THE VASCULAR FLORA OF LUDINGTON STATE PARK, MASON COUNTY, MICHIGAN

David C. Dister
P.O. Box 613
Ludington, MI 49431
david.dister@gmail.com

ABSTRACT

The vascular flora of Ludington State Park, Mason County, Michigan was inventoried and additional historical taxa was noted. Ludington State Park borders Lake Michigan along the western boundary of Mason County and lies wholly within Hamlin Township. A total of 444 taxa of vascular plants in 101 families and 281 genera are now documented for Ludington State Park, including 102 non-native taxa, which constitute 23 percent of the total. The Park includes a diversity of natural communities, including Open Dunes, Great Lakes Barrens, Dry-Mesic Northern Forest, and three types of Palustrine Wetlands. Typical taxa associated with each plant community are described. During the course of this study, 112 taxa were collected that are new to Mason County, including *Corispermum pallasii* (a Michigan Special Concern species). Several taxa that are at or near the limits of their known ranges in the Park include *Andropogon virginicus*, *Bidens discoidea*, *Boechera laevigata*, and *Goodyera oblongifolia*.

KEYWORDS: Flora of Ludington State Park, Michigan, Vascular Plants, Open Dunes, Interdunal Wetlands, Great Lakes Barrens.

INTRODUCTION

Ludington State Park (the Park) borders Lake Michigan along the western boundary of Mason County, Michigan (Figure 1). The Park was established in 1936 and currently includes 5,300 acres of land (Michigan Department of Natural Resources 2016), which lies wholly within Hamlin Township (T19N, R18W) approximately 2.5 miles north of the City of Ludington and immediately south of Nordhouse Dunes Wilderness Area (NDWA) within Manistee National Forest. The Park includes the vast majority of acreage between Hamlin Lake and Lake Michigan, and extends six linear miles from north to south.

Geological and Glacial History

The Park is located within the Manistee Subsection (Subsection VII.4) of the Northern Lacustrine-Influenced Lower Michigan Section (Section VII) of the regional landscape ecosystem classification system for Michigan, Minnesota, and Wisconsin as described by Albert (1995). This subsection is characterized by sandy lake plain and sand end moraine ridges, with very extensive areas of parabolic and perched dune along the shoreline of Lake Michigan (Higman et al. 2002).

Landscape features in Mason County were formed by the complex action of the Lake Michigan lobe of the Wisconsin glacial ice sheet. Winds modified some

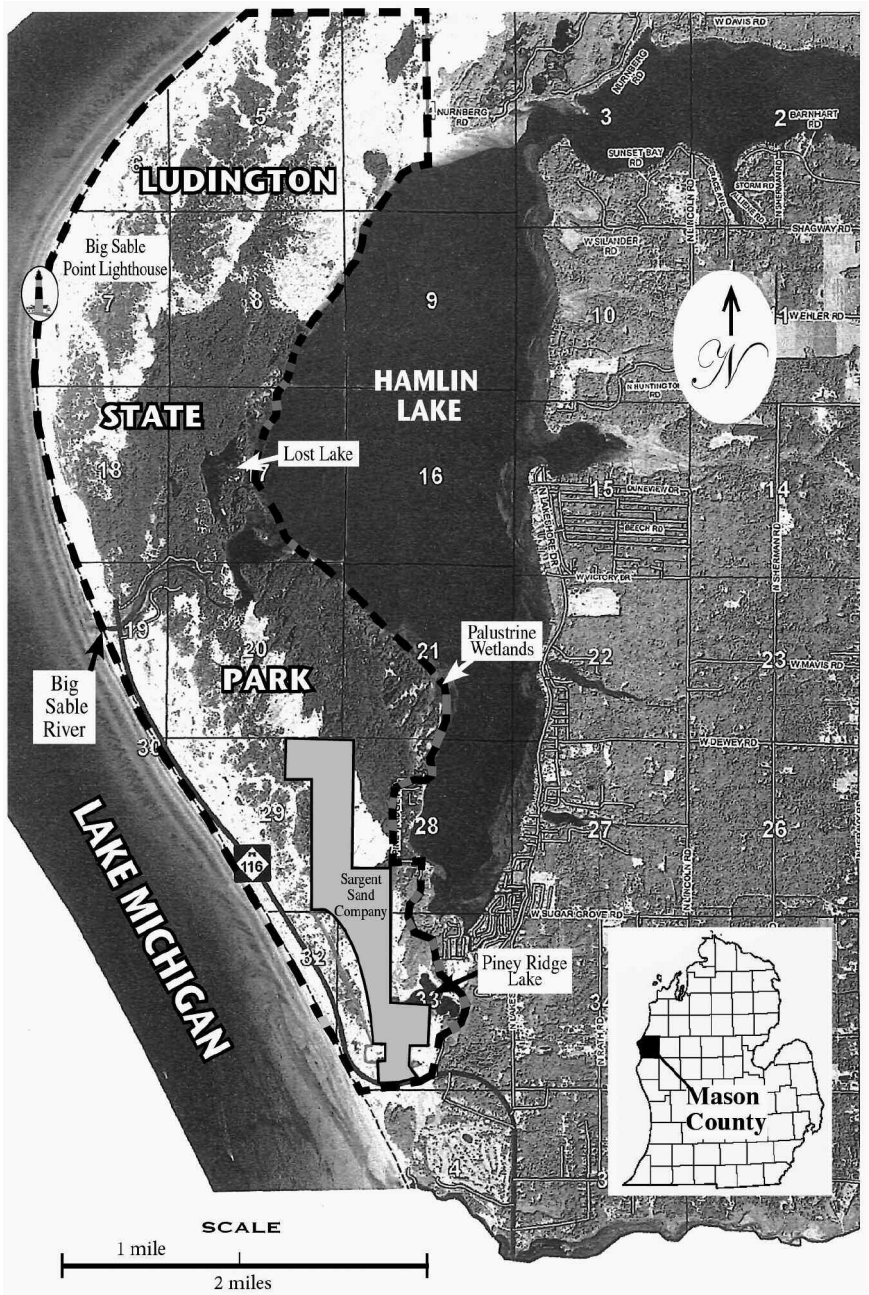

FIGURE 1. Ludington State Park, Mason County, Michigan. Aerial photo base reproduced with the permission of Mapping Solutions; 816-903-3500; mappingsolutionsgis.com

of the land features and deposited large dunes along most of the coast of Lake Michigan (USDA, NRCS, FS 1995). Surface sediments across the Park consist of dune sand. The thickness of glacial drift in the Park varies between 600 and 800 feet. The glacial drift is underlain by the Late Devonian Ellsworth Shale. Currently, the majority of the Park, including all major sand dune areas, is designated as Critical Dunes by the Department of Environmental Quality (DEQ) (MDNR, P&RD 2016).

Climate

Mason County lies within the Laurentian Mixed Forest Province, which is a transitional zone between the boreal forest and broadleaf deciduous forest characterized by warm summers and cold winters as described for ecoregions of the United States by the USDA (Bailey 1995), though the location of the Park along the east edge of Lake Michigan greatly moderates temperature extremes. This lake-modified climate results in a long growing season of 140 to 150 days. The annual precipitation averages 33 inches per year, and the average range of annual snowfall is 100 to 140 inches (Michigan Department of Natural Resources 2016). Furthermore, Mason County occurs a couple counties north of the center of the transition zone or "tension zone" between the Northern Hardwood Forest and the Boreal Forest (Barnes and Wagner 1981, Figure 18; and Andersen 2005, Figure 1). The climatic tension zone and areas along the Great Lakes shoreline with lake-moderated climate, often support species with both northern and southern affinities (Andersen 2005; and Cohen et al. 2015). Additionally, according to the USDA Plant Hardiness Zones map for Michigan, Mason County's coastal areas occur within Zone 6a, which has an average annual minimum temperature of –10°F to –5°F (USDA 2017).

Soils

The soils in the Park are of two primary types: Dune land—Quartzipsamments complex and Nordhouse fine sand. In general, soils in the western half of the Park are of the former soil type, and soils in the eastern half of the Park are of the latter soil type (MDNR, P&RD, 2016). Because these soils are overwhelmingly sand-dominated, even in forested areas, they are considered excessively drained, have rapid permeability, and are highly susceptible to erosion (USDA, NRCS, FS 1995). Consequently, plant life in these soils is adaptable to xeric conditions. Even within the forested dunes, there is only several inches of topsoil, which may be a result both of the relatively young age of the forested dune (relative to less dynamic inland forests) and of impacts from the logging era in the 1800s. On the other hand, wetland (hydric) soils that occur in interdunal wetlands and palustrine wetlands bordering Hamlin Lake, have accumulated layers of clay and organic matter over time due to high water levels, which results in low oxygen levels, thereby decreasing the rate of decomposition. Consequently, these soils support wetland vegetation.

MATERIALS AND METHODS

Floristic Inventory

Annual surveys of vascular plants at the Park were conducted on foot by the author beginning in 2009 and concluding in 2014 (subsequent to the survey period, two non-native taxa were collected in 2016: *Verbena bracteata* and *Berberis vulgaris*; which are included in Appendix 1). Shallow water wetlands (to a maximum of approximately three feet in depth) were surveyed on foot without the use of a boat. A total of 101 field days and 354 field hours from April through October were undertaken during the six years of surveys, the earliest field day being April 1 and the latest October 14. Surveys followed existing trails and roads throughout the Park, but also included random meandering in specific habitats in the efforts to maximize the diversity of taxa encountered. Voucher specimens were collected for every taxon encountered, except that native species that were represented by only a few plants were not collected, but instead were photographed, and collection of state and federal listed species was not permitted. Plants were collected in flowering or fruiting condition if possible, and the lack of such conditions excluded some taxa from collecting (e.g, *Aralia nudicaulis* and *Chimaphila umbellata*). Several other taxa were found in vegetative conditions but were only identifiable to genus (*e.g*., *Apocynum* sp., *Cypripedium* sp., *Erythronium* sp., and *Prenanthes* sp.), and thus were not collected. Herbarium specimens were deposited at the University of Michigan Herbarium (MICH), and identifications were verified by Anton A. Reznicek, curator at MICH.

The presence and quality of natural plant communities in the Park is addressed below in Results by an analysis of the 444 taxa (including subspecies) listed during the survey period, including 15 strictly historical taxa. This includes a FQA analysis, a review of regionally rare taxa, and summary of taxa new to Mason County. Also, six natural communities as defined by the Michigan Natural Features Inventory (Cohen et al. 2015) are also described below under Results.

Previous Collecting in the Park

The author requested information from MICH regarding collections that predated those of the author in the Park. Previous botanical surveys in the Park date back to 1934 when Frank C. Gates collected *Carex garberi* (#17677) "at Hamlin Lake, Michigan State Park" (Mason County list provided by Beverly Walters, MICH, on December 18, 2014). Very little plant collecting within the Park occurred thereafter until the late 1940s and early 1950s. A list of 11 collectors who collected a total of 83 specimens in the Park prior to the current study is provided in Table 1. However, the list also included numerous dubious locations, such as "Hamlin Lake" or "Near Ludington" that did not specify whether they were from the modern-day Park. And while no formal survey of the vascular flora had been conducted previously, a natural features inventory was conducted in 1995 and 1996 (Higman et al. 2002). The inventory found that the state and federal Threatened *Cirsium pitcheri* remains common in open dunes, whereas the state Threatened *Orobanche fasciculata* (last observed in 1985) and the state Special Concern *Cypripedium arietinum* (last observed in 2007) were not re-located.

TABLE 1. Summary of Ludington State Park collectors prior to 2009 with vouchers at MICH (50), WUD (29), MSC (7), BLH (3), and UMBS (1).

Collector	Collecting Year (s)	Number of Vouchers
Frank C. Gates	1934	1
Harley H. Bartlett	1937	13
Rogers McVaugh	1949, 1951	9
N. W. Katz	1951	3
Dale A. Zimmerman	1952	8
C. Marvin Rogers	1953	29
Florence V. Hoseney	1973	1
Sue Lillie	1975	1
Timothy S. Mustard	1979	1
Michael R. Penskar	1986	1
Scott Herron	1998, 1999, 2000	16
TOTALS	13	83

Floristic Quality Assessment

Much of Michigan's native biota is now restricted to relatively small and often isolated tracts of landscape across the state. Floristic Quality Assessment (FQA) is a tool for assessing the floristic, and, implicitly, the natural significance of any given area (Herman et al. 2001). The concept of species conservatism is the foundation of floristic quality assessment. Each native Michigan species has a **coefficient of conservatism** (*C*) following the methodology and philosophy detailed in Herman et al. (2001). Coefficients of conservatism range from 0 to 10 for native species and represent an estimated probability that a plant is likely to occur in a landscape relatively unaltered from what is believed to be pre-European settlement condition. A *C* of 0, for example, is given to plants such as *Ambrosia artemisiifolia* (common ragweed) that demonstrate little fidelity to any remnant natural community, that is, it may be found almost anywhere, whereas a *C* of 10 is given to plants such as *Conopholis americana* (squaw-root) that are almost always restricted to a presettlement remnant, that is, a high quality natural area. Non-native and exotic species are not included in FQA calculations. Floristic Quality Assessment is applied by calculating a **mean coefficient of conservatism** ($\bar{C}$) and a **floristic quality index** (*FQI*) from a comprehensive list of plant species obtained from a particular site, in this case the Park. This is done by summing the coefficients of conservatism (*C*) of an inventory of plants and dividing by the total number of native plant taxa (*n*), yielding an average or the

TABLE 2. Taxa with Coefficient of Conservatism (*C*) ranking of 9 or 10 in Ludington State Park. C rankings are taken from individual species listings in MICHIGAN FLORA ONLINE (2011).

