
RAPID WETLAND ASSESSMENT FOR MICHIGAN

SECTION 1: BIOLOGICAL FRAMEWORK



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Table of Contents

1.0 Introduction.....	1
2.0 Literature Review	1
3.0 Field Sampling	2
4.0 Plant Community Classification and Distribution Map Development	4
5.0 Quantitative Metrics for Wetland Quality, Function, and Value	5
6.0 Hydrologic Metric - Relationship to Plant Communities and Species	5
7.0 Characteristic Plant Species for Each Wetland Type	10
8.0 Photos and Diagrams of Plant Communities	10
9.0 Endangered and Rare Wetland Types	11
10.0 Tables of Rare Plants and Animals by Plant Community	11
11.0 Plant Community Analysis Based on FQA Species Lists of Natural Communities	11
11.1 Methods.....	14
11.2 Results	15
12.0 Wildlife Habitat Models	25
13.0 Discussion	26
14.0 Acknowledgements	26
15.0 Literature	27

Figures

Figure 1. Relationship Between FQI and MiRam Scores	3
Figure 2. Relationship of Mean C Scores to MiRam Scores	3
Figure 3. Bog distributions along DCA axis 1 and axis 2.	12
Figure 4. Bog distributions shown by county along DCA Axis 1 and Axis 2.	13
Figure 5. Bray-Curtis ordination of species at 180 sites representing the Marsh community group.	16
Figure 6. Bray-Curtis ordination of species at 43 sites representing the Wet Prairie community group.	18
Figure 7. Bray-Curtis ordination of species at 144 sites representing the Fen and Bog community group.	20
Figure 8. Bray-Curtis ordination of species at 6 sites representing the Shrub Wetland community group. ...	22
Figure 9. Bray-Curtis ordination of species at 121 sites representing the Forested Wetland community.	24

Tables

Table 1. Primary and Secondary Water Source for Wetland Communities of Michigan.	6
Table 2. Inundation or saturation condition associated with each type of Michigan wetland.	8
Table 3. Endangered (S1) and rare (S2) wetland types.	11
Table 4. Analysis of communities by community group per Kost et al. (2007), but with bog and fen groups combined.	14
Table 5. Reclassification of Marsh community group based on floristic similarity	17
Table 6. Reclassification of Wet Prairie community group based on floristic similarity.	19
Table 7. Reclassification of Fen and Bog community group based on floristic similarity.	21
Table 8. Classification of Shrub Wetland community group based on floristic similarity	22
Table 9. Reclassification of Forested Wetland community group based on floristic similarity.	25

Appendices

APPENDIX I. Key to the Natural Communities of Michigan.	A-2
APPENDIX II. Distribution of Michigan’s Natural Plant Communities by Ecoregion.	A-8
APPENDIX III. Distribution Maps of Natural Communities	CD
APPENDIX IV. Association of wetland types to common landforms of Michigan.	A-9
APPENDIX V-A. Crosswalk of Michigan Natural Features Inventory and National Wetland Inventory Wetland Classifications	A-11
APPENDIX V-B. Crosswalk of Michigan Natural Features Inventory and NatureServe Wetland Community Names	A-14
APPENDIX VI. NWI map codes	CD
APPENDIX VII. Characteristic Plant Species of Michigan Wetlands	A-16
APPENDIX VIII-A, VIII-B, VIII-C and VIII-D. Photographs of Natural Communities	CD
APPENDIX IX-A. Diagram of Wooded Dune and Swale Complex	A-63
APPENDIX IX-B. Diagrams of Interdunal Wetland	A-64
APPENDIX IX-C. Diagrams of Prairie Fen	A-65
APPENDIX IX-D. Diagrams of Bog in Kettle Lake	A-66
APPENDIX X-A. Rare Animals Occupying Michigan’s Wetland Plant Communities.	A-67
APPENDIX X-B. Rare Plants Occupying Michigan’s Wetland Plant Communities.	A-90
APPENDIX XI. Rare species and number by wetland community.	CD
APPENDIX XII-A. Reclassified groupings for Marsh communities based on floristic similarity.	A-104
APPENDIX XII-B. Reclassified groupings for Wet Prairie communities based on floristic similarity. ...	A-108
APPENDIX XII-C. Reclassified groupings for Fen and Bog communities based on floristic similarity. ...	A-110
APPENDIX XII-D. Reclassified groupings for Shrub Wetland communities based on floristic similarity.	A-114
APPENDIX XII-E. Reclassified groupings for Forested Wetland communities based on floristic similarity.	A-115
APPENDIX XIII-A. Importance Values > 50 for species in Shrub Wetland community group, by group number.	A-118
APPENDIX XIII-B. Importance Values > 25 for species in Forested Wetland community group, by group number.	A-120

1.0 Introduction

This project was focused on developing a Rapid Wetland Assessment protocol (MiRAM) and providing associated biological data that would assist users in more efficient and accurate identification of wetland types, their hydrology, and other important attributes. This publication further focuses on the development of the biological support documents, such as the classification and mapping of the state's wetlands, and identification of rare and common species associated with each wetland type.

To assist in the initial process of developing and evaluating an effective **Rapid Wetland Assessment** approach, Dennis Albert participated in the Ohio Rapid Assessment Method (ORAM) training during May of 2007, near Columbus, Ohio. He also communicated directly with John Mack, the developer of the Ohio protocols on several occasions during the winter, spring, and early summer of 2007.

MNFI staff and Paul Adamus participated in the evaluation of MDEQ's draft MiRAM protocols by conference call and by submitting email comments. Dennis Albert, Phyllis Higman, and Suzan Campbell also met with MDEQ and MDOT staff both within in-office meetings and in field evaluation exercises in southern Lower Michigan.

One of the major goals and accomplishments of the project was to utilize Michigan Natural Features Inventory's (MNFI) wetland plot and sampling data to refine MNFI's existing natural community classification, to identify characteristic species of each plant community, and to utilize the plot and sampling data to compare floristic similarity of wetland types from throughout the state. The project resulted in creating Floristic Quality Assessment (FQA) (Herman et al. 2001) scores for most of the wetland sites in MNFI's plant community database. These FQA scores were then transforming into tabular information for spatial analysis.

2.0 Literature Review

Several states and coastal regions of the United States have developed assessment protocols for evaluating wetland quality and function (Ammann et al. 1991, Bradshaw 1991, Brooks et al. 2002, Burglund 1999, Cook et al. 1993, Furgro East Inc. 1995, Hicks et al. 1998, Hruby 2004, Hruby and McMillian 1993, Jacobs 2003, Lodge et al. 1995, Miller and Gunsalus 1999, Mack 2001, Minnesota Board of Water and Soil Resources 2003, Roth et al. 1996, Waldrop et al. 2007, Washington State Department of Ecology 1993, Wisconsin Department of Natural Resources 1992). The protocols for these and other assessment approaches are quite variable, as would be expected for the broad geographic range and range of physical conditions encountered across the US.

These approaches have been reviewed in several studies since the late 1990s (Bartoldus 1999, Innis et al. 2000), including reviews focused on rapid assessment approaches (Van Dam et al. 1998, Carletti et al. 2004, Fennessy et al. 2004 and 2007).

A recent comparison of these approaches found that many of them could not be considered rapid assessment approaches, since they required extensive

or specialized sampling or data bases, or that they were too broad to be effective for site-level evaluation (Fennessy et al. 2007). Detailed evaluation by Fennessy et al. found that only six protocols met their criteria for rapid assessment approaches, those developed for Delaware (Jacobs 2003), Florida (Lodge et al. 1995; Miller and Gunsalus 1999), Massachusetts (Hicks and Carlisle 1998), Montana (Burglund 1999), Ohio (Mack et al. 2000, Mack et al. 2001), and Washington (Washington State Department of Ecology 1993). Factors commonly evaluated in these assessment protocols include wetland type, hydrology, soils, biotic communities, and wetland services and values, but the various approaches are not consistent in which of these factors are incorporated into their framework. The most commonly utilized wetland classifications were HGM (Brinson 1993), which focuses on hydrogeomorphic classification of the wetlands, and Cowardin et al's (1979) classification, which focuses on broad structural vegetation classes.

Hydrologic descriptors are quite variable across the US, and include duration of surface water flooding, maximum water depth, connectivity, source of water (groundwater, precipitation, etc.), nature of inlets and

outlets, and alteration or stressors to the hydrologic conditions (Fennessy et al. 2007). Soils are considered for some states (including Delaware, Massachusetts, and Ohio), but are defined in terms of very different characteristics. Biotic communities are also treated quite diversely, with some states focusing on wildlife utilization, while others consider diversity of plant communities and specific indicator species in their scoring procedures. Ohio has incorporated both Vegetation Indices of Biotic Integrity (Mack et al. 2000) and Floristic Quality Indices (Fennessy et al. 1998) into their rapid assessments.

Early in the process of developing a rapid wetland assessment protocol for Michigan, the Michigan Department of Environmental Quality (MDEQ), the lead agency in the development of MiRAM, made the decision to modify and utilize the Ohio protocols (ORAM) as the model for MiRAM. Ohio's protocols (ORAM) were based partially on protocols developed

earlier for Washington state. As part of MDEQ's development of the MiRAM protocol, they conducted a detailed literature review and we (MNFI) shifted our focus to the evaluation of the modified ORAM protocols that had been incorporated into the new MiRAM for use in Michigan rather than duplicating the effort of developing a detailed literature review on rapid assessment protocols.

One of the primary differences between Michigan and Ohio is the broader latitudinal gradient of wetland types in Michigan, and the resulting increase in the number of wetland types found in Michigan (Kost et al. 2007). Most of the products in this report are aimed at better defining the biological characteristics of Michigan's wetlands, based on a combination of Michigan wetland-literature review, plant community data analysis, and revision of plant community descriptions.

3.0 Field Sampling

Discussions with MDEQ during the spring and early summer led to the decision that MDEQ staff would conduct preliminary wetland sampling utilizing the MiRAM sampling forms to evaluate wetland quality in the southern part of Michigan, and that MNFI staff would revisit those same sites to collect plant lists for input into the FQA program, allowing for comparison of MiRAM quality assessment with FQA quality assessment scores. Site visits were focused in several counties in southern Lower Michigan, including Allegan, Jackson, Ingham, Oakland, and Livingston counties. Species lists were recorded and Floristic Quality Index scores generated to compare with MiRAM scores. Additional highly degraded sites were visited in Jackson County to provide the extremes, with Dennis Albert filling out both MiRAM forms and collecting vegetation data for computation of FQI scores.

Figures 1 and 2 show relationship based on 2007 data collection by Gyekis, Albert, and Campbell. In figure 1 it can be seen that FQI scores increase with MiRAM scores, but the R² is relatively low, 0.56. It appears that the overall plant diversity and FQI score does not decrease as greatly as expected when the overall MiRAM quality score drops. More detailed analysis

may show that this trend does not hold for all wetland types. For example, the inundated shrub swamps and wet meadows of the interlobate in Washtenaw, Jackson, Oakland, and Livingston counties often have invasive plants (which lower FQI scores) near the disturbed wetland margins along roads and ditches, but the remainder of the wetland is often diverse, with few invasives, thus maintaining relatively high FQI scores. In contrast, the coastal plain marshes in Allegan and Barry counties appear to be much more easily degraded by roads or ditches and the entire wetland often becomes choked with cattails following a disturbance, thus greatly lowering the FQI scores.

Figure 2 explores the relationship between Mean C scores and MiRAM scores. The R² is actually lower (0.50) for the relationship between Mean C and MiRAM scores than for FQI and MiRAM scores. For Great Lakes coastal wetlands, Mean C was found to be much less effected by Great Lakes water level fluctuations and appeared to be a more dependable index than FQI. We cannot evaluate the comparative effectiveness of these metrics without collecting multiple years of data for the same set of sites, preferably in years when water levels are fluctuating.

FIGURE 1. RELATIONSHIP BETWEEN FQI AND MiRAM SCORES

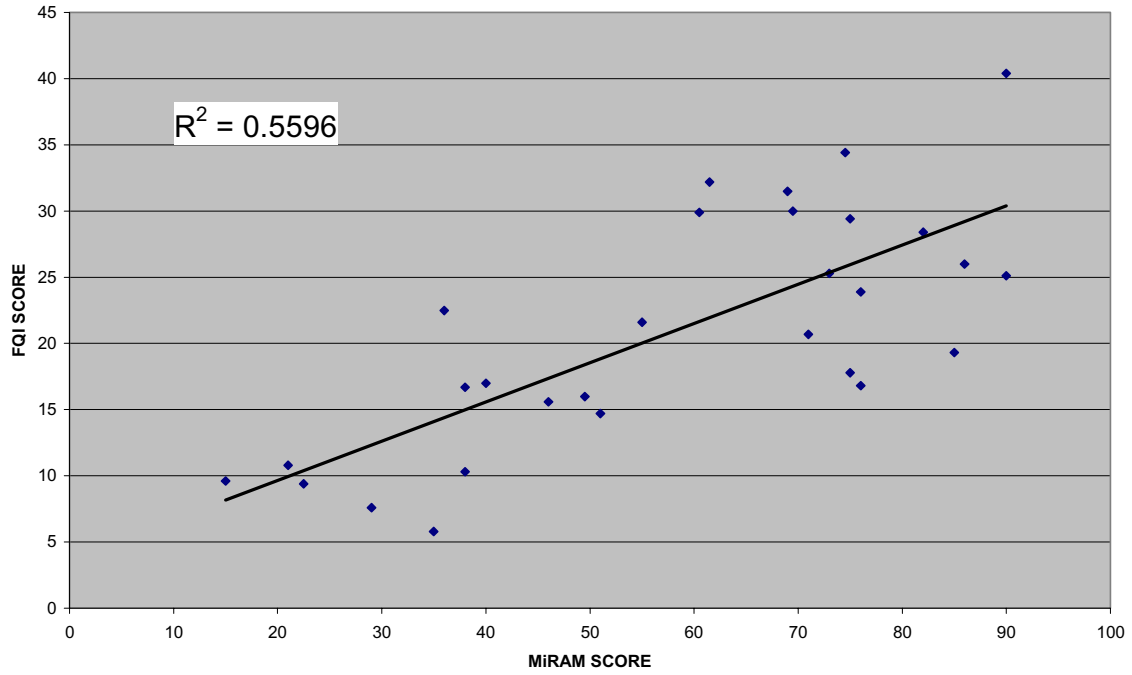
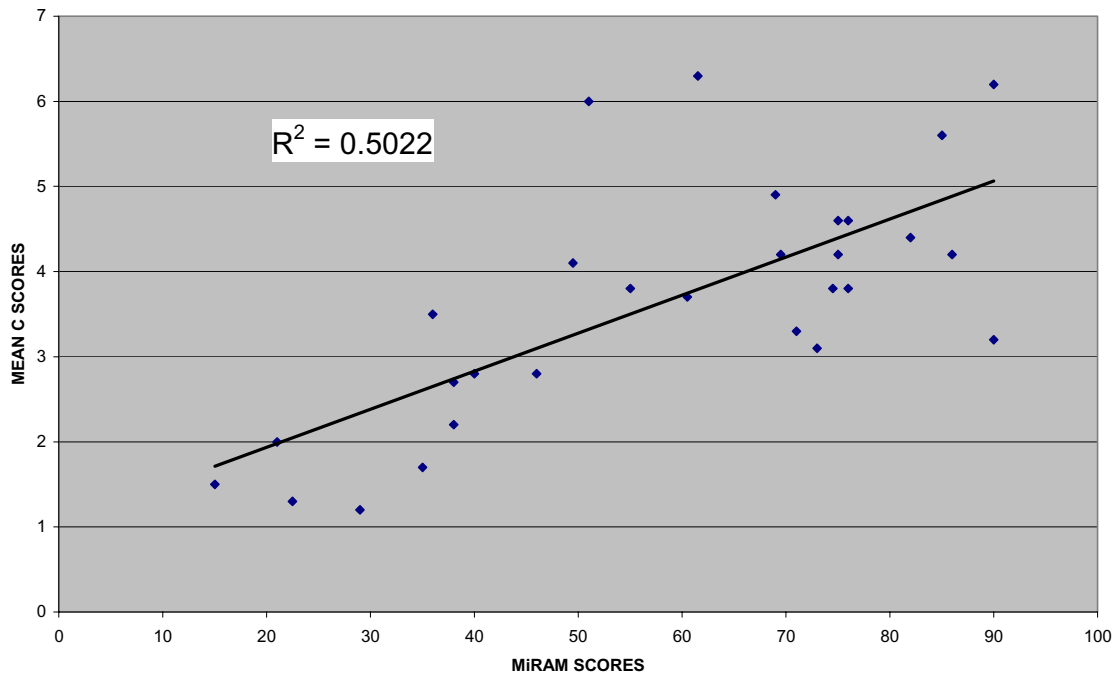


FIGURE 2. RELATIONSHIP OF MEAN C SCORES TO MiRAM SCORES



4.0 Plant Community Classification and Distribution Map Development

Michigan Natural Features Inventory updated and refined “Natural Communities of Michigan: Classification and Description” (Kost et al. 2007) during 2006 and 2007 with funding support from this and several other projects. The revisions included development of a key to the community classification (Appendix I; http://web4.msue.msu.edu/mnfi/reports/2007-21_Natural_Communities_of_Michigan_Classification_and_Description.pdf). For Appendix I, only the wetland portion of the natural community key is included in the report; the subterranean and upland portions of the key were removed to simplify key use and to shorten the report.

A crosswalk table of the distribution of the plant communities by Ecoregion (Albert 1995, <http://www.npwr.usgs.gov/re-source/habitat/rlandscp/index.htm>) was also developed to assist users in easily determining the distribution of plant communities across the ecoregions of the state (Appendix II). For this appendix, a Great Lakes (GL) category includes those communities concentrated on or very near to GL shorelines. If a natural community is concentrated in a certain Ecoregion (or along GL shore) the ecoregion is shown in **Bold type (X)**. Lower case (x) signifies that the community can occur in an ecoregion, but that it is not considered characteristic of the ecoregion.

To further assist users, maps of the distributions of all plant communities were developed (Appendix III), utilizing locational data from sampling, as well as distributional data based on the original land surveys in the 1800s (<http://web4.msue.msu.edu/mnfi/data/veg1800.cfm>). These maps show both counties and ecoregions (Albert 1995: <http://www.npwr.usgs.gov/resource/habitat/rlandscp/index.htm>). For many of the natural communities, especially the more common communities, sampling has been incomplete and the distribution maps are based largely on a combination of the information from the original vegetation maps, National Wetland Inventory (NWI) maps, and statewide field experience of MNFI staff.

An additional table was created to link natural communities to specific landforms that are common in the state (Appendix IV). With this table we attempt to summarize the relationship between landforms and natural wetland communities, as well as provide the location of these wetland types by Ecoregion (Albert

1995). There are many wide-spread wetland types that are not strongly related to any specific landform. For these there is a general category at the end of the table and for these wetland types no ecoregional locational information is provided.

All of the state’s wetlands have been mapped as part of the National Wetland Inventory (NWI) (Cowardin et al. 1979). To facilitate utilization of the NWI maps as part of the MiRAM wetland assessment protocol, a crosswalk was developed between the MNFI wetland classification and NWI mapping codes (Appendix V-A). This is based on a table of all of the NWI codes for vegetated wetland types that occurred on Michigan maps (Appendix VI, only included on CD). Appendix V-A only utilizes the upper levels of the NWI classification, including SYSTEM, SUBSYSTEM, CLASS, and SUBCLASS. Some of the Subclasses were not encountered in the NWI data tables, but if the NWI map units had been thoroughly field tested, the additional subclasses would have been encountered in both the forested and shrub-dominated wetland types.

Two NWI classes, “unconsolidated bottom/mud” (mudflat) class/subclass (PUB₃) and “open water - unknown bottom” described in Cowardin et al. (1979) were not crosswalked with the MNFI community classifications. Unconsolidated bottom or mud is defined to include areas of wetlands characterized by exposed or shallowly inundated substrates with vegetative cover less than 30%. Several MNFI wetland communities would contain areas of this class, including Great Lakes marsh, intermittend wetland, interdunal wetland, shore fen, and wooded dune and swale complexes. The “open water” class includes areas that are 1) inundated, 2) unvegetated, or 3) “open”, i.e. there is no “canopy” of any type of vegetation. Parts of all of these communities (Great Lakes marsh, intermittend wetland, interdunal wetland, shore fen, and wooded dune and swale complexes) can also contain open water.

The MNFI wetland classification has also been crosswalked to the NatureServe Ecological System classification (Appendix V-B). Some of the Michigan plant communities are not well matched by NatureServe equivalents, for example inland salt marsh and intermittend wetland.

5.0 Quantitative Metrics for Wetland Quality, Function, and Value

Quantitative metrics were developed by MDEQ staff and reviewed by Dennis Albert, Phyllis Higman, and Paul Adamus. This review process was conducted by conference call, in meetings in Lansing, as emails, and in field reviews in Jackson County. The Hydrologic metric, which MDEQ and MDOT staff felt needed more detailed attention, is discussed separately below.

As mentioned above, field sampling was conducted to test MiRAM effectiveness, utilizing sites previously visited and scored by Keto Gyekis. FQI scores were computed to allow comparison of FQI quality metrics with the sampling scores from MiRAM protocols.

6.0 Hydrologic Metric - Relationship to Plant Communities and Species

MiRAM's hydrologic metric (metric 3) evaluates wetlands according to four criteria: 1) source of water, 2) connectivity, 3) duration of flooding, and 4) modifications to the natural hydrologic regime. In this report we will attempt to provide information from MNFI's wetland classification and sampling plots to provide additional evaluation tools for this metric, and where possible, to identify areas where the metric could be improved through further data collection or sampling efforts.

6.1 Water source. Hydrologic type and diversity have been identified as directly affecting aspects of a wetland's functional value, including attenuation of floodwater and determining ecological richness (Thibodeau and Ostro 1981, Thom et al. 2001). MiRAM identifies four major water sources, 1) precipitation, 2) groundwater, 3) season/intermittent surface water, and 4) perennial surface water. Table 1 identifies the primary water source for each wetland type in Michigan's Natural Community Classification (Kost et al. 2007).

Precipitation - It is understood that all wetlands receive precipitation as a hydrologic input directly or as surface runoff from adjacent uplands. There are, however, wetland community types whose source of water is primarily precipitation, and these include bogs, muskegs, and vernal pools. Note that vernal pools are not listed as a specific wetland type in the natural (plant) community classification developed by Michigan Natural Features Inventory (Kost et al. 2007). Sphagnum mosses (*Sphagnum* spp.) dominating a relatively open wetland are the best indicator of a wetland that receives most of its water from precipitation. Vernal pools, typically small wetlands beneath the canopy of an upland forest, may be unvegetated or may support annuals such as jewelweed (*Impatiens capensis*), false nettle (*Boehmeria cylindrical*), or clearweed (*Pilea pumila*).

Groundwater - Many wetland types receive periodic or constant inputs from groundwater as part of their annual water budget (Kost et al. 2007), with the plant communities most influenced by groundwater including prairie fen, northern fen, coastal fen, patterned fen, poor fen, inland salt marsh, northern wet meadow, and southern wet meadow. The upland edges of rich conifer swamps, rich tamarack swamps, hardwood-conifer swamps, northern hardwood swamps, and floodplain forests are often strongly influenced by groundwater flow, as are the more inland (as opposed to lakeward) swales in wooded dune and swale complexes.

Indications that a wetland has a major groundwater source include seeps or areas of active marl deposition. Evidence of groundwater flow can be inferred by the presence of plant species commonly associated with groundwater, e.g., skunk cabbage (*Symplocarpus foetidus*), sweet flag (*Acorus calamus*), water speedwell (*Veronica anagallis-aquatica*), and monkey-flower (*Mimulus* spp.). Where groundwater is calcium rich, fen species such as kalm's lobelia (*Lobelia kalmii*), shrubby cinquefoil (*Potentilla fruticosa*), common mountain mint (*Pycnanthemum virginianum*), water-parsnip (*Berula erecta*), spike-rush (*Eleocharis rostellata*), water cress (*Nasturtium officinale*), and stonewort (*Chara* or *Nitella* spp.) are commonly associated with seepage or marl deposition areas.

Seasonal/Intermittent Surface Water - Wetlands that have seasonal inundation from a lake, stream/river, or pond are included in this type. Seasonal intermittent surface water can also be inferred using the primary indicators of hydrology outlined in the *DEQ Wetland Identification Manual* and *Corps Manual*, e.g., water marks, drift lines, sediment deposits, and drainage patterns (MDEQ 2008); the Evaluator does not need to

Table 1. Primary and Secondary Water Source for Wetland Communities of Michigan.

WETLAND TYPE	PRIMARY WATER SOURCE	SECONDARY WATER SOURCE
MARSH COMMUNITIES		
Submergent Marsh	Perennial surface water	
Emergent Marsh	Perennial surface water	Seasonal/intermittent surface water
Great Lakes Marsh	Perennial surface water	
Northern Wet Meadow	Groundwater	Seasonal/intermittent surface water
Southern Wet Meadow	Groundwater	Seasonal/intermittent surface water
Inland Salt Marsh	Groundwater	Seasonal/intermittent surface water
Intermittent Wetland	Seasonal/intermittent surface water	Precipitation
Coastal Plain Marsh	Seasonal/intermittent surface water	Precipitation
Interdunal Wetland	Seasonal/intermittent surface water	Precipitation
WET PRAIRIE COMMUNITIES		
Wet Prairie	Seasonal/intermittent surface water	
Wet-mesic Prairie	Seasonal/intermittent surface water	
Wet-mesic Sand Prairie	Seasonal/intermittent surface water	
Lakeplain Wet Prairie	Seasonal/intermittent surface water	
Lakeplain Wet-mesic Prairie	Seasonal/intermittent surface water	
FEN COMMUNITIES		
Prairie Fen	Groundwater	Seasonal/intermittent surface water
Northern Fen	Groundwater	Seasonal/intermittent surface water
Coastal Fen	Groundwater	Seasonal/intermittent surface water
Patterned Fen	Groundwater	Seasonal/intermittent surface water
Poor Fen	Groundwater	Seasonal/intermittent surface water
BOG COMMUNITIES		
Bog	Precipitation	
Muskeg	Precipitation	
SHRUB WETLAND COMMUNITIES		
Northern Shrub Thicket	Seasonal/intermittent surface water	
Southern Shrub-Carr	Seasonal/intermittent surface water	
Inundated Shrub Swamp	Seasonal/intermittent surface water	
FORESTED WETLAND COMMUNITIES		
Poor Conifer Swamp	Seasonal/intermittent surface water	
Rich Conifer Swamp	Seasonal/intermittent surface water	Groundwater (local seeps)
Rich Tamarack Swamp	Seasonal/intermittent surface water	Groundwater (local seeps)
Hardwood-Conifer Swamp	Seasonal/intermittent surface water	Groundwater (local seeps)
Northern Hardwood Swamp	Seasonal/intermittent surface water	Groundwater (local seeps)
Floodplain Forest	Seasonal/intermittent surface water	Groundwater (local seeps)
Wet-mesic Flatwoods	Seasonal/intermittent surface water	
PALUSTRINE/TERRESTRIAL COMMUNITIES		
Wooded Dune and Swale Complex	Seasonal/intermittent surface water	Groundwater

actually observe surface water within the wetland at the time of the field evaluation.

Floodplain forest is a plant community that receives a substantial portion of its annual hydrologic input from seasonal flooding of nearby streams, as do many other swamp types, including rich conifer and rich tamarack swamps (Kost et al. 2007). Many other swamp types are flooded by intermittent rises in the regional water table in the winter and spring, including hardwood-conifer swamps, poor conifer swamps, northern hardwood swamps, and wet-mesic flatwoods. Herbaceous or shrub dominated communities typically flooded by rising streams include northern and southern wet meadows (although both of these wet meadow communities are characterized by strong groundwater influence), and those flooded by seasonally high water tables include intermittent wetlands, coastal plain marshes, and interdunal wetlands. A large number of wetland plants can be associated with intermittent surface water, many of which are associated with diverse hydrologic conditions, making it difficult to identify good indicator species for this hydrologic type.

Perennial Surface Water - To be awarded points for perennial surface water, the wetland must receive water from or have a perennial connection to a stream, lake, or pond during most times of the year (MDEQ 2008). Wetlands in actual contact with a perennial lake, stream, or pond should receive these points; the MiRAM wetland boundary extends up to 100 feet into the open water of a lake, stream, or pond and therefore these areas are part of the wetland being evaluated. Wetland community types that may have perennial surface water connections with a lake, stream, or pond include submergent marsh, emergent marsh, Great Lakes marsh, various types of swamps, and floodplain forest (Cowardin et al. 1979, Kost et al. 2007).

Plants that best indicate perennial surface water include water lily (*Nymphaea odorata*), spatterdock (*Nuphar* spp.), pondweeds (*Potamogeton* spp.), water celery (*Vallesnaria americana*), common waterweed (*Elodea canadensis*), hornwort (*Ceratophyllum demersum*), and naiad (*Najas* spp.). Other emergent species, such as cattails (*Typha* spp.), bulrushes (*Schoenoplectus* or *Scirpus* spp.), spike-rushes (*Eleocharis* spp.), and bur-reeds (*Sparganium* spp.), are good indicators of perennial surface waters, although these can also survive locally in wetlands with season waters.

It is beyond the scope of this report to identify indicators of each of these water sources, although indicators of both groundwater and permanent inundation are listed in the species lists for the submergent marsh, bog communities, and various types of fens (see Appendix VII in this report). Plant species associated with seasonal or intermittent surface water flooding are much more wide spread and it is not possible to create a short list of these species.

6.2 Connectivity. Connectivity, as described in the MiRAM protocols, is focused on the conditions present at specific sites rather than characterizing the connectivity characteristic of a given wetland type. For this reason we will not comment on the connectivity characteristics that each wetland type may inherently possess. As the MiRAM protocols are refined, it may be desirable to describe the connectivity characteristics of broad classes of wetlands or even for individual wetland types.

6.3 Inundation or saturation. Based on several wildlife studies, MDEQ staff (MDEQ 2008) determined that the duration of standing water and soil saturation often correlates well with use of a wetland's open water areas as breeding and nursery pools for many types of wildlife (Killgore and Baker 1996, Brooks 2000, Brooks 2004, Hoover 2006) and migratory habitat for birds (Niemuth et al. 2006). Table 2 lists the characteristic inundation or saturation condition for each of the wetland types listed in Michigan's Natural Community Classification (Kost 2007). If a natural community is characterized by a certain inundation or saturation condition, it is shown in Table 2 in **Bold type (X)**. Lower case (x) signifies that the inundation or saturation condition can occur, especially during periods of drought, but that it is not considered strongly characteristic of the plant community.

Wetland types that are typically permanently inundated include submergent marsh, emergent marsh, and Great Lakes marsh (Kost et al. 2007).

Wetland types that are typically permanently saturated or regularly inundated include inland salt marsh, prairie fen, northern fen, patterned fen, poor fen, bog, muskeg, and inundated shrub swamp.

Wetland types that are regularly saturated or seasonally inundated include northern and southern wet meadows, intermittent wetland, coastal plain marsh, interdunal wetland, wet prairie, lakeplain wet prairie, northern shrub thicket, southern shrub-carr,

Table 2. Inundation or saturation condition associated with each type of Michigan wetland.

WETLAND TYPE	INUNDATION OR SATURATION CONDITION			
	PERMANENT INUNDATION	PERMANENT SATURATED OR REGULAR INUNDATION	REGULAR SATURATION OR SEASONAL INUNDATION	SEASONAL SATURATION IN UPPER 12 INCHES
MARSH COMMUNITIES				
Submergent Marsh	X	(x)		
Emergent Marsh	X	(x)		
Great Lakes Marsh	X	(x)		
Northern Wet Meadow			X	
Southern Wet Meadow			X	
Inland Salt Marsh		X		
Intermittent Wetland			X	(x)
Coastal Plain Marsh			X	(x)
Interdunal Wetland			X	(x)
WET PRAIRIE COMMUNITIES				
Wet Prairie			X	(x)
Wet-mesic Prairie				X
Wet-mesic Sand Prairie				X
Lakeplain Wet Prairie			X	
Lakeplain Wet-mesic Prairie				X
FEN COMMUNITIES				
Prairie Fen		X	(x)	
Northern Fen		X	(x)	
Coastal Fen		(x)	X	
Patterned Fen		X	(x)	
Poor Fen		X	(x)	
BOG COMMUNITIES				
Bog		X		
Muskeg		X		
SHRUB WETLAND COMMUNITIES				
Northern Shrub Thicket			X	(x)
Southern Shrub-Carr			X	(x)
Inundated Shrub Swamp		X	(x)	

Table 2. continued

FORESTED WETLAND COMMUNITIES				
Poor Conifer Swamp			X	(x)
Rich Conifer Swamp			X	(x)
Rich Tamarack Swamp			X	(x)
Hardwood-Conifer Swamp			X	(x)
Northern Hardwood Swamp			(x)	X
Floodplain Forest			(x)	X
Wet-mesic Flatwoods			(x)	X
PALUSTRINE/TERRESTRIAL COMMUNITIES				
Wooded Dune and Swale Complex			X	(x)

poor conifer swamp, rich conifer swamp, rich tamarack swamp, hardwood-conifer swamp, and wooded dune and swale complex.

Wetland types that are seasonally saturated in the upper 12 inches include wet-mesic prairie, wet-mesic sand prairie, lakeplain wet-mesic prairie, northern hardwood swamp, floodplain forest, and wet-mesic flatwoods.

