CHERRY

- Prunus pumila* L. SAND CHERRY
Prunus serotina Ehrh. BLACK CHERRY
Prunus virginiana L. CHOKE CHERRY
Pteridium aquilinum (L.) Kuhn. BRACKEN FERN
Pterospora andromedea Nutt. PINEDROPS
Pyrola asarifolia Michaux PINK PYROLA
Pyrola elliptica Nutt. SHINLEAF
Pyrola secunda L. ONE-SIDED PYROLA
Quercus alba L. WHITE OAK
Quercus coccinia Moench. SCARLET OAK
Quercus rubra L. RED OAK
Quercus velutina Lam. BLACK OAK
Ranunculus abortivus L. KIDNEY LEAF BUTTERCUP
Ranunculus acris L. COMMON BUTTERCUP
Ranunculus recurvatus Poir. HOOKED CROWFOOT
Rhus typhina L. STAGHORN SUMAC
Ribes americanum Miller WILD BLACK CURRANT
Ribes cynosbati L. WILD GOOSEBERRY
Ribes odoratum Wendl. f. BUFFALO CURRANT
Ribes triste L. SWAMP RED CURRANT
Robinia psuedoacacia L. BLACK LOCUST
Rorippa palustris (L.) Besser FIELD MUSTARD
Rosa blanda Aiton WILD ROSE
Rosa carolina L. PASTURE ROSE
Rosa palustris Marsh. PASTURE ROSE
Rubus alleghaniensis Porter COMMON BLACKBERRY
Rubus flagellaris Willd. NORTHERN DEWBERRY
Rubus hispidus L. SWAMP DEWBERRY
Rubus occidentalis L. BLACK RASPBERRY
Rubus odoratus L. FLOWERING RASPBERRY
Rubus strigosus Michaux WILD RED RASPBERRY
Rudbeckia hirta L. BLACK-EYED SUSAN
Rumex acetosella L. SHEEP SORREL
Rumex crispus L. SOUR DOCK
Rumex obtusifolius L. BITTER DOCK
Sagittaria latifolia Willd. DUCK-POTATO
Salix amygdaloides Andersson PEACH-LEAVED WILLOW
Salix bebbiana Sarg. BEAKED WILLOW
Salix candida Willd. SAGE WILLOW
Salix cordata Michaux SAND-DUNE WILLOW
Salix discolor Muhl. PUSSY WILLOW
Salix exigua Nutt. SANDBAR WILLOW
Salix lucida Muhl. SHINING WILLOW
Salix myricoides Muhl. BLUELEAF WILLOW
Salix petiolaris J. E. Smith SLENDER WILLOW
Salix sericea Marsh. SILKY WILLOW
Sambucus canadensis L. COMMON ELDER
Sanguinaria canadensis L. BLOODROOT
Saponaria officinalis L. BOUNCING BET
Sarracenia purpurea L. PITCHER PLANT
Satureja vulgaris (L.) Fritch. BASIL
Schizachne purpurascens (Torrey) Swallen FALSE MELIC
Scrophularia lanceolata Pursh HARE FIGWORT
Scutellaria galericulata L. COMMON SKULLCAP

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