Scientific Name	Common Name	(*C*)
Ammophila breviligulata	Beach Grass	10
Anticlea elegans	White Camas	10
Bidens beckii	Water-Marigold	10
Calamagrostis stricta	Narrow-leaved Reedgrass	10
Calamovilfa longifolia	Sand Reed Grass	10
Calla palustris	Wild Calla	10
Carex alata	Winged Sedge	10
Carex buxbaumii	Buxbaum's Sedge	10
Carex disperma	Softleaf Sedge	10
Carex folliculata	Northern Long Sedge	10
Cirsium pitcheri	Pitcher's Thistle	10
Cladium mariscoides	Twig-Rush	10
Conopholis americana	Squaw-Root	10
Cypripedium arietinum	Ram's Head Lady Slipper	10
Eleocharis quinqueflora	Few-Flowered Spike-Rush	10
Eipfagus virginiana	Beech-Drops	10
Euphorbia polygonifolia	Seaside Spurge	10
Hudsonia tomentosa	Beach-Heath	10
Hypericum kalmianum	Kalm's St. John's-Wort	10
Lathyrus japonicus	Beach Pea	10
Linum striatum	Stiff Yellow Flax	10
Lithospermum caroliniense	Hairy Puccoon	10
Lobelia kalmii	Kalm's Lobelia	10
Orobanche fasciculata	Clustered Broom Rape	10
Pedicularis canadensis	Wood-Betony	10
Rhynchospora capillacea	Needle Beak-Rush	10
Salix cordata	Sand-Dune Willow	10
Solidago simplex	Gilman's Goldenrod	10
Utricularia cornuta	Horned Bladderwort	10
Utricularia intermedia	Flat-Leaved Bladderwort	10
Eriocaulon aquaticum	Sevenangle Pipewort	9
Koeleria macrantha	June Grass	9
Rumex orbiculatus	Great Water Dock	9
Salix myricoides	Blueleaf Willow	9

mean coefficient of conservatism ($\bar{C} = \sum C / n$). The $\bar{C}$ is then multiplied by the square root of the total number of native taxa ($\sqrt{n}$) to yield the floristic quality index ($FQI = \bar{C}\sqrt{n}$) (Herman et al. 2001). All taxa collected within the Park were noted with their coefficient of conservatism, which is presented in the Appendix. Additionally, taxa that ranked a 9 or 10 coefficient of conservatism are listed separately in Table 2. Final calculations of $\bar{C}$ and *FQI* are presented below under Results.

RESULTS

A total of 444 taxa (including subspecies) of vascular plants, representing 101 families and 281 genera, were documented for the Park, as shown in Table 3 and Appendix 1. Fifteen of these taxa are strictly historical and were documented by the following collectors: Bartlett (3 taxa), Herron (2), Hoseney (1), Katz (1), McVaugh (4), and Rogers (4). Of all taxa, 342 (77 percent) are considered native and 102 (23 percent) are exotics (Herman, et al., 2001). The 444 taxa can further be broken into major plant groups as follows: Pteridophytes (19), Gymnosperms (5), Monocots (138), and Dicots (282) as shown in Table 3. Families represented by the greatest number of taxa are Poaceae (52), Asteraceae (44), and Cyperaceae (43) as shown in Table 4. Twenty-seven of the taxa in the Cyperaceae are in the genus *Carex*, reflecting good diversity in various wetlands within the Park. The complete list includes state and federal listed taxa, and several that are regionally rare (see Listed and Regionally Rare Taxa below). Also, four rare taxa are documented only by photo vouchers: *Aralia nudicaulis*, *Chimaphila umbellata*, *Lobelia cardinalis*, and *Menyanthes trifoliata* (the latter two photographed prior to the study). These are included in Appendix 1.

TABLE 3. Number of families, genera, and taxa (including subspecies) for each of the major groups of plants in Ludington State Park.

Group	Families	Genera	Taxa
Pteridophytes	11	13	19
Gymnosperms	2	4	5
Monocots	16	69	138
Dicots	72	195	282
TOTALS	101	281	444

TABLE 4. The total number of taxa and the number of non-native taxa in each of the ten largest families in Ludington State Park.

Family	Total Number of Taxa	Non-Native Taxa (percentage of total)
Poaceae	52	17 (33%)
Asteraceae	44	14 (32%)
Cyperaceae	43	0 (0%)
Rosaceae	19	1 (5%)
Brassicaceae	15	9 (60%)
Ericaceae	13	0 (0%)
Lamiaceae	12	4 (33%)
Fabaceae	11	9 (82%)
Polygonaceae	9	3 (33%)
Caryophyllaceae	9	8 (89%)
TOTALS	227	65 (29%)

TABLE 5. Excluded taxa represented by vouchers.

Scientific Name	Common Name	Voucher ID	Comments
Acer saccharinum	Silver Maple	Dister 246	No regeneration; likely planted
Alnus glutinosa	Black Alder	Dister 385	No regeneration; likely planted
Cornus foemina or	Gray Dogwood or	Dister 289	No regeneration; likely planted
Cornus × *rugosa*	Dogwood Hybrid	Dister 331	[same plant as Dister 289]
Erigeron annuus	Annual Fleabane	Dister 194	Uncertain identification
Juglans nigra	Black Walnut	Dister 146	No regeneration; likely planted
Pinus resinosa	Red Pine	Dister 282	No regeneration; likely planted
Pinus sylvestris	Scotch Pine	Dister 361	No regeneration; likely planted
Populus balsamifera	Balsam Poplar	Dister 332	No regeneration; likely planted
Populus nigra	Lombardy Poplar	Dister 494	Some root sprouts; likely planted
Rosa multiflora	Multiflora Rose	Dister 323	No regeneration; likely planted
Rosa rubiginosa	Sweetbrier	Dister 398	Some root sprouts; likely planted
Rosa setigera	Prairie Rose	Dister 205	No regeneration; likely planted
Ulmus ?	Elm Hybrid ?	Dister 351	Possible hybrid
Yucca flaccida	Weak-leaf Yucca	Dister 156	No regeneration; likely planted

Fifteen taxa with vouchers that were excluded for various reasons are presented in Table 5. Most such excluded taxa were likely planted and lacked regeneration, or vouchers could not be definitely identified to species or subspecies level. About half of these taxa are non-native species commonly available in the nursery trade, while some of the natives occur along roadsides (*e.g*., *Juglans nigra* and *Populus balsamifera*) or riverbanks (*e.g*, three plants of *Cornus foemina* in a triangular formation).

Species richness as determined by higher taxa diversity occurs within the emergent and submergent wetlands within the Park, typically in the interdunal wetlands throughout the Park and deepwater wetlands along the eastern edge of the Park bordering Hamlin Lake (i.e., in the vicinity of the Canoe Trail). Invasive plants, however, are widespread, particularly *Centaurea stoebe*, *Berberis thunbergii*, *Cynoglossum officinale*, *and Phragmites australis* subsp. *australis*. Fortunately, there has been significant effort to control *Phragmites australis* subsp. *australis* and *Berberis thunbergii*.

In addition to vouchered taxa, there are four taxa lacking vouchers that are also excluded. These taxa lacked regeneration and were likely or obviously planted (Table 6). None of these species is native to Michigan, and all are (or have been) widely available in the nursery trade.

A determination of the $\bar{C}$ for the Park resulted in a score of 4.9, which compares with 5.1 determined by the author for the NDWA study by Hazlett (1986a, 1986b). Additionally, a determination of the *FQI* for the Park resulted in a score

TABLE 6. Excluded taxa not represented by vouchers. All are planted non-natives.

Scientific Name	Common Name	Comments
Ligustrum sp.	Privet sp.	No regeneration; likely planted
Picea abies	Norway Spruce	No regeneration; obviously planted
Picea pungens	Blue Spruce	No regeneration; obviously planted
Robinia pseudoacacia	Black Locust	No regeneration; likely planted

of 91.1, which compares with 91.5 determined by the author for the NDWA study (Hazlett 1986a, 1986b). The slightly higher score of $\bar{C}$ and FQI for NDWA may be a reflection of its "Wilderness" designation that implies a more intact ecosystem than that at the Park. Also, 23 percent (102) of the vouchered taxa at the Park are considered non-native, whereas only 12 percent (43) are considered non-native at NDWA based on the Hazlett study conducted three decades earlier.

State and Federally Listed Taxa and Regionally Rare Taxa

The Michigan Natural Features Inventory (MNFI) tracks plants that are protected at the state level under the categories Endangered (E), Threatened (T), and Probably Extirpated (referred to as "listed" species). In addition, the MNFI notes species of Special Concern (SC), which, although not legally protected, are of concern because of their small or declining population sizes. Four species known from the Park are listed or treated as Special Concern by the State of Michigan. These are *Cirsium pitcheri* (Figure 2) (T), *Orobanche fasciculata* (Figure 3) (T), *Cypripedium arietinum* (Figure 4) (SC), and *Corispermum pallasii* (Figure 5) (SC). Although *Cirsium pitcheri*, (which also has a federal Threatened status), remains common within open dune habitat in the Park, neither *Orobanche fasciculata* nor *Cypripedium arietinum* were located during repeated surveys from

FIGURE 2. *Cirsium pitcheri*. June 21, 2009. Photo by David C. Dister.

FIGURE 3. *Orobanche fasciculata*. No date. Photo provided by Jim Gallie, park manager at Ludington State Park. Used with permission.

2009 through 2014. *Orobanche fasciculata* has not been observed since 1985 (Higman et al. 2002), but *Cypripedium arietinum* was observed and its locations noted by Bob Sanders and Cyrus Hester in the summer of 2007 (Sanders, pers. comm.). A follow-up visit to these locations on June 9, 2016 by the author failed to find this rare orchid. *Corispermum pallasii* was not previously known in the Park.

Regionally rare taxa discovered during the current surveys include *Chimaphila maculata*, *Eriocaulon aquaticum* (Figure 6), *Goodyera oblongifolia* (at the southernmost station in Michigan; Figure 7) *Triglochin maritima* (Figure 8), *Andropogon virginicus* (at the northern edge of its known range in Michigan), *Carex atlantica* (near the northern limit of its known range), *Carex peckii* (near the southern limit of its known range), *Patis racemosa*, *Bidens discoidea* (at the northern edge of its known range in the lower peninsula of Michigan), *Boechera laevigata* (a new northernmost station in the state), and *Parietaria pensylvanica* (one of the more northern known stations in the state). The Park location for *Sicyos angulatus*, which was collected in 1973, but was not relocated during the present study, represents the northernmost known station of this species in the state.

New Records

There were 112 taxa that represented new records for Mason County as a result of this study at the Park. These new records were determined by review of a list of Mason County vouchers at MICH marked for Ludington State Park (provided by Beverly Walters on December 18, 2014). This accounts for 25 percent of the Park's documented vascular flora to date. Only one of the new county records is state-listed: bugseed (*Corispermum pallasii)*, a Michigan Special Concern species. This and several regionally rare taxa are further addressed under Discussion.

FIGURE 4. *Cypripedium arietinum*. Summer 2007. Photo by Cyrus Hester. Used with permission.

FIGURE 5. *Corispermum pallasii*. Fruit depicted. September 11, 2011. Photo by David C. Dister.

Natural Plant Communities

Ludington State Park contained some of the largest areas of unvegetated open dunes encountered by the General Land Office surveyors in the early 1800s. The greater part of the area that is included in the Park was described by the surveyors in 1835 as "loose sand hills" and "no trees." Today, much of the Park remains similar to the conditions described by the General Land Office surveyors (Higman et al. 2002).

The Park consists of six natural communities as classified by the Michigan Natural Features Inventory (Cohen et al. 2015). The classification of natural communities consists of five Classes, each of which are further subdivided into one or more Groups, and then into specific Natural Communities. The six natural communities represented in the Park are: submergent marsh, emergent marsh, interdunal wetland, dry-mesic northern forest, open dunes, and Great Lakes barrens. Of these natural communities, the most important from a regional and statewide perspective are the Great Lakes barrens, open dunes, and interdunal wetlands. Ludington State Park includes some of the highest quality and

FIGURE 6. *Eriocaulon aquaticum*. July 15, 2012. Photo by David C. Dister.

FIGURE 7. *Goodyera oblongifolia*. Leaves depicted. May 31, 2009. Photo by David C. Dister.

FIGURE 8. *Triglochin maritima*. July 5, 2009. Photo by David C. Dister.

largest examples of these three communities in the Great Lakes region (MDNR, P&RD, 2016). Descriptions of these natural communities follows.

Palustrine Class – Marsh Group

Submergent Marsh

Submergent marsh is an herbaceous plant community that occurs in deep to sometimes shallow water in lakes and streams in Michigan. . . . Vegetation is comprised of both rooted and non-rooted plants that occur completely beneath the water surface (i.e., submergent plants), rooted floating-leaved plants, and non-rooted floating-leaved plants. (Cohen et al. 2015).