6.4 Modifications to the natural hydrologic regime.

A large number of human modifications to the natural hydrologic regime are listed on the MiRAM sampling form, and there is space to add other hydrologic modifications that are not listed. These modifications cannot be easily summarized by wetland type and must be evaluated site by site.

6.5 Discussion of Hydrologic Metric.

The importance of hydrology for determining wetland type and vegetation is well known, although the strength of the relationships and the amount of study varies greatly by wetland community and geographic region. The impact of hydrologic alteration on vegetation and wetland function has also been the subject of numerous studies. Wetland literature also defines hydrologic studies in terms of different criteria, some studies focusing on groundwater versus precipitation as the primary water source, while other studies focus on water depth and flood regime.

Fens are the communities for which there has been the greatest amount of literature focusing on hydrologic

characterization. Hydrologic studies of fens include the full range of fen types, from prairie fens to patterned fens and poor fens (Almendinger and Leete 1998, Bedford and Godwin 2003, Amon et al. 2002, Schwintzer 1978, Schwintzer and Tomberlin 1982, Foster and King 1984, Glaser et al. 1981, Glasier et al. 1990, Heinselman 1963, Heinselman 1970, Miner and Ketterling 2003, Siegel and Glaser 1987). Hydrologic studies have also dealt with other types of peatlands (Crum 1988, Dansereau and Segadas-Vianna 1952, Futyma and Miller 1986, Karlin and Bliss 1984, Miller and Futyma 1987, Vitt and Slack 1975, Vogl 1964).

For coastal plain marshes and associated species, water level has been recognized as important for annual plant regeneration (Reznicek 1994, Schneider 1994). Water level fluctuation has also been recognized as important for Great Lakes coastal marshes, resulting in cyclical changes in wetland vegetation (Albert and Minc 2004, Keddy and Reznicek 1986, Keough et al. 1999, Minc 1997).

There have been many fewer published studies on the hydrologic conditions of shrub-dominated wetlands. The effect of flooding on alder and willows was examined for the Great Lakes states (Ohmann et al. 1990). The effects of flooding have also been looked at for forested wetlands and floodplain forests, where water depth is recognized as important for regeneration, tree survival, and tree productivity (Gerkel et al. 2002, Islam and MacDonald 2004, Kudray and Gale 1997, Liefers and Rothwell 1987, MacDonald and Yin 1999, Merkey 2001, Merkey

2006, Pepin et al. 2002, Schwintzer 1982, Schwintzer and Tomberlin 1982, Tardif and Bergeron 1999).

One focus of recent literature is the impact of hydrologic alteration on exotic plant introduction (Kercher and Zedler 2004a and 2004b, Siegel 1988, Ward 1998). Ongoing studies on the St. Clair River

Delta and on Saginaw Bay have demonstrated the rapid rate of exotic plant expansion, either due to water level manipulation by land managers or natural water level fluctuations (observations of lead author). The species that responds most rapidly along the Great Lakes shoreline due to water level alteration is *Phragmites australis*.

7.0 Characteristic Plant Species for Each Wetland Type

The Floristic Quality Assessment program (Herman et al. 2001) was utilized to develop lists of all of the plant species encountered at each wetland site mapped by MNFI. These summaries were combined to identify the most commonly occurring plant species for each wetland type (Appendix VII). Only the species that occurred in one third or more of the sites where a plant community had been sampled were included in the table. Those species that occurred in fifty percent or more of sites were shaded light gray in the table.

The lists of characteristic species should prove helpful for those who are not familiar with Michigan's wetland plant communities. For plant communities that were

sampled at three sites or less, the species lists will provide less insight into characteristic species composition. The recently published "Natural Communities of Michigan: Classification and Description" (Kost et al. 2007) provides a more synthesized discussion of the plant species considered to be characteristic of each plant community, whereas Appendix VII is a summary list based solely on the species lists collected in past surveys of each natural community, with no attempt to provide a synthesis based on field experience.

8.0 Photos and Diagrams of Plant Communities

Photographs were included for all wetland plant communities, along with photos of some of the rare plants and animals for some of the plant communities (Appendix VIII-A through VIII-D). These photos are formatted as large PowerPoint presentations and are only available on CD, not in the printed report. Medium resolution photos were included for all communities for which they were available. Low resolution photos were only utilized if higher resolution photos were not available. Many more low resolution photos are available for viewing within the plant community classification on the MNFI web site (<http://web4.msue.msu.edu/mnfi/communities/index.cfm>).

Diagrams were created for four of the natural communities, bog, prairie fen, interdunal wetland, and wooded dune and swale (Appendix IX-A through IX-

D). These cross-sectional diagrams show sediment characteristics, source and type of water, and landform characteristics that are difficult to see in photos. For most of these plant communities, including bog, prairie fen, and wooded dune and swale complex, hydrologic characteristics are variable across the entire landscape feature. For bogs, there is typically a minerotrophic groundwater-fed moat or lagge where the upland meets the wetland. The open lake at the center of most bogs can also be minerotrophic, while the bog mat itself is nutrient poor (oligotrophic) and acid. Similarly, wooded dune and swale complexes are characterized by groundwater influence near the upland margins, but are under the influence of the Great Lakes close to the lake. The swale or swales closest to the Great Lakes are strongly influenced by the Great Lakes and can be actively flooded or modified during storm events on the lake.

9.0 Endangered and Rare Wetland Types

MNFI's community classification has undergone major updating during 2007 (Kost et al. 2007). Table 3. includes a listing of all endangered (S1) and rare (S2) wetland types. Community rankings are also included

in the community classification on MNFI's web site (<http://web4.msue.msu.edu/mnfi/communities/index.cfm>).

Table 3. Endangered (S1) and rare (S2) wetland types.

ENDANGERED WETLAND TYPES (S1)	RARE WETLAND TYPES (S2)
Inland Salt Marsh	Coastal Fen
Lakeplain Wet Prairie	Coastal Plain Marsh
Lakeplain wet-mesic Prairie	Interdunal Wetland
	Patterned Fen
	Wet Prairie
	Wet-mesic Flatwood
	Wet-mesic Prairie
	Wet-mesic Sand Prairie

10.0 Tables of Rare Plants and Animals by Plant Community

MNFI's database was analyzed to develop a table of rare plants and animals that were associated with each wetland type (Appendix X-A and X-B). These tables list only the species that are found in each natural community, and do not indicate the strength of the association between the species and the natural community. In contrast, an additional table (Appendix XI, available only on CD) lists the species associated with each community and bolds those species that are found at one tenth or more of the sites for each

wetland type. This helps to identify the species that have a strong affinity with a specific wetland type. However, for the rarest species, with only one or two known sites in the state, the relationship between a species and a natural community may be weak. The recently published "Natural Communities of Michigan: Classification and Description" (Kost et al. 2007) also provides a list of rare plants and animals for each natural or plant community.

11.0 Plant Community Analysis Based on FQA Species Lists of Natural Communities

Prior to the analyses included in this report, several wetland natural communities have been systematically sampled statewide by MNFI, including Great Lakes marshes (Albert et al. 1987, 1988, 1989, 2005), wooded dune and swale complexes (Comer and Albert 1991, 1993), and lakeplain prairies (Comer et al. 1995), and analysis was conducted on the data collected in these studies. For all of the above listed studies, with the exception of the lakeplain prairie study, data was collected along transects, along with other physical data for characterization of site conditions and hydrology. For the present MiRAM

study, data was reduced to Floristic Quality Index species lists to see if these would provide enough information to compare plant communities and refine community classifications.

Based on the above-mentioned analyses, Great Lakes marshes have been separated into several types that have distinctly different floras based on Great-Lakes wide analysis (Albert and Minc 2004, Minc 1997, Albert et al. 2006). Similarly, Wooded Dune and Swale Complexes analyses identified five types based on differences related to latitude and to mode of sand

deposition (Comer and Albert 1993). Over 631 vascular plants, mosses, and algae were identified in these wetlands.

For Lakeplain Wet Prairies and Lakeplain Wet-mesic Prairies, TWINSPAN analyses conducted on 40 wetlands separated wetlands along a moisture gradient (wet vs. wet-mesic prairies) rather than on a geographic gradient (Comer et al. 1995). However, a subset of the more inland wetlands on the sand lakeplain have been combined with some northern prairies to be treated as “wet-mesic sand prairies”, based on floristic differences (see Kost et al. 2007 and <http://web4.msue.msu.edu/mnfi/communities/index.cfm>).

Other communities have not been systematically sampled statewide, but some have been of interest to ecologists and have had intensive sampling for more than 20 years. These communities include prairie fen, coastal plain marsh, patterned peatland, and bog.

Detrended Correspondence Analyses (DCA) of bogs were recently completed using presence-absence species lists based on FQA species lists (analysis conducted by Brad Slaughter, unpublished data). The analysis shows a separation between bogs that translates to a northern and southern type (Figures 3 and 4). While the figures show a definite spatial separation between northern and southern bogs, the

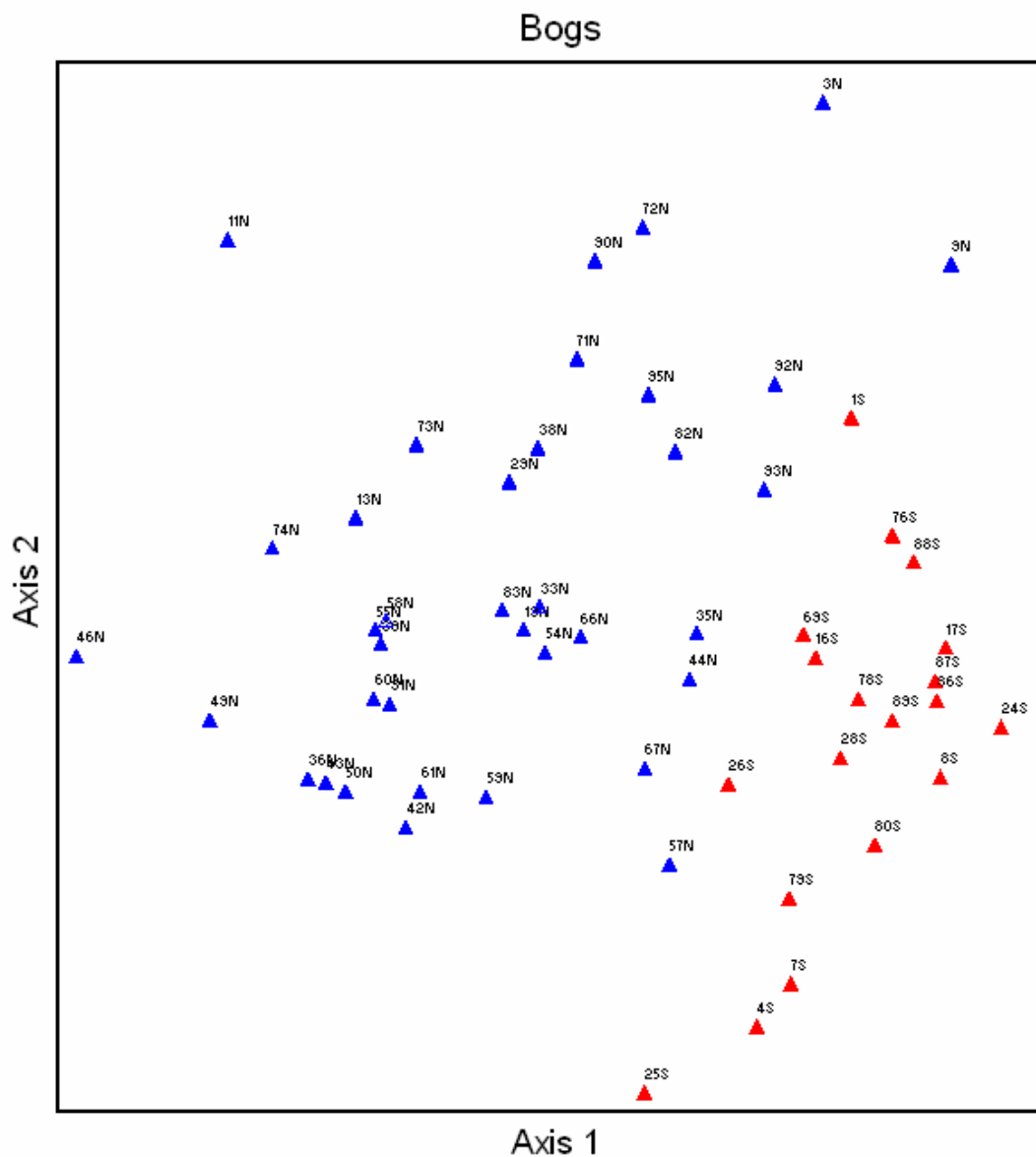


Figure 3. Bog distributions along DCA axis 1 and axis 2. The northern and southern bogs show little overlap.

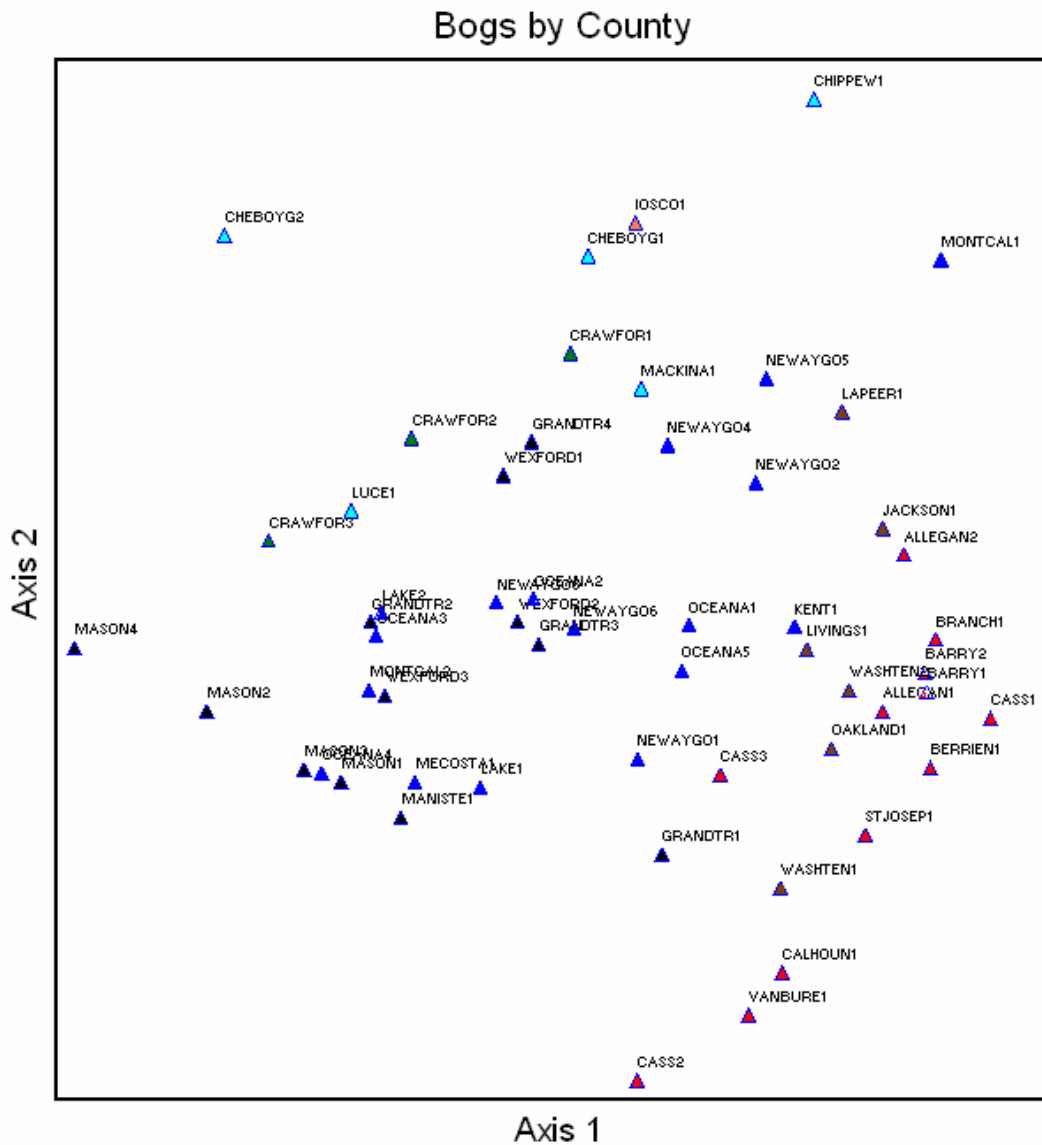


Figure 4. Bog distributions shown by county along DCA Axis 1 and Axis 2.

majority of species were shared, with the northern bogs having isolated shrub-sized paper birch (*Betula papyrifera*), trembling aspen (*Populus tremuloides*), jack pine (*Pinus banksiana*), red pine (*Pinus resinosa*), as well as blueberry (*Vaccinium myrtilloides*), and cotton-grass (*Eriophorum spissum*). The species found only in southern bogs included Virginia chain-fern (*Woodwardia virginica*), royal fern (*Osmunda regalis*), and poison sumac (*Toxicodendron vernix*), species considered to be representative of more minerotrophic or calcium-rich habitats. Most of the MNFI ecologists felt that these few species provided insufficient

justification for separating northern and southern bogs, even though each had some species that were distinctly distributed.

The sparseness of the plant community data matrix has not yet identified clusters that have proved useful for either further subdividing or lumping communities. However, most of the major types of wetlands: marsh, prairie, peatland, forested wetlands, etc. can be easily separated.

11.1 Methods

11.1.1 Analysis of Community groups

Plant community analysis for this report is based on plant lists derived from the Floristic Quality Indices (FQI) generated for each plant community sampling site. FQI scores are based on data collected over the last 27 years by MNFI Ecology staff. Species lists for 535 sites were used to compare species composition among communities assigned by MNFI. Each sampling site was assigned an identification number, shown as EOid in Appendices 12 and 13.

Communities were analyzed in 6 community groups identified in Kost et al. (2007) to assess floristic similarities among the groups; the Bog and Fen groups

were combined to assess these herbaceous-dominated groups as a whole (Table 4).

Cluster analyses and ordinations were run using PCOrd (McCune & Mefford 2006). For cluster analysis, cut levels were defined by the number of communities in the group as assigned by MNFI. Clustering was manipulated in both Sorenson (Bray-Curtis) and relative Euclidean distance measures used with either Ward's or flexible beta group linkage, in order to obtain best group resolution in ordination. Bray-Curtis (polar) ordination was used with Sorenson (Bray-Curtis) distance measure and the variance-regression method for endpoint selection (McCune and Grace 2002). For most of the six community groups, clustering and ordination reclassified sites into new

Table 4. Analysis of communities by community group per Kost et al. (2007), but with bog and fen groups combined.

Marsh	Wet Prairie	Fen & Bog	Shrub Wetland	Forested Wetland	Palustrine/ Terrestrial
Coastal Plain Marsh	Lakeplain Wet Prairie	Bog	Northern Shrub Thicket	Rich Conifer Swamp	Wooded Dune & Swale
Emergent Marsh	Lakeplain Wet-Mesic Prairie	Muskeg	Southern Shrub-Carr	Boreal Forest	
Great Lakes Marsh	Wet-Mesic Sand Prairie	Northern Fen		Hardwood-Conifer Swamp	
Inland Salt Marsh	Wet Prairie	Patterned Fen		Poor Conifer Swamp	
Interdunal Wetland	Wet-Mesic Prairie	Poor Fen		Rich Tamarack Swamp	
Intermittent Wetland		Prairie Fen		Floodplain Forest	
Northern Wet Meadow				Southern Swamp	
Southern Wet Meadow					

groups that were often mixtures of communities, based on floristic similarity. Community membership of reclassified groups was determined by comparison of species in each group with descriptions and keys in Kost et al. (2007), and by use of indicator species analysis in PCOrd.

Wet-mesic flatwoods were not included in the analysis because they were added to the classification after initial analyses were conducted. Coastal fens were

analyzed as Great Lakes marshes, as they were not segregated as a type until after the analyses were conducted. However, Coastal fens will be discussed during the discussion of analysis results – the coastal fens separated nicely from other Great Lakes marshes in analyses. Data from one site (EOid 7696, Southern Swamp 3) was excluded because some of its data were missing.

11.2 Results

11.2.1 Analysis of Community groups

Communities were analyzed in 6 community groups, composed of a total of 29 wetland communities (Table 4). In cluster analysis, deviations from the community cut levels assigned by MFNI generally resulted in loss of group resolution during ordination. Attempts to force low chaining values in dendrograms also resulted in loss of group resolution during ordination.

11.2.1.1. Marsh community group

Data from the 8 marsh communities represented 180 sites. Ordination indicated that 4 of the 8 communities had good resolution but 4 others had poor resolution (Figure 5). Reclassification of the 4 poorly-resolved communities as a single community resulted in better resolution of this group. Table 5 summarizes marsh communities reclassified by floristic similarity, and Appendix 12-A lists the reclassified communities by site.

Group 1 (group numbers are assigned by PcOrd and serve only to identify groups) is composed of approximately equal parts Coastal Plain Marsh and Intermittent Wetland, but also contains 2 Northern Wet Meadow sites and 4 Emergent Marsh sites. The Coastal Plain Marshes include low-diversity Coastal Plain Marshes from northern pitted outwash and southern kettle lakes, as well as many northern low-diversity Intermittent Wetlands. **Group 2** is almost all high-diversity southern Coastal Plain Marshes located on sandy lakeplain, as well as a pair of relatively-diverse northern Coastal Plain Marshes and Intermittent Wetlands located in shallow depressions on outwash that resemble the southern sites with which they are combined. **Group 44** contains all of the Interdunal Wetland but contains all 5 Great Lakes Marsh sites that were reclassified to Coastal Fen and 1

Northern Wet Meadow site along the Garden Island shoreline of Lake Michigan that should also have been reclassified to Coastal Fen. The affinity between Interdunal Wetland, Coastal Fen, and Northern Fen species is very high. **Group 46** is exclusively Great Lakes Marsh located along the St. Marys River (the connecting river between Lake Superior and Lake Huron), with the exception of one delta site at the mouth of the Little Fishdam River. **Group 50**, representing the combined sites that did not resolve well in ordination, is mostly (72 %) Great Lakes Marsh but contains 14 Southern Wet Meadow sites, 5 Emergent Marsh sites, 2 Inland Salt Marsh sites, 2 Northern Wet Meadow sites, and 1 Interdunal Wetland.

The assumption that southern Coastal Plain marsh sites are distinctly different from the more depauperate northern Intermittent Wetlands may need to be reconsidered. All of the Coastal Plain Marshes located in shallow embayments on sandy lakeplain are similar in composition and characterized by a high diversity of coastal plain disjunct plants. Similarly, most of the northern Intermittent Wetlands located at the margins of kettle lakes or ponds are characterized by low diversity of coastal plain marsh disjunct plant species. However, the southern sites classified as coastal plain marshes occurring along the edges of sandy kettle lakes on outwash deposits appear to be much more similar to the low diversity Intermittent Wetlands found in northern Lower Michigan and in eastern Upper Michigan. This is consistent with the observations of the senior author.

The Interdunal Wetlands and Coastal Fen sites in Group 44 occur along identical stretches of the Great Lakes, where the shoreline sediments are calcium rich. The primary difference between these communities is geomorphological, with Interdunal Wetlands being separated from the Great Lakes by low sand dunes or beach ridges, while Coastal Fens are located along the open, exposed shoreline of the Great Lakes

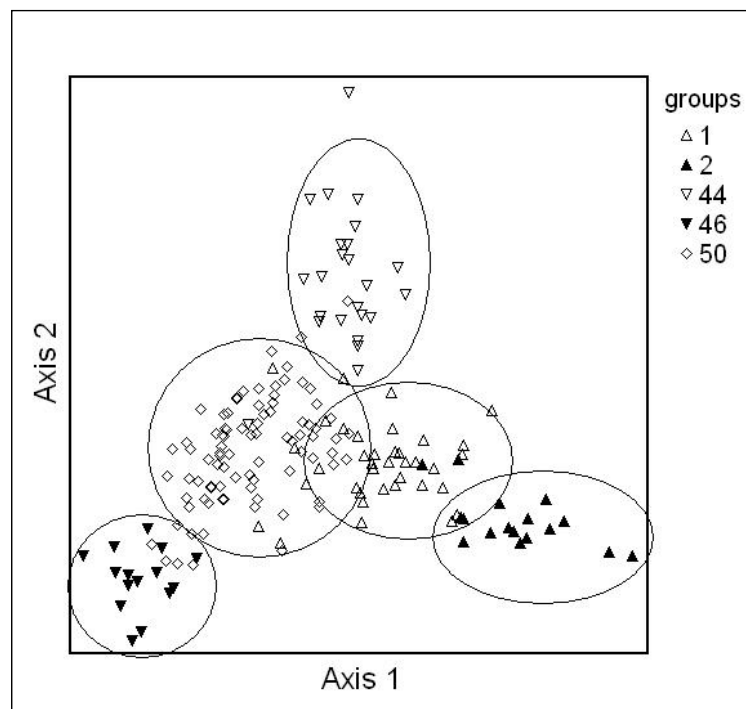
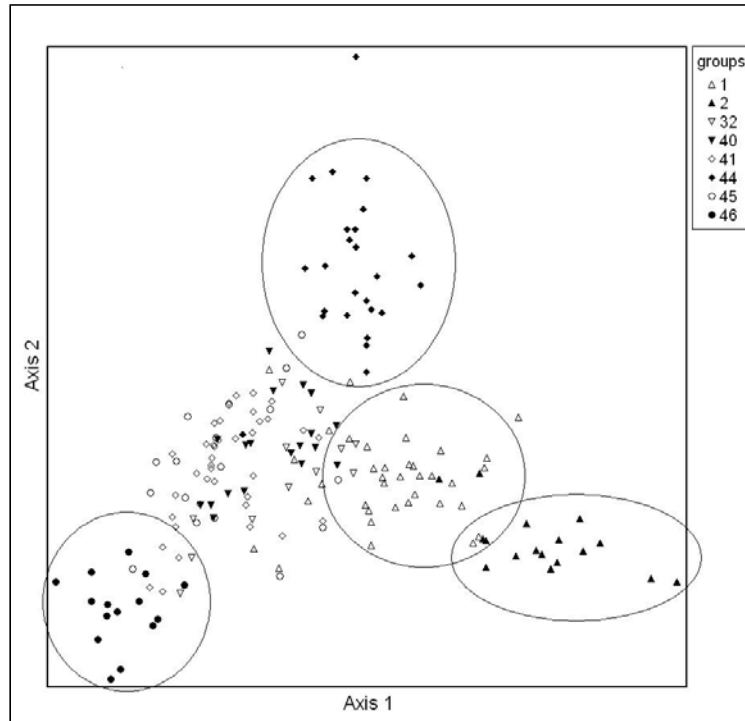


Figure 5. Bray-Curtis ordination of species at 180 sites representing the Marsh community group. Top: 4 communities showing good resolution and 4 showing poor resolution. Bottom: with the 4 poorly-resolved communities reclassified as a single community. Group numbers and symbols are assigned separately by PcOrd for each ordination and are independent of one another.

Table 5. Reclassification of Marsh community group based on floristic similarity.

Reclassified group	Existing community classification	Number of sites	Indicated community name
Group 1	Coastal Plain Marsh	16	Intermittent Wetland
	Intermittent Wetland	15	
	Emergent Marsh	4	
	Northern Wet Meadow	2	
Group 2	Coastal Plain Marsh	15	Coastal Plain Marsh
	Intermittent Wetland	2	
Group 44	Interdunal Wetland	19	Interdunal Wetland
	Great Lakes Marsh	5	
	Northern Wet Meadow	1	
Group 46	Great Lakes Marsh	15	Great Lakes Marsh
Group 50	Great Lakes Marsh	62	Needs new name
	Southern Wet Meadow	14	
	Emergent Marsh	5	
	Inland Salt Marsh	2	
	Northern Wet Meadow	2	
	Interdunal Wetland	1	

themselves. The additional protection of the beach ridge or sand dunes typically results in greater diversity within the Interdunal Wetland, but the two communities share many species and Coastal Fen diversity increases during periods of low Great Lakes water level, when additional fen species appear from the coastal seed bank. As water levels remain low on the Great Lakes, portions of many Coastal Fens become separated from the Great Lakes by newly formed beach ridges, causing them to become Interdunal Wetlands.

The Great Lakes Marshes in Group 46 are almost exclusively from the St. Marys River, which supports an almost continuous fringe of emergent Great Lakes Marsh for roughly 70 miles of shoreline (two major channels and several large bays along roughly 30 linear miles of shoreline). In earlier marsh analyses utilizing more detailed species coverage data, these marshes also separated out as a distinctive marsh type (Albert and Minc 2004, Minc 1997).

Group 50 includes several different marsh types that did not separate well on the basis of the FQI species groups. Many of these Great Lakes marshes separated out as distinctive marsh types in earlier analyses using more detailed species coverage data (Albert and Minc

2004, Minc 1997). It is not surprising that inland and Great Lakes Marsh types do not separate well, as many marsh plants are shared by both inland and Great Lakes wetlands. The differences in wave energy and water level fluctuation between these types justifies their separation regardless of whether they share the majority of their plant species. Even the rarest of Michigan marsh types, Inland Salt Marsh, shares most of its species with other marsh types, but the salt seepage zones are characterized by rare species, especially *Schoenoplectus americanus*, that are only found in salt marshes.

11.2.1.2. Wet Prairie community group

Data from the 5 wet prairie communities represented 43 sites. Ordination indicated that 3 of the 5 communities had good resolution but 2 showed considerable overlap (Figure 6). Reclassification of the 2 overlapping communities as a single community shows better resolution of this group. Table 6 summarizes wet prairie communities reclassified by floristic similarity, and Appendix 12-B lists the reclassified communities by site.

Group 1 represents the combined sites that did not resolve well in ordination, and is composed of one half

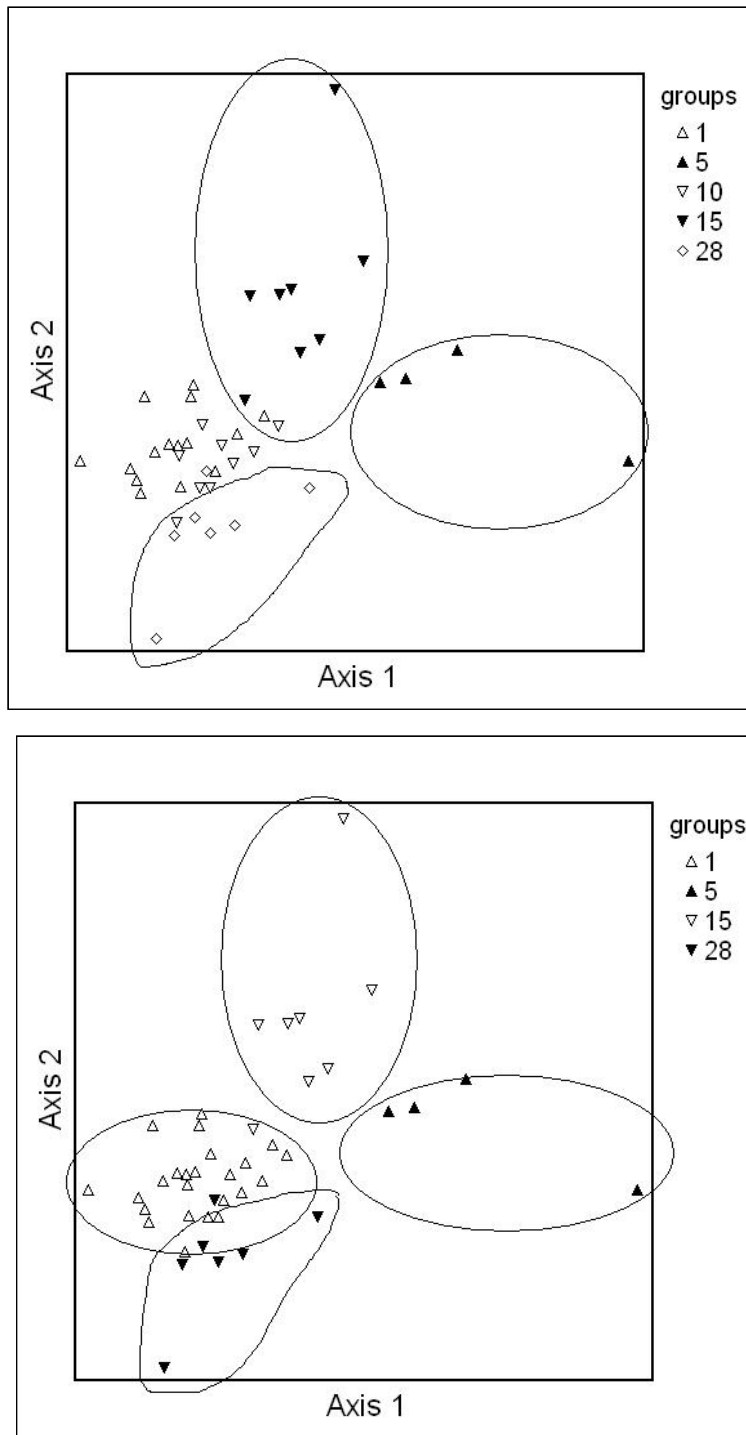


Figure 6. Bray-Curtis ordination of species at 43 sites representing the Wet Prairie community group. Top: 3 communities showing good resolution and 2 showing poor resolution. Bottom: with the 2 poorly-resolved communities reclassified as a single community. Group numbers and symbols are assigned separately by PcOrd for each ordination and are independent of one another.

Table 6. Reclassification of Wet Prairie community group based on floristic similarity.

Reclassified group	Existing community classification	Number of sites	Potential community name
Group 1	Lakeplain Wet Prairie	12	Lakeplain Wet Prairie
	Lakeplain Wet-Mesic Prairie	7	
	Wet Prairie	1	
	Wet-Mesic Prairie	4	
Group 5	Lakeplain Wet Prairie	2	Needs new name
	Lakeplain Wet-Mesic Prairie	1	
	Wet-Mesic Prairie	1	
Group 15	Lakeplain Wet-Mesic Prairie	5	Wet-Mesic Sand Prairie
	Wet-Mesic Sand Prairie	3	
	Wet Prairie	1	
Group 28	Wet Prairie	4	Wet Prairie
	Wet-Mesic Prairie	2	

Lakeplain Wet Prairie (12 sites), with the remaining half being a mix of Lakeplain Wet-Mesic Prairie (7 sites), Wet-Mesic Prairie (4 sites), and Wet Prairie (1 site). However, all of the Lakeplain prairies of this group except for one site are located along Lakes Erie, St. Clair, and Huron, in eastern Michigan. Grand Mere is the only Lakeplain prairie from along Lake Michigan. **Group 5** consists of Lakeplain Wet Prairie (2 sites), Lakeplain Wet-Mesic Prairie (1 site), and Wet-Mesic Prairie (1 site). All Group 5 Lakeplain Prairie sites are from Saginaw Bay along Lake Huron. **Group 15** includes Lakeplain Wet-Mesic Prairie (5 sites), Wet-Mesic Sand Prairie (3 sites), and Wet Prairie (1 site). All of these lakeplain prairies are from inland lakeplain sites within Allegan State Game Area. **Group 28** includes Wet Prairie (4 sites) and Wet-Mesic Prairie (2 sites.), all interior sites far from the Great Lakes.

Groups 5 and 15 resolved well in ordination, but both groups had relatively few members and each had an outlier from the main group. Regrouping gave Group 1 better resolution in ordination, but with some overlap with Group 28.

Lakeplain prairies separate well as western (Allegan State Game Area) and eastern (Lakes Erie, Huron, and St. Clair), with only one Lake Michigan outlier. Inland prairie sites do not show any strong affinities and are mixed in with lakeplain sites. This lack of separation should probably not be a surprise. Prairies are extremely diverse plant communities with many shared species. Only a few rare species regularly separate

inland from Great Lakes sites, with Great Lakes sites characterized by Sullivant's milkweed (*Asclepias sullivantii*), tall green milkweed (*A. hirtella*), and eastern prairie fringed-orchid (*Platanthera leuchophaea*), as well as the presence of a few Great Lakes coastal fen species seldom seen in interior wet prairies.

11.2.1.3. Fen and Bog community group

Data from the 6 fen and bog communities represented 144 sites. Ordination indicated that 4 of the 6 communities had good resolution but 2 showed considerable overlap (Figure 7). Reclassification of the 2 overlapping communities as a single community shows better resolution of this group. Table 7 summarizes fen and bog communities reclassified by floristic similarity, and Appendix 12-C lists the reclassified communities by site.

Group 1 represents the combined sites that did not resolve well in ordination, and is composed of three-quarters Bog (39 sites), with the remaining quarter including Muskeg (6 sites), Northern Fen (2 sites), Patterned Fen (2 sites), and Poor Fen (4 sites). Group 1 overlaps with Group 3 but the spread of points in Group 3 was distinct enough to keep it separate from Group 1. **Group 3** is comprised exclusively of Bog, with considerable overlap with Group 1 in one part of the cluster of points. Group 62 is about two-thirds Northern Fen and one-third Patterned Fen. **Group 64**

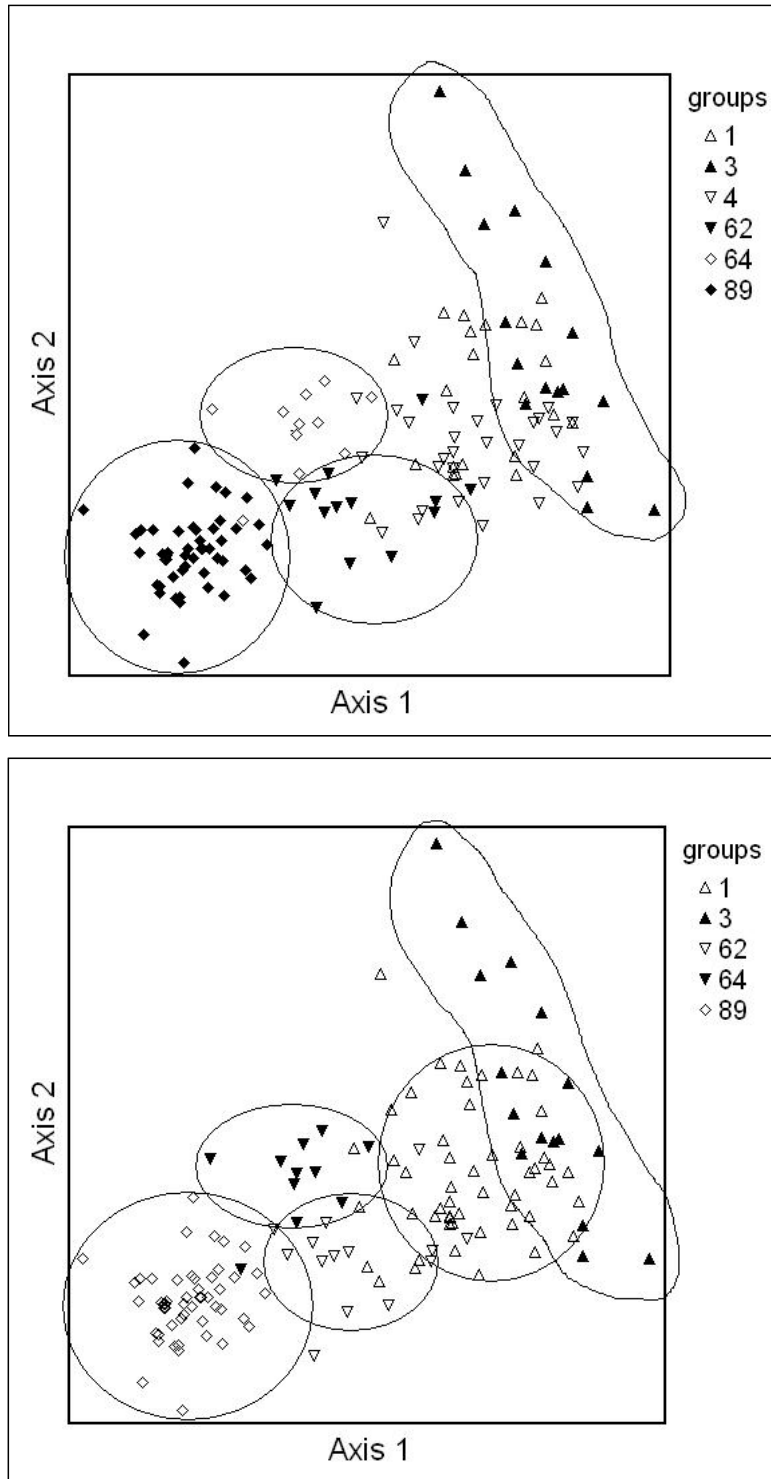


Figure 7. Bray-Curtis ordination of species at 144 sites representing the Fen and Bog community group. Top: 4 communities showing good resolution and 2 showing poor resolution. Bottom: with the 2 poorly-resolved communities reclassified into a single community. Group numbers and symbols are assigned separately by PcOrd for each ordination and are independent of one another.

Table 7. Reclassification of Fen and Bog community group based on floristic similarity.

Reclassified group	Existing community classification	Number of sites	Indicated community name
Group 1	Bog	39	Bog
	Muskeg	6	
	Northern Fen	2	
	Patterned Fen	2	
	Poor Fen	4	
Group 3	Bog	16	Needs new name
Group 62	Northern Fen	9	Northern Fen
	Patterned Fen	5	
Group 64	Northern Fen	5	Needs new name
	Prairie Fen	6	
Group 89	Prairie Fen	50	Prairie Fen

is about half Northern Fen and half Prairie Fen. Group 89 is comprised exclusively of Prairie Fen.

While few communities separate well in these analyses, Bogs and Muskegs, the wetlands most strongly dominated by Sphagnum mosses, separate relatively well, as do most Northern Fens and Prairie Fens, communities characterized by calcareous conditions and several calcium-loving plants.

There are several reasons why fens and bogs do not separate well in these analyses. First, FQA scores are based only on presence and absence, not coverage values. For this reason, communities characterized by low coverage of trees (Bog, Patterned Fen, and Northern Fen), but containing small, shrub-sized black spruce and tamarack on Sphagnum mounds, share many species, including the tree sized black spruce and tamarack found in Poor Fens and Muskegs. Patterned Fens also share many species with other northern Fen, Muskeg, and Bog communities, but Patterned Fens have distinctive patterning of wet and dry zones that are recognizable both from the air and on the ground. Northern Fens, characterized by calcium-rich ground water and marl deposits, also contain zones where organic material has accumulated and Sphagnum-moss-dominated mounds have developed, supporting acid-tolerant species common in bogs and muskegs. Thus, many of these plant communities are differentiated on the basis of several characteristics besides plant composition, including hydrologic conditions (marl and calcareous seeps), tree size (not just presence), and distinctive vegetation patterning.

Also, if data were analyzed on the basis of detailed zonal vegetation sampling that including plant coverage values, these communities would likely separate much better.

Even with the reduced resolution that appears to characterize presence-absence FQA data, analyses identified that almost one-third (29%) of Bog sites formed a monotypic entity in Group 3, which has many species in common with Group 1 but these could be distinguished by an absence of a few important species such as *Ledum groenlandicum*, *Myrica gale*, *Kalmia polifolia*, *Sphagnum fuscum*, and *Carex lasiocarpa*. One-third of Patterned Fen clustered with Bog in Group 1 and the remainder clustered with Northern Fen in Group 62. Groups 62 and 64 share a number of less common species with Group 89 and obviously have some floristic affinities with the southern part of the state, but also straddle the tension zone and include a number of the northern peatland species included in Groups 1 and 3. Group 89 contains many species that do not occur in any of the other peatland groups, presumably because of its location south of the tension zone and proximity to prairie.

11.2.1.4. Shrub Wetland community group

Data from the 2 shrub wetland communities represented 6 sites. Ordination indicated that the 2 communities had good resolution (Figure 8). Table 8 summarizes shrub wetland communities classified by

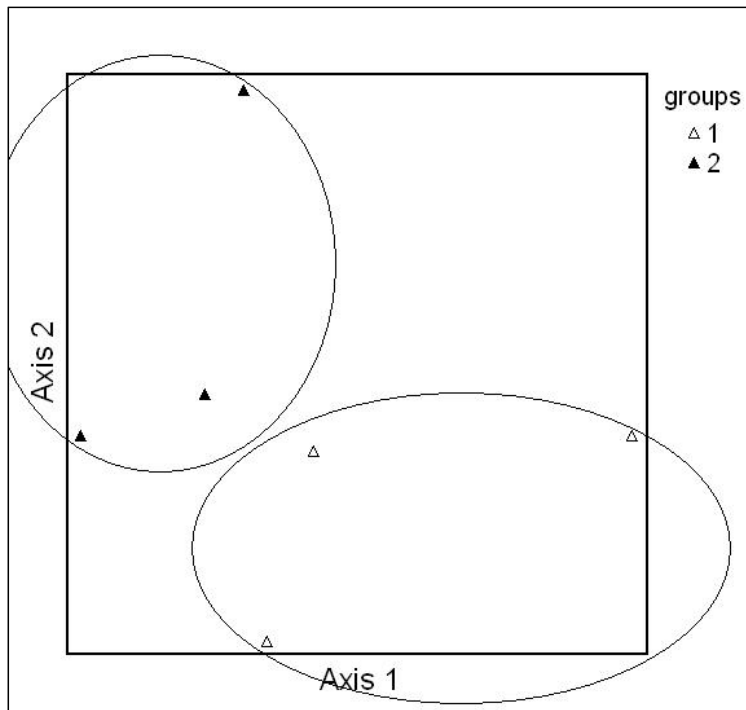


Figure 8. Bray-Curtis ordination of species at 6 sites representing the Shrub Wetland community group. Two communities had good resolution. Group numbers and symbols are assigned separately by PcOrd for each ordination and are independent of one another.

Table 8. Classification of Shrub Wetland community group based on floristic similarity.

Reclassified group	Existing community classification	Number of sites	Indicated community name
Group 1	Northern Shrub Thicket	2	Needs new name
	Southern Shrub-Carr	1	
Group 2	Northern Shrub Thicket	3	Northern Shrub Thicket

floristic similarity, and Appendix 12-D lists the reclassified communities by site.

Group 1 (reclassified) is composed of a mixture of Northern Shrub Thicket (2 sites) and Southern Shrub-Carr (1 site). **Group 2** is composed exclusively of Northern Shrub Thicket (3 sites). Points in both groups, though resolved well in two clusters, are

widely scattered with outliers, indicating that the species lists are not very well aggregated. Indicator species analysis (Appendix 13-A) indicates that Group 1 corresponds to Southern Shrub-Carr (*Aronia prunifolia*), and Group 2 corresponds to Northern Shrub Thicket (*Alnus rugosa*, *Eupatorium maculatum*, *Impatiens capensis*, *Lycopus uniflorus*, *Osmunda regalis*).

Inadequate sample size limits the meaningful comparison of shrub wetland communities. Shrub wetlands are among the communities that should be the focus of further sampling, if this portion of the wetland classification is to be validated or improved.

11.2.1.5. Forested Wetland community group

Data from the 7 forested wetland communities represented 121 sites. Ordination indicated that 3 of the 7 communities had good resolution but 4 others had poor resolution (Figure 9). Reclassification of the 4 poorly-resolved communities as a single community shows better resolution of this group. Table 9 summarizes forested wetland communities reclassified by floristic similarity, and Appendix 12-E lists the reclassified communities by site.

Group 1 represents the combined sites that did not resolve well in ordination, and is composed of approximately equal parts Floodplain Forest and a heterogeneous mix of Boreal Forest (1 site), Hardwood-Conifer Swamp (5 sites), Poor Conifer Swamp (2 sites), Rich Conifer Swamp (1 site), Rich Tamarack Swamp (8 sites), and Southern Hardwood Swamp (10 sites). Half of **Group 15** is composed of Hardwood-Conifer Swamp and the other half a mix of Rich Conifer Swamp (3 sites), Rich Tamarack Swamp (3 sites), Floodplain Forest (1 site), and Southern Hardwood Swamp (1 site). **Group 36** is almost exclusively Rich Conifer Swamp, with a single Floodplain Forest. **Group 63** is about half Poor Conifer Swamp and half a mix of Boreal Forest (10 sites), Hardwood-Conifer Swamp (1 site), Rich Conifer Swamp (2 sites), and Southern Hardwood Swamp (1 site).

The separation of forested wetlands using the FQA-generated species lists, lumped many forest types that have been considered distinct different. It appears that plant cover data may be needed to effectively separate these wetland types. Even with the reduced information contained in the FQA species lists, Groups tended to contain a restricted subset of types. For example, almost all Floodplain Forests were in Group 1, as were all Southern Hardwood Swamps. Similarly, most Rich Conifer Swamps were in Group 36, and all

Poor Conifer Swamps and most Boreal Forests were in Group 63. Most of the remaining forested wetland types were found in several Groups. It should be noted here that Boreal Forests were being considered for inclusion as a wetland type when these analyses were initiated, but it was later decided to eliminate Boreal Forest from the wetland classification, as most of the sites for this community were largely upland sites. Originally there were extensive areas of poorly drained Boreal Forest growing on the clay plain of the eastern Upper Peninsula, in an area south of Sault Ste. Marie, but this extensive wetland area has been converted largely to agriculture.

Indicator species analysis (Appendix 13-B) indicates that Group 1 corresponds to Floodplain Forest (*Acer saccharinum*, *Fraxinus pennsylvanica*). Group 15 corresponds to Hardwood-Conifer Swamp (*Amphicarpa bracteata*, *Arisaema triphyllum*, *Carpinus caroliniana*, *Impatiens capensis*, *Lindera benzoin*, *Mitchella repens*, *Parthenocissus quinquefolia*, *Senecio aureus*, *Tilia americana*, *Vitis riparia*). Group 36 corresponds to Rich Conifer Swamp (*Abies balsamea*, *Botrychium virginianum*, *Gaultheria hispidula*, *Gymnocarpium dryopteris*, *Thuja occidentalis*). *Aster macrophyllus*, *Cornus canadensis*, *Epigaea repens*, and *Petasites palmatus* also had high importance values in this group but were not listed as components of Rich Conifer Swamp by Kost et al. (2007). Group 63 corresponds to Poor Conifer Swamp, but only *Chamaedaphne calyculata* and *Nemopanthus mucronata* had importance values above 25, with *Chamaedaphne* the strongest at 30.2, indicating that this group was not very cohesive in its species composition.

11.2.1.6. Palustrine / Terrestrial community group

Data from the Wooded Dune and Swale community was not analyzed, since the FQA species lists did not separate the wetland and the upland species sampled at each site. It was assumed that the results of these analyses would be much coarser than the extensive, detailed analyses conducted in 1995, and would not assist in separating this community into meaningful subtypes.

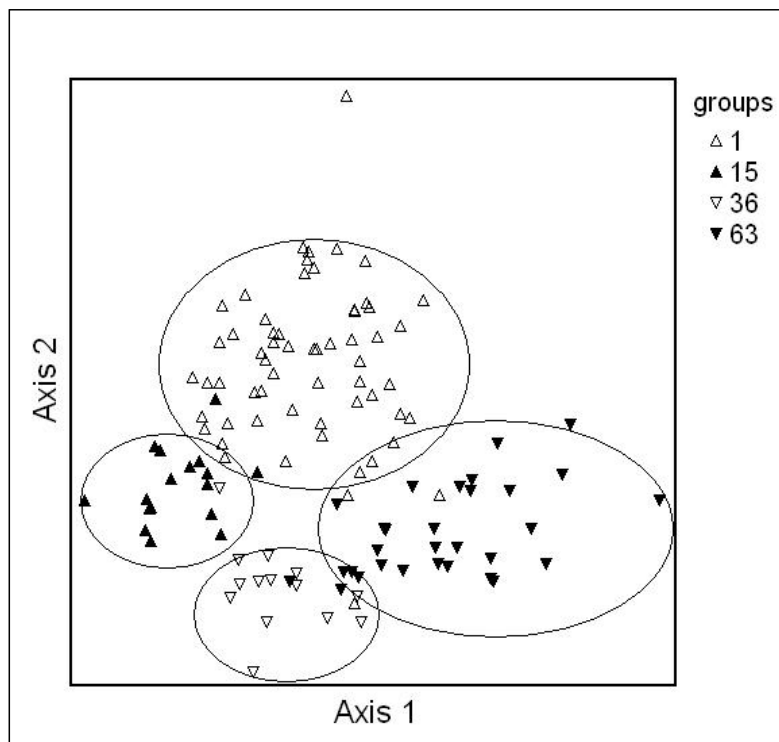
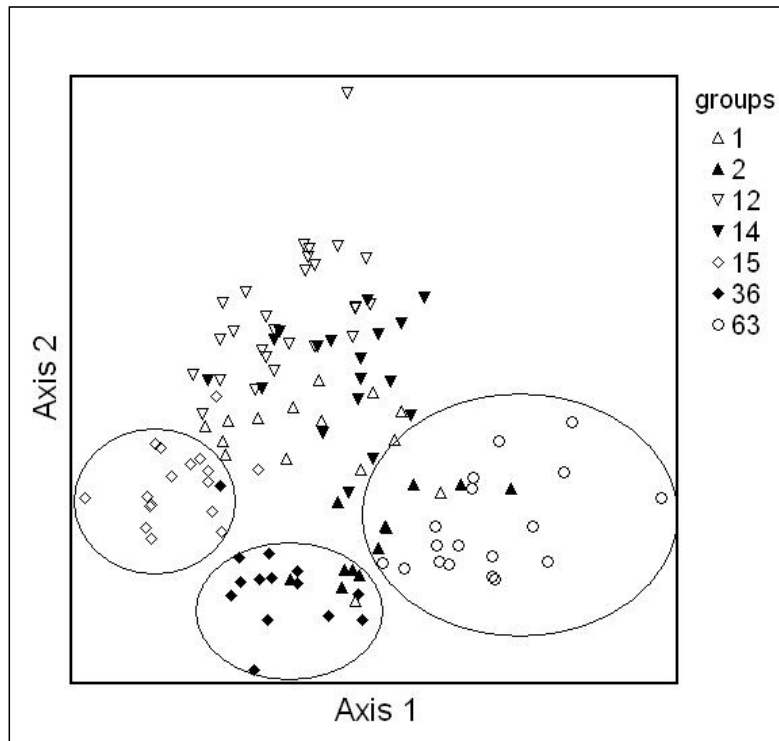


Figure 9. Bray-Curtis ordination of species at 121 sites representing the Forested Wetland community group. Top: 3 communities showing good resolution and 4 showing poor resolution. Bottom: with the 4 poorly-resolved communities reclassified into two communities. Group numbers and symbols are assigned separately by PcOrd for each ordination and are independent of one another.

Table 9. Reclassification of Forested Wetland community group based on floristic similarity.

Reclassified group	Existing community classification	Number of sites	Indicated community name
Group 1	Boreal Forest	1	Floodplain Forest
	Hardwood-Conifer Swamp	5	
	Poor Conifer Swamp	3	
	Rich Tamarack Swamp	8	
	Floodplain Forest	33	
	Southern Hardwood Swamp	10	
Group 15	Hardwood-Conifer Swamp	9	Hardwood-Conifer Swamp
	Rich Conifer Swamp	3	
	Rich Tamarack Swamp	3	
	Floodplain Forest	1	
	Southern Hardwood Swamp	1	
Group 36	Rich Conifer Swamp	13	Rich Conifer Swamp
	Floodplain Forest	1	
Group 63	Boreal Forest	10	Poor Conifer Swamp
	Hardwood-Conifer Swamp	1	
	Poor Conifer Swamp	16	
	Rich Conifer Swamp	2	
	Southern Hardwood Swamp	1	

12.0 Wildlife Habitat Models

Paul Adamus and Dennis Albert developed a habitat model based on state-wide species and natural wetland community distributions. This model, treated as Section 2, is presented independent of this section of the report. The model also links the physical, hydrologic, and structural characteristics to wetland communities, and then lists the relationship of these characteristics for each faunal species (amphibian,

reptile, bird, and mammal) occurring in the state. The statewide faunal distributions are based on the recently completed MIWILD report by the Michigan DNR (Thomasma et al. 2007). The plant community characteristics are based on the recently revised community descriptions (Kost et al. 2007 and <http://web4.msue.msu.edu/mnfi/communities/index.cfm>) and community distribution maps (Appendix III).

13.0 Discussion

One of the primary accomplishments of this project has been the scanning of almost all wetland field forms collected by MNFI ecologists over the last 27 years, followed by the input of these species lists into the FQA program. The FQA metrics allow comparison of all wetlands of a given type and also allow other information, such as the wetness of each wetland to be evaluated. It has also become clear which wetland types have been under-sampled. These under-sampled types are often the most common wetland types in the state, and because they are common, they are types for which MDEQ and MDOT must regularly make management decisions.

The FQA program has allowed for relatively fast and easy creation of species lists for cluster and DCA analysis. Unfortunately, our analyses have demonstrated that presence-absence species lists do not provide adequate information for plant community refinement. Instead, more detailed field-data collection will be needed to refine the community classification. The usefulness for classification purposes of detailed plant community data collected along ecological gradients has been demonstrated by

past studies (Albert and Minc 2004, Minc 1997, Comer and Albert 1995).

Other important accomplishment from this study has been the refinement of the community classification, the development of maps for each natural community, and creation of a list of common plant species for each wetland type. For the first time since the mid 1980s, this project, in conjunction with other state-funded projects, has allowed MNFI to review all of its wetland natural communities, summarizing large amounts of both environmental and species data.

Probably the greatest remaining task is the collection of additional data for our most common wetland types, and for some natural communities, to identify geographic areas where certain wetland types have been under-collected. For example, the western Upper Peninsula contains large numbers of bogs, especially in the ice-contact topography along the Wisconsin border in Iron and Gogebic counties. Unfortunately, almost no vegetation data has been collected from these western bogs. Wet meadows and several shrub and swamp forest types have also been under-sampled.

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Appendices

Note - the following appendices can be located on the attached CD

APPENDIX III. Distribution Maps of Natural Communities

APPENDIX VI. NWI map codes

APPENDIX VIII-A, VIII-B, VIII-C and VIII-D. Photographs of Natural Communities

APPENDIX XI. Rare species and number by wetland community

APPENDIX I. Key to the Natural Communities of Michigan (M. Kost)

Subterranean or Upland Communities

See MNFI Web page or printed copy of “Natural Communities of Michigan: Classification and Description” (Kost et al. 2007) for details of Subterranean or Upland Community portions of the key.

Wetland Communities

- 45A. Open (non-forested) wetland. Mature trees and/or tall (> 1.5 m) shrubs absent or contributing less than 50% overall canopy cover. **Open (non-forested) Wetlands, 46A**
- 45B. Forested or tall shrub-dominated wetland. Mature trees and/or tall shrubs forming 50% or more canopy cover. **Forested and Shrub Wetlands, 66A, p. 9**
- 46A. Occurrence limited to shorelines of the Great Lakes and areas strongly influenced by Great Lakes water levels and processes such as connecting channels, river mouths, and dune fields.
- 47A. Vegetation forms distinct zones typically including submergent marsh, emergent marsh, and wet meadow, with shrub and forested wetlands common along the upland margins. **Great Lakes Marsh**
- 47B. Vegetation zonation less pronounced.
- 48A. Located within low depressions in open dunes or between dune ridges of foredunes. Vegetation dominated by rushes, sedges and shrubs including Baltic rush, and twig-rush (*Cladium mariscoides*), golden-seeded spike-rush (*Eleocharis elliptica*), beak-rush (*Rhynchospora capillacea*), sedges (*Carex aquatilis*, *C. garberi*, *C. viridula*, *C. lasiocarpa*), and shrubby cinquefoil (*Potentilla fruticosa*). Soils neutral to moderately alkaline sand sometimes covered by a thin layer of muck or marl. **Interdunal Wetland**
- 48B. Located in protected bays and abandoned coastal embayments along the shorelines of northern Lake Huron and Lake Michigan. Soils grade from alkaline marl and organic deposits further inland to calcareous sand or clay along the shore. Vegetation comprised of calciphiles including spike-rushes (*Eleocharis elliptica* and *E. rostellata*), false asphodel (*Tofieldia glutinosa*), low calamint (*Calamintha arkansana*), Kalm’s lobelia (*Lobelia kalmii*), grass-of-Parnassus (*Parnassia glauca*), Indian paintbrush (*Castilleja coccinea*), bird’s-eye primula (*Primula mistassinica*), fringed gentian (*Gentianopsis procera*), yellow lady’s-slipper (*Cypripedium calceolus* var. *parviflorum*), grass- and white camas (*Zigadenus glaucus*), and shrubby cinquefoil (*Potentilla fruticosa*). **Coastal Fen**
- 46B. Occurrence more broadly distributed. Found near Great Lakes’ shorelines and/or inland.
- 49A. Vegetation dominated by grasses, with sedges important but generally not dominant
- 50A. Distribution limited to glacial lakeplain in southeastern or southwestern Lower Michigan
- 51A. Vegetation dominated by big bluestem, switch grass (*Panicum virgatum*), little bluestem, and Indian grass. Important species include sedges (*Carex* spp.), Ohio goldenrod (*Solidago ohioensis*), common mountain mint (*Pycnanthemum virginianum*), swamp-betony (*Pedicularis lanceolata*), Riddell’s goldenrod (*Solidago riddellii*), and ironweed (*Vernonia* spp.). **Lakeplain Wet-mesic Prairie**
- 51B. Vegetation dominated by blue-joint grass (*Calamagrostis canadensis*) and cordgrass (*Spartina pectinata*). Important species typically include Baltic rush (*Juncus balticus*), sedges (*Carex stricta*, *C. aquatilis*), twig-rush, and shrubby cinquefoil. **Lakeplain Wet Prairie**
- 50B. Distribution more broadly distributed.
- 52A. Soils sand to sandy loam. Occurring in both northern and southern Lower Michigan on outwash plains, old glacial lakebeds, abandoned stream channels, and river terraces. Dominant grasses may include big bluestem (*Andropogon gerardii*), little bluestem (*Schizachyrium scoparium*), Indian grass (*Sorghastrum nutans*), blue-joint grass, cordgrass, and prairie dropseed (*Sporobolus heterolepis*). Tussock sedge (*Carex stricta*) may be locally dominant. **Wet-mesic Sand Prairie**

- 52B. Soils loam to silt loam.
- 53A. Dominant grasses big bluestem, Indian grass, with blue-joint grass and cordgrass, tussock sedge (*Carex stricta*) locally important.
..... **Wet-mesic Prairie**
- 53B. Dominant grasses include blue-joint grass and cordgrass, with tussock sedge locally dominant. **Wet Prairie**
- 49B. Vegetation dominated by sedges, rushes, bulrushes, and/or sphagnum mosses, with grasses important but generally not dominant.
- 54A. Standing water greater than 6 inches in depth usually present throughout the growing season.
- 55A. Vegetation with leaves primarily submergent or floating on water surface during growing season. Common submergent plants may include common waterweed (*Elodea canadensis*), water star-grass (*Heteranthera dubia*), milfoils (*Myriophyllum* spp.), naiads (*Najas* spp.), pondweeds (*Potamogeton amplifolius*, *P. praelongus*, *P. illinoensis*, *P. zosteriformis*, *P. friesii*, and *P. strictifolius*), water crowfoots (*Ranunculus* spp.), wild-celery (*Vallisneria americana*), stonewort (*Chara* spp. and *Mitella* spp.), honewort (*Ceratophyllum demersum*), bladderworts (*Utricularia vulgaris*, *U. intermedia*, and *U. gibba*), water lily (*Nymphaea odorata*), spatterdock (*Nuphar variegata* and *N. advena*), water shield (*Brasenia schreberi*), duck weed (*Lemna minor* and *L. trisulca*), great duckweed (*Spirodela polyrhiza*), and water meal (*Wolffia* spp.).
..... **Submergent Marsh**
- 55B. Vegetation primarily emergent with leaves protruding above water (when present) during growing season. Occurring along the shores of lakes and streams. Vegetation characterized by emergent and floating-leaved plants. Common species may include cat-tail (*Typha angustifolia*, *T. latifolia*), bulrush (*Schoenoplectus acutus*, *S. pungens*, *S. subterminalis*, and *S. tabernaemontani*), sedges (*Carex comosa*, *C. lacustris*, *C. lasiocarpa*, *C. oligosperma*, *C. stricta*, and many more), manna grass (*Glyceria borealis*, *G. canadensis*, *G. striata*), pickerel weed (*Pontederia cordata*), arrowhead (*Sagittaria graminea*, *S. latifolia*, *S. montevidensis*, and *S. rigida*), bur-reed (*Sparganium americanum*, *S. angustifolium*, *S. chlorocarpum*, *S. eurycarpum*, *S. fluctuans*, and *S. minimum*), water-plantain (*Alisma plantago-aquatica*), spike-rush (*Eleocharis acicularis*, *E. elliptica*, *E. equisetoides*, *E. obtusa*, *E. quinqueflora*, *E. smallii*, and others), cut grass (*Leersia oryzoides*), duckweed (*Lemna minor*), yellow pond-lily (*Nuphar advena* and *N. variegata*), water-lily (*Nymphaea odorata*), smartweeds (*Polygonum amphibium*, *P. hydropiper*, *P. lapathifolium* and others), greater duckweed (*Spirodela polyrhiza*), water-meal (*Wolffia* spp.), and wild-rice (*Zizania aquatica*). **Emergent Marsh**
- 54B. Standing water absent or less than six inches in depth from mid summer through fall but soil remaining saturated throughout the year. May occur in isolated depressions or along the shores of lakes and rivers.
- 56A. Soil saturated by sodium- and chloride-laden groundwater from natural brine aquifers. Common plants may include Olney three-square (*Schoenoplectus americanus*), water-plantain (*Alisma plantago-aquatica*), spearscale (*Atriplex patula*), dwarf spike-rush (*Eleocharis parvula*), spike-rush (*Eleocharis erythropoda*), giant reed (*Phragmites australis*), purslane (*Portulaca oleracea*), water-pimpernel (*Samolus floribundas*), and water-parsnip (*Sium suave*).
..... **Inland Salt Marsh**
- 56B. Soil saturated but not by sodium- and chloride-laden groundwater from natural brine aquifers.
- 57A. Community structure characterized by a repeated, alternating pattern of low peat rises (strings) and hollows (flarks). Strings may support scattered and stunted black spruce and tamarack, low shrubs including *Betula pumila* (bog birch), *Potentilla fruticosa* (shrubby cinquefoil), *Andromeda glaucophylla* (bog rosemary), and *Chamaedaphne calyculata* (leatherleaf),

and sedges (*Carex oligosperma*, *C. limosa*, *Carex lasiocarpa*). The alternating flarks are often inundated and may support open lawns of sphagnum mosses, sedges (*Carex oligosperma*, *C. limosa*, *C. exilis*), *Triglochin maritima* (common bog arrow grass), and *Scheuchzeria palustris* (arrow grass). Soils are deep peat and medium to slightly acid.