This plant community occurs along the eastern boundary of the Park bordering Hamlin Lake in Sections 8, 17 (Lost Lake vicinity), 21, and 28 (north to south) (Figures 1 and 9). Characteristic species found in this community within the Park include: *Elodea canadensis*, *Valisneria americana*, *Myriophyllum verticillatum*, *Heteranthera dubia*, *Potamogeton friesii*, *Potamogeton gramineus*, *Potamogeton zosteriformis*, *Stuckenia pectinata*, *Brasenia schreberi*, *Nuphar variegata*, *Nymphaea odorata*, *Lemna trisulca*, *Lemna turionifera*, and *Spirodela polyrhiza*.

Emergent Marsh

Emergent marsh is a shallow water wetland that occurs along the shores of lakes and streams throughout Michigan. Water depth of 15 cm (6 in) or more is usually present throughout the growing season. . . . Vegetation is comprised of

FIGURE 9. Submergent Marsh. July 15, 2016. Photo by David C. Dister.

narrow- and broad-leaved graminoids (i.e., grass-like plants) and herbs that extend above the water surface (i.e., emergent plants), as well as floating-leaved plants. (Cohen et al. 2015).

This plant community also occurs along the eastern boundary of the Park bordering Hamlin Lake as described for the submergent marsh community above (Figures 1 and 10). Characteristic species found in this community within the Park include: *Carex aquatilis*, *Carex lacustris*, *Carex lasiocarpa*, *Dulichium arundinaceum*, *Leersia oryzoides*, *Zizania palustris*, *Pontedaria cordata*, *Sagittaria latifolia*, *Sparganium natans*, *Thelypteris palustris*, *Brasenia schreberi*, *Nuphar variegata*, *Nymphaea odorata*, *Lemna trisulca*, *Lemna turionifera*, and *Spirodela polyrhiza*.

Interdunal Wetland

Interdunal wetland is a rush-, sedge-, and shrub-dominated wetland situated in depressions within open dunes or between beach ridges along the shorelines of the Great Lakes. . . . Water levels fluctuate both seasonally and from year to year in synchrony with changes in the Great Lakes water levels and strongly influence species composition and community structure. (Cohen et al. 2015).

This plant community occurs between the foredunes bordering Lake Michigan and the higher forested dunes further inland (Figures 1 and 11). Characteristic species found in this community within the Park include: *Calamagrostis canadensis*, *Carex garberi*, *Carex viridula*, *Cladium mariscoides*, *Eleocharis elliptica*, *Eleocharis quinqueflora*, *Juncus balticus*, *Schoenoplectus pungens*, *Triglochin maritima*, *Utricularia cornuta*, and *Hypericum kalmianum*.

FIGURE 10. Emergent Marsh. July 17, 2016. Photo by David C. Dister.

FIGURE 11. Interdunal Wetland. June 8, 2013. Photo by David C. Dister.

Terrestrial Class – Forest Group

Dry-mesic Northern Forest

Dry-mesic northern forest is a pine or pine-hardwood forest found throughout the Upper Peninsula and northern Lower Peninsula . . . . Dry-mesic northern forest develops on extremely to very strongly acidic sands or loamy sands. (Cohen et al. 2015).

This plant community occurs on the inland high dunes, ridges, and valleys within the east-central portion of the Park (Figures 1 and 12). Characteristic species found in this community within the Park include: *Avenella flexuosa*, *Carex pensylvanica*, *Oryzopsis asperifolia*, *Maianthemum canadense*, *Mitchella repens*, *Polygala paucifolia*, *Trientalis borealis*, *Dryopteris intermedia*, *Pteridium aquilinum*, *Gaultheria procumbens*, *Gaylussacia baccacta*, *Vaccinium angustifolium*, *Acer rubrum*, *Pinus strobus*, *Quercus rubra*, and *Tsuga canadensis*.

Primary Class – Dunes Group

Open Dunes

Open dunes is a grass- and shrub-dominated community located on wind-deposited sand formations near the shorelines of the Great Lakes. . . . Blowouts, sand burial and abrasion, excessively well-drained and droughty soils, desiccating winds, and occasional fires maintain open conditions. (Cohen et al. 2015).

This plant community is interspersed with Great Lakes Barrens and dominates the northern third and the southern third of the Park (Figures 1 and 13). Characteristic species found in this community within the Park include: *Am-*

FIGURE 12. Dry–Mesic Northern Forest. July 17, 2016. Photo by David C. Dister.

FIGURE 13. Open Dunes—view north from Big Sable Point Lighthouse. October 22, 2008. Photo by David C. Dister.

mophila breviligulata, *Calamovilfa longifolia*, *Schizachyrium scoparium*, *Arabidopsis lyrata*, *Artemisia campestris*, *Cirsium pitcheri*, *Euphorbia polygonifolia*, *Lithospermum caroliniense*, *Monarda punctata*, *Solidago simplex*, *Hudsonia tomentosa*, *Prunus pumila*, and *Salix cordata*.

Great Lakes Barrens

Great Lakes barrens is a coniferous savanna community of scattered and clumped trees and an often dense, low or creeping shrub layer. The community occurs on circumneutral sands along the shores of the Great Lakes, where it is often associated with interdunal wetland and open dunes. (Cohen et al. 2015).

This plant community occurs predominantly in the northern third and the southern third of the Park east of the foredunes along Lake Michigan (Figures 1 and 14). Characteristic species found in this community within the Park include: *Artemisia campestris*, *Koeleria macrantha*, *Schizachyrium scoparium*, *Galium pilosum*, *Monarda punctata*, *Arctostaphylos uva-ursi*, *Hudsonia tomentosa*, *Juniperus communis*, *Prunus pumila*, *Shepherdia canadensis*, *Pinus banksiana*, *Pinus strobus*, and *Quercus velutina*.

DISCUSSION

The flora of Ludington State Park includes 444 taxa (including subspecies) based on this study and historic collecting of 15 taxa not found during this study. The flora diversity relies heavily on interdunal wetlands eastward of Lake Michigan, and palustrine wetlands bordering Hamlin Lake. This is reflected in 27 species of *Carex* and six species of *Juncus* documented in the Park. A total of 112 taxa were collected that are new records for Mason County.

As a consequence of the Park's soils being highly xeric and topsoil depths

FIGURE 14. Great Lakes Barrens. July 15, 2016. Photo by David C. Dister.

being quite shallow, spring ephemeral wildflowers are relatively few. Among the most widespread spring ephemerals are *Maianthemum canadense*, *Maianthemum racemosum*, *Maianthemum stellatum*, *Polygonatum pubescens*, and *Trientalis borealis*. Interestingly, a small population of *Hepatica americana* was found in black loamy sand along the southeastern edge of the Park, which is the only location in the park with this mapped organic soil (USDA, NRCS, FS 1995).

The only state-listed taxon not previously documented at the Park is bugseed (*Corispermum pallasii)*, a Michigan Special Concern species, that was found September 11, 2011 in open dune habitat (Figure 5). Repeated annual efforts to re-locate two of the previously known state-listed taxa, *Cypripedium arietinum* and *Orobanche fasciculata*, were not successful during this study.

One of the most significant finds of a non-listed taxon was *Eriocaulon aquaticum* (Figure 6). More than 1,000 flowering plants were estimated to inhabit a mucky 1.5-acre interdunal wetland with *Schoenoplectus acutus* approximately one mile east of Lake Michigan when discovered on July 15, 2012. In succeeding summers, water levels were apparently too high, and there was no sign of germination. This taxon appears to be regionally rare based on rarity of the habitat and the author's other field work in Mason, Manistee and Lake Counties. Another noteworthy discovery was a population of the **native** common reed (*Phragmites australis* subsp. *americanus*) on July 27, 2014.

A determination of the $\bar{C}$ for the Park resulted in a score of 4.9, which compares with 5.1 determined by the author for the NDWA study by Hazlett (1986a, 1986b). Additionally, a determination of the *FQI* for the Park resulted in a score of 91.1, which compares with 91.5 determined by the author for the NDWA study (Hazlett 1986a, 1986b). The higher scores for both parameters at NDWA may re-

FIGURE 15. Ravine with extensive beech bark disease mortality. September 3, 2007. Photo by David C. Dister.

flect basic differences in management, as designated wilderness areas have much greater restrictions on human activity as compared to state parks. Also, 23 percent (102) of the vouchered taxa at the Park are considered non-native, whereas only 12 percent (43) are considered non-native at NDWA based on the Hazlett study conducted three decades earlier. Some of this discrepancy may be a result of much greater human interaction and visitation (with incidental introduction of non-natives), in the Park than in NDWA. A total of 34 taxa at LSP have a Coefficient of Conservatism (C) ranking of 9 or 10, which represents 8 percent of the 444 vouchered taxa (Table 2). In comparison, 33 taxa at NDWA also have a C ranking of 9 or 10, which represents 9 percent of the 365 vouchered taxa at that park (Hazlett 1986a, 1986b). These high rankings are not that dissimilar, despite the fact that the Park is much larger than NDWA. Negative impacts to the herbaceous flora of the Park are largely due to an excessive population of white-tailed deer (*Odocoileus virginianus*). Succulent taxa such as members of the Osmundaceae and Orchidaceae are especially sought after by browsing deer, and the modest diversity of orchid taxa found in the Park may be a reflection of this. Additionally, the deer herd population statewide appears to have been notably larger during the current study than during the NDWA study (Hazlett, 1986a, 1986b). A search of statewide herd estimates provided estimates of 1 million in 1981 (MDNR 2017) vs. 1.75 million in 2015 (Lansing State Journal 2017).

Negative impacts to forest canopy taxa in the Park are largely due to exotic pathogens and/or insects. Pathogens such as beech bark disease (Figure 15), is a *Neonectria* fungus spread by a sap-feeding scale insect (*Cryptococcus fagisuga*)

that causes mortality of *Fagus grandifolia*, while emerald ash borer (*Agrilus planipennis*) has similar effects upon *Fraxinus americana* and *F. pennsylvanica*, impacting the diversity of canopy taxa in the Park.

Lastly, surveys in deepwater aquatic bed communities were limited to wadable water depths, and more thorough surveys with the use of watercraft might result in additional taxa among *Potamogeton* and other aquatic genera. Similarly, new terrestrial taxa are likely to be introduced over time along roadways, trails, and campgrounds due to human activities.

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LITERATURE CITED

Albert, D. A. (1995). Regional landscape ecosystems of Michigan, Minnesota, and Wisconsin: A working map and classification (Fourth revision: 1994). General Technical Report NC–178. North Central Forest Experiment Station, Forest Service—U. S. Department of Agriculture, Minneapolis, Minnesota. Available at https://www.nrs.fs.fed.us/pubs/gtr/other/gtr-nc178/index.html; PDF available at https://www.nrs.fs.fed.us/pubs/gtr/gtr_nc178.pdf (Accessed March 3, 2017)

Andersen, B. J. (2005). The historical development of the tension zone concept in the Great Lakes Region of North America. The Michigan Botanist. 44: 127-138.

Bailey, R. G. (1995). Description of the ecoregions of the United States (second edition). U. S. Department of Agriculture, Miscellaneous Publication No. 1391, 77 pp.

Barnes, B. V. and W. H. Wagner, Jr. (1981). Michigan trees: A guide to the trees of Michigan and the Great Lakes Region. The University of Michigan Press, Ann Arbor.

Cohen, J. G., M. A. Kost, B. S. Slaughter, and D. A. Albert. (2015). A field guide to the natural communities of Michigan. Michigan State University Press, East Lansing.

Hazlett, B. T., (1986a). The vegetation and flora of the Nordhouse Dunes, Manistee National Forest, Mason County, Michigan: I. History and Present Vegetation. The Michigan Botanist. 25: 74-92.

Hazlett, B. T., (1986b). The vegetation and flora of the Nordhouse Dunes, Manistee National Forest, Mason County, Michigan: II. Catalogue of Vascular Plants. The Michigan Botanist. 25: 125-139.

Herman, K. D., L. A. Masters, M. R. Penskar, A. A. Reznicek, G. S. Wilhelm, W. W. Brodovich, and K. P. Gardiner. (2001). Floristic quality assessment with wetland categories and examples of computer applications for the State of Michigan, revised, 2nd Edition. Michigan Department of Natural Resources, Wildlife Division, Natural Heritage Program, Lansing.

Higman, P. J., D. A. Albert, D. L. Cuthrell, H. D. Enander, R. R. Goforth, and Y. Lee. (2002). An inventory of Ludington State Park to identify significant natural features. Michigan Natural Features Inventory, Lansing, Report Number 2002-13.

Lansing State Journal. (2017). Area motorists urged to keep eyes open for deer. Available at http://www.lansingstatejournal.com/story/news/local/2015/09/25/area-motorists-urged-keep-eyes-open-deer/72821502/ (Accessed March 20, 2017).

MDNR. (2017). White-tailed deer (*Odocoileus virginianus*). Available at http://www.michigan.gov/dnr/0,4570,7-153-10370_12145_12205-56904—,00.html (Accessed March 20, 2017).