..... **Patterned Fen**

- 57B. Community structure lacks repeating pattern of low peat rises and alternating hollows.
- 58A. Groundlayer dominated by a continuous carpet of sphagnum mosses or sphagnum mosses locally dominant on widely scattered low peat-ridges.
- 59A. Trees, predominantly stunted black spruce and tamarack, occurring in scattered clumps throughout wetland. Occurring north of the climatic tension zone, predominantly in the Upper Peninsula and rarely occasionally in northern Lower Michigan..... **Muskeg**
- 59B. Trees absent, rare or occurring in small portion of wetland. Occurring statewide but rare in southern Lower Michigan.
- 60A. Vegetation dominated by low, ericaceous shrubs such as leatherleaf, cranberry, Labrador tea, and bog rosemary. Soil very strongly acidic, fibric peat. Occurring statewide but rare in southern Lower Michigan. **Bog**
- 60B. Vegetation dominated by few-seed sedge (*Carex oligosperma*) and/or wiregrass sedge (*C. lasiocarpa*), often with sphagnum either throughout ground layer or dominating widely scattered, low peat ridges along with ericaceous shrubs and conifers. Soils very strongly to strongly acidic, saturated deep peat. Hydrology moderately influenced by groundwater flow. Occurring north of the climatic tension zone in kettle depressions and on level areas or mild depressions of glacial outwash and lake plains. **Poor Fen**
- 58B. Groundlayer dominated by sedges, rushes, grasses, and/or forbs with Sphagnum mosses absent or occurring locally.
- 61A. Soils, mineral or occasionally shallow muck (< 3 feet) over sand or loamy sand. Occupies perimeters or entire basins of softwater seepage lakes and other isolated depressions characterized by with large water table fluctuations (both seasonally and from year to year).
- 62A. Atlantic and Gulf coastal plain disjuncts plants common to locally dominant. Soils strongly acidic to very strongly acidic. **Coastal Plain Marsh**
- 62B. Atlantic and Gulf coastal plain disjuncts plants absent or rare. Soils neutral to very strongly acidic..... **Intermittent Wetland**
- 61B. Soils typically deep peat (> 1 m). Occupying depressions in glacial lakeplains and outwash plains, abandoned glacial lakebeds, stream corridors, and margins of lakes.
- 63A. Dominated by sedges, particularly tussock sedge (*Carex stricta*), wiregrass (*C. lasiocarpa*), and/or lake sedge (*C. lacustris*), with blue-joint grass (*Calamagrostis canadensis*) occasionally co-dominant. Vegetation zonation weak.
- 64A. Located south of the climatic tension zone in southern Lower Michigan. Vegetation dominated by tussock sedge (*Carex stricta*), and sometimes by wiregrass (*C. lasiocarpa*), and lake sedge (*C. lacustris*). sometimes co-dominant with sedges. Other important species include species include blue-joint grass (*Calamagrostis*

canadensis), sedges (*Carex aquatilis*, *C. comosa*, *C. prairea*, *C. rostrata*), fringed brome (*Bromus ciliatus*), marsh wild timothy (*Muhlenbergia glomerata*), joe-pye-weed (*Eupatorium maculatum*), and boneset (*E. perfoliatum*). Soils are typically neutral to mildly alkaline peat. Frequently invaded by dogwoods, willows, and meadow sweet (*Spiraea alba*), forming southern shrub-carr. May occur as a vegetation zone within a prairie fen complex or Great Lakes marsh.

..... **Southern Wet Meadow**

64B. Located north of climatic tension zone in northern Lower Michigan and the Upper Peninsula. Vegetation dominated by tussock sedge (*Carex stricta*), lake sedge (*C. lacustris*), *C. lasiocarpa* (wiregrass sedge), *C. rostrata* (beaked sedge), and/or *C. vesicaria* (blister sedge). Blue-joint grass often co-dominant with sedges. Other important species include), fringed brome (*Bromus ciliatus*), manna grass (*Glyceria canadensis*), marsh wild timothy, and *Scirpus atrovirens* (green bulrush). Soils are neutral to strongly acidic, shallow to deep peat.

Frequently invaded by tag alder (*Alnus rugosa*), forming northern shrub thicket. **Northern Wet Meadow**

64B. Dominance shared by sedges, grasses, rushes, bulrushes, and forbs. Scattered conifers and shrubs common. Soils neutral to moderately alkaline deep peat or marl. Vegetation sparse where marl covers the surface. Vegetation zonation well developed and strongly influenced by surface and subsurface groundwater seepage.

65A. Located north of climatic tension zone in northern Lower Michigan and the Upper Peninsula. Common species include wiregrass sedge (*Carex lasiocarpa*), creeping sedge (*C. chordorrhiza*), bristly-stalked sedge (*C. leptalea*), mud sedge (*C. limosa*), livid sedge (*C. livida*), dioecious sedge (*C. sterilis*), blue-joint grass (*Calamagrostis canadensis*), hair grass (*Deschampsia cespitosa*), twig-rush (*Cladium mariscoides*), sheathed cotton-grass (*Eriophorum spissum*), Kalm's lobelia (*Lobelia kalmii*), Ohio goldenrod (*Solidago ohioensis*), bog goldenrod (*S. uliginosa*), false asphodel (*Tofieldia glutinosa*), arrow-grass (*Triglochin maritimum*), shrubby cinquefoil (*Potentilla fruticosa*), sweet gale (*Myrica gale*), bog birch (*Betula pumila*) alder-leaved buckthorn (*Rhamnus alnifolia*), northern white-cedar (*Thuja occidentalis*), and tamarack (*Larix laricina*).....

..... **Northern Fen**

65B. Located south of the climatic tension zone in southern Lower Michigan, primarily in interlobate regions. Common species include tussock sedge (*Carex stricta*), dioecious sedge (*C. sterilis*), wiregrass sedge (*C. lasiocarpa*), Bauxbaum's sedge (*C. buxbaumii*), prairie sedge (*C. prairea*), big bluestem (*Andropogon gerardii*), little bluestem (*A. scoparia*), Indian grass (*Sorghastrum nutans*), tall flat-top white aster (*A. umbellatus*), whorled loosestrife (*Lysimachia quadriflora*), Virginia mountain mint (*Pycnanthemum virginianum*), Ohio goldenrod (*Solidago ohioensis*), Riddell's goldenrod (*S. riddellii*),

bog lobelia (*Lobelia kalmii*), grass-of-Parnassus (*Parnassia glauca*), beak-rushes (*Rhynchospora alba* and *R. capillacea*), bog arrow-grass (*Triglochin maritimum*), twig-rush (*Cladium mariscoides*), rush (*Juncus brachycephalus*), golden-seeded spike-rush (*Eleocharis elliptica*), spike-rush (*Eleocharis rostellata*), white camas (*Zigadenus glauca*), shrubby cinquefoil (*Potentilla fruticosa*), alder-leaved buckthorn (*Rhamnus alnifolia*), sage willow (*Salix candida*), and bog birch (*Betula pumila*), poison sumac (*Toxicodendron vernix*) and tamarack (*Larix laricina*). **Prairie Fen**

Forested and Shrub Wetlands.

66A. Mature trees contributing 50% or more overall cover. **Forested Wetland**, 67A

66B. Mature trees contributing less than 50% overall cover. Tall shrubs (>5 feet) dominant, contributing great than 50% overall canopy cover. **Shrub Wetland**, 75A, p. 11

67A. Conifers important, common to dominant in the canopy layer.

68A. Conifers overwhelmingly dominant.

69A. Canopy strongly dominant by black spruce, tamarack, and occasionally jack pine. Substrate extremely acid to very strongly acid, deep fibric peat. Sphagnum mosses dominant in ground layer. Ericaceous shrubs dominant to locally abundant including leather leaf (*Chamaedaphne calyculata*), (*Ledum groenlandicum*), (*Kalmia polifolia*), and in southern Lower Michigan, smooth highbush blueberry (*Vaccinium corymbosum*). Occurring mostly north of the climatic tension zone in depressions of glacial outwash, glacial lake plains, ground moraine, and kettles in coarse-textured moraines and ice-contact topography. **Poor Conifer Swamp**

69B. Canopy dominated by northern white cedar (*Thuja occidentalis*). Other important tree species include balsam fir (*Abies balsamea*), tamarack (*Larix laricina*), black spruce (*Picea mariana*), white spruce (*P. alba*), hemlock (*Tsuga canadensis*), white pine (*Pinus strobus*), black ash (*Fraxinus nigra*), red maple (*Acer saccharum*), yellow birch, paper birch (*Betula papyrifera*), American elm (*Ulmus americana*), quaking aspen (*Populus tremuloides*), and balsam poplar (*Populus balsamifera*). Substrate very strongly acid to moderately alkaline woody peat. Hydrology strongly influenced by groundwater movement. Occurring primarily north of the climatic tension zone, in northern Lower Michigan and the Upper Peninsula on glacial outwash plains, lakeplains, depressions on coarse- to medium-textured ground moraines, floodplains, and along the Great Lakes shoreline in old abandoned coastal embayments and in swales between former beach ridges within wooded dune and swale complexes. **Rich Conifer Swamp**

68B. Conifers co-dominant or sub-dominant to hardwoods.

70A. Occurring statewide in floodplains of 3rd order or greater streams and rivers. Typically dominated by hardwoods such as *Acer saccharinum* (silver maple) and *Fraxinus pennsylvanica* (red ash) but conifers (*Larix laricina*, *Thuja occidentalis*, *Pinus strobus*, and *Tsuga canadensis*) become important north of climatic tension zone, where organic soils accumulate in areas of groundwater seepage, backswamps, and meander-scars. Other important hardwoods associated with floodplain conifers include *Fraxinus nigra*, *Betula alleghaniensis*, *Acer rubrum*, and *Tilia americana*. **Floodplain Forest**

70B. Occurring along headwater streams (1st and 2nd orders), and on poorly drained glacial outwash, lakeplain, and moraines.

71A. Tamarack sparse to absent. Overall canopy comprised of a mixture of conifer and hardwood species but either may be heavily dominant locally. Common trees include hemlock, northern white cedar, white pine, tamarack, yellow birch, black ash, red maple, and American elm. Substrate neutral to strongly acid, deep to shallow peat. Occurring statewide. **Hardwood-conifer Swamp**

- 71B. Tamarack dominant to abundant. Canopy comprised of a mixture of conifer and hardwood species including tamarack, northern white cedar, white pine black ash, yellow birch, red maple, swamp white oak, and American elm. Substrate neutral to moderately alkaline, deep peat (>3 feet), often containing a layer a marl within the soil profile. Hydrology strongly influenced by groundwater movement. Occurring primarily south of climatic tension zone southern Lower Michigan and in interlobate regions is often associated with prairie fen. **Rich Tamarack Swamp**
- 67B. Conifers absent or rare in the canopy layer. Hardwoods dominant throughout.
- 72A. Occurring in floodplains of 3rd order of greater streams and rivers. Dominant overstory species include *Acer saccharinum* (silver maple), *Fraxinus pennsylvanica* (red ash), *Salix nigra*, *Populus deltoides*, *Tilia americana*, *Q. bicolor*, *Q. macrocarpa*, *Platanus occidentalis*, *Celtis occidentalis*, and *Carya ovata*. Where organic soil accumulates in areas such as groundwater seepages, backswamps, and meander-scars, tree species may include occur *Fraxinus nigra*, *Betula alleghaniensis*, *Acer rubrum*, and conifers (*Larix laricina*, *Thuja occidentalis*, *Pinus strobus*, and *Tsuga canadensis*), especially north of the tension zone. **Floodplain Forest**
- 72B. Occurring along headwater streams (1st and 2nd orders), and on poorly drained glacial outwash, lakeplain, and moraines.
- 73A. Distributed primarily north of climatic tension zone in northern Lower Michigan and the Upper Peninsula. Canopy dominated by black ash with lesser importance of red maple (*Acer rubrum*), American elm (*Ulmus americana*), silver maple (*Acer saccharinum*), yellow birch (*Betula alleghaniensis*), basswood (*Tilia americana*), balsam fir (*Abies balsamifera*), white cedar (*Thuja occidentalis*), and green ash (*Fraxinus pennsylvanica*). Soils are neutral to slightly acidic, hydric, mineral soils and shallow muck over mineral soils. Occurring on poorly drained lakeplains, outwash plains, and fine- to medium-textured glacial till. **Northern Hardwood Swamp**
- 73B. Distributed primarily south of climatic tension zone in southern Lower Michigan.
- 74A. Located almost exclusively on level lakeplain in southeastern Lower Michigan. Dominant tree species comprised of highly diverse mixture of lowland and upland hardwoods including oaks, hickories, maples, ashes, and basswood. Soils typically medium to slightly acid sandy loam or loam over mildly alkaline clay. **Wet-mesic Flatwoods**
- 74B. Located in depressions on glacial outwash, moraines, and lakeplain throughout southern Lower Michigan. Dominant tree species comprised of lowland hardwoods including silver maple (*Acer saccharinum*), red maple (*A. rubrum*), green ash (*Fraxinus pensylvanica*), black ash (*F. nigra*), swamp white oak (*Quercus bicolor*), bur oak (*Q. macrocarpa*), and occasionally (*Q. palustris*). Soils mineral or organic, typically neutral to mildly alkaline pH. **Southern Hardwood Swamp**

Shrub Wetlands

- 75A. Dominated by buttonbush (*Cephalanthus occidentalis*). Typically Occurring in small, isolated depressions south of the climatic tension zone in southern Lower Michigan. Standing water often present throughout growing season. **Inundated Shrub Swamp**
- 75B. Dominated by shrub species other than buttonbush.
- 76A. Shrub canopy dominated by tag alder. Occurring predominantly north of the climatic tension zone in northern Lower Michigan and the Upper Peninsula along streams and lake edges, on outwash channels, outwash plains, and lakeplains. **Northern Shrub Thicket**
- 76B. Shrub canopy dominated by dogwoods (*Cornus foemina*, *C. stolonifera*, *C. amomum*) and willows (*Salix bebbiana*, *S. discolor*, *S. exigua*, *S. petiolaris*, *S. eriocephala*) with other common shrubs including bog birch, Michigan holly, and elderberry. Occurring predominantly south of the climatic tension zone in southern Lower Michigan on outwash channels, outwash plains, and lakeplains. **Southern Shrub-carr**

APPENDIX II. Distribution of Michigan's natural plant communities by Ecoregion ¹					
MNFI COMMUNITY	REGION VI: South Lower Michigan	REGION VII: North Lower Michigan	REGION VIII: Eastern Upper Michigan	REGION IX: Western Upper Michigan	GREAT LAKES SHORE ²
PALUSTRINE					
Marsh					
Submergent marsh	X	X	X	X	
Emergent marsh	X	X	X	X	
Great Lakes Marsh	X	X	X	X	X³
Northern wet meadow		X	X	X	
Southern wet meadow	X				
Inland salt marsh	X				
Intermittent wetland	x	X	X	X	
Coastal plain marsh	X	X			
Interdunal wetland	X	X	X	X	X
Prairie					
Lakeplain wet prairie	X				
Lakeplain wet-mesic prairie	X				
Wet-mesic sand prairie	X	X			
Wet prairie	X				
Wet-mesic prairie	X				
Fen					
Prairie fen	X				
Northern fen		X	X		
Patterned fen			X	x ⁴	
Poor fen		X	X	X	
Coastal fen		X	X		X
Bog					
Bog	X	X	X	X	
Muskeg		X	X	X	
Forest					
Poor conifer swamp	x	X	X	X	
Rich conifer swamp	x	X	X	X	
Rich tamarack swamp	X	x			
Hardwood-conifer swamp	x	X	X	X	
Northern hardwood swamp		X	X	X	
Southern hardwood swamp	X	x			
Floodplain forest	X	X	X	X	
Wet-mesic flatwood	X				X
Shrub					
Northern shrub thicket		X	X	X	
Southern shrub-carr	X	x			
Inundated shrub swamp	X	x			
Palustrine/Terrestrial					
Wooded dune & swale complex	x	X	X	X	X

1. Ecoregions based on Regional Landscape Ecosystems of Michigan, Minnesota, and Wisconsin (1995).
2. Great Lakes (GL) category includes those communities concentrated on or very near to GL shorelines.
3. **Bold** type signifies that this natural community is concentrated in this Ecoregion (or along GL shore).
4. Lower case (x) signifies that the community can occur in this Ecoregion, but that it is not characteristic.

APPENDIX III. Distribution Maps of Natural Communities - Located on CD

APPENDIX IV. Association of wetland types to common landforms of Michigan.		
LANDFORM OR FEATURE	WETLAND COMMUNITIES	REGIONS
GREAT LAKES SHORELINE	GREAT LAKES MARSH	
“ “	COASTAL FEN	
GREAT LAKES SAND DUNES	INTERDUNAL WETLAND	
GREAT LAKES SHORE: BEACH RIDGES	INTERDUNAL WETLAND	
“ “	WOODED DUNE AND SWALE COMPLEX	
GLACIAL LAKE BED – BROAD, FLAT	COASTAL PLAIN MARSH	REGION VI, VII
“ ”	MUSKEG	REGION VII, VIII, IX
“ “	PATTERNED FEN	REGION VIII
“ “	WET-MESIC FLAT WOOD	REGION VI
“ “	LAKEPLAIN WET PRAIRIE	REGION VI
“ “	LAKEPLAIN WET-MESIC PRAIRIE	REGION VI
OUTWASH PLAIN-BROAD, FLAT	MUSKEG	REGION VII, VIII, IX
“ “	PATTERNED FEN	REGION VIII
“ “	WET-MESIC SAND PRAIRIE	REGIONS VI, VII
GROUND MORAINE – DEPRESSIONS WITHIN	RICH TAMARACK SWAMP	REGION VI
SEEPAGES AT BASE OF SLOPES	INLAND SALT MARSH	REGION VI
“ “	PRAIRIE FEN	REGION VI
“ “	NORTHERN FEN	REGION VII, VIII
“ “	RICH CONIFER SWAMP	REGION VII, VIII
“ “	RICH TAMARACK SWAMP	REGION VI, VII
STREAM CHANNELS-NARROW	RICH CONIFER SWAMP	REGION VII, VIII, IX
“ “	FLOODPLAIN FOREST	STATEWIDE
KETTLE DEPRESSIONS- STEEP	BOG	STATEWIDE
“ “	INUNDATED SHRUB SWAMP	REGION VI
KETTLE DEPRESSIONS - GENTLE	COASTAL PLAIN MARSH	REGION VI, VII
“ “	INTERMITTENT WETLAND	REGION VI, VII, VIII, IX
GENERAL: DEPRESSIONS IN MANY TYPES OF LANDSCAPES	SUBMERGENT MARSH	
“ “	EMERGENT MARSH	
“ “	NORTHERN WET MEADOW	

APPENDIX IV. Association of wetland types to common landforms of Michigan, continued.		
LANDFORM OR FEATURE	WETLAND COMMUNITIES	COMMENTS
GENERAL: DEPRESSIONS IN MANY TYPES OF LANDSCAPES	SOUTHERN WET MEADOW	
“ “	MUSKEG	
“ “	POOR FEN	
“ “	POOR CONIFER SWAMP	
“ “	RICH CONIFER SWAMP	
“ “	HARDWOOD-CONIFER SWAMP	
“ “	NORTHERN HARDWOOD SWAMP	
“ “	SOUTHERN HARDWOOD SWAMP	
“ “	NORTHERN SHRUB-THICKET	
“ “	SOUTHERN SHRUB-CARR	

APPENDIX V-A. Crosswalk of Michigan Natural Features Inventory and
National Wetland Inventory Wetland Classifications

MNFI COMMUNITY	NATIONAL WETLAND INVENTORY CLASSIFICATION			
	SYSTEM ¹	SUBSYSTEM	CLASS ¹	SUBCLASS
WETLAND TYPE				
Marsh				
Submergent Marsh	RIVERINE	LOWER PERENNIAL	AQUATIC BED	
“ “	LACUSTRINE	LITTORAL	AQUATIC BED	
“ “	LACUSTRINE	LIMNETIC	AQUATIC BED	
“ “	LACUSTRINE	LITTORAL	OPEN WATER	FLOATING VASCULAR
“ “	PALUSTRINE		AQUATIC BED	AQUATIC MOSS
“ “	PALUSTRINE		AQUATIC BED	ROOTED VASCULAR
“ “	PALUSTRINE		AQUATIC BED	FLOATING VASCULAR
Emergent Marsh	RIVERINE	LOWER PERENNIAL	EMERGENT	NON PERSISTENT
“ “	RIVERINE	LOW PERENNIAL	EMERGENT	PERSISTENT
“ “	“ “	LACUSTRINE	LITTORAL	
Great Lakes Marsh	LACUSTRINE	LIMNETIC	AQUATIC BED	
“ “	“ “	LITTORAL	AQUATIC BED	ROOTED VASCULAR
“ “	“ “	“ “	OPEN WATER	FLOATING VASCULAR
“ “	“ “	“ “	SCRUB/SHRUB	BROAD-LEAVED DECIDUOUS (1)
“ “	“ “	“ “	“ “	BROAD-LEAVED EVERGREEN
Northern Wet Meadow	PALUSTRINE		EMERGENT	PERSISTENT
Southern Wet Meadow	PALUSTRINE		EMERGENT	PERSISTENT
Inland Salt Marsh	PALUSTRINE		EMERGENT	PERSISTENT
Intermittent Wetland	PALUSTRINE		EMERGENT	PERSISTENT
Coastal Plain Marsh	PALUSTRINE		EMERGENT	PERSISTENT
“ “	“ “		“ “	NON PERSISTENT
Interdunal Wetland	PALUSTRINE		EMERGENT	PERSISTENT
“ “	“ “		“ “	NON PERSISTENT
Prairie				
Lakeplain Wet Prairie	PALUSTRINE		EMERGENT	PERSISTENT
Lakeplain Wet-mesic Prairie	PALUSTRINE		EMERGENT	PERSISTENT
Wet-mesic Sand Prairie	PALUSTRINE		EMERGENT	PERSISTENT

Wet Prairie	PALUSTRINE		EMERGENT	PERSISTENT
Wet-mesic Prairie	PALUSTRINE		EMERGENT	PERSISTENT
Fen				
Prairie Fen	PALUSTRINE		EMERGENT	PERSISTENT
Northern Fen	PALUSTRINE		EMERGENT	PERSISTENT
“ “	“ “		SHRUB-SCRUB	EVERGREEN
Patterned Fen	PALUSTRINE		EMERGENT	PERSISTENT
“ “	“ “		SHRUB-SCRUB	EVERGREEN
Poor Fen	PALUSTRINE		EMERGENT	PERSISTENT
“ “	“ “		SHRUB-SCRUB	EVERGREEN
Coastal Fen	PALUSTRINE		EMERGENT	PERSISTENT
“ “	“ “		“ “	NONPERSISTENT
Bog				
Bog	PALUSTRINE		EMERGENT	MOSS/LICHEN
“ “	“ “		SCRUB/SHRUB	BROAD-LEAVED EVERGREEN
“ “	“ “		“ “	NEEDLE-LEAVED EVERGREEN
Muskeg	PALUSTRINE		EMERGENT	MOSS/LICHEN
“ “	“ “		SCRUB/SHRUB	BROAD-LEAVED EVERGREEN
“ “	“ “		“ “	NEEDLE-LEAVED EVERGREEN
Forest				
Poor Conifer Swamp	PALUSTRINE		FORESTED	NEEDLE-LEAVED EVERGREEN
Rich Conifer Swamp	PALUSTRINE		FORESTED	NEEDLE-LEAVED EVERGREEN
Rich Tamarack Swamp	PALUSTRINE		FORESTED	NEEDLE-LEAVED DECIDUOUS (LARIX)
Hardwood-conifer Swamp	PALUSTRINE		FORESTED	NEEDLE-LEAVED DECIDUOUS
“ “	“ “		FORESTED	NEEDLE-LEAVED EVERGREEN
“ “	“ “		FORESTED	BROAD-LEAVED DECIDUOUS
Northern Hardwood Swamp	PALUSTRINE		FORESTED	NEEDLE-LEAVED EVERGREEN
“ “	“ “		FORESTED	NEEDLE-LEAVED DECIDUOUS
Southern Hardwood Swamp	PALUSTRINE		FORESTED	BROAD-LEAVED DECIDUOUS
Floodplain Forest	PALUSTRINE	RIVERINE	FORESTED	BROAD-LEAVED DECIDUOUS
Shrub				
Northern Shrub	PALUSTRINE		SCRUB/SHRUB	BROAD-LEAVED

Thicket				DECIDUOUS
“ “	“ “		“ “	BROAD-LEAVED EVERGREEN
Southern Shrub-carr	PALUSTRINE		SCRUB/SHRUB	BROAD-LEAVED DECIDUOUS
Inundated Shrub Swamp	PALUSTRINE		SCRUB/SHRUB	BROAD-LEAVED DECIDUOUS
Palustrine/ Terrestrial				
Wooded Dune and Swale Complex	PALUSTRINE		FORESTED	NEEDLE-LEAVED EVERGREEN
“ “	“ “		“ “	DECIDUOUS
“ “	“ “		EMERGENT	PERSISTENT
“ “	“ “		SCRUB/SHRUB	BROAD-LEAVED DECIDUOUS
“ “	“ “		SCRUB/SHRUB	BROAD-LEAVED EVERGREEN

¹ While the Class “Open Water” is only noted as commonly occurring in the “Lacustrine” Systems for MNFI’s “Submergent Marsh” and “Great Lakes Marsh”, small inclusions of “Palustrine Open Water” may occur in many other wetland communities as small inclusions.

APPENDIX V-B Crosswalk of Michigan Natural Features Inventory and NatureServe (NS) Wetland Community Names

MI COMMUNITY	SYSTEM (NS)	CODE (NS)
Bog	Boreal Laurentian Bog	CES103.581
Bog	North Central Interior and Appalachian Acidic Peatland	CES202.606
Coastal Fen	Northern Great Lakes Coastal Marsh	CES201.722
Coastal Fen	Great Lakes Alkaline Rocky Shore and Cliff	CES201.995
Coastal Plain Marsh	Northern Atlantic Coastal Plain Pondshore	CES203.518
Emergent Marsh	Laurentian Acadian Freshwater Marsh	CES201.594
Emergent Marsh	North Central Interior Wet Meadow Shrub Swamp	CES202.701
Emergent Marsh	North Central Interior Freshwater Marsh	CES202.899
Floodplain Forest	Eastern Boreal Floodplain	CES103.588
Floodplain Forest	Laurentian Acadian Floodplain Forest	CES201.587
Floodplain Forest	North Central Interior Floodplain	CES202.694
Great Lakes Marsh	Northern Great Lakes Coastal Marsh	CES201.722
Great Lakes Marsh	Great Lakes Freshwater Estuary and Delta	CES202.033
Hardwood-Conifer Swamp	Laurentian Acadian Alkaline Conifer Hardwood Swamp	CES201.575
Inland Salt Marsh	Eastern Great Plains Wet Meadow, Prairie, and Marsh	CES205.687
Interdunal Wetland	Northern Great Lakes Interdunal Wetland	CES201.034
Intermittent Wetland	Laurentian Acadian Freshwater Marsh	CES201.594
Intermittent Wetland	Laurentian Acadian Wet Meadow Shrub Swamp	CES201.582
Intermittent Wetland	North Central Interior Wet Meadow Shrub Swamp	CES202.701
Intermittent Wetland	North Central Interior Freshwater Marsh	CES202.899
Intermittent Wetland	Boreal Laurentian Acadian Acidic Basin Fen	CES201.583
Intermittent Wetland	Boreal Laurentian Bog	CES103.581
Intermittent Wetland	North Central Interior and Appalachian Acidic Peatland	CES202.606
Inundated Shrub Swamp	North Central Interior Wet Meadow Shrub Swamp	CES202.701
Lakeplain Wet Prairie	Great Lakes Wet Mesic Lakeplain Prairie	CES202.027
Lakeplain Wet-mesic Prairie	Great Lakes Wet Mesic Lakeplain Prairie	CES202.027
Muskeg	Boreal Laurentian Bog	CES103.581
Muskeg	Boreal Laurentian Conifer Acidic Swamp	CES103.725
Northern Fen	Laurentian Acadian Alkaline Fen	CES201.585
Northern Hardwood Swamp	Laurentian Acadian Alkaline Conifer Hardwood Swamp	CES201.575
Northern Shrub Thicket	Laurentian Acadian Wet Meadow Shrub Swamp	CES201.582
Northern Wet Meadow	Laurentian Acadian Wet Meadow Shrub Swamp	CES201.582
Patterned Fen	Boreal Laurentian Acadian Acidic Basin Fen	CES201.583
Poor Conifer Swamp	Boreal Laurentian Conifer Acidic Swamp	CES103.724
Poor Conifer Swamp	North Central Interior and Appalachian Acidic Peatland	CES202.606
Poor Fen	Boreal Laurentian Bog	CES103.581
Poor Fen	Boreal Laurentian Conifer Acidic Swamp	CES103.726
Poor Fen	Boreal Laurentian Acadian Acidic Basin Fen	CES201.583
Poor Fen	North Central Interior and Appalachian Acidic Peatland	CES202.606
Prairie Fen	North Central Interior Shrub Graminoid Alkaline Fen	CES202.702
Rich Conifer Swamp	Laurentian Acadian Alkaline Conifer Hardwood Swamp	CES201.575
Rich Conifer Swamp	North Central Interior and Appalachian Rich Swamp	CES202.605
Rich Tamarack Swamp	North Central Interior and Appalachian Rich Swamp	CES202.605
Southern Hardwood Swamp	North Central Interior and Appalachian Rich Swamp	CES202.605
Southern Hardwood Swamp	North Central Interior Wet Flatwoods	CES202.700
Southern Shrub-Carr	North Central Interior Wet Meadow Shrub Swamp	CES202.701
Southern Wet Meadow	North Central Interior Wet Meadow Shrub Swamp	CES202.701
Submergent Marsh	Laurentian Acadian Freshwater Marsh	CES201.594
Submergent Marsh	North Central Interior Freshwater Marsh	CES202.899

Wet Prairie	North Central Interior Wet Meadow Shrub Swamp	CES202.701
Wet Prairie	Eastern Great Plains Wet Meadow, Prairie, and Marsh	CES205.687
Wet-mesic Flatwoods	North Central Interior Wet Flatwoods	CES202.700
Wet-mesic Praire	Central Tallgrass Prairie	CES205.683
Wet-mesic Prairie	North Central Interior Wet Meadow Shrub Swamp	CES202.701
Wet-mesic Sand Prairie	Laurentian Acadian Wet Meadow Shrub Swamp	CES201.582
Wet-mesic Sand Prairie	North Central Interior Sand and Gravel Tallgrass Prairie	CES202.695
Wet-mesic Sand Prairie	North Central Interior Wet Meadow Shrub Swamp	CES202.701
Wet-mesic Sand Prairie	Northern Tallgrass Prairie	CES205.686
Wooded Dune and Swale Complex	Great Lakes Dune and Swale	CES201.726

APPENDIX VII: Characteristic Plant Species of Michigan Wetlands

Common Plant Species of Bogs (55 sites)		
ScientificName	Group	Proportion of sites reporting
<i>Chamaedaphne calyculata</i>	vascular plant	0.98
<i>Larix laricina</i>	vascular plant	0.84
<i>Carex oligosperma</i>	vascular plant	0.69
<i>Pinus strobus</i>	vascular plant	0.67
<i>Acer rubrum</i>	vascular plant	0.62
<i>Sarracenia purpurea</i>	vascular plant	0.62
<i>Aronia prunifolia</i>	vascular plant	0.58
<i>Vaccinium oxycoccos</i>	vascular plant	0.56
<i>Andromeda glaucophylla</i>	vascular plant	0.53
<i>Drosera rotundifolia</i>	vascular plant	0.51
<i>Picea mariana</i>	vascular plant	0.51
<i>Rhynchospora alba</i>	vascular plant	0.49
<i>Woodwardia virginica</i>	vascular plant	0.49
<i>Dulichium arundinaceum</i>	vascular plant	0.45
<i>Ilex verticillata</i>	vascular plant	0.45
<i>Vaccinium macrocarpon</i>	vascular plant	0.45
<i>Eriophorum virginicum</i>	vascular plant	0.42
<i>Calamagrostis canadensis</i>	vascular plant	0.40
<i>Nemopanthus mucronata</i>	vascular plant	0.40
<i>Scirpus cyperinus</i>	vascular plant	0.40
<i>Vaccinium corymbosum</i>	vascular plant	0.40
<i>Potentilla palustris</i>	vascular plant	0.35
<i>Thelypteris palustris</i>	vascular plant	0.35
<i>Typha latifolia</i>	vascular plant	0.35
<i>Vaccinium angustifolium</i>	vascular plant	0.33

Common Plant Species of Coastal Plain Marshes (31 sites)		
ScientificName	Group	Proportion of Sites Reporting
Juncus canadensis	vascular plant	0.77
Calamagrostis canadensis	vascular plant	0.71
Fimbristylis autumnalis	vascular plant	0.71
Viola lanceolata	vascular plant	0.71
Rhynchospora capitellata	vascular plant	0.68
Spiraea tomentosa	vascular plant	0.68
Euthamia remota	vascular plant	0.61
Rhynchospora macrostachya	vascular plant	0.61
Spiraea alba	vascular plant	0.61
Cephalanthus occidentalis	vascular plant	0.58
Cladium mariscoides	vascular plant	0.55
Hypericum boreale	vascular plant	0.55
Rhexia virginica	vascular plant	0.55
Dulichium arundinaceum	vascular plant	0.52
Psilocarya scirpoides	vascular plant	0.52
Stachys hyssopifolia	vascular plant	0.52
Chamaedaphne calyculata	vascular plant	0.48
Eleocharis melanocarpa	vascular plant	0.48
Eleocharis olivacea	vascular plant	0.48
Eleocharis robbinsii	vascular plant	0.48
Panicum spretum	vascular plant	0.48
Scirpus cyperinus	vascular plant	0.48
Nymphaea odorata	vascular plant	0.45
Rotala ramosior	vascular plant	0.45
Rubus hispidus	vascular plant	0.45
Agalinis purpurea	vascular plant	0.42
Eupatorium perfoliatum	vascular plant	0.42
Polygonum amphibium	vascular plant	0.42
Brasenia schreberi	vascular plant	0.39
Drosera intermedia	vascular plant	0.39
Pontederia cordata	vascular plant	0.39
Utricularia gibba	vascular plant	0.39
Acer rubrum	vascular plant	0.35
Fuirena squarrosa	vascular plant	0.35
Lycopus uniflorus	vascular plant	0.35
Triadenum virginicum	vascular plant	0.35
Xyris difformis	vascular plant	0.35

Common Plant Species of Emergent Marshes (9 sites)		
ScientificName	Group	Proportion of Sites Reporting
Schoenoplectus acutus	vascular plant	0.67
Nymphaea odorata	vascular plant	0.56
Polygonum amphibium	vascular plant	0.56
Eupatorium maculatum	vascular plant	0.44
Larix laricina	vascular plant	0.44
Nuphar variegata	vascular plant	0.44
Spiraea alba	vascular plant	0.44
Typha latifolia	vascular plant	0.44
Carex lasiocarpa	vascular plant	0.33
Dulichium arundinaceum	vascular plant	0.33
TYPHA ANGUSTIFOLIA	vascular plant	0.33

Common Plant Species of Floodplain Forests (35 sites)		
ScientificName	Group	Proportion of Sites Reporting
Laportea canadensis	vascular plant	0.80
Toxicodendron radicans	vascular plant	0.77
Acer saccharinum	vascular plant	0.74
Onoclea sensibilis	vascular plant	0.74
Fraxinus nigra	vascular plant	0.71
Carpinus caroliniana	vascular plant	0.69
Lindera benzoin	vascular plant	0.66
Fraxinus pennsylvanica	vascular plant	0.63
Impatiens capensis	vascular plant	0.60
Tilia americana	vascular plant	0.60
Parthenocissus quinquefolia	vascular plant	0.57
Ulmus americana	vascular plant	0.57
Arisaema triphyllum	vascular plant	0.51
Sambucus canadensis	vascular plant	0.51
Symplocarpus foetidus	vascular plant	0.51
Vitis riparia	vascular plant	0.49
Acer saccharum	vascular plant	0.46
Galium aparine	vascular plant	0.46
Glyceria striata	vascular plant	0.46
Ranunculus hispidus	vascular plant	0.46
Urtica dioica	vascular plant	0.46
Boehmeria cylindrica	vascular plant	0.43
LYSIMACHIA NUMMULARIA	vascular plant	0.43
Platanus occidentalis	vascular plant	0.43
Populus deltoides	vascular plant	0.43
Quercus macrocarpa	vascular plant	0.43
Osmunda regalis	vascular plant	0.40
Zanthoxylum americanum	vascular plant	0.40
Acer rubrum	vascular plant	0.37
Carex intumescens	vascular plant	0.37
Fraxinus americana	vascular plant	0.37
Polygonum virginianum	vascular plant	0.37
Quercus bicolor	vascular plant	0.37
Quercus rubra	vascular plant	0.37
Thalictrum dasycarpum	vascular plant	0.37
Thalictrum dioicum	vascular plant	0.37
Viburnum lentago	vascular plant	0.37
Alnus rugosa	vascular plant	0.34
Carex lacustris	vascular plant	0.34
Geranium maculatum	vascular plant	0.34
Phalaris arundinacea	vascular plant	0.34

Common Plant Species of Great Lakes Marshes (84 sites)		
ScientificName	Group	Proportion of Sites Reporting
Calamagrostis canadensis	vascular plant	0.85
Schoenoplectus acutus	vascular plant	0.64
Carex stricta	vascular plant	0.62
Polygonum amphibium	vascular plant	0.61
Sagittaria latifolia	vascular plant	0.58
Impatiens capensis	vascular plant	0.56
Eupatorium perfoliatum	vascular plant	0.52
Campanula aparinoides	vascular plant	0.51
Carex aquatilis	vascular plant	0.50
Rorippa palustris	vascular plant	0.50
Typha latifolia	vascular plant	0.50
Lycopus americanus	vascular plant	0.49
Nymphaea odorata	vascular plant	0.49
Potamogeton gramineus	vascular plant	0.49
Alnus rugosa	vascular plant	0.48
Eleocharis smallii	vascular plant	0.48
Phalaris arundinacea	vascular plant	0.46
Chara globularis	alga	0.45
Elodea canadensis	vascular plant	0.45
Galium trifidum	vascular plant	0.45
Schoenoplectus tabernaemontani	vascular plant	0.45
Scutellaria galericulata	vascular plant	0.45
Pontederia cordata	vascular plant	0.44
TYPHA ANGUSTIFOLIA	vascular plant	0.43
Utricularia intermedia	vascular plant	0.43
Utricularia vulgaris	vascular plant	0.43
Cicuta bulbifera	vascular plant	0.42
Carex lasiocarpa	vascular plant	0.42
Myrica gale	vascular plant	0.42
Najas flexilis	vascular plant	0.42
Salix petiolaris	vascular plant	0.42
Carex lacustris	vascular plant	0.40
Potentilla palustris	vascular plant	0.40
Potamogeton richardsonii	vascular plant	0.40
Sparganium eurycarpum	vascular plant	0.39
Spiraea alba	vascular plant	0.38
Bidens cernuus	vascular plant	0.37
Cornus stolonifera	vascular plant	0.37
Equisetum fluviatile	vascular plant	0.37
Lemna minor	vascular plant	0.37
Polygonum lapathifolium	vascular plant	0.37
Vallisneria americana	vascular plant	0.36
Ceratophyllum demersum	vascular plant	0.35
Juncus canadensis	vascular plant	0.35
Leersia oryzoides	vascular plant	0.35
Nuphar variegata	vascular plant	0.35
Verbena hastata	vascular plant	0.35

Common Plant Species of Great Lakes Marshes, continued.		
<i>Lycopus uniflorus</i>	vascular plant	0.33
<i>Phragmites australis</i>	vascular plant	0.33
<i>Potamogeton pectinatus</i>	vascular plant	0.33
<i>Schoenoplectus pungens</i>	vascular plant	0.33

Common Plant Species of Hardwood-Conifer Swamps (15 sites)		
ScientificName	Group	Proportion of Sites Reporting
Acer rubrum	vascular plant	0.93
Onoclea sensibilis	vascular plant	0.93
Osmunda cinnamomea	vascular plant	0.93
Fraxinus nigra	vascular plant	0.80
Lindera benzoin	vascular plant	0.80
Maianthemum canadense	vascular plant	0.80
Osmunda regalis	vascular plant	0.80
Arisaema triphyllum	vascular plant	0.73
Betula alleghaniensis	vascular plant	0.73
Coptis trifolia	vascular plant	0.73
Impatiens capensis	vascular plant	0.73
Pinus strobus	vascular plant	0.73
Thuja occidentalis	vascular plant	0.73
Trientalis borealis	vascular plant	0.73
Ilex verticillata	vascular plant	0.67
Mitchella repens	vascular plant	0.67
Parthenocissus quinquefolia	vascular plant	0.67
Quercus rubra	vascular plant	0.67
Aralia nudicaulis	vascular plant	0.60
Betula papyrifera	vascular plant	0.60
Boehmeria cylindrica	vascular plant	0.60
Cirsium muticum	vascular plant	0.60
Dryopteris carthusiana	vascular plant	0.60
Eupatorium maculatum	vascular plant	0.60
Galium triflorum	vascular plant	0.60
Glyceria striata	vascular plant	0.60
Lycopus uniflorus	vascular plant	0.60
Symplocarpus foetidus	vascular plant	0.60
Tilia americana	vascular plant	0.60
Toxicodendron radicans	vascular plant	0.60
Amphicarpaea bracteata	vascular plant	0.53
Aster lateriflorus	vascular plant	0.53
Carpinus caroliniana	vascular plant	0.53
Circaea alpina	vascular plant	0.53
Circaea lutetiana	vascular plant	0.53
Clintonia borealis	vascular plant	0.53
Eupatorium perfoliatum	vascular plant	0.53
Mitella diphylla	vascular plant	0.53
Mitella nuda	vascular plant	0.53
Polygonatum pubescens	vascular plant	0.53
Ranunculus recurvatus	vascular plant	0.53
Rubus pubescens	vascular plant	0.53
Solidago patula	vascular plant	0.53
Solidago rugosa	vascular plant	0.53
Ulmus americana	vascular plant	0.53
Vitis riparia	vascular plant	0.53
Alnus rugosa	vascular plant	0.47

Common Plant Species of Hardwood-Conifer Swamps, continued.		
Aster umbellatus	vascular plant	0.47
Botrychium virginianum	vascular plant	0.47
Chelone glabra	vascular plant	0.47
Cicuta maculata	vascular plant	0.47
Cornus canadensis	vascular plant	0.47
Carex intumescens	vascular plant	0.47
Fagus grandifolia	vascular plant	0.47
Larix laricina	vascular plant	0.47
Leersia oryzoides	vascular plant	0.47
PRUNELLA VULGARIS	vascular plant	0.47
SOLANUM DULCAMARA	vascular plant	0.47
Actaea pachypoda	vascular plant	0.40
Adiantum pedatum	vascular plant	0.40
Agrimonia gryposepala	vascular plant	0.40
Asclepias incarnata	vascular plant	0.40
Athyrium filix-femina	vascular plant	0.40
Calamagrostis canadensis	vascular plant	0.40
Euthamia graminifolia	vascular plant	0.40
Fragaria virginiana	vascular plant	0.40
Hamamelis virginiana	vascular plant	0.40
Hystrix patula	vascular plant	0.40
Lobelia siphilitica	vascular plant	0.40
Medeola virginiana	vascular plant	0.40
Polygala paucifolia	vascular plant	0.40
Populus tremuloides	vascular plant	0.40
Prunus serotina	vascular plant	0.40
Pyrola elliptica	vascular plant	0.40
Ribes triste	vascular plant	0.40
Rubus strigosus	vascular plant	0.40
Scirpus cyperinus	vascular plant	0.40
Scutellaria lateriflora	vascular plant	0.40
Senecio aureus	vascular plant	0.40
Tsuga canadensis	vascular plant	0.40
Typha latifolia	vascular plant	0.40
Uvularia grandiflora	vascular plant	0.40
Acer saccharum	vascular plant	0.33
Asclepias syriaca	vascular plant	0.33
Aster macrophyllus	vascular plant	0.33
Caltha palustris	vascular plant	0.33
Chrysosplenium americanum	vascular plant	0.33
Cinna arundinacea	vascular plant	0.33
Cornus foemina	vascular plant	0.33
Carex stricta	vascular plant	0.33
Dryopteris cristata	vascular plant	0.33
ELAEAGNUS UMBELLATA	vascular plant	0.33
Equisetum arvense	vascular plant	0.33
Eupatorium rugosum	vascular plant	0.33
Geranium maculatum	vascular plant	0.33

Common Plant Species of Hardwood-Conifer Swamps, continued.		
<i>Geum canadense</i>	vascular plant	0.33
<i>Hepatica americana</i>	vascular plant	0.33
<i>Laportea canadensis</i>	vascular plant	0.33
<i>Lonicera canadensis</i>	vascular plant	0.33
<i>Osmorhiza claytonii</i>	vascular plant	0.33
<i>Polygonum sagittatum</i>	vascular plant	0.33
<i>Quercus alba</i>	vascular plant	0.33
<i>Rhamnus alnifolia</i>	vascular plant	0.33
<i>Rubus hispidus</i>	vascular plant	0.33
<i>Sambucus racemosa</i>	vascular plant	0.33
<i>Scirpus atrovirens</i>	vascular plant	0.33
<i>Smilacina racemosa</i>	vascular plant	0.33
<i>Smilax tamnoides</i>	vascular plant	0.33
<i>Thelypteris palustris</i>	vascular plant	0.33
<i>Toxicodendron vernix</i>	vascular plant	0.33
<i>Urtica dioica</i>	vascular plant	0.33
<i>Viola cucullata</i>	vascular plant	0.33

Common Plant Species of Inland Salt Marshes (2 sites)		
Scientific Name	Group	Proportion of Sites Reporting
<i>Asclepias incarnata</i>	vascular plant	1.00
<i>Aster lanceolatus</i>	vascular plant	1.00
ATRIPLEX PATULA	vascular plant	1.00
<i>Eupatorium maculatum</i>	vascular plant	1.00
<i>Eupatorium perfoliatum</i>	vascular plant	1.00
<i>Mentha arvensis</i>	vascular plant	1.00
<i>Rumex orbiculatus</i>	vascular plant	1.00
<i>Schoenoplectus americanus</i>	vascular plant	1.00
<i>Schoenoplectus pungens</i>	vascular plant	1.00
TYPHA ANGUSTIFOLIA	vascular plant	1.00
<i>Acorus calamus</i>	vascular plant	0.50
<i>Alisma plantago-aquatica</i>	vascular plant	0.50
<i>Calamagrostis canadensis</i>	vascular plant	0.50
<i>Cicuta bulbifera</i>	vascular plant	0.50
<i>Carex lacustris</i>	vascular plant	0.50
<i>Carex lasiocarpa</i>	vascular plant	0.50
<i>Carex sartwellii</i>	vascular plant	0.50
<i>Dulichium arundinaceum</i>	vascular plant	0.50
<i>Eleocharis parvula</i>	vascular plant	0.50
<i>Eleocharis rostellata</i>	vascular plant	0.50
<i>Erechtites hieracifolia</i>	vascular plant	0.50
<i>Hierochloa odorata</i>	vascular plant	0.50
<i>Impatiens capensis</i>	vascular plant	0.50
<i>Iris virginica</i>	vascular plant	0.50
<i>Lycopus americanus</i>	vascular plant	0.50
<i>Lycopus uniflorus</i>	vascular plant	0.50
LYSIMACHIA NUMMULARIA	vascular plant	0.50
<i>Onoclea sensibilis</i>	vascular plant	0.50
<i>Pilea fontana</i>	vascular plant	0.50
<i>Portulaca oleracea</i>	vascular plant	0.50
<i>Samolus parviflorus</i>	vascular plant	0.50
<i>Sium suave</i>	vascular plant	0.50
SOLANUM DULCAMARA	vascular plant	0.50
<i>Thelypteris palustris</i>	vascular plant	0.50
<i>Typha latifolia</i>	vascular plant	0.50
<i>Urtica dioica</i>	vascular plant	0.50
<i>Verbena hastata</i>	vascular plant	0.50

Common Plant Species of Interdunal Wetlands (20 sites)		
Scientific Name	Group	Proportion of Sites Reporting
<i>Juncus balticus</i>	vascular plant	0.70
<i>Lobelia kalmii</i>	vascular plant	0.65
<i>Cladium mariscoides</i>	vascular plant	0.60
<i>Fragaria virginiana</i>	vascular plant	0.55
<i>Solidago houghtonii</i>	vascular plant	0.50
<i>Triglochin maritimum</i>	vascular plant	0.50
<i>Carex viridula</i>	vascular plant	0.45
<i>Eleocharis elliptica</i>	vascular plant	0.45
<i>Hypericum kalmianum</i>	vascular plant	0.45
<i>Parnassia glauca</i>	vascular plant	0.45
<i>Thuja occidentalis</i>	vascular plant	0.45
<i>Utricularia cornuta</i>	vascular plant	0.45
<i>Equisetum variegatum</i>	vascular plant	0.40
<i>Euthamia graminifolia</i>	vascular plant	0.40
<i>Senecio pauperculus</i>	vascular plant	0.40
<i>Tofieldia glutinosa</i>	vascular plant	0.40
<i>Calamagrostis canadensis</i>	vascular plant	0.35
<i>Carex garberi</i>	vascular plant	0.35
<i>Eupatorium perfoliatum</i>	vascular plant	0.35
<i>Pinus strobus</i>	vascular plant	0.35
<i>Potentilla anserina</i>	vascular plant	0.35
<i>Potentilla fruticosa</i>	vascular plant	0.35
<i>Rhynchospora capillacea</i>	vascular plant	0.35
<i>Salix myricoides</i>	vascular plant	0.35
<i>Solidago ohioensis</i>	vascular plant	0.35

Common Plant Species of Intermittent Wetlands (17 sites)		
Scientific Name	Group	Proportion of Sites Reporting
<i>Calamagrostis canadensis</i>	vascular plant	0.82
<i>Juncus canadensis</i>	vascular plant	0.82
<i>Chamaedaphne calyculata</i>	vascular plant	0.71
<i>Scirpus cyperinus</i>	vascular plant	0.65
<i>Spiraea alba</i>	vascular plant	0.65
<i>Dulichium arundinaceum</i>	vascular plant	0.59
<i>Iris versicolor</i>	vascular plant	0.59
<i>Viola lanceolata</i>	vascular plant	0.59
<i>Lycopus uniflorus</i>	vascular plant	0.53
<i>Pinus banksiana</i>	vascular plant	0.53
<i>Triadenum fraseri</i>	vascular plant	0.53
<i>Carex oligosperma</i>	vascular plant	0.47
<i>Glyceria canadensis</i>	vascular plant	0.47
<i>Polygonum amphibium</i>	vascular plant	0.47
<i>Eupatorium perfoliatum</i>	vascular plant	0.41
<i>Euthamia graminifolia</i>	vascular plant	0.41
<i>Nymphaea odorata</i>	vascular plant	0.41
<i>Pinus strobus</i>	vascular plant	0.41
<i>Acer rubrum</i>	vascular plant	0.35
<i>Carex lasiocarpa</i>	vascular plant	0.35
<i>Eleocharis smallii</i>	vascular plant	0.35
<i>Populus tremuloides</i>	vascular plant	0.35
<i>Rubus hispidus</i>	vascular plant	0.35
<i>Schoenoplectus acutus</i>	vascular plant	0.35

Common Plant Species of Lakeplain Wet Prairies (14 sites)		
Scientific Name	Group	Proportion of Sites Reporting
<i>Calamagrostis canadensis</i>	vascular plant	0.79
<i>Rudbeckia hirta</i>	vascular plant	0.71
<i>Spartina pectinata</i>	vascular plant	0.71
<i>Andropogon gerardii</i>	vascular plant	0.64
<i>Cornus stolonifera</i>	vascular plant	0.64
<i>Euthamia graminifolia</i>	vascular plant	0.64
<i>Lycopus americanus</i>	vascular plant	0.64
<i>Sorghastrum nutans</i>	vascular plant	0.64
<i>Asclepias incarnata</i>	vascular plant	0.57
<i>Cornus foemina</i>	vascular plant	0.57
<i>Iris virginica</i>	vascular plant	0.57
<i>Juncus balticus</i>	vascular plant	0.57
<i>Potentilla anserina</i>	vascular plant	0.57
<i>Pycnanthemum virginianum</i>	vascular plant	0.57
<i>Apocynum sibiricum</i>	vascular plant	0.50
<i>Calystegia sepium</i>	vascular plant	0.50
<i>Fragaria virginiana</i>	vascular plant	0.50
<i>Hypericum kalmianum</i>	vascular plant	0.50
<i>Liatris spicata</i>	vascular plant	0.50
<i>Lysimachia quadriflora</i>	vascular plant	0.50
<i>Lythrum alatum</i>	vascular plant	0.50
POA COMPRESSA	vascular plant	0.50
AGROSTIS GIGANTEA	vascular plant	0.43
<i>Anemone canadensis</i>	vascular plant	0.43
<i>Asclepias syriaca</i>	vascular plant	0.43
<i>Aster ericoides</i>	vascular plant	0.43
<i>Campanula aparinoides</i>	vascular plant	0.43
<i>Carex aquatilis</i>	vascular plant	0.43
<i>Glyceria striata</i>	vascular plant	0.43
<i>Juncus canadensis</i>	vascular plant	0.43
<i>Lobelia spicata</i>	vascular plant	0.43
<i>Monarda fistulosa</i>	vascular plant	0.43
<i>Panicum virgatum</i>	vascular plant	0.43
<i>Platanthera leucophaea</i>	vascular plant	0.43
<i>Populus deltoides</i>	vascular plant	0.43
<i>Populus tremuloides</i>	vascular plant	0.43
<i>Solidago altissima</i>	vascular plant	0.43
<i>Solidago gigantea</i>	vascular plant	0.43
<i>Solidago ohioensis</i>	vascular plant	0.43
<i>Thalictrum dasycarpum</i>	vascular plant	0.43
TYPHA ANGUSTIFOLIA	vascular plant	0.43
<i>Achillea millefolium</i>	vascular plant	0.36
<i>Cladium mariscoides</i>	vascular plant	0.36
<i>Eupatorium perfoliatum</i>	vascular plant	0.36
<i>Fraxinus pennsylvanica</i>	vascular plant	0.36
<i>Galium boreale</i>	vascular plant	0.36
<i>Lathyrus palustris</i>	vascular plant	0.36

Common Plant Species of Lakeplain Wet Prairies, continued.		
Potentilla fruticosa	vascular plant	0.36
Quercus macrocarpa	vascular plant	0.36
Rosa palustris	vascular plant	0.36
Solidago nemoralis	vascular plant	0.36
Spiraea alba	vascular plant	0.36
Stachys tenuifolia	vascular plant	0.36

Common Plant Species of Lakeplain Wet-mesic Prairies (14 sites)		
Scientific Name	Group	Proportion of Sites Reporting
Andropogon gerardii	vascular plant	1.00
Calamagrostis canadensis	vascular plant	0.86
Spiraea alba	vascular plant	0.86
Andropogon scoparius	vascular plant	0.79
Panicum virgatum	vascular plant	0.79
Sorghastrum nutans	vascular plant	0.79
Pycnanthemum virginianum	vascular plant	0.71
Spartina pectinata	vascular plant	0.71
Liatris spicata	vascular plant	0.64
Anemone canadensis	vascular plant	0.57
Cornus foemina	vascular plant	0.57
Eupatorium perfoliatum	vascular plant	0.50
Lycopus americanus	vascular plant	0.50
Populus tremuloides	vascular plant	0.50
Rudbeckia hirta	vascular plant	0.50
Solidago altissima	vascular plant	0.50
Solidago nemoralis	vascular plant	0.50
Solidago rugosa	vascular plant	0.50
Spiranthes cernua	vascular plant	0.50
Aster ericoides	vascular plant	0.43
Aster lanceolatus	vascular plant	0.43
Euthamia graminifolia	vascular plant	0.43
Fragaria virginiana	vascular plant	0.43
Helianthus giganteus	vascular plant	0.43
Iris virginica	vascular plant	0.43
Lythrum alatum	vascular plant	0.43
Vernonia missurica	vascular plant	0.43
Agalinis purpurea	vascular plant	0.36
AGROSTIS GIGANTEA	vascular plant	0.36
Apocynum cannabinum	vascular plant	0.36
Aster dumosus	vascular plant	0.36
Aster novae-angliae	vascular plant	0.36
Cirsium discolor	vascular plant	0.36
Coreopsis tripteris	vascular plant	0.36
Desmodium canadense	vascular plant	0.36
Eleocharis elliptica	vascular plant	0.36
Eupatorium maculatum	vascular plant	0.36
Gentiana andrewsii	vascular plant	0.36
Juncus dudleyi	vascular plant	0.36
Lobelia spicata	vascular plant	0.36
Monarda fistulosa	vascular plant	0.36
Onoclea sensibilis	vascular plant	0.36
Quercus palustris	vascular plant	0.36
Salix humilis	vascular plant	0.36
Solidago riddellii	vascular plant	0.36
Thelypteris palustris	vascular plant	0.36
Veronicastrum virginicum	vascular plant	0.36

Common Plant Species of Muskegs (6 sites)		
Scientific Name	Group	Proportion of Sites Reporting
<i>Larix laricina</i>	vascular plant	1.00
<i>Picea mariana</i>	vascular plant	1.00
<i>Ledum groenlandicum</i>	vascular plant	0.83
<i>Sarracenia purpurea</i>	vascular plant	0.83
<i>Andromeda glaucophylla</i>	vascular plant	0.67
<i>Aronia prunifolia</i>	vascular plant	0.67
<i>Chamaedaphne calyculata</i>	vascular plant	0.67
<i>Kalmia polifolia</i>	vascular plant	0.67
<i>Pinus strobus</i>	vascular plant	0.67
<i>Thuja occidentalis</i>	vascular plant	0.67
<i>Trientalis borealis</i>	vascular plant	0.67
<i>Vaccinium macrocarpon</i>	vascular plant	0.67
<i>Aster nemoralis</i>	vascular plant	0.50
<i>Betula pumila</i>	vascular plant	0.50
<i>Nemopanthus mucronata</i>	vascular plant	0.50
<i>Pinus banksiana</i>	vascular plant	0.50
<i>Rhynchospora alba</i>	vascular plant	0.50
<i>Smilacina trifolia</i>	vascular plant	0.50
<i>Aralia nudicaulis</i>	vascular plant	0.33
<i>Calamagrostis canadensis</i>	vascular plant	0.33
<i>Cornus canadensis</i>	vascular plant	0.33
<i>Carex limosa</i>	vascular plant	0.33
<i>Carex oligosperma</i>	vascular plant	0.33
<i>Carex pauciflora</i>	vascular plant	0.33
<i>Carex trisperma</i>	vascular plant	0.33
<i>Gaultheria hispidula</i>	vascular plant	0.33
<i>Iris versicolor</i>	vascular plant	0.33
<i>Osmunda regalis</i>	vascular plant	0.33
<i>Picea glauca</i>	vascular plant	0.33
<i>Pinus resinosa</i>	vascular plant	0.33
<i>Solidago uliginosa</i>	vascular plant	0.33
<i>Vaccinium oxycoccos</i>	vascular plant	0.33

Common Plant Species of Northern Fens (16 sites)		
Scientific Name	Group	Proportion of Sites Reporting
<i>Calamagrostis canadensis</i>	vascular plant	0.75
<i>Potentilla fruticosa</i>	vascular plant	0.75
<i>Cladium mariscoides</i>	vascular plant	0.69
<i>Schoenoplectus acutus</i>	vascular plant	0.69
<i>Larix laricina</i>	vascular plant	0.63
<i>Sarracenia purpurea</i>	vascular plant	0.63
<i>Juncus balticus</i>	vascular plant	0.56
<i>Lobelia kalmii</i>	vascular plant	0.56
<i>Carex flava</i>	vascular plant	0.50
<i>Carex lasiocarpa</i>	vascular plant	0.50
<i>Ledum groenlandicum</i>	vascular plant	0.50
<i>Myrica gale</i>	vascular plant	0.50
<i>Thuja occidentalis</i>	vascular plant	0.50
<i>Iris versicolor</i>	vascular plant	0.44
<i>Parnassia glauca</i>	vascular plant	0.44
<i>Triglochin maritimum</i>	vascular plant	0.44
<i>Andromeda glaucophylla</i>	vascular plant	0.38
<i>Carex viridula</i>	vascular plant	0.38
<i>Drosera rotundifolia</i>	vascular plant	0.38
<i>Muhlenbergia glomerata</i>	vascular plant	0.38
<i>Picea mariana</i>	vascular plant	0.38
<i>Rhamnus alnifolia</i>	vascular plant	0.38
<i>Solidago uliginosa</i>	vascular plant	0.38
<i>Spiraea alba</i>	vascular plant	0.38
<i>Tofieldia glutinosa</i>	vascular plant	0.38
<i>Vaccinium oxycoccos</i>	vascular plant	0.38

Common Plant Species of Northern Shrub Swamps (5 sites)		
Scientific Name	Group	Proportion of Sites Reporting
<i>Alnus rugosa</i>	vascular plant	1.00
<i>Carex stricta</i>	vascular plant	1.00
<i>Chamaedaphne calyculata</i>	vascular plant	0.80
<i>Larix laricina</i>	vascular plant	0.80
<i>Lycopus uniflorus</i>	vascular plant	0.80
<i>Osmunda regalis</i>	vascular plant	0.80
<i>Pinus strobus</i>	vascular plant	0.80
<i>Potentilla palustris</i>	vascular plant	0.80
<i>Thelypteris palustris</i>	vascular plant	0.80
<i>Acer rubrum</i>	vascular plant	0.60
<i>Betula pumila</i>	vascular plant	0.60
<i>Bromus ciliatus</i>	vascular plant	0.60
<i>Calamagrostis canadensis</i>	vascular plant	0.60
<i>Cornus stolonifera</i>	vascular plant	0.60
<i>Carex comosa</i>	vascular plant	0.60
<i>Carex lasiocarpa</i>	vascular plant	0.60
<i>Dryopteris cristata</i>	vascular plant	0.60
<i>Eupatorium maculatum</i>	vascular plant	0.60
<i>Impatiens capensis</i>	vascular plant	0.60
<i>Iris versicolor</i>	vascular plant	0.60
<i>Ledum groenlandicum</i>	vascular plant	0.60
<i>Myrica gale</i>	vascular plant	0.60
<i>Picea mariana</i>	vascular plant	0.60
<i>Triadenum fraseri</i>	vascular plant	0.60
<i>Vaccinium macrocarpon</i>	vascular plant	0.60
AGROSTIS GIGANTEA	vascular plant	0.40
<i>Aronia prunifolia</i>	vascular plant	0.40
<i>Asclepias incarnata</i>	vascular plant	0.40
<i>Aster puniceus</i>	vascular plant	0.40
<i>Betula papyrifera</i>	vascular plant	0.40
<i>Brachyelytrum erectum</i>	vascular plant	0.40
<i>Caltha palustris</i>	vascular plant	0.40
<i>Cicuta bulbifera</i>	vascular plant	0.40
<i>Cirsium muticum</i>	vascular plant	0.40
<i>Cornus canadensis</i>	vascular plant	0.40
<i>Drosera rotundifolia</i>	vascular plant	0.40
<i>Dulichium arundinaceum</i>	vascular plant	0.40
<i>Epilobium coloratum</i>	vascular plant	0.40
<i>Epilobium leptophyllum</i>	vascular plant	0.40
<i>Eriophorum virginicum</i>	vascular plant	0.40
<i>Eupatorium perfoliatum</i>	vascular plant	0.40
<i>Glyceria canadensis</i>	vascular plant	0.40
<i>Glyceria striata</i>	vascular plant	0.40
<i>Ilex verticillata</i>	vascular plant	0.40
<i>Juncus brachycephalus</i>	vascular plant	0.40
<i>Lemna minor</i>	vascular plant	0.40
<i>Mentha arvensis</i>	vascular plant	0.40

Common Plant Species of Northern Shrub Swamps, continued.		
NASTURTIUM OFFICINALE	vascular plant	0.40
Nymphaea odorata	vascular plant	0.40
Onoclea sensibilis	vascular plant	0.40
Osmunda cinnamomea	vascular plant	0.40
Panicum boreale	vascular plant	0.40
Pinus banksiana	vascular plant	0.40
Polygonum amphibium	vascular plant	0.40
Polygonum hydropiperoides	vascular plant	0.40
Ribes americanum	vascular plant	0.40
Rosa palustris	vascular plant	0.40
Rubus hispidus	vascular plant	0.40
Rubus strigosus	vascular plant	0.40
Rumex orbiculatus	vascular plant	0.40
Sarracenia purpurea	vascular plant	0.40
Scirpus atrovirens	vascular plant	0.40
Scirpus cyperinus	vascular plant	0.40
Smilacina trifolia	vascular plant	0.40
SOLANUM DULCAMARA	vascular plant	0.40
Solidago rugosa	vascular plant	0.40
Solidago uliginosa	vascular plant	0.40
Spiraea alba	vascular plant	0.40
Thalictrum dasycarpum	vascular plant	0.40
TYPHA ANGUSTIFOLIA	vascular plant	0.40
Typha latifolia	vascular plant	0.40
Vaccinium angustifolium	vascular plant	0.40
Viburnum lentago	vascular plant	0.40