MDNR, P&RD. (2016). General Management Plan: Ludington State Park. Available at

http://www.michigan.gov/dnr/0,4570,7-153-10365_76344_31399_55764-382772—,00.html. (Accessed March 18, 2017).
MICHIGAN FLORA ONLINE. A. A. Reznicek, E. G. Voss, & B. S. Walters. (2011) University of Michigan. Available at http://michiganflora.net/information.aspx. (Accessed 2011-2016)
USDA. (2017). USDA plant hardiness zone map. Available at http://planthardiness.ars.usda.gov/PHZMWeb/. (Accessed March 18, 2017).
USDA, NRCS. (2017). The PLANTS Database. National Plant Data Team, Greensboro, NC 27401-4901 USA. Available at http://plants.usda.gov/java/ (Accessed 2013-2016)
USDA, NRCS, FS. (1995). Soil Survey of Mason County, Michigan. Available at https://www.nrcs.usda.gov/Internet/FSE_MANUSCRIPTS/michigan/MI105/0/Mason_Mi.pdf. (Accessed March 18, 2017).
Voss, E. G., and A. A. Reznizek. (2012). Field Manual of Michigan flora. University of Michigan Press. Ann Arbor.

APPENDIX 1. ANNOTATED CHECKLIST OF THE VASCULAR FLORA OF LUDINGTON STATE PARK.

This list includes all taxa of vascular plants within Ludington State Park collected by the author during 2009 through 2014 and by other botanists during the 20th century. Except for Pteridophytes, the list is arranged according to Voss and Reznicek (2012). Ferns and lycopods are listed alphabetically by family, genus, and species following the classification in MICHIGAN FLORA ONLINE (2011). Common names are largely taken from Voss and Reznicek (2012), and also from the USDA Plants Database (2013-2016). Voucher specimens are deposited at the University of Michigan Herbarium (MICH). The Coefficient of Conservatism (***C***) numbers are taken from MICHIGAN FLORA ONLINE (2011). Collections by the author are indicated by D followed by the collection number, and collections by others of taxa not found in this study are as indicated by their last name, the collection number, and the year of collection in parentheses. These collectors are Harley H. Bartlett, Scott Herron, Florence V. Hoseney, N. W. Katz, Rogers McVaugh, and C. Marvin Rogers. The 15 historic vouchers in the Appendix are deposited at MICH (10), WUD (4), and BLH (1). For several taxa without vouchers, the phrase "photo voucher only" is noted.

The abundance of plant taxa are noted as follows: **rare** (scarce, small locality); **occasional** (scattered); **common** (many localities or individuals); **locally common** (not found often but abundant where found); and **abundant** (extremely common in most of the suitable habitat). Abundance is followed by the habitat within the Park where the taxon is typically found. "ND" indicates that no frequency or habitat information is available. Taxa marked with an asterisk (*) are alien taxa. Taxa marked with a dagger (†) represent new Mason County records.

PTERIDOPHYTES

CYSTOPTERIDACEAE (Bladder Fern Family)

Gymnocarpium dryopteris (L.) Newm.; Oak Fern; locally common on semi-open forested dunes; D373; ***C*** 5

DENNSTAEDTIACEAE (Bracken Fern Family)

Pteridium aquilinum (L.) Kuhn; Bracken Fern; locally common on mixed forested dunes; D125; ***C*** 0

DRYOPTERIDACEAE (Wood Fern Family)

Dryopteris carthusiana (Vill.) H. P. Fuchs; Spinulose Woodfern; occasional on shaded mixed forested dunes; D088; ***C*** 5

Dryopteris intermedia (Willd.) A. Gray; Evergreen Woodfern; locally common on shaded mixed forested dunes; D272; ***C*** 5

†*Dryopteris marginalis* (L.) A. Gray; Marginal Woodfern; rare on north slope of sugar maple forest; D309; ***C*** 5

EQUISETACEAE (Horsetail Family)

Equisetum arvense L.; Common Horsetail; locally common along steep shaded slope along Piney Ridge Lake (Lake Ann); D478; ***C*** 0

†*Equisetum fluviatile* L.; Water Horsetail; locally common in deepwater emergent wetlands; D298; ***C*** 7

Equisetum hyemale L.; Scouring Rush; locally common in low moist thickets; D306; ***C*** 2

†*Equisetum variegatum* Schleich.; Variegated Scouring Rush; locally common along moist edge of emergent wetlands; D307; ***C*** 6

LYCOPODIACEAE (Clubmoss Family)

†*Dendrolycopodium obscurum* (L.) A Haines; Ground-Pine; rare on mossy hummocks by edge of shaded wetland; D506; ***C*** 5

Diphasiastrum digitatum (A. Braun) Holub; Ground-Cedar; rare, in opening of mixed forested dune; D302; ***C*** 3

†*Huperzia lucidula* (Michx.) R. Trevis.; Shining Clubmoss; rare on steep east-facing logging road cut in forested dune; D187; ***C*** 5

ONOCLEACEAE (Sensitive Fern Family)

Onoclea sensibilis L.; Sensitive Fern; occasional along damp margins of wetlands; D287; ***C*** 2

OPHIOGLOSSACEAE (Grape-Fern Family)

Botrypus virginianus (L.) Michx.; Rattlesnake Fern; rare on deciduous forested dune; D366; **C** 5

OSMUNDACEAE (Flowering-Fern family)

Osmunda cinnamomea L.; Cinnamon Fern; occasional along wetland edges; D093; ***C*** 5

Osmunda regalis L.; Royal Fern; uncommon along wetland edges; D092; ***C*** 5

POYPODIACEAE (Polypody Family)

Polypodium virginianum L.; Common Polypody; fairly rare on steep slopes of old logging roads in mixed forested dunes; D102; ***C*** 8

SELAGINELLACEAE (Spikemoss Family)

Selaginella rupestris (L.) Spring; Sand Club Moss; ND; Bartlett s.n. (1937); ***C*** 3

THELYPTERIDACEAE (Marsh Fern Family)

Thelypteris palustris Schott; Marsh Fern; locally common along edge of emergent wetlands; D241; ***C*** 2

GYMNOSPERMS

CUPRESSACEAE (Cypress Family)

Juniperus communis L.; Ground Juniper; abundant in jack pine barrens, but occasional in open dunes; D279, ***C*** 4

Thuja occidentalis L.; White-Cedar; common in forested wetlands and occasional elsewhere; D291; ***C*** 4

PINACEAE (Pine Family)

Pinus banksiana Lamb.; Jack Pine; abundant in older/stable dune habitats; D281; ***C*** 5

Pinus strobus L.; White Pine; common in forested dunes and wetlands; D284; ***C*** 3

Tsuga canadensis (L.) Carrière; Eastern Hemlock; abundant in mixed forested dunes; D293; ***C*** 5

ANGIOSPERMS—MONOCOTS

ALISMATACEAE (Water-Plantain Family)

Sagittaria latifolia Willd.; Common Arrowhead; occasional in shallow water wetlands; D299; ***C*** 4

ARACEAE (Arum Family)

Calla palustris L.; Wild Calla; rare in semi-shaded backwater wetlands; D068; ***C*** 10

Lemna trisulca L.; Star Duckweed; rare in semi-shaded wetlands; D103; ***C*** 6

Lemna turionifera Landolt; Red Duckweed; locally common in semi-shaded wetlands; D342; ***C*** 5

Spirodela polyrhiza (L.) Schleid.; Greater Duckweed; rare in semi-shaded wetlands; D343; ***C*** 6

ASPARAGACEAE (Asparagus Family)

**Asparagus officinalis* L.; Garden Asparagus; rare in jack pine barrens; D411

CONVALLARIACEAE (Lily-of-the-Valley Family)

Maianthemum canadense Desf.; Canada Mayflower; common in mixed forested dunes; D039; ***C*** 4

Maianthemum racemosum (L.) Link; Solomon's-Plume; occasional in mixed forested dunes; D382; ***C*** 5

†*Maianthemum stellatum* (L.) Link; Starry Solomon's-Plume; occasional in jack pine barrens; D085; ***C*** 5

Polygonatum pubescens (Willd.) Pursh; Downy Solomon Seal; occasional in mixed forested dunes; D035, D116; ***C*** 5

CYPERACEAE (Sedge Family)

Carex alata Torr.; Winged Sedge; occasional along edges of wetlands; D104, D174; ***C*** 10

Carex aquatilis Wahlenb.; Water Sedge; locally common in deepwater emergent wetlands; D060; ***C*** 7

Carex arctata Boott; Drooping Woodland Sedge; occasional in mixed forested dunes; D041; ***C*** 3

Carex atlantica L. H. Bailey; Prickly Bog Sedge; occasional along edges of semi-shaded emergent wetlands; D491; ***C*** 7

Carex brunnescens (Pers.) Poir.; Brownish Sedge; occasional along edges of semi-shaded emergent wetlands; D371; ***C*** 5

†*Carex buxbaumii* Wahlenb.; Buxbaum's Sedge; locally common in sedge meadow within jack pine barrens; D489; ***C*** 10

Carex canescens L.; Silvery Sedge; occasional in alder thicket edge of interdunal wetland; D408; ***C*** 8

Carex communis L. H. Bailey; Fibrousroot Sedge; occasional in semi-shaded mixed forested or open dunes; D029, D488; ***C*** 2

Carex crinita Lam.; Fringed Sedge; occasional along edges of semi-shaded wetlands; D070; ***C*** 4

†*Carex deweyana* Schwein.; Dewey's Sedge; occasional in shaded mixed forested dunes; D089; D322; ***C*** 3

†*Carex disperma* Dewey; Softleaf Sedge; locally common along edge of semi-shaded wetlands; D492; ***C*** 10

Carex eburnea Boott; Bristleleaf Sedge; locally common on steep shaded sandy dune ridge; D022; ***C*** 7

Carex folliculata L.; Northern Long Sedge; rare, in shaded wetland swale near Hamlin Lake; D507; ***C*** 10

Carex garberi Fernald; Elk Sedge; locally common in draw-down margins of interdunal wetlands and lake margins; D044; ***C*** 8

Carex interior L. H. Bailey; Inland Sedge; occasional along edges of open wetlands; D064, D370; ***C*** 3

Carex intumescens Rudge; Greater Bladder Sedge; occasional along edges of semi-shaded wetlands: D071; ***C*** 3

†*Carex lacustris* Willd.; Lake Sedge; occasional along edges of semi-shaded wetlands; D066; ***C*** 6

†*Carex lasiocarpa* Ehrh.; Woollyfruit Sedge; locally common along edge of backwater slough wetlands; D095; ***C*** 8

†*Carex leptonervia* (Fernald) Fernald; Nerveless Woodland Sedge; occasional in shaded mixed forested dunes; D090; ***C*** 3

Carex muehlenbergii Willd.; Muhlenberg's Sedge; occasional on semi-shaded forested dune ridges; D462; ***C*** 7

Carex peckii Howe; Peck's Sedge; ND; Rogers 9262 (1953); ***C*** 3

Carex pensylvanica Lam.; Pennsylvania Sedge; common on shaded upland mixed forested dunes; D372; ***C*** 4

†*Carex pseudocyperus* L.; Cypress-like Sedge; occasional, along edges of semi-shaded wetlands; D063; ***C*** 5

†*Carex stipata* Willd.; Awlfruit Sedge; rare, along edges of semi-shaded wetlands; D091; ***C*** 1

†*Carex stricta* Lam.; Upright Sedge; rare on hummock of mixed forested wetland; D374; ***C*** 4

†*Carex viridula* Michx.; Little Green Sedge; locally common along mucky edge of interdunal wetland; D421; ***C*** 4

†*Carex vulpinoidea* Michx.; Fox Sedge; rare along semi-shaded roadside; D435; ***C*** 1

Cladium mariscoides (Muhl.) Torr.; Twig-Rush; occasional in interdunal wetlands, and locally common in wet meadow along south side of Big Sable River; D196; ***C*** 10

Cyperus bipartitus Kunth; Brook Nut Sedge; locally common in wet meadow along south side of Big Sable River; D189; ***C*** 3

†*Cyperus esculentus* L.; Yellow Nut Sedge; occasional along sandy north bank of Big Sable River; D355; ***C*** 1

Cyperus schweinitzii Torr.; Rough Sand Sedge; rare in open sandy dunes; D208; ***C*** 5

Cyperus strigosus L.; Long Scaled Nut Sedge; occasional in wet meadow north of Big Sable River; D269; ***C*** 3

Dulichium arundinaceum (L.) Britton; Three-way Sedge; fairly common in shallow water wetlands; D167; ***C*** 8

Eleocharis elliptica Kunth; Golden-seeded Spike-Rush; locally common in interdunal wetlands; D158; ***C*** 6

Eleocharis palustris (L.) Roem. & Schult.; Common Spike-Rush; locally common in sedge/willow interdunal wetlands; D463; ***C*** 5

†*Eleocharis quinqueflora* (Hartmann) O. Schwarz; Few-flowered Spike-Rush; locally common in interdunal wetlands; D442; ***C*** 10

Fimbristylis autumnalis (L.) Roem. & Schult.; Autumn Sedge; rare, along draw-down sandy edge of Piney Ridge Lake; D362; ***C*** 6

†*Rhynchospora capillacea* Torr.; Needle Beak-Rush; occasional, in wet meadow south of Big Sable River; D198; ***C*** 10

†*Schoenoplectus acutus* (Bigelow) Á. Löve & D. Löve; Hardstem Bulrush; locally common in interdunal wetlands; D217; ***C*** 5