Common Plant Species of Northern Swamps (1 site)		
Scientific Name	Group	Proportion of Sites Reporting
<i>Abies balsamea</i>	vascular plant	1.00
<i>Acer rubrum</i>	vascular plant	1.00
<i>Acer saccharinum</i>	vascular plant	1.00
<i>Acer spicatum</i>	vascular plant	1.00
<i>Adiantum pedatum</i>	vascular plant	1.00
<i>Aralia nudicaulis</i>	vascular plant	1.00
<i>Arisaema triphyllum</i>	vascular plant	1.00
<i>Aster lateriflorus</i>	vascular plant	1.00
<i>Athyrium filix-femina</i>	vascular plant	1.00
<i>Betula alleghaniensis</i>	vascular plant	1.00
<i>Bidens cernuus</i>	vascular plant	1.00
<i>Boehmeria cylindrica</i>	vascular plant	1.00
<i>Brachyelytrum erectum</i>	vascular plant	1.00
<i>Circaea lutetiana</i>	vascular plant	1.00
<i>Clematis virginiana</i>	vascular plant	1.00
<i>Coptis trifolia</i>	vascular plant	1.00
<i>Corylus americana</i>	vascular plant	1.00
<i>Cryptotaenia canadensis</i>	vascular plant	1.00
<i>Carex crinita</i>	vascular plant	1.00
<i>Carex intumescens</i>	vascular plant	1.00
<i>Carex leptalea</i>	vascular plant	1.00
<i>Carex lupulina</i>	vascular plant	1.00
<i>Carex muskingumensis</i>	vascular plant	1.00
<i>Carex vulpinoidea</i>	vascular plant	1.00
<i>Dryopteris carthusiana</i>	vascular plant	1.00
<i>Dryopteris intermedia</i>	vascular plant	1.00
<i>Equisetum arvense</i>	vascular plant	1.00
<i>Eupatorium perfoliatum</i>	vascular plant	1.00
<i>Fraxinus nigra</i>	vascular plant	1.00
<i>Fraxinus pennsylvanica</i>	vascular plant	1.00
<i>Galium triflorum</i>	vascular plant	1.00
<i>Geranium robertianum</i>	vascular plant	1.00
<i>Geum canadense</i>	vascular plant	1.00
<i>Glyceria striata</i>	vascular plant	1.00
<i>Gymnocarpium dryopteris</i>	vascular plant	1.00
<i>Ilex verticillata</i>	vascular plant	1.00
<i>Impatiens capensis</i>	vascular plant	1.00
<i>Laportea canadensis</i>	vascular plant	1.00
<i>Lindera benzoin</i>	vascular plant	1.00
<i>Lobelia cardinalis</i>	vascular plant	1.00
<i>Lonicera canadensis</i>	vascular plant	1.00
<i>Lycopodium annotinum</i>	vascular plant	1.00
<i>Lycopus uniflorus</i>	vascular plant	1.00
<i>Maianthemum canadense</i>	vascular plant	1.00
<i>Melica smithii</i>	vascular plant	1.00
<i>Mitella nuda</i>	vascular plant	1.00
<i>Onoclea sensibilis</i>	vascular plant	1.00

Common Plant Species of Northern Swamps, continued.		
<i>Osmunda cinnamomea</i>	vascular plant	1.00
<i>Osmorhiza claytonii</i>	vascular plant	1.00
<i>Osmunda regalis</i>	vascular plant	1.00
<i>Parthenocissus quinquefolia</i>	vascular plant	1.00
<i>Phryma leptostachya</i>	vascular plant	1.00
<i>Pinus strobus</i>	vascular plant	1.00
<i>Polygala paucifolia</i>	vascular plant	1.00
<i>Polygonatum pubescens</i>	vascular plant	1.00
<i>Populus tremuloides</i>	vascular plant	1.00
<i>Prunus serotina</i>	vascular plant	1.00
PRUNELLA VULGARIS	vascular plant	1.00
<i>Pteridium aquilinum</i>	vascular plant	1.00
<i>Ranunculus hispidus</i>	vascular plant	1.00
<i>Rhamnus alnifolia</i>	vascular plant	1.00
<i>Ribes cynosbati</i>	vascular plant	1.00
<i>Rubus pubescens</i>	vascular plant	1.00
<i>Rubus strigosus</i>	vascular plant	1.00
<i>Sambucus racemosa</i>	vascular plant	1.00
<i>Scutellaria lateriflora</i>	vascular plant	1.00
<i>Sium suave</i>	vascular plant	1.00
SOLANUM DULCAMARA	vascular plant	1.00
<i>Solidago flexicaulis</i>	vascular plant	1.00
<i>Thuja occidentalis</i>	vascular plant	1.00
<i>Tilia americana</i>	vascular plant	1.00
<i>Toxicodendron radicans</i>	vascular plant	1.00
<i>Trientalis borealis</i>	vascular plant	1.00
<i>Trillium grandiflorum</i>	vascular plant	1.00
<i>Ulmus americana</i>	vascular plant	1.00
<i>Urtica dioica</i>	vascular plant	1.00
<i>Vitis riparia</i>	vascular plant	1.00

Common Plant Species of Northern Wet Meadows (5 site)		
Scientific Name	Group	Proportion of Sites Reporting
<i>Calamagrostis canadensis</i>	vascular plant	0.60
<i>Cladium mariscoides</i>	vascular plant	0.60
<i>Carex lasiocarpa</i>	vascular plant	0.60
<i>Carex stricta</i>	vascular plant	0.60
<i>Myrica gale</i>	vascular plant	0.60
<i>Spiraea alba</i>	vascular plant	0.60
<i>Alnus rugosa</i>	vascular plant	0.40
<i>Betula pumila</i>	vascular plant	0.40
<i>Brasenia schreberi</i>	vascular plant	0.40
<i>Dulichium arundinaceum</i>	vascular plant	0.40
<i>Larix laricina</i>	vascular plant	0.40
<i>Potentilla fruticosa</i>	vascular plant	0.40
<i>Potamogeton gramineus</i>	vascular plant	0.40
<i>Potamogeton natans</i>	vascular plant	0.40
<i>Sarracenia purpurea</i>	vascular plant	0.40
<i>Schoenoplectus acutus</i>	vascular plant	0.40
<i>Typha latifolia</i>	vascular plant	0.40
<i>Utricularia vulgaris</i>	vascular plant	0.40

Common Plant Species of Patterned Peatlands (7 site)		
Scientific Name	Group	Proportion of Sites Reporting
<i>Andromeda glaucophylla</i>	vascular plant	1.00
<i>Chamaedaphne calyculata</i>	vascular plant	0.86
<i>Carex limosa</i>	vascular plant	0.86
<i>Rhynchospora alba</i>	vascular plant	0.86
<i>Aronia prunifolia</i>	vascular plant	0.71
<i>Aster nemoralis</i>	vascular plant	0.71
<i>Betula pumila</i>	vascular plant	0.71
<i>Carex exilis</i>	vascular plant	0.71
<i>Carex lasiocarpa</i>	vascular plant	0.71
<i>Drosera intermedia</i>	vascular plant	0.71
<i>Larix laricina</i>	vascular plant	0.71
<i>Menyanthes trifoliata</i>	vascular plant	0.71
<i>Sarracenia purpurea</i>	vascular plant	0.71
<i>Arethusa bulbosa</i>	vascular plant	0.57
<i>Aster umbellatus</i>	vascular plant	0.57
<i>Carex livida</i>	vascular plant	0.57
<i>Carex oligosperma</i>	vascular plant	0.57
<i>Eleocharis elliptica</i>	vascular plant	0.57
<i>Iris versicolor</i>	vascular plant	0.57
<i>Picea mariana</i>	vascular plant	0.57
<i>Pogonia ophioglossoides</i>	vascular plant	0.57
<i>Salix pedicellaris</i>	vascular plant	0.57
<i>Solidago uliginosa</i>	vascular plant	0.57
<i>Thuja occidentalis</i>	vascular plant	0.57
<i>Trichophorum cespitosum</i>	vascular plant	0.57
<i>Vaccinium oxycoccos</i>	vascular plant	0.57
<i>Acer rubrum</i>	vascular plant	0.43
<i>Alnus rugosa</i>	vascular plant	0.43
<i>Aster borealis</i>	vascular plant	0.43
<i>Calamagrostis canadensis</i>	vascular plant	0.43
<i>Calopogon tuberosus</i>	vascular plant	0.43
<i>Carex chordorrhiza</i>	vascular plant	0.43
<i>Carex stricta</i>	vascular plant	0.43
<i>Drosera rotundifolia</i>	vascular plant	0.43
<i>Galium labradoricum</i>	vascular plant	0.43
<i>Gaultheria hispidula</i>	vascular plant	0.43
<i>Ledum groenlandicum</i>	vascular plant	0.43
<i>Myrica gale</i>	vascular plant	0.43
<i>Nemopanthus mucronata</i>	vascular plant	0.43
<i>Osmunda regalis</i>	vascular plant	0.43
<i>Potentilla fruticosa</i>	vascular plant	0.43
<i>Potentilla palustris</i>	vascular plant	0.43
<i>Rhynchospora fusca</i>	vascular plant	0.43
<i>Tofieldia glutinosa</i>	vascular plant	0.43
<i>Trichophorum alpinum</i>	vascular plant	0.43
<i>Utricularia cornuta</i>	vascular plant	0.43
<i>Utricularia intermedia</i>	vascular plant	0.43

Common Plant Species of Poor Conifer Swamps (18 site)		
Scientific Name	Group	Proportion of Sites Reporting
<i>Larix laricina</i>	vascular plant	0.94
<i>Acer rubrum</i>	vascular plant	0.89
<i>Carex trisperma</i>	vascular plant	0.72
<i>Picea mariana</i>	vascular plant	0.72
<i>Chamaedaphne calyculata</i>	vascular plant	0.67
<i>Nemopanthus mucronata</i>	vascular plant	0.67
<i>Trientalis borealis</i>	vascular plant	0.61
<i>Ilex verticillata</i>	vascular plant	0.56
<i>Maianthemum canadense</i>	vascular plant	0.56
<i>Sarracenia purpurea</i>	vascular plant	0.56
<i>Vaccinium oxycoccos</i>	vascular plant	0.56
<i>Gaultheria hispidula</i>	vascular plant	0.50
<i>Smilacina trifolia</i>	vascular plant	0.44
<i>Vaccinium angustifolium</i>	vascular plant	0.44
<i>Alnus rugosa</i>	vascular plant	0.39
<i>Andromeda glaucophylla</i>	vascular plant	0.39
<i>Calla palustris</i>	vascular plant	0.39
<i>Gaultheria procumbens</i>	vascular plant	0.39
<i>Kalmia polifolia</i>	vascular plant	0.39
<i>Ledum groenlandicum</i>	vascular plant	0.39
<i>Pinus strobus</i>	vascular plant	0.39
<i>Vaccinium corymbosum</i>	vascular plant	0.39
<i>Coptis trifolia</i>	vascular plant	0.33
<i>Dulichium arundinaceum</i>	vascular plant	0.33
<i>Osmunda cinnamomea</i>	vascular plant	0.33
<i>Vaccinium myrtilloides</i>	vascular plant	0.33
<i>Woodwardia virginica</i>	vascular plant	0.33

Common Plant Species of Poor Fens (4 site)		
Scientific Name	Group	Proportion of Sites Reporting
<i>Andromeda glaucophylla</i>	vascular plant	1.00
<i>Chamaedaphne calyculata</i>	vascular plant	1.00
<i>Pinus strobus</i>	vascular plant	1.00
<i>Potentilla palustris</i>	vascular plant	1.00
<i>Utricularia vulgaris</i>	vascular plant	1.00
<i>Vaccinium oxycoccos</i>	vascular plant	1.00
<i>Acer rubrum</i>	vascular plant	0.75
<i>Carex oligosperma</i>	vascular plant	0.75
<i>Carex stricta</i>	vascular plant	0.75
<i>Drosera rotundifolia</i>	vascular plant	0.75
<i>Iris versicolor</i>	vascular plant	0.75
<i>Larix laricina</i>	vascular plant	0.75
<i>Ledum groenlandicum</i>	vascular plant	0.75
<i>Sarracenia purpurea</i>	vascular plant	0.75
<i>Thelypteris palustris</i>	vascular plant	0.75
<i>Triadenum fraseri</i>	vascular plant	0.75
<i>Typha latifolia</i>	vascular plant	0.75
<i>Alnus rugosa</i>	vascular plant	0.50
<i>Aronia prunifolia</i>	vascular plant	0.50
<i>Calamagrostis canadensis</i>	vascular plant	0.50
<i>Carex lacustris</i>	vascular plant	0.50
<i>Carex lasiocarpa</i>	vascular plant	0.50
<i>Carex limosa</i>	vascular plant	0.50
<i>Carex sterilis</i>	vascular plant	0.50
<i>Danthonia spicata</i>	vascular plant	0.50
<i>Drosera intermedia</i>	vascular plant	0.50
<i>Dulichium arundinaceum</i>	vascular plant	0.50
<i>Equisetum fluviatile</i>	vascular plant	0.50
<i>Eriophorum viridi-carinatum</i>	vascular plant	0.50
<i>Euthamia graminifolia</i>	vascular plant	0.50
<i>Kalmia polifolia</i>	vascular plant	0.50
<i>Lysimachia terrestris</i>	vascular plant	0.50
<i>Menyanthes trifoliata</i>	vascular plant	0.50
<i>Nemopanthus mucronata</i>	vascular plant	0.50
<i>Onoclea sensibilis</i>	vascular plant	0.50
<i>Osmunda cinnamomea</i>	vascular plant	0.50
<i>Osmunda regalis</i>	vascular plant	0.50
<i>Picea mariana</i>	vascular plant	0.50
<i>Pinus banksiana</i>	vascular plant	0.50
<i>Polygonum amphibium</i>	vascular plant	0.50
<i>Potentilla fruticosa</i>	vascular plant	0.50
<i>Rhynchospora alba</i>	vascular plant	0.50
<i>Rubus pubescens</i>	vascular plant	0.50
<i>Salix pedicellaris</i>	vascular plant	0.50
<i>Scirpus cyperinus</i>	vascular plant	0.50
<i>Scutellaria galericulata</i>	vascular plant	0.50
<i>Smilacina trifolia</i>	vascular plant	0.50

Common Plant Species of Poor Fens, continued.		
<i>Solidago rugosa</i>	vascular plant	0.50
<i>Solidago uliginosa</i>	vascular plant	0.50
<i>Spiraea alba</i>	vascular plant	0.50
<i>Thuja occidentalis</i>	vascular plant	0.50
<i>Trientalis borealis</i>	vascular plant	0.50
<i>Vaccinium myrtilloides</i>	vascular plant	0.50

Common Plant Species of Prairie Fens (56 site)		
Scientific Name	Group	Proportion of Sites Reporting
Potentilla fruticosa	vascular plant	0.89
Thelypteris palustris	vascular plant	0.86
Carex stricta	vascular plant	0.84
Toxicodendron vernix	vascular plant	0.79
Calamagrostis canadensis	vascular plant	0.73
Eupatorium maculatum	vascular plant	0.73
Pycnanthemum virginianum	vascular plant	0.73
Cirsium muticum	vascular plant	0.71
Cornus stolonifera	vascular plant	0.71
Eupatorium perfoliatum	vascular plant	0.70
Larix laricina	vascular plant	0.66
Typha latifolia	vascular plant	0.64
Betula pumila	vascular plant	0.63
Cornus foemina	vascular plant	0.63
Rudbeckia hirta	vascular plant	0.61
Schoenoplectus acutus	vascular plant	0.61
Solidago ohioensis	vascular plant	0.61
Muhlenbergia glomerata	vascular plant	0.59
Parnassia glauca	vascular plant	0.57
Solidago riddellii	vascular plant	0.57
Thalictrum dasycarpum	vascular plant	0.57
Zizia aurea	vascular plant	0.57
Asclepias incarnata	vascular plant	0.55
Bromus ciliatus	vascular plant	0.55
Andropogon gerardii	vascular plant	0.54
Pedicularis lanceolata	vascular plant	0.54
Populus tremuloides	vascular plant	0.52
Solidago patula	vascular plant	0.52
Liatis spicata	vascular plant	0.48
Lysimachia quadriflora	vascular plant	0.48
Onoclea sensibilis	vascular plant	0.48
Rhamnus alnifolia	vascular plant	0.48
Solidago rugosa	vascular plant	0.48
Solidago uliginosa	vascular plant	0.48
Aster puniceus	vascular plant	0.46
Aster umbellatus	vascular plant	0.46
Caltha palustris	vascular plant	0.46
Cladium mariscoides	vascular plant	0.45
Lathyrus palustris	vascular plant	0.45
Galium boreale	vascular plant	0.43
Lobelia kalmii	vascular plant	0.43
Salix candida	vascular plant	0.43
Senecio aureus	vascular plant	0.43
Campanula aparinoides	vascular plant	0.41
Oxypolis rigidior	vascular plant	0.39
Smilacina stellata	vascular plant	0.39
Carex sterilis	vascular plant	0.38

Common Plant Species of Prairie Fens, continued.		
<i>Drosera rotundifolia</i>	vascular plant	0.38
<i>Phalaris arundinacea</i>	vascular plant	0.38
<i>Rosa palustris</i>	vascular plant	0.38
<i>Valeriana uliginosa</i>	vascular plant	0.38
<i>Carex hystericina</i>	vascular plant	0.36
<i>Glyceria striata</i>	vascular plant	0.36
<i>Iris virginica</i>	vascular plant	0.36
<i>Juniperus virginiana</i>	vascular plant	0.36
<i>Sarracenia purpurea</i>	vascular plant	0.36
<i>Aster novae-angliae</i>	vascular plant	0.34
<i>Eleocharis rostellata</i>	vascular plant	0.34

Common Plant Species of Rich Conifer Swamps (19 site)		
Scientific Name	Group	Proportion of Sites Reporting
<i>Maianthemum canadense</i>	vascular plant	0.95
<i>Thuja occidentalis</i>	vascular plant	0.95
<i>Acer rubrum</i>	vascular plant	0.89
<i>Cornus canadensis</i>	vascular plant	0.89
<i>Abies balsamea</i>	vascular plant	0.84
<i>Aralia nudicaulis</i>	vascular plant	0.84
<i>Clintonia borealis</i>	vascular plant	0.84
<i>Alnus rugosa</i>	vascular plant	0.79
<i>Gaultheria hispidula</i>	vascular plant	0.79
<i>Trientalis borealis</i>	vascular plant	0.79
<i>Coptis trifolia</i>	vascular plant	0.74
<i>Rubus pubescens</i>	vascular plant	0.74
<i>Betula papyrifera</i>	vascular plant	0.68
<i>Botrychium virginianum</i>	vascular plant	0.68
<i>Fraxinus nigra</i>	vascular plant	0.68
<i>Gymnocarpium dryopteris</i>	vascular plant	0.68
<i>Linnaea borealis</i>	vascular plant	0.68
<i>Mitella nuda</i>	vascular plant	0.68
<i>Onoclea sensibilis</i>	vascular plant	0.68
<i>Aster macrophyllus</i>	vascular plant	0.63
<i>Caltha palustris</i>	vascular plant	0.63
<i>Osmunda regalis</i>	vascular plant	0.63
<i>Polygala paucifolia</i>	vascular plant	0.63
<i>Brachyelytrum erectum</i>	vascular plant	0.58
<i>Carex intumescens</i>	vascular plant	0.58
<i>Carex trisperma</i>	vascular plant	0.58
<i>Impatiens capensis</i>	vascular plant	0.58
<i>Osmunda cinnamomea</i>	vascular plant	0.58
PRUNELLA VULGARIS	vascular plant	0.58
<i>Vaccinium angustifolium</i>	vascular plant	0.58
<i>Betula alleghaniensis</i>	vascular plant	0.53
<i>Glyceria striata</i>	vascular plant	0.53
<i>Larix laricina</i>	vascular plant	0.53
<i>Lycopus uniflorus</i>	vascular plant	0.53
<i>Picea mariana</i>	vascular plant	0.53
<i>Pinus strobus</i>	vascular plant	0.53
<i>Rhamnus alnifolia</i>	vascular plant	0.53
<i>Thelypteris palustris</i>	vascular plant	0.53
<i>Cornus stolonifera</i>	vascular plant	0.47
<i>Carex disperma</i>	vascular plant	0.47
<i>Mitchella repens</i>	vascular plant	0.47
<i>Smilacina trifolia</i>	vascular plant	0.47
<i>Circaea alpina</i>	vascular plant	0.42
<i>Cirsium muticum</i>	vascular plant	0.42
<i>Carex stricta</i>	vascular plant	0.42
<i>Dryopteris cristata</i>	vascular plant	0.42
<i>Epigaea repens</i>	vascular plant	0.42

Common Plant Species of Rich Conifer Swamps, continued.		
<i>Equisetum sylvaticum</i>	vascular plant	0.42
<i>Fragaria virginiana</i>	vascular plant	0.42
<i>Gaultheria procumbens</i>	vascular plant	0.42
<i>Ledum groenlandicum</i>	vascular plant	0.42
<i>Carex leptalea</i>	vascular plant	0.37
<i>Dryopteris carthusiana</i>	vascular plant	0.37
<i>Galium triflorum</i>	vascular plant	0.37
<i>Geum rivale</i>	vascular plant	0.37
<i>Petasites palmatus</i>	vascular plant	0.37
<i>Pteridium aquilinum</i>	vascular plant	0.37
<i>Quercus rubra</i>	vascular plant	0.37
SOLANUM DULCAMARA	vascular plant	0.37

Common Plant Species of Rich Tamarack Swamps (11 site)		
Scientific Name	Group	Proportion of Sites Reporting
Larix laricina	vascular plant	1.00
Acer rubrum	vascular plant	0.82
Boehmeria cylindrical	vascular plant	0.82
Impatiens capensis	vascular plant	0.82
Solidago patula	vascular plant	0.82
Symplocarpus foetidus	vascular plant	0.82
Thelypteris palustris	vascular plant	0.82
Toxicodendron vernix	vascular plant	0.82
Eupatorium maculatum	vascular plant	0.73
Maianthemum canadense	vascular plant	0.73
Rubus pubescens	vascular plant	0.73
Solidago rugosa	vascular plant	0.73
Toxicodendron radicans	vascular plant	0.73
Ulmus americana	vascular plant	0.73
Betula alleghaniensis	vascular plant	0.64
Betula pumila	vascular plant	0.64
Carex lacustris	vascular plant	0.64
Carex stricta	vascular plant	0.64
Dryopteris cristata	vascular plant	0.64
Equisetum fluviatile	vascular plant	0.64
Lycopus uniflorus	vascular plant	0.64
Onoclea sensibilis	vascular plant	0.64
Parthenocissus quinquefolia	vascular plant	0.64
Rhamnus alnifolia	vascular plant	0.64
Rosa palustris	vascular plant	0.64
Senecio aureus	vascular plant	0.64
Viburnum lentago	vascular plant	0.64
Arisaema triphyllum	vascular plant	0.55
Asclepias incarnata	vascular plant	0.55
Caltha palustris	vascular plant	0.55
Cirsium muticum	vascular plant	0.55
Cornus foemina	vascular plant	0.55
Carex comosa	vascular plant	0.55
Carex leptalea	vascular plant	0.55
Eupatorium perfoliatum	vascular plant	0.55
Glyceria striata	vascular plant	0.55
Ilex verticillata	vascular plant	0.55
Leersia oryzoides	vascular plant	0.55
Lindera benzoin	vascular plant	0.55
Osmunda regalis	vascular plant	0.55
Trientalis borealis	vascular plant	0.55
Vaccinium corymbosum	vascular plant	0.55
Calamagrostis canadensis	vascular plant	0.45
Carpinus caroliniana	vascular plant	0.45
Fraxinus nigra	vascular plant	0.45
Lemna minor	vascular plant	0.45
Mitella diphylla	vascular plant	0.45

Common Plant Species of Rich Tamarack Swamps, continued.		
<i>Osmunda cinnamomea</i>	vascular plant	0.45
PRUNELLA VULGARIS	vascular plant	0.45
<i>Rumex orbiculatus</i>	vascular plant	0.45
<i>Typha latifolia</i>	vascular plant	0.45
<i>Amphicarpaea bracteata</i>	vascular plant	0.36
<i>Apios americana</i>	vascular plant	0.36
<i>Aster lateriflorus</i>	vascular plant	0.36
<i>Bidens coronatus</i>	vascular plant	0.36
<i>Bromus ciliatus</i>	vascular plant	0.36
<i>Cicuta bulbifera</i>	vascular plant	0.36
<i>Circaea alpina</i>	vascular plant	0.36
<i>Coptis trifolia</i>	vascular plant	0.36
<i>Corylus americana</i>	vascular plant	0.36
<i>Cornus stolonifera</i>	vascular plant	0.36
<i>Carex hystericina</i>	vascular plant	0.36
<i>Carex radiata</i>	vascular plant	0.36
<i>Galium asprellum</i>	vascular plant	0.36
<i>Lysimachia thyrsiflora</i>	vascular plant	0.36
<i>Phalaris arundinacea</i>	vascular plant	0.36
<i>Phragmites australis</i>	vascular plant	0.36
<i>Pilea pumila</i>	vascular plant	0.36
<i>Potentilla fruticosa</i>	vascular plant	0.36
<i>Quercus bicolor</i>	vascular plant	0.36
<i>Ribes hirtellum</i>	vascular plant	0.36
<i>Sagittaria latifolia</i>	vascular plant	0.36
<i>Salix candida</i>	vascular plant	0.36
<i>Sarracenia purpurea</i>	vascular plant	0.36
<i>Vitis riparia</i>	vascular plant	0.36

Common Plant Species of Southern Shrub-carrs (1 sites)		
ScientificName	Group	Proportion of Sites Reporting
Aronia prunifolia	vascular plant	1.00
Cornus stolonifera	vascular plant	1.00
Larix laricina	vascular plant	1.00
Lonicera dioica	vascular plant	1.00
Peltandra virginica	vascular plant	1.00
Phragmites australis	vascular plant	1.00
Rosa palustris	vascular plant	1.00
SOLANUM DULCAMARA	vascular plant	1.00
Symplocarpus foetidus	vascular plant	1.00
Thalictrum dasycarpum	vascular plant	1.00
Thelypteris palustris	vascular plant	1.00
Toxicodendron vernix	vascular plant	1.00
Typha latifolia	vascular plant	1.00
Ulmus americana	vascular plant	1.00

Common Plant Species of Southern Swamps (12 sites)		
ScientificName	Group	Proportion of Sites Reporting
Fraxinus nigra	vascular plant	0.75
Acer rubrum	vascular plant	0.58
Caltha palustris	vascular plant	0.58
Betula alleghaniensis	vascular plant	0.50
Fraxinus pennsylvanica	vascular plant	0.50
Lindera benzoin	vascular plant	0.50
Onoclea sensibilis	vascular plant	0.50
Osmunda cinnamomea	vascular plant	0.50
Symplocarpus foetidus	vascular plant	0.50
Ilex verticillata	vascular plant	0.42
Thelypteris palustris	vascular plant	0.42
Tilia americana	vascular plant	0.42
Ulmus americana	vascular plant	0.42
Viburnum lentago	vascular plant	0.42
Acer saccharinum	vascular plant	0.33
Arisaema triphyllum	vascular plant	0.33
Carpinus caroliniana	vascular plant	0.33
Galium triflorum	vascular plant	0.33
Impatiens capensis	vascular plant	0.33
Osmunda regalis	vascular plant	0.33
Rosa palustris	vascular plant	0.33
Rubus pubescens	vascular plant	0.33

Common Plant Species of Southern Wet Meadows (14 sites)		
ScientificName	Group	Proportion of Sites Reporting
Eupatorium maculatum	vascular plant	0.93
Thelypteris palustris	vascular plant	0.93
Asclepias incarnata	vascular plant	0.71
Calamagrostis canadensis	vascular plant	0.71
Cornus stolonifera	vascular plant	0.71
Eupatorium perfoliatum	vascular plant	0.71
Onoclea sensibilis	vascular plant	0.71
Carex stricta	vascular plant	0.64
Spiraea alba	vascular plant	0.64
Carex lacustris	vascular plant	0.57
Impatiens capensis	vascular plant	0.57
Phalaris arundinacea	vascular plant	0.57
Potentilla fruticosa	vascular plant	0.57
Toxicodendron vernix	vascular plant	0.57
Typha latifolia	vascular plant	0.57
Campanula aparinoides	vascular plant	0.50
Cornus foemina	vascular plant	0.50
Scutellaria galericulata	vascular plant	0.50
Thalictrum dasycarpum	vascular plant	0.50
Polygonum amphibium	vascular plant	0.43
Pycnanthemum virginianum	vascular plant	0.43
Salix bebbiana	vascular plant	0.43
Solidago rugosa	vascular plant	0.43
Aster puniceus	vascular plant	0.36
Betula pumila	vascular plant	0.36
Bromus ciliatus	vascular plant	0.36
Cicuta bulbifera	vascular plant	0.36
Cornus amomum	vascular plant	0.36
Larix laricina	vascular plant	0.36
Mentha arvensis	vascular plant	0.36
Populus tremuloides	vascular plant	0.36
Salix candida	vascular plant	0.36
Ulmus americana	vascular plant	0.36

Common Plant Species of Wet Prairies (6 sites)		
ScientificName	Group	Proportion of Sites Reporting
Andropogon gerardii	vascular plant	1.00
Eupatorium maculatum	vascular plant	1.00
Eupatorium perfoliatum	vascular plant	1.00
Rudbeckia hirta	vascular plant	1.00
Thalictrum dasycarpum	vascular plant	1.00
Aster novae-angliae	vascular plant	0.83
Bromus ciliatus	vascular plant	0.83
Calamagrostis Canadensis	vascular plant	0.83
Helianthus giganteus	vascular plant	0.83
Lilium michiganense	vascular plant	0.83
Monarda fistulosa	vascular plant	0.83
Pedicularis lanceolata	vascular plant	0.83
Pycnanthemum virginianum	vascular plant	0.83
Solidago altissima	vascular plant	0.83
Thelypteris palustris	vascular plant	0.83
Typha latifolia	vascular plant	0.83
Angelica atropurpurea	vascular plant	0.67
Apios Americana	vascular plant	0.67
Asclepias incarnate	vascular plant	0.67
Aster puniceus	vascular plant	0.67
Caltha palustris	vascular plant	0.67
Campanula aparinoides	vascular plant	0.67
Cicuta maculate	vascular plant	0.67
Cornus stolonifera	vascular plant	0.67
Carex stricta	vascular plant	0.67
Euthamia graminifolia	vascular plant	0.67
Glyceria striata	vascular plant	0.67
Lathyrus palustris	vascular plant	0.67
Lysimachia quadriflora	vascular plant	0.67
Onoclea sensibilis	vascular plant	0.67
Oxypolis rigidior	vascular plant	0.67
Populus tremuloides	vascular plant	0.67
Silphium terebinthinaceum	vascular plant	0.67
Solidago Canadensis	vascular plant	0.67
Solidago gigantean	vascular plant	0.67
Spartina pectinata	vascular plant	0.67
Vernonia missurica	vascular plant	0.67
Veronicastrum virginicum	vascular plant	0.67
Zizia aurea	vascular plant	0.67
AGROSTIS GIGANTEA	vascular plant	0.50
Allium cernuum	vascular plant	0.50
Apocynum androsaemifolium	vascular plant	0.50
Asclepias syriaca	vascular plant	0.50
Calystegia sepium	vascular plant	0.50
Chelone glabra	vascular plant	0.50
Cirsium discolor	vascular plant	0.50

Common Plant Species of Wet Prairies, continued.		
Cirsium muticum	vascular plant	0.50
Clematis virginiana	vascular plant	0.50
Cornus amomum	vascular plant	0.50
Cornus foemina	vascular plant	0.50
Coreopsis tripteris	vascular plant	0.50
Euphorbia corollata	vascular plant	0.50
Galium boreale	vascular plant	0.50
Iris virginica	vascular plant	0.50
Lycopus americanus	vascular plant	0.50
Parnassia glauca	vascular plant	0.50
Phalaris arundinacea	vascular plant	0.50
Potentilla fruticosa	vascular plant	0.50
PRUNELLA VULGARIS	vascular plant	0.50
Ratibida pinnata	vascular plant	0.50
Schoenoplectus acutus	vascular plant	0.50
Solidago riddellii	vascular plant	0.50
Sorghastrum nutans	vascular plant	0.50
Spiraea alba	vascular plant	0.50
Toxicodendron vernix	vascular plant	0.50
Vitis riparia	vascular plant	0.50
Acer negundo	vascular plant	0.33
Achillea millefolium	vascular plant	0.33
Agrimonia gryposepala	vascular plant	0.33
Amphicarpaea bracteata	vascular plant	0.33
Andropogon scoparius	vascular plant	0.33
Anemone Canadensis	vascular plant	0.33
Anemone virginiana	vascular plant	0.33
Apocynum cannabinum	vascular plant	0.33
Apocynum sibiricum	vascular plant	0.33
ARCTIUM MINUS	vascular plant	0.33
Aster borealis	vascular plant	0.33
Aster firmus	vascular plant	0.33
Aster laevis	vascular plant	0.33
Aster lateriflorus	vascular plant	0.33
Aster umbellatus	vascular plant	0.33
Cacalia plantaginea	vascular plant	0.33
DAUCUS CAROTA	vascular plant	0.33
Desmodium canadense	vascular plant	0.33
Elymus virginicus	vascular plant	0.33
Equisetum arvense	vascular plant	0.33
Erigeron philadelphicus	vascular plant	0.33
Erigeron strigosus	vascular plant	0.33
Fragaria virginiana	vascular plant	0.33
Helianthus grosseserratus	vascular plant	0.33
Juncus dudleyi	vascular plant	0.33
Juniperus virginiana	vascular plant	0.33
Liatris spicata	vascular plant	0.33
Lycopus uniflorus	vascular plant	0.33
LYTHRUM SALICARIA	vascular plant	0.33

Common Plant Species of Wet Prairies, continued.		
MELILOTUS ALBA	vascular plant	0.33
Mentha arvensis	vascular plant	0.33
Phlox pilosa	vascular plant	0.33
Physocarpus opulifolius	vascular plant	0.33
POA PRATENSIS	vascular plant	0.33
Prenanthes alba	vascular plant	0.33
Prunus serotina	vascular plant	0.33
Quercus alba	vascular plant	0.33
Quercus macrocarpa	vascular plant	0.33
Rhamnus alnifolia	vascular plant	0.33
Rhus glabra	vascular plant	0.33
Rhus typhina	vascular plant	0.33
Rudbeckia laciniata	vascular plant	0.33
Salix exigua	vascular plant	0.33
Salix petiolaris	vascular plant	0.33
Sambucus canadensis	vascular plant	0.33
SAPONARIA OFFICINALIS	vascular plant	0.33
Saxifraga pensylvanica	vascular plant	0.33
Scirpus atrovirens	vascular plant	0.33
Smilacina racemosa	vascular plant	0.33
Solidago ohioensis	vascular plant	0.33
Solidago rugosa	vascular plant	0.33
Solidago simplex	vascular plant	0.33
TYPHA ANGUSTIFOLIA	vascular plant	0.33
Ulmus americana	vascular plant	0.33
Verbena hastata	vascular plant	0.33
Verbena urticifolia	vascular plant	0.33
Zigadenus glaucus	vascular plant	0.33