Schoenoplectus pungens (Vahl) Palla; Threesquare; locally common in interdunal wetlands; D078, D131; ***C*** 5

†*Schoenoplectus subterminalis* (Torr.) Soják; Swaying Bulrush; occasional in aquatic bed wetlands; D391, D426; ***C*** 8

Schoenoplectus tabernaemontani (C. C. Gmel.) Palla; Softstem Bulrush; occasional, in wet meadow south of Big Sable River; D433; ***C*** 4

Scirpus cyperinus (L.) Kunth; Wool-Grass; occasional, in interdunal marshes; D220; ***C*** 5

ERIOCAULACEAE (Pipewort Family)

Eriocaulon aquaticum (Hill) Druce; Sevenangle Pipewort; rare along mucky edges of old interdunal wetland; D420; ***C*** 9

HYDROCHARITACEAE (Frog's-Bit Family)

Elodea canadensis Michx.; Common Waterweed; fairly common in aquatic bed wetlands; D390; ***C*** 1

Vallisneria americana Michx.; Eel-Grass; locally common in aquatic bed wetlands; D250; ***C*** 7

IRIDACEAE (Iris Family)

**Iris pseudoacorus* L.; Yellow Flag; rare, in wetland slough off Hamlin Lake; D067

†*Iris versicolor* L.; Wild Blue Flag; locally common along edges of shaded wetlands; D058; ***C*** 5

†*Sisyrinchium montanum* Greene; Mountain Blue-Eyed-Grass; rare along grassy trail edge through jack pine barrens; D453, D457; ***C*** 4

JUNCACEAE (Rush Family)

Juncus alpinoarticulatus Chaix; Northern Green Rush; occasional along edges of interdunal emergent wetlands; D218; ***C*** 5

Juncus balticus Willd.; Baltic Rush; occasional along edges of interdunal wetlands and drawdown lake margins; D439, D497; ***C*** 4

†*Juncus brachycephalus* (Engelm.) Buchenau; Smallhead Rush; occasional in wet meadow south of Big Sable River; D432; ***C*** 7

†*Juncus dudleyi* Weigand; Dudley's Rush; occasional, along moist shaded trailsides and wetland edges; D252; ***C*** 1

Juncus effusus L.; Soft-stemmed Rush; occasional in scrub-shrub and other shallow water wetlands; D266, D445; ***C*** 3

†*Juncus nodosus* L.; Joint Rush; occasional in interdunal wetlands; D230; ***C*** 5

JUNCAGINACEAE (Arrow-Grass Family)

Triglochin maritima L.; Common Bog Arrow-Grass; rare in interdunal wetlands; D110; ***C*** 8

Triglochin palustris L.; Slender Bog Arrow-Grass; abundant in wet sand in interdunal hollows; McVaugh 11193 (1949); ***C*** 8

MELANTHIACEAE (Bunchflower Family)

Anticlea elegans (Pursh) Rydb.; White Camas; fairly rare on open dunes; D111; ***C*** 10

ORCHIDACEAE (Orchid Family)

Corallorhiza odontorhiza (Willd.) Nutt.; Fall Coral-Root; rare in semi-shaded mixed forested dune; D363; ***C*** 8

Cypripedium arietinum R Br.; Ram's Head Lady Slipper; rare in jack pine barrens; photo voucher only (Figure 4); *C* 10

**Epipactis helleborine* (L.) Crantz; Helleborine; rare in semi-shaded mixed forested dune; D341

Goodyera oblongifolia Raf.; Menzies' Rattlesnake Plantain; rare on moss-covered steep semi-shaded dune; D027; ***C*** 8

†*Liparis loeselii* (L.) Rich.; Green Twayblade; rare, in saturated sedge meadow fringe bordering deepwater wetlands; D466; ***C*** 5

Spiranthes cernua (L.) Rich.; Nodding Ladies'-Tresses; occasional, along margins of interdunal wetlands; D214; ***C*** 4

†*Spiranthes lacera* (Raf.) Raf.; Slender Ladies'-Tresses; rare in jack pine/ground juniper barrens; D461; ***C*** 8

POACEAE (Grass Family)

**Agrostis gigantea* Roth; Redtop; occasional in wet meadow north of Big Sable River; D133

Agrostis perennans (Walter) Tuck.; Autumn Bent; occasional in semi-shaded emergent wetlands; D467; ***C*** 5

Agrostis scabra Willd.; Ticklegrass; occasional in open emergent marsh/interdunal wetlands; D162, D496; ***C*** 4

Ammophila breviligulata Fernald; Beach Grass; abundant on foredunes and beach margins fronting Lake Michigan; D226; ***C*** 10

†*Andropogon virginicus* L.; Broom-Sedge; rare in moist meadow south of Piney Ridge Lake; D443; **C** 4

Avenella flexuosa (L.) Drejer; Hairgrass; occasional on semi-shaded mixed forested dunes; D069; ***C*** 6

Bromus ciliatus L.; Fringed Brome; rare, under white pine with *Linnaea* and *Mitchella*; Katz 692 (1951); ***C*** 6

**Bromus inermis* Leyss.; Smooth Brome; occasional along Piney Ridge Road/east edge of park; D437

*†*Bromus tectorum* L.; Downy Chess; occasional in semi-open jack pine/black oak barrens; D124

Calamagrostis canadensis (Michx.) P. Beauv.; Blue-Joint; fairly common in interdunal emergent wetlands; D144, D215, D460; ***C*** 3

Calamagrostis stricta (Timm) Koeler; Narrow-leaved Reedgrass; abundant in low places amongst dunes along Lake Michigan; McVaugh 12649 (1951); ***C*** 10

Calamovilfa longifolia (Hook.) Scrib.; Sand Reed Grass; common to abundant on open dunes; D197, D275; ***C*** 10

Cenchrus longispinus (Hack.) Fernald; Sandbur; rare, in disturbed sandy area north of Hamlin Beach parking lot; D345; ***C*** 0

**Dactylis glomerata* L.; Orchard Grass; occasional along roadsides and forested dune openings; D143

Danthonia spicata (L.) Roem. & Schult.; Poverty Grass; rare, in low opening within jack pine barrens; D498; ***C*** 4

†*Dichanthelium commonsianum* (Ashe) Freckmann; Hemlock Rosette Grass; occasional on open dunes; D321; ***C*** 6

Dicanthelium implicatum (Schribn.) Kerguélen; Western Panic Grass; abundant in jack pine barrens, common in wet meadow south of Big Sable River; D190, D340; ***C*** 3

†*Dicanthelium xanthophysum* (A. Gray) Freckmann; Slender Rosette Grass; rare in semi-shaded mixed forested dunes; D383; ***C*** 6

†*Digitaria cognata* (Schult.) Pilg.; Fall Witch Grass; occasional, grassy edge along paved walkway; D245; ***C*** 3

*†*Digitaria ischaemum* (Schreb.) Muhl.; Smooth Crab Grass; locally common along edge of semi-shaded paved road; D434

†*Echinochloa muricata* (P. Beauv.) Fernald; Rough Barnyard Grass; rare, along shallow rocky edge of Big Sable River; D347; ***C*** 1

Elymus canadensis L.; Canada Wild Rye; occasional on open dunes; D235; ***C*** 5

**Elymus repens* (L.) Gould; Quack Grass; rare, open grassy disturbed dune areas; D223

†*Eragrostis pectinacea* (Michx.) Nees; Love Grass; rare; along grassy open 2-track road through jack pine barrens; D471; ***C*** 0

†*Eragrostis spectabilis* (Pursh) Steud.; Tumble Grass; rare, on steep sandy bank of Big Sable River; D356; ***C*** 3

*†*Festuca trachyphylla* (Hack.) Krajina; Sheep Fescue; rare, in disturbed forested campgrounds; D490

†*Glyceria borealis* (Nash) Batch.; Northern Manna Grass; occasional in shallow water emergent wetlands; D414; ***C*** 6

Glyceria canadensis (Michx.) Trin.; Rattlesnake Grass; rare, along edges of interdunal wetlands/marshes; D168; ***C*** 8

Glyceria striata (Lam.) Hitch.; Fowl Manna Grass; occasional in semi-shaded mixed forested wetlands; D065; ***C*** 4

Koeleria macrantha (Ledeb.) Schult.; June Grass; occasional in semi-open jack pine barrens; D161; ***C*** 9

†*Leersia oryzoides* (L.) Sw.; Cut Grass; occasional in emergent marshes; D295; ***C*** 3

*†*Leymus arenarius* (L.) Hochst; Lyme Grass; rare in open dunes; D210

*†*Lolium perenne* L.; Ryegrass; rare, semi-shaded grassy slope by river boardwalk; D138

Muhlenbergia mexicana (L.) Trin.; Leafy Satin Grass; occasional, open wet sandy habitats; D259; ***C*** 3

†*Muhlenbergia schreberi* J. F. Gmel.; Nimblewill; locally common in forested dune openings; D399; ***C*** 0

Oryzopsis asperifolia Michx.; Rough-leaved Rice-Grass; occasional in mixed forested dunes; D010; ***C*** 6

Panicum virgatum L.; Switch Grass; abundant in low places among dunes; McVaugh 12650 (1951); ***C*** 4

†*Patis racemosa* (Sm.) Romasch., P. M. Peterson & Soreng (syn. *Piptatherum racemosum* (Sm.) Eaton); Black Seed Rice Grass; rare on deciduous forested dune ridgetops; D256; ***C*** 8

Phalaris arundinacea L.; Reed Canary Grass; occasional along riparian and wetland edges; D129; ***C*** 0

**Phleum pratense* L.; Timothy; rare, in semi-shaded mixed forested dunes and roadsides; D142

†*Phragmites australis* subsp. *americanus* (Cav.) Steud.; American Common Reed; rare, small colony in open shallow emergent marsh; D495; ***C*** 5

*†*Phragmites australis* subsp. *australis* (Cav.) Steud.; European Common Reed; locally common in interdunal wetlands; D145

*†*Poa bulbosa* L.; Bulbous Bluegrass; occasional in disturbed campgrounds; D021
**Poa compressa* L.; Canada Bluegrass; locally common on deciduous forested dune ridgetops and forest openings/roadsides; D057
**Poa pratensis* subsp. *angustifolia* (L.) Lej.; Kentucky Bluegrass; locally common on open disturbed sites; D222
**Poa pratensis* subsp. *pratensis* L.; Kentucky Bluegrass; locally common in sedge meadow wetlands; D409
Schizachne purpurascens (Torr.) Swallen; False Melic; occasional in semi-shaded forested dunes; D114, D367; ***C*** 5
Schizachyrium scoparium (Michx.) Nash; Little Bluestem; fairly common in open dunes and jack pine barrens; D225; ***C*** 5
*†*Setaria pumila* (Poir.) Roem. & Schult.; Yellow Foxtail; occasional along sandy open banks of the Big Sable River; D354
**Setaria viridis* (L.) P. Beauv.; Green Foxtail; occasional along edges of roadsides, parking lots, and other disturbed habitats; D254
Sporobolus cryptandrus (Torr.) A. Gray; Sand Dropseed; rare, sandy disturbed zone north of Hamlin Beach parking lot; D349; ***C*** 3
Zizania palustris L.; Northern Wild Rice; occasional in deepwater aquatic bed/emergent marshes; D177; ***C*** 8

PONTEDERIACEAE (Pickerel-Weed Family)
Heteranthera dubia Jacq.; Water Star-Grass; rare in deepwater aquatic bed/emergent marshes; D389; ***C*** 6
Pontederia cordata L.; Pickerel-Weed; occasional in deepwater aquatic bed/emergent marshes; D176; ***C*** 8

POTAMOGETONACEAE (Pondweed Family)
*†*Potamogeton crispus* L.; Curly Pondweed; rare in deepwater aquatic bed wetlands; D378
Potamogeton friesii Rupr.; Fries's Pondweed; occasional in deepwater aquatic bed wetlands; D416; ***C*** 6
Potamogeton gramineus L.; Variableleaf Pondweed; occasional in deepwater aquatic bed wetlands; D084; ***C*** 5
Potamogeton zosteriformis Fernald; Flat-Stemmed Pondweed; occasional in deepwater aquatic bed wetlands; D415; ***C*** 5
Stuckenia pectinata (L.) Börner; Sago Pondweed; Lost Lake; Bartlett s.n. (1937); ***C*** 3

TYPHACEAE (Cat-Tail or Bur-Reed Family)
Sparganium eurycarpum Engelm.; Common Bur-Reed; occasional in emergent marsh wetlands; D257; ***C*** 5
*†*Sparganium natans* L.; Small Bur-Reed; locally common in aquatic bed/emergent marsh wetlands; D242; ***C*** 8
**Typha angustifolia* L.; Narrow-Leaf Cat-Tail; locally common in deepwater aquatic bed/emergent marsh wetlands; D 182
Typha latifolia L.; Common Cat-Tail; occasional in deepwater aquatic bed/emergent marsh wetlands; D334; ***C*** 1

ANGIOSPERMS—DICOTS

ADOXACEAE (Moschatel Family)
Sambucus canadensis L.; Common Elderberry; rare, in thickets along Big Sable River; D206; ***C*** 3
Sambucus racemosa L.; Red Elderberry; rare, on east slope of remote forested dune; D053; ***C*** 3
Viburnum acerifolium L.; Maple-leaved Viburnum; locally common in mixed forested dunes; D237; ***C*** 6
*†*Viburnum opulus* L.; European Highbush-Cranberry; rare, in scrub-shrub wetland; D308

AMARANTHACEAE (Amaranth Family)
*†*Chenopodium album* L.; Lamb's-Quarters; rare in disturbed habitats; D504

FIGURE 16. *Rhus typhina.* April 21, 2017. Photo by David C. Dister.