Common Plant Species of Wet-mesic Prairies (7 sites)		
ScientificName	Group	Proportion of Sites Reporting
Andropogon gerardii	vascular plant	1.00
Pycnanthemum virginianum	vascular plant	1.00
Sorghastrum nutans	vascular plant	1.00
Spartina pectinata	vascular plant	1.00
Euthamia graminifolia	vascular plant	0.86
Rudbeckia hirta	vascular plant	0.86
Solidago gigantea	vascular plant	0.86
Thalictrum dasycarpum	vascular plant	0.86
Aster novae-angliae	vascular plant	0.71
Cornus amomum	vascular plant	0.71
Fragaria virginiana	vascular plant	0.71
Iris virginica	vascular plant	0.71
Monarda fistulosa	vascular plant	0.71
Populus tremuloides	vascular plant	0.71
Zizia aurea	vascular plant	0.71
Achillea millefolium	vascular plant	0.57
Andropogon scoparius	vascular plant	0.57
Aster lanceolatus	vascular plant	0.57
Calamagrostis canadensis	vascular plant	0.57
Cicuta maculata	vascular plant	0.57
Cornus foemina	vascular plant	0.57
Cornus stolonifera	vascular plant	0.57
Coreopsis tripteris	vascular plant	0.57
Euphorbia corollata	vascular plant	0.57
Eupatorium perfoliatum	vascular plant	0.57
Galium boreale	vascular plant	0.57
Lactuca canadensis	vascular plant	0.57
Lilium michiganense	vascular plant	0.57
Onoclea sensibilis	vascular plant	0.57
Oxypolis rigidior	vascular plant	0.57
Phalaris arundinacea	vascular plant	0.57
Potentilla fruticosa	vascular plant	0.57
Sisyrinchium albidum	vascular plant	0.57
Solidago altissima	vascular plant	0.57
Solidago nemoralis	vascular plant	0.57
Solidago rugosa	vascular plant	0.57
Spiraea alba	vascular plant	0.57
Thelypteris palustris	vascular plant	0.57
Vernonia missurica	vascular plant	0.57
Veronicastrum virginicum	vascular plant	0.57
AGROSTIS GIGANTEA	vascular plant	0.43
Aletris farinosa	vascular plant	0.43
Apocynum cannabinum	vascular plant	0.43
Asclepias tuberosa	vascular plant	0.43
Aster oolentangiensis	vascular plant	0.43
Aster puniceus	vascular plant	0.43
Aster umbellatus	vascular plant	0.43

Common Plant Species of Wet-mesic Prairies, continued.		
Bromus ciliatus	vascular plant	0.43
Caltha palustris	vascular plant	0.43
Cirsium muticum	vascular plant	0.43
Comandra umbellata	vascular plant	0.43
Corylus americana	vascular plant	0.43
Carex stricta	vascular plant	0.43
Desmodium canadense	vascular plant	0.43
Equisetum arvense	vascular plant	0.43
Eupatorium maculatum	vascular plant	0.43
Gentiana andrewsii	vascular plant	0.43
Helianthus giganteus	vascular plant	0.43
Hypoxis hirsuta	vascular plant	0.43
Juniperus virginiana	vascular plant	0.43
Lathyrus palustris	vascular plant	0.43
Lespedeza capitata	vascular plant	0.43
Liatris spicata	vascular plant	0.43
Lobelia spicata	vascular plant	0.43
Lycopus americanus	vascular plant	0.43
Lysimachia quadriflora	vascular plant	0.43
Muhlenbergia mexicana	vascular plant	0.43
Phlox pilosa	vascular plant	0.43
POA COMPRESSA	vascular plant	0.43
Potentilla simplex	vascular plant	0.43
Prunus serotina	vascular plant	0.43
PRUNELLA VULGARIS	vascular plant	0.43
Ratibida pinnata	vascular plant	0.43
Rosa carolina	vascular plant	0.43
Salix discolor	vascular plant	0.43
Salix humilis	vascular plant	0.43
Saxifraga pensylvanica	vascular plant	0.43
Senecio aureus	vascular plant	0.43
Smilacina stellata	vascular plant	0.43
Solidago canadensis	vascular plant	0.43
Solidago riddellii	vascular plant	0.43
Solidago rigida	vascular plant	0.43
Ulmus americana	vascular plant	0.43
Zigadenus glaucus	vascular plant	0.43

Common Plant Species of Wet-mesic Sand Prairies (3 site)		
Scientific Name	Group	Proportion of Sites Reporting
Andropogon gerardii	vascular plant	1.00
Andropogon scoparius	vascular plant	1.00
Calamagrostis canadensis	vascular plant	1.00
Hypericum kalmianum	vascular plant	1.00
Juncus balticus	vascular plant	1.00
Pinus banksiana	vascular plant	1.00
Spiraea alba	vascular plant	1.00
Agrostis hyemalis	vascular plant	0.67
Campanula rotundifolia	vascular plant	0.67
Comandra umbellata	vascular plant	0.67
Carex buxbaumii	vascular plant	0.67
Carex flava	vascular plant	0.67
Carex pellita	vascular plant	0.67
Carex pensylvanica	vascular plant	0.67
Carex stricta	vascular plant	0.67
Eleocharis elliptica	vascular plant	0.67
Glyceria striata	vascular plant	0.67
Juncus effusus	vascular plant	0.67
Juncus greenei	vascular plant	0.67
Juncus vaseyi	vascular plant	0.67
Lobelia cardinalis	vascular plant	0.67
Lobelia spicata	vascular plant	0.67
Lycopus americanus	vascular plant	0.67
Monarda fistulosa	vascular plant	0.67
Panicum boreale	vascular plant	0.67
Panicum virgatum	vascular plant	0.67
Pinus resinosa	vascular plant	0.67
POA PRATENSIS	vascular plant	0.67
Polygonum amphibium	vascular plant	0.67
Rosa carolina	vascular plant	0.67
Rubus flagellaris	vascular plant	0.67
Rubus hispidus	vascular plant	0.67
Salix humilis	vascular plant	0.67
Scirpus cyperinus	vascular plant	0.67
Senecio pauperculus	vascular plant	0.67
Sorghastrum nutans	vascular plant	0.67
Spartina pectinata	vascular plant	0.67
Sporobolus heterolepis	vascular plant	0.67
Thelypteris palustris	vascular plant	0.67
Triadenum fraseri	vascular plant	0.67
AGROSTIS GIGANTEA	vascular plant	0.33
AGROPYRON REPENS	vascular plant	0.33
Agropyron trachycaulum	vascular plant	0.33
Alisma plantago-aquatica	vascular plant	0.33
Alnus rugosa	vascular plant	0.33
Aristida purpurascens	vascular plant	0.33
Aronia prunifolia	vascular plant	0.33

Common Plant Species of Wet-mesic Sand Prairies, continued.		
<i>Asclepias incarnata</i>	vascular plant	0.33
<i>Aster borealis</i>	vascular plant	0.33
<i>Aster lateriflorus</i>	vascular plant	0.33
<i>Aster longifolius</i>	vascular plant	0.33
<i>Aster sagittifolius</i>	vascular plant	0.33
<i>Aster umbellatus</i>	vascular plant	0.33
<i>Bromus ciliatus</i>	vascular plant	0.33
<i>Bromus pubescens</i>	vascular plant	0.33
CAMPANULA PERSICIFOLIA	vascular plant	0.33
<i>Castilleja coccinea</i>	vascular plant	0.33
CENTAUREA MACULOSA	vascular plant	0.33
<i>Chamaedaphne calyculata</i>	vascular plant	0.33
<i>Cicuta maculata</i>	vascular plant	0.33
<i>Cirsium hillii</i>	vascular plant	0.33
<i>Cirsium muticum</i>	vascular plant	0.33
<i>Comptonia peregrina</i>	vascular plant	0.33
<i>Cornus foemina</i>	vascular plant	0.33
<i>Coreopsis lanceolata</i>	vascular plant	0.33
<i>Cornus stolonifera</i>	vascular plant	0.33
<i>Carex bebbii</i>	vascular plant	0.33
<i>Carex brevior</i>	vascular plant	0.33
<i>Carex cryptolepis</i>	vascular plant	0.33
<i>Carex lacustris</i>	vascular plant	0.33
<i>Carex leptalea</i>	vascular plant	0.33
<i>Danthonia spicata</i>	vascular plant	0.33
<i>Deschampsia cespitosa</i>	vascular plant	0.33
<i>Dryopteris cristata</i>	vascular plant	0.33
<i>Dulichium arundinaceum</i>	vascular plant	0.33
<i>Elatine minima</i>	vascular plant	0.33
<i>Eleocharis obtusa</i>	vascular plant	0.33
<i>Eleocharis smallii</i>	vascular plant	0.33
<i>Epilobium leptophyllum</i>	vascular plant	0.33
<i>Equisetum hyemale</i>	vascular plant	0.33
<i>Equisetum laevigatum</i>	vascular plant	0.33
<i>Eragrostis spectabilis</i>	vascular plant	0.33
EUPHORBIA ESULA	vascular plant	0.33
<i>Euphorbia maculata</i>	vascular plant	0.33
<i>Eupatorium maculatum</i>	vascular plant	0.33
<i>Euthamia graminifolia</i>	vascular plant	0.33
<i>Euthamia remota</i>	vascular plant	0.33
FESTUCA RUBRA	vascular plant	0.33
<i>Fragaria virginiana</i>	vascular plant	0.33
<i>Galium labradoricum</i>	vascular plant	0.33
<i>Gaultheria procumbens</i>	vascular plant	0.33
<i>Gentiana rubricaulis</i>	vascular plant	0.33
<i>Geum rivale</i>	vascular plant	0.33
<i>Glyceria canadensis</i>	vascular plant	0.33
<i>Gnaphalium obtusifolium</i>	vascular plant	0.33

<i>Helianthemum canadense</i>	vascular plant	0.33
Common Plant Species of Wet-mesic Sand Prairies, continue.		
<i>Helianthus divaricatus</i>	vascular plant	0.33
HIERACIUM AURANTIACUM	vascular plant	0.33
<i>Hieracium gronovii</i>	vascular plant	0.33
<i>Hieracium longipilum</i>	vascular plant	0.33
<i>Hieracium scabrum</i>	vascular plant	0.33
<i>Hieracium venosum</i>	vascular plant	0.33
<i>Houstonia longifolia</i>	vascular plant	0.33
<i>Hypericum canadense</i>	vascular plant	0.33
HYPERICUM PERFORATUM	vascular plant	0.33
<i>Iris versicolor</i>	vascular plant	0.33
<i>Iris virginica</i>	vascular plant	0.33
<i>Juncus acuminatus</i>	vascular plant	0.33
<i>Juncus alpinus</i>	vascular plant	0.33
<i>Juncus biflorus</i>	vascular plant	0.33
<i>Juncus canadensis</i>	vascular plant	0.33
<i>Juncus pelocarpus</i>	vascular plant	0.33
<i>Juncus tenuis</i>	vascular plant	0.33
<i>Kalmia angustifolia</i>	vascular plant	0.33
<i>Kalmia polifolia</i>	vascular plant	0.33
<i>Larix laricina</i>	vascular plant	0.33
<i>Lechea villosa</i>	vascular plant	0.33
<i>Ledum groenlandicum</i>	vascular plant	0.33
<i>Leersia oryzoides</i>	vascular plant	0.33
<i>Liatris aspera</i>	vascular plant	0.33
LIATRIS PYCNOSTACHYA	vascular plant	0.33
<i>Lindernia anagallidea</i>	vascular plant	0.33
<i>Ludwigia palustris</i>	vascular plant	0.33
<i>Lupinus perennis</i>	vascular plant	0.33
<i>Lycopus uniflorus</i>	vascular plant	0.33
<i>Lysimachia ciliata</i>	vascular plant	0.33
<i>Lysimachia thyriflora</i>	vascular plant	0.33
<i>Maianthemum canadense</i>	vascular plant	0.33
<i>Melampyrum lineare</i>	vascular plant	0.33
<i>Mentha arvensis</i>	vascular plant	0.33
<i>Muhlenbergia glomerata</i>	vascular plant	0.33
<i>Muhlenbergia uniflora</i>	vascular plant	0.33
<i>Oenothera perennis</i>	vascular plant	0.33
<i>Panicum implicatum</i>	vascular plant	0.33
<i>Panicum oligosanthos</i>	vascular plant	0.33
<i>Phalaris arundinacea</i>	vascular plant	0.33
<i>Picea mariana</i>	vascular plant	0.33
<i>Pinus strobus</i>	vascular plant	0.33
<i>Platanthera lacera</i>	vascular plant	0.33
POA COMPRESSA	vascular plant	0.33
<i>Polygonum hydropiperoides</i>	vascular plant	0.33
<i>Polygala paucifolia</i>	vascular plant	0.33
<i>Populus tremuloides</i>	vascular plant	0.33

Potentilla fruticosa	vascular plant	0.33
Common Plant Species of Wet-mesic Sand Prairies, continued.		
Potentilla simplex	vascular plant	0.33
Prunus pumila	vascular plant	0.33
Prunus serotina	vascular plant	0.33
PRUNELLA VULGARIS	vascular plant	0.33
Pteridium aquilinum	vascular plant	0.33
Pycnanthemum pilosum	vascular plant	0.33
Pycnanthemum virginianum	vascular plant	0.33
Quercus alba	vascular plant	0.33
Quercus ellipsoidalis	vascular plant	0.33
Quercus macrocarpa	vascular plant	0.33
Quercus velutina	vascular plant	0.33
Rhamnus alnifolia	vascular plant	0.33
Rhynchospora capitellata	vascular plant	0.33
Rosa palustris	vascular plant	0.33
Rubus pubescens	vascular plant	0.33
Salix discolor	vascular plant	0.33
Salix petiolaris	vascular plant	0.33
Schizachne purpurascens	vascular plant	0.33
Scutellaria galericulata	vascular plant	0.33
Sisyrinchium albidum	vascular plant	0.33
Solidago gigantea	vascular plant	0.33
Solidago houghtonii	vascular plant	0.33
Solidago juncea	vascular plant	0.33
Solidago rugosa	vascular plant	0.33
Solidago uliginosa	vascular plant	0.33
Spiranthes lacera	vascular plant	0.33
Thalictrum dasycarpum	vascular plant	0.33
Thuja occidentalis	vascular plant	0.33
TRAGOPOGON DUBIUS	vascular plant	0.33
Trichophorum clintonii	vascular plant	0.33
Vaccinium angustifolium	vascular plant	0.33
Viola lanceolata	vascular plant	0.33
Viola novae-angliae	vascular plant	0.33
Zigadenus glaucus	vascular plant	0.33

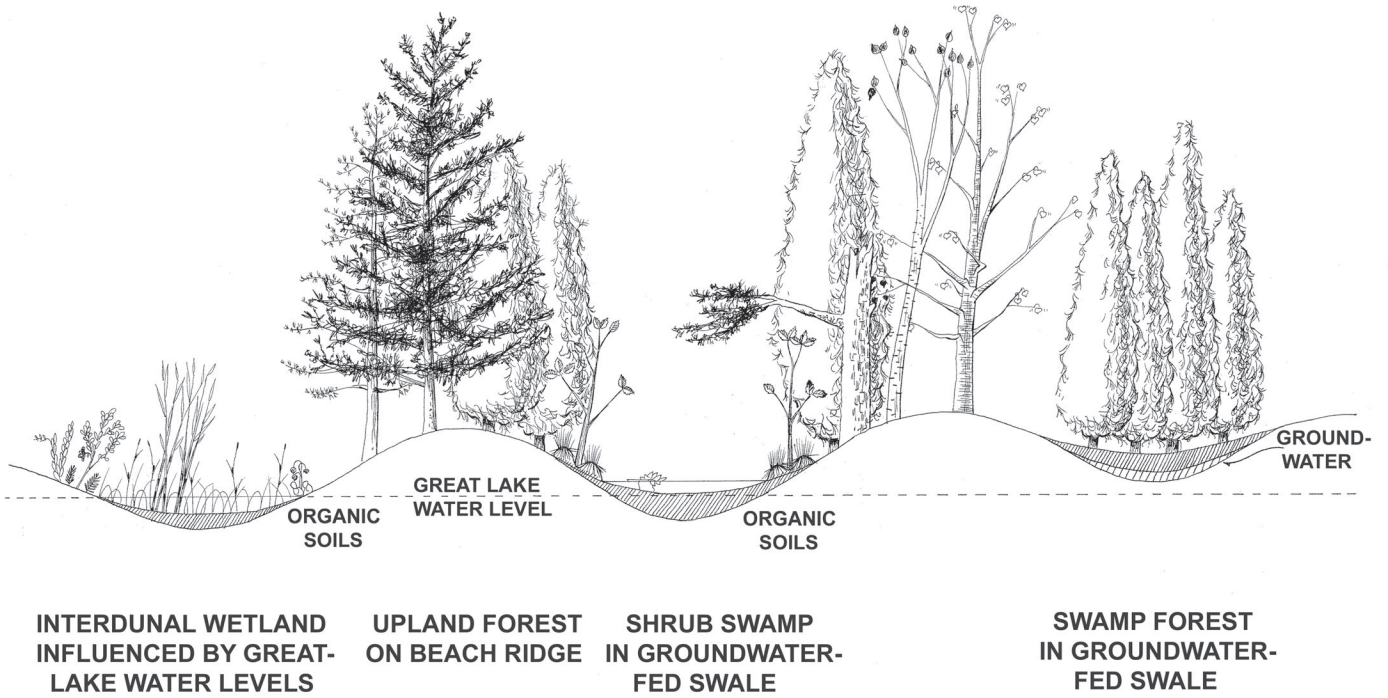
Common Plant Species of Wooded Dune and Swale Complexes (39 site)		
Scientific Name	Group	Proportion of Sites Reporting
<i>Trientalis borealis</i>	vascular plant	1.00
<i>Acer rubrum</i>	vascular plant	0.97
<i>Maianthemum canadense</i>	vascular plant	0.97
<i>Pteridium aquilinum</i>	vascular plant	0.97
<i>Pinus strobus</i>	vascular plant	0.92
<i>Gaultheria procumbens</i>	vascular plant	0.90
<i>Rubus pubescens</i>	vascular plant	0.90
<i>Alnus rugosa</i>	vascular plant	0.87
<i>Betula papyrifera</i>	vascular plant	0.87
<i>Iris versicolor</i>	vascular plant	0.87
<i>Calamagrostis canadensis</i>	vascular plant	0.85
<i>Melampyrum lineare</i>	vascular plant	0.85
<i>Vaccinium myrtilloides</i>	vascular plant	0.85
<i>Cornus canadensis</i>	vascular plant	0.82
<i>Thuja occidentalis</i>	vascular plant	0.79
<i>Lycopus uniflorus</i>	vascular plant	0.77
<i>Coptis trifolia</i>	vascular plant	0.72
<i>Aralia nudicaulis</i>	vascular plant	0.69
<i>Abies balsamea</i>	vascular plant	0.67
<i>Picea mariana</i>	vascular plant	0.67
<i>Dicranum scoparium</i>	bryophyte	0.64
<i>Pinus resinosa</i>	vascular plant	0.64
<i>Potentilla palustris</i>	vascular plant	0.64
<i>Clintonia borealis</i>	vascular plant	0.62
<i>Cornus stolonifera</i>	vascular plant	0.62
<i>Carex stricta</i>	vascular plant	0.62
<i>Ilex verticillata</i>	vascular plant	0.62
<i>Ledum groenlandicum</i>	vascular plant	0.62
<i>Osmunda regalis</i>	vascular plant	0.62
<i>Epigaea repens</i>	vascular plant	0.59
<i>Glyceria striata</i>	vascular plant	0.59
<i>Linnaea borealis</i>	vascular plant	0.59
<i>Thelypteris palustris</i>	vascular plant	0.59
<i>Scutellaria galericulata</i>	vascular plant	0.56
<i>Sphagnum girghensonii</i>	bryophyte	0.56
<i>Vaccinium angustifolium</i>	vascular plant	0.56
<i>Fragaria virginiana</i>	vascular plant	0.54
<i>Myrica gale</i>	vascular plant	0.54
<i>Quercus rubra</i>	vascular plant	0.54
<i>Ammophila breviligulata</i>	vascular plant	0.51
<i>Carex interior</i>	vascular plant	0.51
<i>Carex leptalea</i>	vascular plant	0.51
<i>Carex trisperma</i>	vascular plant	0.51
<i>Gaultheria hispidula</i>	vascular plant	0.51
<i>Scirpus cyperinus</i>	vascular plant	0.51
<i>Arctostaphylos uva-ursi</i>	vascular plant	0.49
<i>Dryopteris carthusiana</i>	vascular plant	0.49

Common Plant Species of Wooded Dune and Swale Complexes, continued.		
<i>Equisetum palustre</i>	vascular plant	0.49
<i>Gaylussacia baccata</i>	vascular plant	0.49
<i>Larix laricina</i>	vascular plant	0.49
<i>Lysimachia terrestris</i>	vascular plant	0.49
<i>Galium labradoricum</i>	vascular plant	0.46
<i>Lysimachia thyrsoflora</i>	vascular plant	0.46
<i>Onoclea sensibilis</i>	vascular plant	0.46
<i>Populus grandidentata</i>	vascular plant	0.46
<i>Populus tremuloides</i>	vascular plant	0.46
<i>Pyrola elliptica</i>	vascular plant	0.46
<i>Cicuta bulbifera</i>	vascular plant	0.44
<i>Carex intumescens</i>	vascular plant	0.44
<i>Carex lasiocarpa</i>	vascular plant	0.44
<i>Carex pauperula</i>	vascular plant	0.44
<i>Deschampsia flexuosa</i>	vascular plant	0.44
<i>Lonicera canadensis</i>	vascular plant	0.44
<i>Caltha palustris</i>	vascular plant	0.41
<i>Campanula aparinoides</i>	vascular plant	0.41
<i>Chamaedaphne calyculata</i>	vascular plant	0.41
<i>Carex disperma</i>	vascular plant	0.41
<i>Carex lacustris</i>	vascular plant	0.41
<i>Equisetum sylvaticum</i>	vascular plant	0.41
<i>Euthamia graminifolia</i>	vascular plant	0.41
<i>Juncus balticus</i>	vascular plant	0.41
<i>Lycopodium annotinum</i>	vascular plant	0.41
<i>Lycopodium clavatum</i>	vascular plant	0.41
<i>Osmunda cinnamomea</i>	vascular plant	0.41
<i>Picea glauca</i>	vascular plant	0.41
<i>Sium suave</i>	vascular plant	0.41
<i>Triadenum fraseri</i>	vascular plant	0.41
<i>Aster macrophyllus</i>	vascular plant	0.38
<i>Carex aquatilis</i>	vascular plant	0.38
<i>Carex pensylvanica</i>	vascular plant	0.38
<i>Carex retrorsa</i>	vascular plant	0.38
<i>Fraxinus nigra</i>	vascular plant	0.38
<i>Sarracenia purpurea</i>	vascular plant	0.38
<i>Smilacina stellata</i>	vascular plant	0.38
<i>Smilacina trifolia</i>	vascular plant	0.38
<i>Typha latifolia</i>	vascular plant	0.38
<i>Andromeda glaucophylla</i>	vascular plant	0.36
<i>Equisetum fluviatile</i>	vascular plant	0.36
<i>Juniperus communis</i>	vascular plant	0.36
<i>Juncus effusus</i>	vascular plant	0.36
<i>Lycopus americanus</i>	vascular plant	0.36
<i>Mentha arvensis</i>	vascular plant	0.36
<i>Pyrola chlorantha</i>	vascular plant	0.36
<i>Rhamnus alnifolia</i>	vascular plant	0.36
<i>Solidago rugosa</i>	vascular plant	0.36
<i>Sparganium minimum</i>	vascular plant	0.36

Common Plant Species of Wooded Dune and Swale Complexes, continued.		
Sphagnum centrale	bryophyte	0.36
Toxicodendron radicans	vascular plant	0.36
Carex canescens	vascular plant	0.33
Carex oligosperma	vascular plant	0.33
Carex pseudo-cyperus	vascular plant	0.33
Eupatorium maculatum	vascular plant	0.33
Geocaulon lividum	vascular plant	0.33
Lathyrus japonicus	vascular plant	0.33
Menyanthes trifoliata	vascular plant	0.33
Pinus banksiana	vascular plant	0.33
POA COMPRESSA	vascular plant	0.33
Populus balsamifera	vascular plant	0.33
Sphagnum wulfianum	bryophyte	0.33
Tsuga canadensis	vascular plant	0.33
Vaccinium macrocarpon	vascular plant	0.33

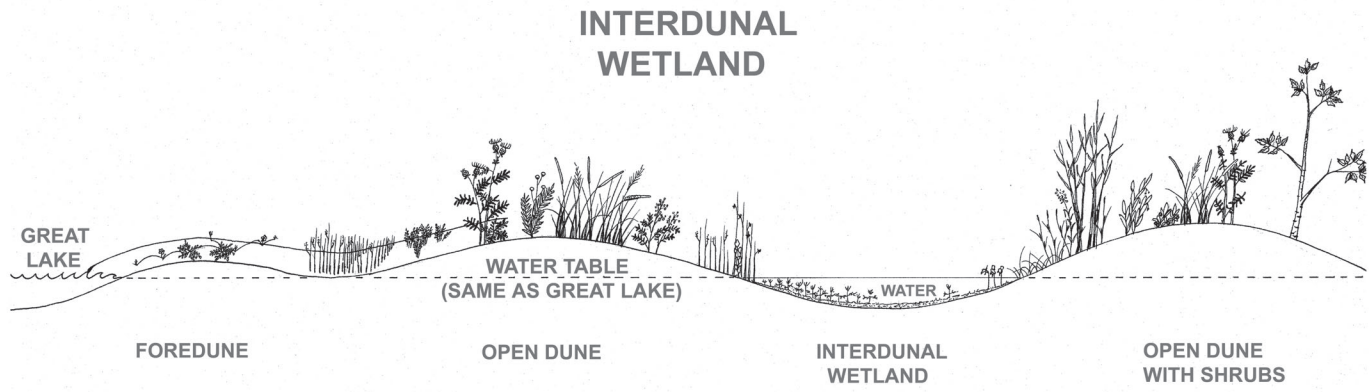
APPENDIX IX-A. Diagram of Wooded Dune and Swale Complex

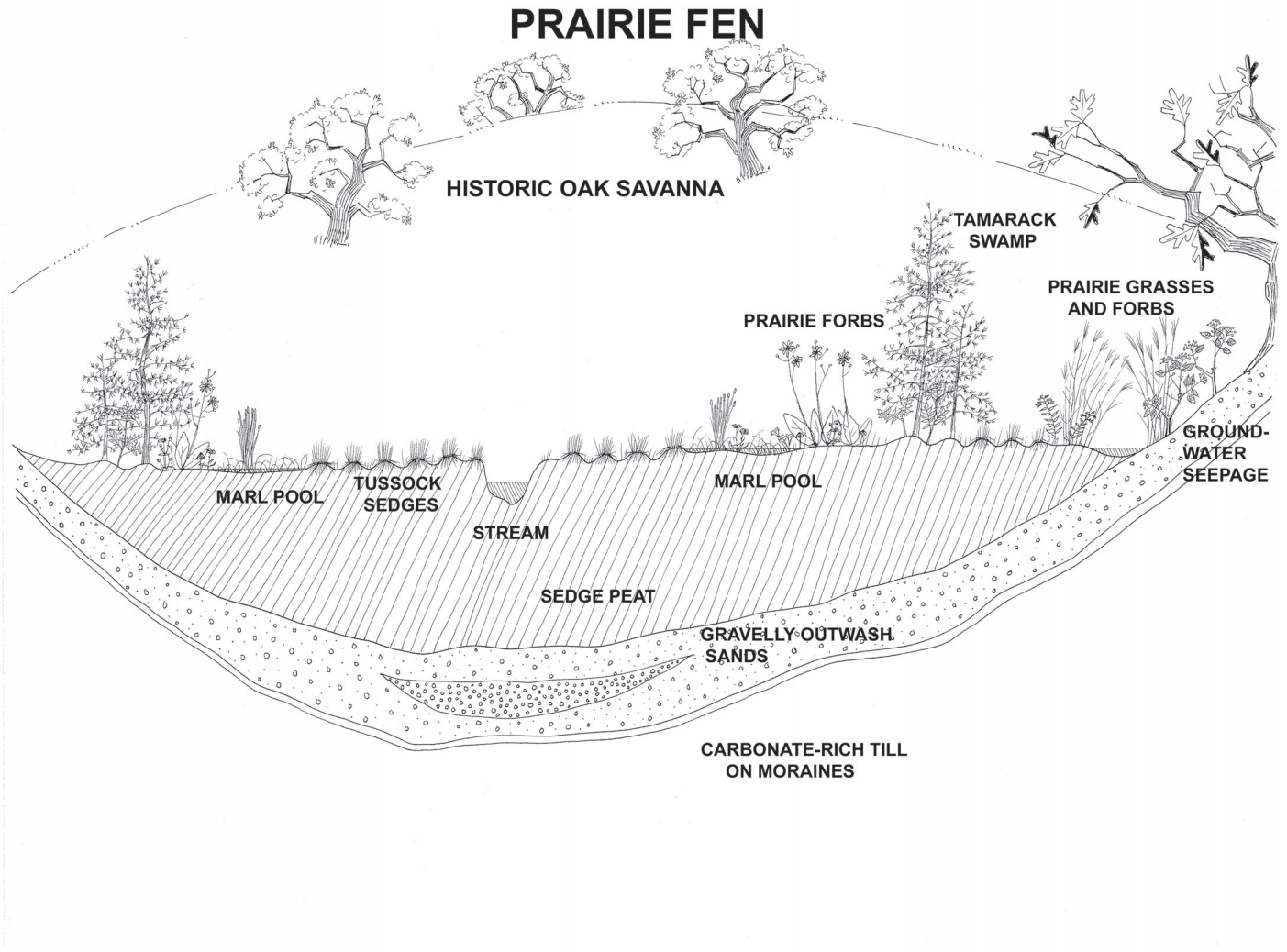
By: David Campbell

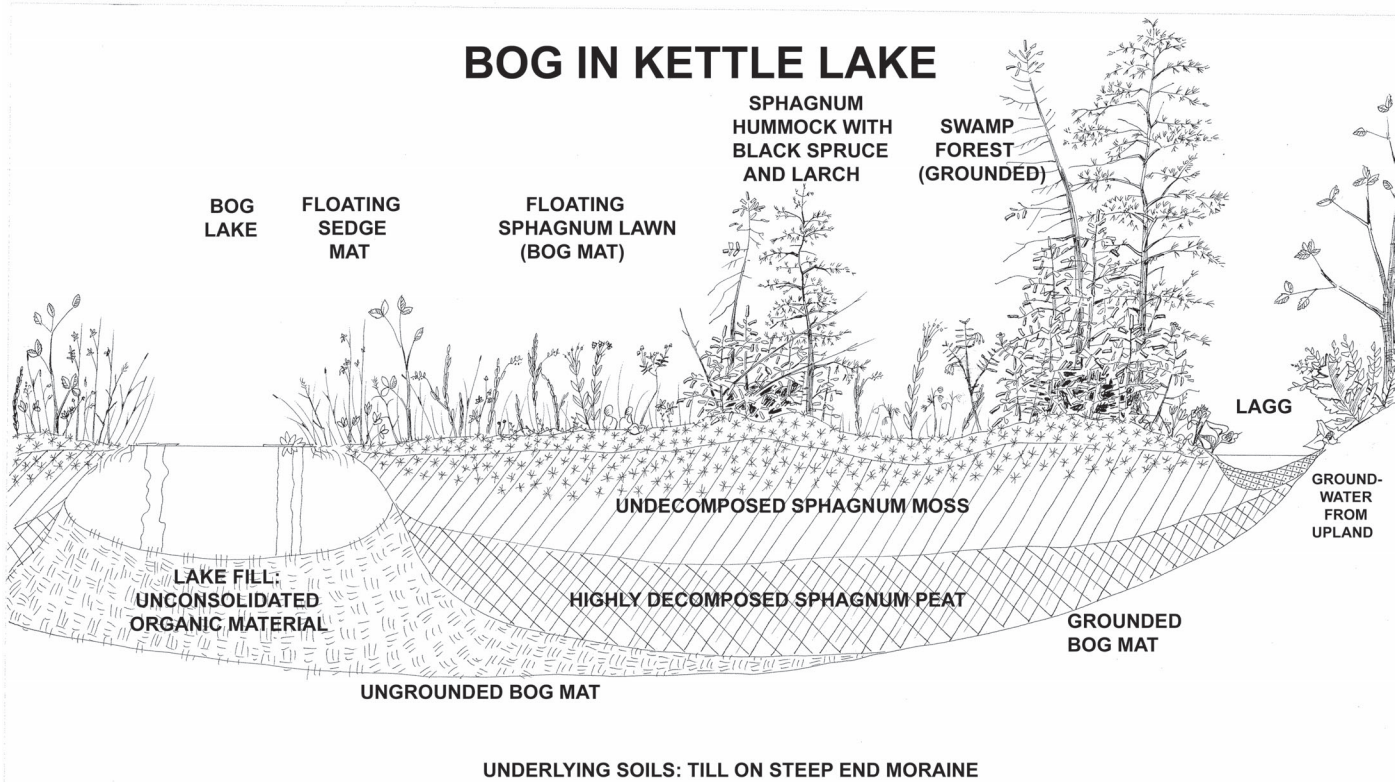


WOODED DUNE AND SWALE COMPLEX

APPENDIX IX-B. Diagrams of Interdunal Wetland
By: David Campbell







APPENDIX X-A. Rare Animals Occupying Michigan's Wetland Plant Communities.