Corispermum pallasii Steven; Bugseed; occasional on open dunes; D393; ***C*** 3

**Cycloloma atriplicifolium* (Spreng.) J. M. Coult.; Winged Pigweed; occasional on open dunes; D292

**Salsola tragus* L.; Russian-Thistle; rare, in sedge meadow; D440

ANACARDIACEAE (Sumac Family)

Rhus typhina L.; Staghorn Sumac; rare, along grassy roadside; photo voucher only (Figure 16); ***C*** 2

Toxicodendron rydbergii (Rydb.) Greene; Western Poison-Ivy; locally common in grassy dunes; D454; ***C*** 3

APIACEAE (Carrot Family)

*†*Cicuta bulbifera* L.; Water-Hemlock; occasional in emergent wetlands; D251; ***C*** 5

**Daucus carota* L.; Wild Carrot; rare in open dunes and disturbed habitats; D153

Osmorhiza claytonii (Michx.) C. B. Clarke; Hairy Sweet-Cicely; rare in mixed forested dunes; D042; ***C*** 4

Sium suave Walter; Water-Parsnip; occasional in emergent wetlands; D184; ***C*** 5

**Torilis japonica* (Houtt.) DC.; Hedge-Parsley; rare on steep shaded forested dune; D201

APOCYNACEAE (Dogbane Family)

Asclepias incarnata L.; Swamp Milkweed; occasional in emergent wetlands; D377; ***C*** 6

Asclepias syriaca L.; Common Milkweed; occasional in open dunes; D107; ***C*** 1

AQUIFOLIACEAE (Holly Family)

Ilex verticillata (L.) A. Gray; Winterberry; occasional along shrubby margins of emergent wetlands; D261; ***C*** 5

FIGURE 17. *Aralia nudicaulis*. Leaves depicted. August 24, 2014. Photo by David C. Dister.

ARALIACEAE (Ginseng Family)

Aralia nudicaulis L.; Wild Sarsaparilla; rare in mixed forested dunes; photo voucher only (Figure 17); ***C*** 5

ASTERACEAE (Aster Family)

Achillea millefolium L.; Yarrow; occasional along grassy margins of roadways and parking lots; D105; ***C*** 1

Ambrosia artemisiifolia L.; Common Ragweed; rare, grassy steep bank of Big Sable River; D352; ***C*** 0

*†*Ambrosia psilostachya* DC.; Western Ragweed; rare; disturbed sandy parking lot southeast of Lighthouse; D394

Anaphalis margaritacea (L.) Benth. & Hook.; Pearly Everlasting; occasional in jack pine barrens; D212; ***C*** 3

Antennaria howellii Greene; Small Pussytoes; rare, semi-shaded north slope of mixed forested dune; D025; ***C*** 2

Antennaria parlinii Fernald; Smooth Pussytoes; rare, semi-shaded east slope of mixed forested dune; D365; ***C*** 2

*†*Arctium minus* Bernh.; Common Burdock; rare, along slopes by Big Sable River boardwalk; D357

Artemisia campestris L.; Wild Wormwood; common in open dunes; D209; ***C*** 5

*†*Bellis perennis* L.; English Daisy; locally common, in lawn by park office; D317

Bidens beckii Spreng.; Water-Marigold; locally common, shaded deepwater wetland sloughs; D183; ***C*** 10

†*Bidens cernua* L.; Nodding Bur-Marigold; occasional in emergent marsh wetlands; D265; ***C*** 3

†*Bidens connata* Muhl.; Purple-Stemmed Tickseed; rare, along sandy vegetated north edge of Piney Ridge Lake; D474; ***C*** 5

†*Bidens discoidea* (Torr. & A. Gray); Britton; Swamp Beggar-Ticks; rare, mostly shaded emergent marsh; D240; ***C*** 7

**Centaurea stoebe* L.; Spotted Knapweed; common in open dunes and meadows; D232

**Cichorium intybus* L.; Chickory; occasional on open dunes/ roadsides bordering M-116; D154

*†*Cirsium arvense* (L.) Scop.; Canada Thistle; rare, forest openings and disturbed wetlands; D135

Cirsium pitcheri (Torr.) Torr. & A. Gray; Pitcher's Thistle; sand dune – interdune; Herron 183 (2000); ***C*** 10

**Cirsium vulgare* (Savi.) Ten; Bull Thistle; rare, disturbed open grassy habitats; D221

Conyza canadensis (L.) Cronq.; Horseweed; occasional in wet meadows and disturbed areas; D191, D464; ***C*** 0

†*Erechtites hieraciifolia* (L.) Raf.; Fireweed; rare, dry hummock within emergent marsh wetland; D229; ***C*** 2

†*Erigeron philadelphicus* L.; Common Fleabane; rare; open willow/honeysuckle thicket; D045; ***C*** 2

Eupatorium perfoliatum L.; Common Boneset; occasional in emergent marsh wetlands and lake margins; D233; ***C*** 4

Eurybia macrophylla (L.) Cass.; Large-Leaved Aster; rare, base of steep mixed forested dune along Piney Ridge Road; D311; ***C*** 4

Euthamia graminifolia (L.) Nutt.; Grass-Leaved Goldenrod; occasional in wet meadows and interdunal wetlands; D236; ***C*** 3

**Hieracium caespitosum* Dumort.; Yellow Hawkweed; occasional in openings of jack pine barrens and forested dunes; D081, D101

**Hypochaeris radicata* L.; Cat's-Ear; occasional in wet meadows and disturbed areas; D134

Krigia virginica (L.) Willd.; Dwarf Dandelion; rare, openings in forested dunes and jack pine barrens; D405; ***C*** 4

**Leucanthemum vulgare* Lam.; Ox-Eye Daisy; rare; wet meadow south of Big Sable River; D077

Packera paupercula Michx.; Northern Ragwort; rare in open dunes; D048; ***C*** 3

Pseudognaphalium macounii (Greene) Kartesz; Clammy Cudweed; rare, along base of active dune by jack pine barrens; D227; ***C*** 2

†*Pseudognaphalium obtusifolium* (L.) Hilliard & B. L. Burtt; Fragrant Cudweed; rare, open mixed forested ravine with massive American beech die-off; D263; ***C*** 2

Solidago altissima L.; Tall Goldenrod; occasional, in grassy meadows; D234, D360; ***C*** 1

Solidago caesia L.; Bluestem Goldenrod; rare, along edge of forested back dune; D278; ***C*** 6

Solidago nemoralis Aiton; Gray Goldenrod; rare, sandy old field with open ground patches; D480; ***C*** 2

Solidago rugosa Mill.; Rough-leaved Goldenrod; rare, damp meadow along south edge of Piney Ridge Lake; D479; ***C*** 3

Solidago simplex Kunth; Gillman's Goldenrod; occasional on open dunes; D274; ***C*** 10

*†*Sonchus arvensis* L.; Prickly Sow-Thistle; rare, on grassy hummock by edge of Hamlin Lake; D180

Symphyotrichum dumosum (L.) G. L. Nesom; Bushy Aster; rare, in damp meadow along south edge of Piney Ridge Lake; D477; ***C*** 7

Symphyotrichum laeve (L.) G. L. Nesom; Smooth Aster; rare, along west edge of forested dune bordering grassy opening; D473; ***C*** 5

Symphyotrichum lateriflorum (L.) Á. Löve & D. Löve; Calico Aster; occasional in wet meadow south of Big Sable River; D476; ***C*** 2

Symphyotrichum pilosum var. *pringlei* (A. Gray) G. L. Nesom; Hairy Aster; occasional in wet meadow south of Big Sable River and along roadsides; D195, D392; ***C*** 1

**Taraxacum officinale* F. H. Wigg.; Dandelion; occasional in disturbed habitats and rare elsewhere; D011

**Tragopogon dubius* Scop.; Goat's Beard; rare along roadsides; D324

*†*Xanthium strumarium* L.; Common Cocklebur; rare along Lake Michigan beaches; D276

BALSAMINACEAE (Jewelweed Family)

Impatiens capensis Meerb.; Spotted Touch-Me-Not; occasional in emergent marsh wetlands; D253; ***C*** 2

BERBERIDACEAE (Barberry Family)

**Berberis aquifolium* Pursh; Oregon-Grape; rare, in jack pine barrens and the south edge of Piney Ridge Lake; D108

**Berberis thunbergii* DC.; Japanese Barberry; common in jack pine barrens and forested dune habitats; D023

**Berberis vulgaris* L; Common Barberry; rare along shrubby edge of gravel road to the Lighthouse; D704

BETULACEAE (Birch Family)

Alnus incana (L.) Moench; Speckled Alder; locally common along wetland margins of the Big Sable River; D247; ***C*** 5

Betula alleghaniensis Britton; Yellow Birch; rare in forested wetlands; D388; ***C*** 7

Betula papyrifera Marshall; Paper Birch; occasional in jack pine barrens and forested dunes; D280; ***C*** 2

Ostrya virginiana (Mill.) K. Koch; Hop-Hornbeam; occasional in forested dunes; D051; ***C*** 5

BORAGINACEAE (Borage Family)

Cynoglossum boreale Fernald; Northern Wild Comfrey; rare in jack pine barrens south of Big Sable River; D452; ***C*** 7

*†*Cynoglossum officinale* L.; Hound's-Tongue; common in jack pine barrens; D028

*†*Echium vulgare* L.; Viper's Bugloss; occasional in jack pine barrens; D082

†*Hackelia deflexa* (Wahlenb.) Opiz; Nodding Stickseed; rare, openings and edges of forested dunes; D118; ***C*** 2

Lithospermum caroliniense (Walter) MacMill; Hairy Puccoon; common in open dunes and jack pine barrens; D030; ***C*** 10

*†*Lithospermum officinale* L.; Gromwell; rare in jack pine barrens; D486

*†*Myosotis arvensis* (L.) Hill; Field Scorpion-Grass; rare along margins of interdunal and emergent wetlands; D074

BRASSICACEAE (Mustard Family)

*†*Alliaria petiolata* (M. Bieb.) Cavara & Grande; Garlic Mustard; rare in disturbed forested dunes and roadsides; D014

Arabidopsis lyrata (L.) O'Kane & Al-Shehbaz; Sand Cress; common in open and semi-vegetated dunes; D015, D451; ***C*** 7

**Barbarea vulgaris* R. Br.; Yellow Rocket; occasional along weedy trailsides; D016

†*Boechera laevigata* (Willd.) Al-Shehbaz; Smooth Bank Cress; rare in mixed forested dunes; D040; ***C*** 5

**Berteroa incana* (L.) DC.; Hoary Alyssum; occasional along open trailsides; D136

Cakile edentula (Bigelow) Hook.; Sea-Rocket; occasional along high water mark of Lake Michigan beaches; D346; ***C*** 5

**Capsella bursa-pastoris* (L.) Medik.; Shepherd's-Purse; occasional along open roadsides; D076

**Cardamine hirsuta* L.; Hoary Bitter Cress; occasional along disturbed roadsides and openings in forested dunes; D017, D315

Cardamine pensylvanica Willd.; Pennsylvania Bitter Cress; occasional in semi-shaded shallow wetlands; D244; ***C*** 1

*†*Draba verna* L.; Whitlow-Grass; rare, in open sandy, weedy lawn by Hamlin Beach House; D400

*†*Erucastrum gallicum* (Willd.) Schulz; Dog-Mustard; rare in open dunes; D159

**Lepidium campestre* (L.) R. Br.; Field Cress; rare in disturbed openings/ edges of forested dunes; D075

†*Lepidium virginicum* L.; Common Peppergrass; rare in disturbed vegetated dunes; D505; ***C*** 0

**Lunaria annua* L.; Money-Plant; rare in exposed wetland edge along Piney Ridge Road; D403

FIGURE 18. *Lobelia cardinalis*. September 3, 2007. Photo by David C. Dister.

Rorippa palustris (L.) Besser; Yellow Cress; rare along margins of interdunal emergent wetlands; D337; ***C*** 1

CABOMBACEAE (Water-Shield Family)

Brasenia schreberi J. F. Gmel.; Water-Shield; locally common in aquatic bed and emergent wetlands; D294; ***C*** 6

CAMPANULACEAE (Bellflower Family)

Campanula aparinoides Pursh; Marsh Bellflower; rare, in emergent wetlands along west side of Lost Lake; D165; ***C*** 7

Campanula rotundifolia L.; Harebell; occasional in open dunes: D112; ***C*** 6

Lobelia cardinalis L.; Cardinal-flower; rare in emergent marshes; photo voucher only (Figure 18); ***C*** 7

Lobelia kalmii L.; Kalm's Lobelia; occasional in wet meadow south of Big Sable River; D188; ***C*** 10

CAPRIFOLIACEAE (Honeysuckle Family)

Lonicera canadensis Marshall; Canadian Fly-Honeysuckle; rare, by shaded roadside edge of mixed forested dune; D369; ***C*** 5

Lonicera dioica L.; Glaucous Honeysuckle; rare, in semi-open jack pine barrens by emergent wetland; D163; ***C*** 5

*†*Lonicera morrowii* A. Gray; Morrow Honeysuckle; locally common, in shrubby low thicket with willows northwest of Piney Ridge Lake; D046

CARYOPHYLLACEAE (Pink Family)

**Arenaria serpyllifolia* L.; Thyme-leaved Sandwort; occasional in semi-open forested dunes; D026

**Dianthus armeria* L.; Deptford Pink; rare, in sandy meadow north of Big Sable River; D204
**†Gypsophila paniculata* L.; Baby's Breath; rare, in open dunes along gravel road to Lighthouse; D418
**Petrorhagia saxifraga* (L.) Link; Saxifrage Pink; rare, in open dunes along gravel road to Lighthouse; D231
**†Saponaria officinalis* L.; Bouncing Bet; occasional in open dunes along M-116; D151
Silene antirrhina L.; Sleepy Catchfly; rare, in semi-open jack pine barrens; D083; ***C*** 2
**Silene latifolia* Poir.; White Campion; rare, on steep grassy slope south of Big Sable River; D137
**Silene vulgaris* (Moench) Garcke; Bladder Campion; occasional, in open dunes and openings in forested dunes; D106
**Stellaria media* (L.) Vill.; Common Chickweed; ND; Rogers 9289 (1953)

CELASTRACEAE (Bittersweet Family)
†Celastrus scandens L.; American Bittersweet; rare, in moist thickets and along roadsides; D310; ***C*** 3

CISTACEAE (Rockrose Family)
Crocanthemum canadense (L.) Britton; Canada Frostweed; occasional in forested dune openings; D344; ***C*** 8
Hudsonia tomentosa Nutt.; Beach-Heath; locally common in open dunes; D080; ***C*** 10

CONVOLVULLACEAE (Morning-Glory Family)
†Calystegia sepium (L.) R. Br.; Hedge Bindweed; rare, disturbed marshy west edge of Hamlin Lake; D099; ***C*** 2

CUCURBITACEAE (Gourd Family)
Sicyos angulatus L.; Bur-Cucumber; rare, trailing over osier dogwood along Big Sable River; Hoseney s.n. (1973); ***C*** 2

CORNACEAE (Dogwood Family)
Cornus rugosa Lam.; Round-leaved Dogwood; rare, small dense stand on east-facing steep deciduous forested dune along Piney Ridge Road; D052; ***C*** 6
Cornus sericea L.; Red-Osier Dogwood; occasional along wetland margins; D049; ***C*** 2

DIERVILLACEAE (Bush-Honeysuckle Family)
Diervilla lonicera Mill.; Bush-Honeysuckle; rare on semi-open forested slope south of Piney Ridge Lake; D325; ***C*** 4

DROSERACEAE (Sundew Family)
Drosera rotundifolia L.; Round-leaved Sundew; rare on mossy hummocks in emergent wetlands bordering Hamlin Lake; D033; ***C*** 6

ELAEAGNACEAE (Oleaster Family)
**†Elaeagnus umbellata* Thunb.; Autumn-Olive; rare, in low willow thickets northwest of Piney Ridge Lake; D056
Shepherdia canadensis (L.) Nutt.; Soapberry; rare in semi-open jack pine barrens east of M-116 at south end of park, and shrubby meadow south of Piney Ridge Lake; D160; ***C*** 7

ERICACEAE (Heath Family)
Arctostaphylos uva-ursi (L.) Spreng.; Bearberry; common in jack pine barrens; D157; ***C*** 8
Chamaedaphne calyculata (L.) Moench; Leatherleaf; fairly common in shallow wetlands near Hamlin Lake, though rare in interior wetlands; D 009; ***C*** 8
Chimaphila maculata (L.) Pursh; Spotted Wintergreen; rare, moderately steep east-facing slope in mixed forested dune; D396; ***C*** 8
Chimaphila umbellata (L.) W.P.C. Barton; Pipsissewa; rare in mixed forested dunes; photo voucher only (Figure 19); ***C*** 8
Epigaea repens L; Trailing-Arbutus; rare on shaded moss-covered slopes in mixed forested dunes; D100; ***C*** 7
Gaultheria procumbens L.; Wintergreen; locally common in semi-shaded mixed forested dunes; D338; ***C*** 5

FIGURE 19. *Chimaphila umbellata*. Leaves depicted. July 12, 2009. Photo by David C. Dister.

Gaylussacia baccata (Wangenh.) K. Koch; Huckleberry; locally common in mixed forested dunes and along margins of wetlands; D061; ***C*** 7

Hypopitys monotropa Crantz; Pinesap; rare on upland mixed forested dune ridge; D472; ***C*** 6

Monotropa uniflora L.; Indian-Pipe; rare in shaded mixed forested dunes with deep leaf litter; D173; ***C*** 5

Pyrola elliptica Nutt.; Large-leaved Shinleaf; rare along moist edge of mixed forested dune by aquatic bed wetland; D375; ***C*** 6

Vaccinium angustifolium Aiton; Low Sweet Blueberry; locally common in mixed forested dunes; D036; ***C*** 4

Vaccinium macrocarpon Aiton; Large Cranberry; locally common on mossy hummocks of emergent wetlands; D300; ***C*** 8

Vaccinium myrtilloides Michx.; Velvetleaf Blueberry; occasional in mixed forested dunes; D062; ***C*** 4

EUPHORBIACEAE (Spurge Family)

Euphorbia polygonifolia L.; Seaside Spurge; occasional on open dunes; D273; ***C*** 10

FABACEAE (Bean Family)

Lathyrus japonicus Willd.; Beach Pea; fairly rare in open dunes and semi-open jack pine barrens; D113; ***C*** 10

Lathyrus palustris var. *myrifolius* L.; Marsh Pea; rare in emergent wetlands along west side of Lost Lake; D166; ***C*** 7

**Medicago lupulina* L.; Black Medick; occasional along edges of gravel trails and roads; D199

*†*Medicago sativa* L.; Alfalfa; rare, in grassy opening of pine forest; D336

**Melilotus albus* Medik.; White Sweet-Clover; rare, along sandy south edge of Big Sable River; D128

*†*Trifolium arvense* L.; Rabbitfoot Clover; rare, in sandy disturbed site adjacent to emergent wetland; D120

**Trifolium hybridum* L.; Alsike Clover; rare, on semi-open grassy slope by Big Sable River boardwalk; D139

**Trifolium pratense* L.; Red Clover; rare, in open grassy meadow near Warming Shelter; D207

**Trifolium repens* L.; White Clover; occasional, in wet meadow south of Big Sable River, along trails, lawns, etc.; D079, D386

*†*Vicia sativa* L.; Common Vetch; rare, in open willow thicket northwest of Piney Ridge Lake; D047

**Vicia villosa* Roth; Hairy Vetch; rare, in open grassy edge by trail south of Big Sable River; D410

FAGACEAE (Beech Family)

Fagus grandifolia Ehrh.; American Beech; locally common in forested dunes; D186; ***C*** 6

Quercus alba L.; White Oak; rare, in mixed forest along east edge of park by Piney Ridge Road; D483; ***C*** 5

Quercus rubra L.; Red Oak; abundant in forested dunes; D277; ***C*** 5

Quercus velutina Lam.; Black Oak; common in jack pine barrens and ridgetops in forested dunes; D330, D444; ***C*** 6

GENTIANACEAE (Gentian Family)

**Centaurium erythacea* Rafn; Forking Centaury; occasional in wet meadows and margins of emergent wetlands; D119

GERANIACEAE (Geranium Family)

*†*Erodium cicutarium* (L.) L Hér.; Stork's-Bill; rare, in semi-open sandy/disturbed lawn near Hamlin Beach House; D318

Geranium robertianum L.; Herb-Robert; occasional in shaded forested dunes and disturbed sites; D200; ***C*** 3

GROSSULARIACEAE (Gooseberry Family)

Ribes cynosbati L.; Prickly Gooseberry; fairly rare, in shaded forested dunes; D364, D448; ***C*** 4

HALORAGACEAE (Water-Milfoil Family)

†Myriophyllum verticillatum L.; Whorl-leaf Water-Milfoil; occasional in aquatic bed wetlands bordering Hamlin Lake; D379; ***C*** 6

HAMAMELIDACEAE (Witch-Hazel Family)

Hamamelis virginiana L; Witch-Hazel; occasional along edges of forested dunes and shaded roadsides; D312; ***C*** 5

HYPERICACEAE (St. John's-Wort Family)

Hypericum kalmianum L; Kalm's St. John's-Wort; occasional, in wet meadow south of Big Sable River and in interdunal wetlands; D141; ***C*** 10

Hypericum majus (A. Gray) Britton; Larger Canada St. John's-Wort; abundant in wet meadow south of Big Sable River; D213; ***C*** 4

**Hypericum perforatum* L.; Common St. John's-Wort; fairly common in forest openings, along roadsides, meadows, and disturbed sites; D122

Triadenum fraseri (Spach) Gleason; Marsh St. John's-Wort; locally common in interdunal emergent wetlands; D419; ***C*** 6

LAMIACEAE (Mint Family)

Clinopodium vulgare L.; Wild Basil; rare, along shaded grassy roadsides; D436; ***C*** 3

*†*Glechoma hederacea* L.; Ground-Ivy; occasional along roadsides, in lawns, and disturbed riparian areas; D404

*†*Lamiastrum galeobdolon* (L.) Ehrend. & Polatschek; Yellow Archangel; rare, along edge of mixed forested dune bordering Piney Ridge Road; D368

*†*Leonurus cardiaca* L.; Motherwort; rare, along weedy/grassy trails bordering the Big Sable River; D126

Lycopus americanus Muhl.; Common Water Horehound; occasional, in wet meadow north of Big Sable River and along forested wetland edges elsewhere; D132; ***C*** 2

Lycopus uniflorus Michx.; Northern Bugle Weed; occasional, along edges of scrub-shrub and forested wetlands; D 219; ***C*** 2

Mentha canadensis L.; Wild Mint; occasional in emergent wetlands; D181; ***C*** 3

Monarda punctata L.; Dotted Mint; occasional in open dunes; D211; ***C*** 4

**Nepeta cataria* L.; Catnip; rare, in open mixed forest north of Big Sable River, west of dam; D130

Prunella vulgaris L.; Self-Heal; occasional along damp shorelines, roadsides, and trails; D169; ***C*** 0

†*Scutellaria galericulata* L.; Marsh Skullcap; occasional in emergent wetlands; D094; ***C*** 5

Scutellaria lateriflora L.; Mad-Dog Skullcap; occasional in emergent wetlands; D185; ***C*** 5

LAURACEAE (Laurel Family)

Sassafras albidum (Nutt.) Nees; Sassafras; occasional along forested edges and roadsides; D313; ***C*** 5

LENTIBULARIACEAE (Bladderwort Family)

Utricularia cornuta Michx.; Horned Bladderwort; locally common in interdunal emergent wetlands; D109; ***C*** 10

Utricularia intermedia Hayne; Flat-leaved Bladderwort; locally common in interdunal emergent wetlands; D216; ***C*** 10

Utricularia vulgaris L.; Common Bladderwort; rare, in interdunal pond within forested dunes; D073; ***C*** 6

LINACEAE (Flax Family)

Linum striatum Walter; Stiff Yellow Flax; rare, in wet meadow south of Big Sable River and sandbars bordering Hamlin Lake; D258, D417; ***C*** 10

LINNAEACEAE (Twinflower Family)

Linnaea borealis var. *longifolia* (Torr.) Hultén; Twinflower; locally common in jack pine barrens and open mixed forests; D054; ***C*** 6

LYTHRACEAE (Loosestrife Family)

*†*Lythrum salicaria* L.; Purple Loosestrife; rare along north edge of Piney Ridge Lake; D395

MALVACEAE (Mallow Family)

Tilia americana L.; Basswood; rare, edges of forested dunes; D050; ***C*** 5

MENYANTHACEAE (Buckbean Family)

†*Menyanthes trifoliata* L.; Buckbean; rare in emergent marshes; photo voucher only (Figure 20); ***C*** 8

MOLLUGINACEAE (Carpetweed Family)

**Mollugo verticillata* L.; Carpetweed; rare, sandy disturbed zone north of Hamlin Beach House parking lot; D350

MONTIACEAE (Blinks Family)

Claytonia virginica L.; Spring-Beauty; northern mesic forest; Herron 154 (2000); ***C*** 4

MYRICACEAE (Bayberry Family)

Myrica gale L.; Sweet Gale; occasional along edges of deepwater wetlands; D020; ***C*** 6

MYRSINACEAE (Myrsine Family)

Lysimachia terrestris (L.) Britton, Sterns & Poggenb.; Swamp-Candles; occasional in semi-shaded emergent wetlands; D380, D509; ***C*** 6

Lysimachia thyrsiflora L.; Tufted Loosestrife; rare in emergent wetlands/margins of lakes; D059; ***C*** 6

Trientalis borealis Raf.; Starflower; locally common in mixed forested dunes; D032; ***C*** 5

NYMPHAEACEAE (Water-Lily Family)

Nuphar variegata Durand; Yellow Pond-Lily; locally common in deepwater aquatic bed wetlands; D096; ***C*** 7

FIGURE 20. *Menyanthes trifoliata*. Leaves depicted. September 3, 2007. Photo by David C. Dister.

Nymphaea odorata Aiton; Sweet-Scented Water-Lily; locally common in deepwater aquatic bed wetlands; D098; ***C*** 6

OLEACEAE (Olive Family)

Fraxinus americana L.; White Ash; occasional, largely in upland forested dunes; D249; ***C*** 5

Fraxinus pennsylvanica Marshall; Green Ash; uncommon; largely in riparian and wetland habitats; D 397; ***C*** 2

ONAGRACEAE (Evening-primrose Family)

†*Epilobium coloratum* Biehler; Cinnamon Willow-Herb; occasional along margins of emergent wetlands; D262; ***C*** 3

*†*Epilobium hirsutum* L.; Great Hairy Willow-Herb; rare, along steep north bank of the Big Sable River; D353

†*Ludwigia palustris* (L.) Elliott; Water Purslane; rare, in backwater slough along south side of Big Sable River; D359; ***C*** 4

Oenothera oakesiana (A. Gray) S. Watson & J. M. Coult.; Oakes' Evening-Primrose; rare on open dunes; D155, D502; ***C*** 7

Oenothera perennis L.; Small Sundrops; rare, moist margins of interdunal emergent wetlands; D413; ***C*** 5

OROBANCHACEAE (Broom-Rape Family)

Agalinus purpurea (L.) Pennell; Purple False Foxglove; occasional in wet meadows and interdunal wetlands; D193; ***C*** 7

Conopholis americana (L.) Wallr.; Squaw-Root; occasional in forested dunes with American beech; D038; ***C*** 10

Epifagus virginiana (L.) Bart.; Beech-Drops; occasional in forested dunes with American beech; D238; ***C*** 10

Melampyrum lineare Desr.; Cow-Wheat; rare in jack pine barrens and forested dunes; D123; ***C*** 6

Orobanche fasciculata Nutt.; Clustered Broom Rape; rare in open dunes; McVaugh 11188 (1949); ***C*** 10

Pedicularis canadensis L.; Wood-Betony; rare in mixed forested dunes; D328; ***C*** 10

OXALIDACEAE (Wood-Sorrel Family)

Oxalis dillenii Jacq.; Common Yellow Wood-Sorrel; rare along roadsides and edges of parking lots; D255; ***C*** 0

PHRYMACEAE (Lopseed Family)

Mimulus ringens L.; Monkey-Flower; rare, shaded emergent marsh bordering forested dune; D175; ***C*** 5

PHYTOLACCACEAE (Pokeweed Family)

†*Phytolacca americana*, L.; Pokeweed; rare, shaded ravine in deciduous forested dune; D508; ***C*** 2

PLANTAGINACEAE (Plantain Family)

**Linaria vulgaris* Mill; Butter-and-Eggs; rare, grassy disturbed area within jack pine barrens; D224

**Plantago lanceolata* L.; Narrow-leaved Plantain; rare, along semi-shaded edge of marsh; D140

**Plantago major* L.; Common Plantain; rare, along shallow sandy/rocky edge of Big Sable River; D348

Plantago rugelii Decne.; Rugel's Plantain; rare, along west edge of Piney Ridge Road; D475; ***C*** 0

**Veronica arvensis* L.; Field Speedwell; rare, along trail through open mowed area; D018

*†*Veronica serpyllifolia* L.; Thyme-leaved Speedwell; rare, along trail in semi-shaded mixed forest; D087

POLYGALACEAE (Milkwort Family)

Polygala paucifolia Willd.; Fringed Polygala; occasional in mixed forested dunes; D037; ***C*** 7

POLYGONACEAE (Smartweed Family)

†*Fallopia cilinodis* (Michx.) Holub; Fringed False Buckwheat; rare, on open disturbed sandy hillside southeast of Piney Ridge Lake; D326; ***C*** 3

†*Fallopia scandens* (L.) Holub; False Buckwheat; rare, on open disturbed sandy hillside southeast of Piney Ridge Lake; D500; ***C*** 2

Persicaria amphibia (L.) Delabare; Water Smartweed; rare; in forested interdunal pond; D072; ***C*** 6

**Persicaria maculosa* Gray; Lady's-Thumb; rare, along shrubby south shoreline of Big Sable River; D358

Persicaria punctata (Elliott) Small; Dotted Smartweed; occasional in shaded emergent wetlands; D239; ***C*** 5

Polygonum articulatum L.; Jointweed; occasional in open dunes and openings in forested dunes; D267; ***C*** 8

**Rumex acetosella* L.; Sheep Sorrel; occasional in vegetated dunes and disturbed habitats, D013

**Rumex crispus* L.; Curly Dock; occasional along margins of emergent wetlands; D121

†*Rumex orbiculatus* A. Gray; Great Water Dock; occasional in shallow water wetlands; D243; ***C*** 9

RANUNCULACEAE (Buttercup Family)

Actaea pachypoda Elliott; White Baneberry; rare, in mixed forested dunes; D438; ***C*** 7

Aquilegia canadensis L.; Wild Columbine; rare, open hilltop meadow; D043; ***C*** 5

Coptis trifolia (L.) Salisb.; Goldthread; occasional, mossy margins of shaded wetlands; D268; ***C*** 5

Hepatica americana (DC.) Ker Gawl.; Round-lobed Hepatica; rare in sugar maple/hemlock forest on organic sandy soils; D008; ***C*** 6

†*Ranunculus pensylvanicus* L. f.; Bristly Crowfoot; rare, in semi-shaded emergent wetland; D339; ***C*** 6

†*Ranunculus sceleratus* L.; Cursed Crowfoot; rare, in semi-shaded edge of cattail marsh; D406; ***C*** 1

RHAMNACEAE (Buckthorn Family)

**Frangula alnus* Mill; Glossy Buckthorn; rare, along wetland edge of pond and along Piney Ridge Road; D465

ROSACEAE (Rose Family)

Amelanchier interior Nielsen; Inland Serviceberry; ND; Rogers 9277 (1953); ***C*** 4

Amelanchier laevis Weigand; Smooth Shadbush; occasional along margins of forested dunes and riparian banks; D019, D314; ***C*** 4

Aronia prunifolia (Marshall) Rehder; Chokeberry; rare, along margins of emergent and scrub-shrub wetlands; D055; ***C*** 5

Comarum palustre L.; Marsh Cinquefoil; rare, in semi-shaded backwater emergent wetlands; D097; ***C*** 7

Fragaria vesca L.; Woodland Strawberry; occasional in jack pine barrens; D319, D320; ***C*** 2

Fragaria virginiana Mill.; Wild Strawberry; fairly common along margins of open emergent wetlands and in meadows; D447; ***C*** 2

**Malus* x *purpurea* (Barbier & Cie) Rehder; Apple Hybrid; rare in grassy meadow; D316

Potentilla anserina L.; Silverweed; occasional, in wet meadows and banks along the Big Sable River; D024; ***C*** 5

Potentilla norvegica L.; Rough Cinquefoil; rare, on mossy log in emergent wetland; D179; ***C*** 0

Potentilla simplex Michx.; Common Cinquefoil; locally common in meadows, old fields, and forest openings; D402; ***C*** 2

Prunus pensylvanica L. f.; Fire Cherry; rare, in jack pine barrens; D412; ***C*** 3

Prunus pumila L.; Sand Cherry; common in open dunes; D152; ***C*** 8

Prunus serotina Ehrh.; Wild Black Cherry; occasional in forested dunes; D285; ***C*** 2

Prunus virginiana L.; Choke Cherry; occasional along margins of forested dunes and roadsides; D031; ***C*** 2

Rosa blanda Aiton; Wild Rose; rare, in jack pine/ground juniper barrens; D086; ***C*** 3

Rosa palustris Marshall; Swamp Rose; occasional, along margins of emergent wetlands; D164; ***C*** 5

Rubus hispidus L.; Swamp Dewberry; locally common along margins of emergent wetlands and in scrub-shrub wetland thickets; D459; ***C*** 4

Rubus strigosus Michx.; Wild Red Raspberry; occasional, in jack pine barrens, and edges/openings of forested dunes; D387; ***C*** 2

Spiraea alba Du Roi; Meadowsweet; rare, in interdunal wetlands within jack pine barrens; D329; ***C*** 4

RUBIACEAE (Madder Family)

Cephalanthus occidentalis L.; Buttonbush; rare, low moist area along west edge of Piney Ridge Road; D172; ***C*** 7

Galium aparine L.; Cleavers; rare, in openings in mixed forested dunes; D487; ***C*** 0

Gallium pilosum Aiton; Hairy Bedstraw; occasional, in jack pine barrens and dry meadows; D384; ***C*** 6

Galium tinctorium L.; Stiff Bedstraw; occasional, in semi-shaded backwater wetland sloughs; D170; ***C*** 5

Galium triflorum Michx.; Fragrant Bedstraw; occasional, in mixed forested dunes; D115; ***C*** 4

Mitchella repens L.; Partridge-Berry; occasional, in mixed forested dunes and margins of wetlands; D376; ***C*** 5

SALICACEAE (Willow Family)

Populus deltoides Marshall; Cottonwood; occasional, in open and semi-vegetated dunes, and along roadsides; D149; ***C*** 1

Populus grandidentata Michx.; Big-tooth Aspen; rare, in ridgetop openings of mixed forested dunes; D381; ***C*** 4

Populus tremuloides Michx.; Quaking Aspen; rare, in open deciduous forests along west side of Piney Ridge Road; D286; ***C*** 1

Salix cordata Michx.; Sand-Dune Willow; occasional, along open dunes bordering Lake Michigan; D147; ***C*** 10

Salix exigua Nutt.; Sandbar Willow; common along open dunes bordering Lake Michigan; D148; ***C*** 1

Salix myricoides Muhl.; Blueleaf Willow; occasional, along open dunes bordering Lake Michigan, and the margins of Piney Ridge Lake; D150, D401; ***C*** 9

†*Salix nigra* Marshall; Black Willow; rare; steep eastern edge of Piney Ridge Lake; D304; ***C*** 5

SANTALACEAE (Sandalwood Family)

Comandra umbellata (L.) Nutt.; Star-Toadflax; ND; Bartlett s.n. (1937); ***C*** 5

SAPINDACEAE (Soapberry Family)

Acer rubrum L.; Red Maple; common in mixed forested dunes; D301; ***C*** 1

Acer saccharum Marshall; Sugar Maple; locally common in deciduous and mixed forested dunes; D283; ***C*** 5

SAXIFRAGACEAE (Saxifrage Family)

†*Chrysosplenium americanum* Hook.; Golden Saxifrage; occasional, in mucky shaded forested wetlands; D450; ***C*** 6

SCROPHULARIACEAE (Figwort Family)

*†*Verbascum blattaria* L.; Moth Mullein; rare, along rocky south bank of Big Sable River; D127

**Verbascum thapsus* L.; Common Mullein; occasional, in meadows, trailsides, and forested dune openings; D117

SIMAROUBACEAE (Quassia Family)

*†*Ailanthus altissima* (Mill.) Swingle; Tree-of-Heaven; rare, along grassy west side of Piney Ridge Road; D171

SOLANACEAE (Nightshade Family)

**Solanum dulcamara* L.; Bittersweet Nightshade; occasional, along margins of wetlands and banks of the Big Sable River; D288

†*Solanum ptychanthum* Dunal; Black Nightshade; rare, in sandy disturbed interdunal opening; D264; ***C*** 1

URTICACEAE (Nettle Family)

Boehmeria cylindrica (L.) Sw.; False Nettle; occasional in emergent wetlands; D178; ***C*** 5

†*Parietaria pensylvanica* Willd.; Pellitory; rare, on disturbed sandy slope in sugar maple forest; D327; ***C*** 2

†*Pilea fontana* (Lunell) Rydb.; Bog Clearweed; occasional, along margins of emergent and scrub-shrub wetlands; D260; ***C*** 5

Urtica dioica L.; Stinging Nettle; rare, in moist riparian meadows and thickets; D202; ***C*** 1

VERBENACEAE (Vervain Family)

*†*Verbena bracteata* Lag. & Rodr.; Creeping Vervain; rare in weedy disturbed sandy ground; D696

Verbena hastata L.; Blue Vervain; rare, in wet meadow south of Big Sable River; D192; ***C*** 4

VIOLACEAE (Violet Family)

Viola labradorica Schrank; Dog Violet; ND; Rogers 9266 (1953); ***C*** 3

Viola lanceolata L.; Lance-leaved Violet; locally common in interdunal wetlands; D441; ***C*** 8

Viola macloskeyi F. E. Lloyd; Smooth White Violet; occasional, along shaded margins of emergent wetlands; D034; ***C*** 6

Viola pubescens Aiton; Yellow Violet; rare, in sugar maple/red oak forest south of Piney Ridge Lake; D449; ***C*** 4

Viola rostrata Pursh; Long-Spurred Violet; rare, in mixed forested dunes west of Piney Ridge Road; D012; ***C*** 6

VITACEAE (Grape Family)

†*Parthenocissus quinquefolia* (L.) Planch.; Virginia Creeper; occasional, on roadside trees near park entrance; D501; ***C*** 5

Vitis riparia Michx.; River-Bank Grape; occasional, in thickets and trees along roadsides; D248; ***C*** 3