Animals found in bog

Scientific Name	Common Name	Taxonomic Group
<u>Acris crepitans blanchardi</u>	<u>Blanchard's Cricket Frog</u>	Amphibians
<u>Alces alces</u>	<u>Moose</u>	Mammals
<u>Appalachia arcana</u>	<u>Secretive Locust</u>	Insects: Grasshoppers and Crickets
<u>Asio flammeus</u>	<u>Short-eared Owl</u>	Birds
<u>Atlanticus davisii</u>	<u>Davis's Shield-bearer</u>	Insects: Grasshoppers and Crickets
<u>Boloria freija</u>	<u>Freija Fritillary</u>	Insects: Butterflies and Moths
<u>Boloria frigga</u>	<u>Frigga Fritillary</u>	Insects: Butterflies and Moths
<u>Canis lupus</u>	<u>Gray Wolf</u>	Mammals
<u>Clemmys guttata</u>	<u>Spotted Turtle</u>	Reptiles
<u>Cordulegaster erronea</u>	<u>Tiger Spiketail</u>	Insects: Damselflies and Dragonflies
<u>Emydoidea blandingii</u>	<u>Blanding's Turtle</u>	Reptiles
<u>Erebia discoidalis</u>	<u>Red-disked Alpine</u>	Insects: Butterflies and Moths
<u>Falcapennis canadensis</u>	<u>Spruce Grouse</u>	Birds
<u>Gavia immer</u>	<u>Common Loon</u>	Birds
<u>Glyptemys insculpta</u>	<u>Wood Turtle</u>	Reptiles
<u>Gomphus quadricolor</u>	<u>Rapids Clubtail</u>	Insects: Damselflies and Dragonflies
<u>Haliaeetus leucocephalus</u>	<u>Bald Eagle</u>	Birds
<u>Liodessus cantralli</u>	<u>Cantrall's Bog Beetle</u>	Insects: Beetles
<u>Merolonche dolli</u>	<u>Doll's Merolonche</u>	Insects: Butterflies and Moths
<u>Neoconocephalus lyristes</u>	<u>Bog Conehead</u>	Insects: Grasshoppers and Crickets
<u>Ophiogomphus howei</u>	<u>Pygmy Snaketail</u>	Insects: Damselflies and Dragonflies
<u>Pantherophis spiloides</u>	<u>Black Rat Snake</u>	Reptiles
<u>Paroxya hoosieri</u>	<u>Hoosier Locust</u>	Insects: Grasshoppers and Crickets
<u>Picooides arcticus</u>	<u>Black-backed Woodpecker</u>	Birds
<u>Pseudacris triseriata maculata</u>	<u>Boreal Chorus Frog</u>	Amphibians
<u>Sistrurus catenatus</u>	<u>Eastern Massasauga</u>	Reptiles

catenatus		
Somatochlora hineana	Hine's Emerald	Insects: Damselflies and Dragonflies
Somatochlora incurvata	Incurvate Emerald	Insects: Damselflies and Dragonflies
Tachopteryx thoreyi	Grey Petaltail	Insects: Damselflies and Dragonflies
Williamsonia fletcheri	Ebony Boghaunter	Insects: Damselflies and Dragonflies

Animals found in coastal fen

Scientific Name	Common Name	Taxonomic Group
Alces alces	Moose	Mammals
Botaurus lentiginosus	American Bittern	Birds
Canis lupus	Gray Wolf	Mammals
Catinella exile	Land Snail	Snails
Clemmys guttata	Spotted Turtle	Reptiles
Cordulegaster erronea	Tiger Spiketail	Insects: Damselflies and Dragonflies
Emydoidea blandingii	Blanding's Turtle	Reptiles
Euconulus alderi	Land Snail	Snails
Gomphus quadricolor	Rapids Clubtail	Insects: Damselflies and Dragonflies
Hemileuca maia	Barrens Buckmoth	Insects: Butterflies and Moths
Merolonche dolli	Doll's Merolonche	Insects: Butterflies and Moths
Oncocnemis piffardi	3-striped Oncocnemis	Insects: Butterflies and Moths
Planogyra asteriscus	Eastern Flat-whorl	Snails
Sistrurus catenatus catenatus	Eastern Massasauga	Reptiles
Somatochlora hineana	Hine's Emerald	Insects: Damselflies and Dragonflies
Somatochlora incurvata	Incurvate Emerald	Insects: Damselflies and Dragonflies
Stagnicola petoskeyensis	Petoskey Pondsnaail	Snails
Tachopteryx thoreyi	Grey Petaltail	Insects: Damselflies and Dragonflies
Terrapene carolina carolina	Eastern Box Turtle	Reptiles
Vertigo elatior	Tapered Vertigo	Snails
Vertigo morsei	Six-whorl Vertigo	Snails
Vertigo nylanderi	Deep-throat Vertigo	Snails
Vertigo paradoxa	Land Snail	Snails
Vertigo pygmaea	Crested Vertigo	Snails

Williamsonia fletcheri	Ebony Boghaunter	Insects: Damselflies and Dragonflies
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Animals found in coastal plain marsh

Scientific Name	Common Name	Taxonomic Group
Acris crepitans blanchardi	Blanchard's Cricket Frog	Amphibians
Botaurus lentiginosus	American Bittern	Birds
Chlidonias niger	Black Tern	Birds
Circus cyaneus	Northern Harrier	Birds
Cistothorus palustris	Marsh Wren	Birds
Clemmys guttata	Spotted Turtle	Reptiles
Cordulegaster erronea	Tiger Spiketail	Insects: Damselflies and Dragonflies
Cygnus buccinator	Trumpeter Swan	Birds
Dorydiella kansana	Leafhopper	Insects: Cicadas and Hoppers
Emydoidea blandingii	Blanding's Turtle	Reptiles
Gallinula chloropus	Common Moorhen	Birds
Ixobrychus exilis	Least Bittern	Birds
Meropleon ambifusca	Newman's Brocade	Insects: Butterflies and Moths
Nycticorax nycticorax	Black-crowned Night-heron	Birds
Orphulella pelidna	Green Desert Grasshopper	Insects: Grasshoppers and Crickets
Paroxya hoosieri	Hoosier Locust	Insects: Grasshoppers and Crickets
Phalaropus tricolor	Wilson's Phalarope	Birds
Rallus elegans	King Rail	Birds
Sistrurus catenatus catenatus	Eastern Massasauga	Reptiles
Tyto alba	Barn Owl	Birds

Animals found in emergent marsh

Scientific Name	Common Name	Taxonomic Group
Acella haldemani	Spindle Lymnaea	Snails
Acris crepitans blanchardi	Blanchard's Cricket Frog	Amphibians
Alces alces	Moose	Mammals
Asio flammeus	Short-eared Owl	Birds
Botaurus lentiginosus	American Bittern	Birds
Calephelis mutica	Swamp Metalmark	Insects: Butterflies and Moths
Chlidonias niger	Black Tern	Birds
Circus cyaneus	Northern Harrier	Birds
Cistothorus palustris	Marsh Wren	Birds
Clemmys guttata	Spotted Turtle	Reptiles
Clonophis kirtlandii	Kirtland's Snake	Reptiles
Cordulegaster erronea	Tiger Spiketail	Insects: Damselflies and Dragonflies
Cygnus buccinator	Trumpeter Swan	Birds
Emydoidea blandingii	Blanding's Turtle	Reptiles
Gallinula chloropus	Common Moorhen	Birds
Gavia immer	Common Loon	Birds
Gomphus quadricolor	Rapids Clubtail	Insects: Damselflies and Dragonflies
Ixobrychus exilis	Least Bittern	Birds
Liodessus cantralli	Cantrall's Bog Beetle	Insects: Beetles
Meropleon ambifusca	Newman's Brocade	Insects: Butterflies and Moths
Neoconocephalus lyristes	Bog Conehead	Insects: Grasshoppers and Crickets
Neoconocephalus retusus	Conehead Grasshopper	Insects: Grasshoppers and Crickets
Nerodia erythrogaster neglecta	Copperbelly Watersnake	Reptiles
Nycticorax nycticorax	Black-crowned Night-heron	Birds
Oncocnemis piffardi	3-striped Oncocnemis	Insects: Butterflies and Moths
Ophiogomphus howei	Pygmy Snaketail	Insects: Damselflies and Dragonflies
Orchelimum concinnum	Red-faced Meadow Katydid	Insects: Grasshoppers and Crickets

Pantherophis gloydi	Eastern Fox Snake	Reptiles
Pantherophis spiloides	Black Rat Snake	Reptiles
Papaipema cerina	Golden Borer	Insects: Butterflies and Moths
Papaipema maritima	Maritime Sunflower Borer	Insects: Butterflies and Moths
Paroxya hoosieri	Hoosier Locust	Insects: Grasshoppers and Crickets
Phalaropus tricolor	Wilson's Phalarope	Birds
Planorbella smithi	Aquatic Snail	Snails
Rallus elegans	King Rail	Birds
Sistrurus catenatus catenatus	Eastern Massasauga	Reptiles
Somatochlora hineana	Hine's Emerald	Insects: Damselflies and Dragonflies
Tyto alba	Barn Owl	Birds

Animals found in floodplain forest

Scientific Name	Common Name	Taxonomic Group
Accipiter cooperii	Cooper's Hawk	Birds
Accipiter gentilis	Northern Goshawk	Birds
Acronicta falcata	Corylus Dagger Moth	Insects: Butterflies and Moths
Ambystoma opacum	Marbled Salamander	Amphibians
Ambystoma texanum	Smallmouth Salamander	Amphibians
Anguispira kochi	Banded Globe	Snails
Appalachina sayanus	Spike-lip Crater	Snails
Basilodes pepita	Gold Moth	Insects: Butterflies and Moths
Battus philenor	Pipevine Swallowtail	Insects: Butterflies and Moths
Brychius hungerfordi	Hungerford's Crawling Water Beetle	Insects: Beetles
Buteo lineatus	Red-shouldered Hawk	Birds
Catocala dulciola	Quiet Underwing	Insects: Butterflies and Moths
Catocala illecta	Magdalen Underwing	Insects: Butterflies and Moths
Clonophis kirtlandii	Kirtland's Snake	Reptiles
Dendroica cerulea	Cerulean Warbler	Birds
Dendroica dominica	Yellow-throated Warbler	Birds
Discus patulus	Domed Disc	Snails
Dryobius sexnotatus	Six-banded Longhorn Beetle	Insects: Beetles
Emydoidea blandingii	Blanding's Turtle	Reptiles

Euphyes dukesi	Dukes' Skipper	Insects: Butterflies and Moths
Gomphus quadricolor	Rapids Clubtail	Insects: Damselflies and Dragonflies
Haliaeetus leucocephalus	Bald Eagle	Birds
Heterocampa subrotata	Small Heterocampa	Insects: Butterflies and Moths
Heteropacha rileyana	Riley's Lappet Moth	Insects: Butterflies and Moths
Mesodon elevatus	Proud Globe	Snails
Mesomphix cupreus	Copper Button	Snails
Microtus pinetorum	Woodland Vole	Mammals
Myotis sodalis	Indiana Bat or Indiana Myotis	Mammals
Nerodia erythrogaster neglecta	Copperbelly Watersnake	Reptiles
Pandion haliaetus	Osprey	Birds
Papaipema speciosissima	Regal Fern Borer	Insects: Butterflies and Moths
Philomycus carolinianus	Carolina Mantleslug	Snails
Pomatiopsis cincinnatiensis	Brown Walker	Snails
Protonotaria citrea	Prothonotary Warbler	Birds
Pyrgulopsis letsoni	Gravel Pyrg	Snails
Seiurus motacilla	Louisiana Waterthrush	Birds
Sistrurus catenatus catenatus	Eastern Massasauga	Reptiles
Stenelmis douglasensis	Douglas Stenelmis Riffle Beetle	Insects: Beetles
Tachopteryx thoreyi	Grey Petaltail	Insects: Damselflies and Dragonflies
Wilsonia citrina	Hooded Warbler	Birds
Xolotrema denotata	Velvet Wedge	Snails

Animals found in great lakes marsh

Scientific Name	Common Name	Taxonomic Group
<u>Asio flammeus</u>	<u>Short-eared Owl</u>	Birds
<u>Botaurus lentiginosus</u>	<u>American Bittern</u>	Birds
<u>Chlidonias niger</u>	<u>Black Tern</u>	Birds
<u>Circus cyaneus</u>	<u>Northern Harrier</u>	Birds
<u>Cistothorus palustris</u>	<u>Marsh Wren</u>	Birds
<u>Clemmys guttata</u>	<u>Spotted Turtle</u>	Reptiles
<u>Cordulegaster erronea</u>	<u>Tiger Spiketail</u>	Insects: Damselflies and Dragonflies
<u>Cygnus buccinator</u>	<u>Trumpeter Swan</u>	Birds
<u>Emydoidea blandingii</u>	<u>Blanding's Turtle</u>	Reptiles
<u>Gallinula chloropus</u>	<u>Common Moorhen</u>	Birds
<u>Gomphus quadricolor</u>	<u>Rapids Clubtail</u>	Insects: Damselflies and Dragonflies
<u>Ixobrychus exilis</u>	<u>Least Bittern</u>	Birds
<u>Nycticorax nycticorax</u>	<u>Black-crowned Night-heron</u>	Birds
<u>Oncocnemis piffardi</u>	<u>3-striped Oncocnemis</u>	Insects: Butterflies and Moths
<u>Pantherophis gloydi</u>	<u>Eastern Fox Snake</u>	Reptiles
<u>Phalaropus tricolor</u>	<u>Wilson's Phalarope</u>	Birds
<u>Rallus elegans</u>	<u>King Rail</u>	Birds
<u>Somatochlora hineana</u>	<u>Hine's Emerald</u>	Insects: Damselflies and Dragonflies
<u>Sterna forsteri</u>	<u>Forster's Tern</u>	Birds
<u>Terrapene carolina carolina</u>	<u>Eastern Box Turtle</u>	Reptiles
<u>Tyto alba</u>	<u>Barn Owl</u>	Birds
<u>Xanthocephalus xanthocephalus</u>	<u>Yellow-headed Blackbird</u>	Birds

Animals found in hardwood-conifer swamp

Scientific Name	Common Name	Taxonomic Group
Accipiter cooperii	Cooper's Hawk	Birds
Accipiter gentilis	Northern Goshawk	Birds
Alces alces	Moose	Mammals
Appalachina sayanus	Spike-lip Crater	Snails
Asio otus	Long-eared Owl	Birds
Canis lupus	Gray Wolf	Mammals
Glyptemys insculpta	Wood Turtle	Reptiles
Gomphus quadricolor	Rapids Clubtail	Insects: Damselflies and Dragonflies
Haliaeetus leucocephalus	Bald Eagle	Birds
Incisalia henrici	Henry's Elfin	Insects: Butterflies and Moths
Pachypolia atricornis	Three-horned Moth	Insects: Butterflies and Moths
Pandion haliaetus	Osprey	Birds
Sistrurus catenatus catenatus	Eastern Massasauga	Reptiles
Tachopteryx thoreyi	Grey Petaltail	Insects: Damselflies and Dragonflies
Williamsonia fletcheri	Ebony Boghaunter	Insects: Damselflies and Dragonflies

Animals found in inland salt marsh

No species found.

Animals found in interdunal wetland

Scientific Name	Common Name	Taxonomic Group
Acris crepitans blanchardi	Blanchard's Cricket Frog	Amphibians
Catinella exile	Land Snail	Snails
Charadrius melodius	Piping Plover	Birds
Clemmys guttata	Spotted Turtle	Reptiles
Onconemesis piffardi	3-striped Onconemesis	Insects: Butterflies and Moths
Orchelimum delicatum	Delicate Meadow Katydid	Insects: Grasshoppers and Crickets
Papaipema aweme	Aweme Borer	Insects: Butterflies and Moths

Animals found in intermittent wetland [boggy seepage wetland]

Scientific Name	Common Name	Taxonomic Group
Appalachia arcana	Secretive Locust	Insects: Grasshoppers and Crickets
Sistrurus catenatus catenatus	Eastern Massasauga	Reptiles

Animals found in inundated shrub swamp

Scientific Name	Common Name	Taxonomic Group
<u>Acris crepitans blanchardi</u>	<u>Blanchard's Cricket Frog</u>	Amphibians
<u>Ambystoma texanum</u>	<u>Smallmouth Salamander</u>	Amphibians
<u>Clemmys guttata</u>	<u>Spotted Turtle</u>	Reptiles
<u>Emydoidea blandingii</u>	<u>Blanding's Turtle</u>	Reptiles
<u>Heterocampa subrotata</u>	<u>Small Heterocampa</u>	Insects: Butterflies and Moths
<u>Heteropacha rileyana</u>	<u>Riley's Lappet Moth</u>	Insects: Butterflies and Moths
<u>Nerodia erythrogaster neglecta</u>	<u>Copperbelly Watersnake</u>	Reptiles
<u>Nycticorax nycticorax</u>	<u>Black-crowned Night-heron</u>	Birds
<u>Papaipema speciosissima</u>	<u>Regal Fern Borer</u>	Insects: Butterflies and Moths
<u>Terrapene carolina carolina</u>	<u>Eastern Box Turtle</u>	Reptiles
<u>Williamsonia fletcheri</u>	<u>Ebony Boghaunter</u>	Insects: Damselflies and Dragonflies

Animals found in lakeplain wet prairie

Scientific Name	Common Name	Taxonomic Group
Ammodramus savannarum	Grasshopper Sparrow	Birds
Asio flammeus	Short-eared Owl	Birds
Botaurus lentiginosus	American Bittern	Birds
Circus cyaneus	Northern Harrier	Birds
Clemmys guttata	Spotted Turtle	Reptiles
Dorydiella kansana	Leafhopper	Insects: Cicadas and Hoppers
Flexamia delongi	Leafhopper	Insects: Cicadas and Hoppers
Flexamia reflexus	Leafhopper	Insects: Cicadas and Hoppers
Gastrocopta holzingeri	Lambda Snaggletooth Snail	Snails
Neoconocephalus lyristes	Bog Conehead	Insects: Grasshoppers and Crickets
Orchelimum concinnum	Red-faced Meadow Katydid	Insects: Grasshoppers and Crickets
Orchelimum delicatum	Delicate Meadow Katydid	Insects: Grasshoppers and Crickets
Orphulella pelidna	Green Desert Grasshopper	Insects: Grasshoppers and Crickets
Pantherophis gloydi	Eastern Fox Snake	Reptiles
Papaipema beeriana	Blazing Star Borer	Insects: Butterflies and Moths
Phalaropus tricolor	Wilson's Phalarope	Birds
Rallus elegans	King Rail	Birds
Spiza americana	Dickcissel	Birds
Tyto alba	Barn Owl	Birds

Animals found in lakeplain wet-mesic prairie

Scientific Name	Common Name	Taxonomic Group
Ammodramus henslowii	Henslow's Sparrow	Birds
Ammodramus savannarum	Grasshopper Sparrow	Birds
Asio flammeus	Short-eared Owl	Birds
Botaurus lentiginosus	American Bittern	Birds
Circus cyaneus	Northern Harrier	Birds
Clemmys guttata	Spotted Turtle	Reptiles
Dorydiella kansana	Leafhopper	Insects: Cicadas and Hoppers

Flexamia delongi	Leafhopper	Insects: Cicadas and Hoppers
Flexamia reflexus	Leafhopper	Insects: Cicadas and Hoppers
Gastrocopta holzingeri	Lambda Snaggletooth Snail	Snails
Neoconocephalus lyristes	Bog Conehead	Insects: Grasshoppers and Crickets
Pantherophis gloydi	Eastern Fox Snake	Reptiles
Papaipema beeriana	Blazing Star Borer	Insects: Butterflies and Moths
Rallus elegans	King Rail	Birds
Spiza americana	Dickcissel	Birds
Tyto alba	Barn Owl	Birds

Animals found in muskeg

Scientific Name	Common Name	Taxonomic Group
Alces alces	Moose	Mammals
Canis lupus	Gray Wolf	Mammals
Erebia discoidalis	Red-disked Alpine	Insects: Butterflies and Moths
Picoides arcticus	Black-backed Woodpecker	Birds
Williamsonia fletcheri	Ebony Boghaunter	Insects: Damselflies and Dragonflies

Animals found in northern fen

Scientific Name	Common Name	Taxonomic Group
Alces alces	Moose	Mammals
Botaurus lentiginosus	American Bittern	Birds
Canis lupus	Gray Wolf	Mammals
Catinella exile	Land Snail	Snails
Clemmys guttata	Spotted Turtle	Reptiles
Cordulegaster erronea	Tiger Spiketail	Insects: Damselflies and Dragonflies
Emydoidea blandingii	Blanding's Turtle	Reptiles
Euconulus alderi	Land Snail	Snails
Gomphus quadricolor	Rapids Clubtail	Insects: Damselflies and Dragonflies
Hemileuca maia	Barrens Buckmoth	Insects: Butterflies and Moths
Merolonche dolli	Doll's Merolonche	Insects: Butterflies and Moths
Oncocnemis piffardi	3-striped Oncocnemis	Insects: Butterflies and Moths
Planogyra asteriscus	Eastern Flat-whorl	Snails
Sistrurus catenatus catenatus	Eastern Massasauga	Reptiles
Somatochlora hineana	Hine's Emerald	Insects: Damselflies and Dragonflies
Somatochlora incurvata	Incurvate Emerald	Insects: Damselflies and Dragonflies
Stagnicola petoskeyensis	Petoskey Pondsnaail	Snails
Tachopteryx thoreyi	Grey Petaltail	Insects: Damselflies and Dragonflies
Terrapene carolina carolina	Eastern Box Turtle	Reptiles
Vertigo elatior	Tapered Vertigo	Snails
Vertigo morsei	Six-whorl Vertigo	Snails
Vertigo nylanderi	Deep-throat Vertigo	Snails
Vertigo paradoxa	Land Snail	Snails
Vertigo pygmaea	Crested Vertigo	Snails
Williamsonia fletcheri	Ebony Boghaunter	Insects: Damselflies and Dragonflies

Animals found in northern shrub thicket

Scientific Name	Common Name	Taxonomic Group
Alces alces	Moose	Mammals
Brychius hungerfordi	Hungerford's Crawling Water Beetle	Insects: Beetles
Canis lupus	Gray Wolf	Mammals
Euconulus alderi	Land Snail	Snails
Glyptemys insculpta	Wood Turtle	Reptiles
Hemileuca maia	Barrens Buckmoth	Insects: Butterflies and Moths
Pipistrellus subflavus	Eastern Pipistrelle	Mammals
Planogyra asteriscus	Eastern Flat-whorl	Snails
Sistrurus catenatus catenatus	Eastern Massasauga	Reptiles
Stagnicola petoskeyensis	Petoskey Pondsnailed	Snails
Terrapene carolina carolina	Eastern Box Turtle	Reptiles
Tympanuchus phasianellus	Sharp-tailed Grouse	Birds

Animals found in northern swamp

Scientific Name	Common Name	Taxonomic Group
Accipiter cooperii	Cooper's Hawk	Birds
Accipiter gentilis	Northern Goshawk	Birds
Alces alces	Moose	Mammals
Appalachina sayanus	Spike-lip Crater	Snails
Canis lupus	Gray Wolf	Mammals
Gomphus quadricolor	Rapids Clubtail	Insects: Damselflies and Dragonflies
Haliaeetus leucocephalus	Bald Eagle	Birds
Incisalia henrici	Henry's Elfin	Insects: Butterflies and Moths
Pachypolia atricornis	Three-horned Moth	Insects: Butterflies and Moths
Pandion haliaetus	Osprey	Birds
Sistrurus catenatus catenatus	Eastern Massasauga	Reptiles
Terrapene carolina carolina	Eastern Box Turtle	Reptiles

Animals found in northern wet meadow

Scientific Name	Common Name	Taxonomic Group
Alces alces	Moose	Mammals
Asio flammeus	Short-eared Owl	Birds
Botaurus lentiginosus	American Bittern	Birds
Brychius hungerfordi	Hungerford's Crawling Water Beetle	Insects: Beetles
Canis lupus	Gray Wolf	Mammals
Circus cyaneus	Northern Harrier	Birds
Clemmys guttata	Spotted Turtle	Reptiles
Coturnicops noveboracensis	Yellow Rail	Birds
Emydoidea blandingii	Blanding's Turtle	Reptiles
Erebia discoidalis	Red-disked Alpine	Insects: Butterflies and Moths
Glyptemys insculpta	Wood Turtle	Reptiles
Oncocnemis piffardi	3-striped Oncocnemis	Insects: Butterflies and Moths
Phyciodes batesii	Tawny Crescent	Insects: Butterflies and Moths
Sistrurus catenatus catenatus	Eastern Massasauga	Reptiles

Animals found in northern wet-mesic prairie

Scientific Name	Common Name	Taxonomic Group
Appalachia arcana	Secretive Locust	Insects: Grasshoppers and Crickets
Asio flammeus	Short-eared Owl	Birds
Botaurus lentiginosus	American Bittern	Birds
Circus cyaneus	Northern Harrier	Birds
Sistrurus catenatus catenatus	Eastern Massasauga	Reptiles
Tympanuchus phasianellus	Sharp-tailed Grouse	Birds

Animals found in patterned fen

Scientific Name	Common Name	Taxonomic Group
Alces alces	Moose	Mammals
Boloria freija	Freija Fritillary	Insects: Butterflies and Moths
Boloria frigga	Frigga Fritillary	Insects: Butterflies and Moths
Canis lupus	Gray Wolf	Mammals
Erebia discoidalis	Red-disked Alpine	Insects: Butterflies and Moths
Gomphus quadricolor	Rapids Clubtail	Insects: Damselflies and Dragonflies
Somatochlora hineana	Hine's Emerald	Insects: Damselflies and Dragonflies
Somatochlora incurvata	Incurvate Emerald	Insects: Damselflies and Dragonflies
Tachopteryx thoreyi	Grey Petaltail	Insects: Damselflies and Dragonflies
Williamsonia fletcheri	Ebony Boghaunter	Insects: Damselflies and Dragonflies

Animals found in poor conifer swamp

Scientific Name	Common Name	Taxonomic Group
Alces alces	Moose	Mammals
Canis lupus	Gray Wolf	Mammals
Falcipennis canadensis	Spruce Grouse	Birds
Haliaeetus leucocephalus	Bald Eagle	Birds
Merolonche dolli	Doll's Merolonche	Insects: Butterflies and Moths
Sistrurus catenatus catenatus	Eastern Massasauga	Reptiles

Animals found in poor fen

Scientific Name	Common Name	Taxonomic Group
Alces alces	Moose	Mammals
Botaurus lentiginosus	American Bittern	Birds
Erebia discoidalis	Red-disked Alpine	Insects: Butterflies and Moths
Somatochlora hineana	Hine's Emerald	Insects: Damselflies and Dragonflies
Williamsonia fletcheri	Ebony Boghaunter	Insects: Damselflies and Dragonflies

Animals found in prairie fen

Scientific Name	Common Name	Taxonomic Group
Acris crepitans blanchardi	Blanchard's Cricket Frog	Amphibians
Calephelis mutica	Swamp Metalmark	Insects: Butterflies and Moths
Catinella exile	Land Snail	Snails
Clemmys guttata	Spotted Turtle	Reptiles
Clonophis kirtlandii	Kirtland's Snake	Reptiles
Cordulegaster erronea	Tiger Spiketail	Insects: Damselflies and Dragonflies
Emydoidea blandingii	Blanding's Turtle	Reptiles
Euconulus alderi	Land Snail	Snails
Euphyes dukesi	Dukes' Skipper	Insects: Butterflies and Moths
Flexamia huroni	Huron River Leafhopper	Insects: Cicadas and Hoppers
Flexamia reflexus	Leafhopper	Insects: Cicadas and Hoppers
Fontigens nickliniana	Watercress Snail	Snails
Hemileuca maia	Barrens Buckmoth	Insects: Butterflies and Moths
Lepyronia angulifera	Angular Spittlebug	Insects: Cicadas and Hoppers
Liodessus cantralli	Cantrall's Bog Beetle	Insects: Beetles
Meropleon ambifusca	Newman's Brocade	Insects: Butterflies and Moths
Neoconocephalus lyristes	Bog Conehead	Insects: Grasshoppers and Crickets
Neonympha mitchellii mitchellii	Mitchell's Satyr	Insects: Butterflies and Moths
Oarisma poweshiek	Poweshiek Skipperling	Insects: Butterflies and Moths
Oecanthus laricis	Tamarack Tree Cricket	Insects: Grasshoppers and Crickets
Orchelimum concinnum	Red-faced Meadow Katydid	Insects: Grasshoppers and Crickets
Papaipema beeriana	Blazing Star Borer	Insects: Butterflies and Moths
Papaipema cerina	Golden Borer	Insects: Butterflies and Moths
Papaipema maritima	Maritime Sunflower Borer	Insects: Butterflies and Moths
Papaipema sciata	Culvers Root Borer	Insects: Butterflies and Moths
Papaipema silphii	Silphium Borer Moth	Insects: Butterflies and Moths
Papaipema speciosissima	Regal Fern Borer	Insects: Butterflies and Moths
Paroxya hoosieri	Hoosier Locust	Insects: Grasshoppers and Crickets
Prosapia ignipectus	Red-legged Spittlebug	Insects: Cicadas and Hoppers

Sistrurus catenatus catenatus	Eastern Massasauga	Reptiles
Spartiniphaga inops	Spartina Moth	Insects: Butterflies and Moths
Stenelmis douglasensis	Douglas Stenelmis Riffle Beetle	Insects: Beetles
Terrapene carolina carolina	Eastern Box Turtle	Reptiles
Vertigo elatior	Tapered Vertigo	Snails
Williamsonia fletcheri	Ebony Boghaunter	Insects: Damselflies and Dragonflies

Animals found in rich conifer swamp

Scientific Name	Common Name	Taxonomic Group
Alces alces	Moose	Mammals
Appalachina sayanus	Spike-lip Crater	Snails
Brychius hungerfordi	Hungerford's Crawling Water Beetle	Insects: Beetles
Canis lupus	Gray Wolf	Mammals
Emydoidea blandingii	Blanding's Turtle	Reptiles
Euconulus alderi	Land Snail	Snails
Felis lynx	Lynx	Mammals
Glyptemys insculpta	Wood Turtle	Reptiles
Merolonche dolli	Doll's Merolonche	Insects: Butterflies and Moths
Pachypolia atricornis	Three-horned Moth	Insects: Butterflies and Moths
Picoides arcticus	Black-backed Woodpecker	Birds
Planogyra asteriscus	Eastern Flat-whorl	Snails
Pupilla muscorum	Widespread Column	Snails
Sistrurus catenatus catenatus	Eastern Massasauga	Reptiles
Somatochlora hineana	Hine's Emerald	Insects: Damselflies and Dragonflies
Somatochlora incurvata	Incurvate Emerald	Insects: Damselflies and Dragonflies
Stagnicola petoskeyensis	Petoskey Pondsnaail	Snails
Vertigo elatior	Tapered Vertigo	Snails
Vertigo paradoxa	Land Snail	Snails

Animals found in rich tamarack swamp

Scientific Name	Common Name	Taxonomic Group
Acris crepitans blanchardi	Blanchard's Cricket Frog	Amphibians
Clemmys guttata	Spotted Turtle	Reptiles
Clonophis kirtlandii	Kirtland's Snake	Reptiles
Emydoidea blandingii	Blanding's Turtle	Reptiles
Haliaeetus leucocephalus	Bald Eagle	Birds
Neonympha mitchellii mitchellii	Mitchell's Satyr	Insects: Butterflies and Moths
Oarisma poweshiek	Poweshiek Skipperling	Insects: Butterflies and Moths
Oecanthus laricis	Tamarack Tree Cricket	Insects: Grasshoppers and Crickets
Papaipema speciosissima	Regal Fern Borer	Insects: Butterflies and Moths
Sistrurus catenatus catenatus	Eastern Massasauga	Reptiles

Animals found in southern shrub-carr

Scientific Name	Common Name	Taxonomic Group
Acris crepitans blanchardi	Blanchard's Cricket Frog	Amphibians
Catocala illecta	Magdalen Underwing	Insects: Butterflies and Moths
Clemmys guttata	Spotted Turtle	Reptiles
Erynnis persius persius	Persius Duskywing	Insects: Butterflies and Moths
Gomphus quadricolor	Rapids Clubtail	Insects: Damselflies and Dragonflies
Hemileuca maia	Barrens Buckmoth	Insects: Butterflies and Moths
Lanius ludovicianus migrans	Migrant Loggerhead Shrike	Birds
Neonympha mitchellii mitchellii	Mitchell's Satyr	Insects: Butterflies and Moths
Nycticorax nycticorax	Black-crowned Night-heron	Birds
Papaipema speciosissima	Regal Fern Borer	Insects: Butterflies and Moths
Sistrurus catenatus catenatus	Eastern Massasauga	Reptiles
Terrapene carolina carolina	Eastern Box Turtle	Reptiles
Williamsonia fletcheri	Ebony Boghaunter	Insects: Damselflies and Dragonflies

Animals found in southern swamp

Scientific Name	Common Name	Taxonomic Group
Accipiter cooperii	Cooper's Hawk	Birds
Acronicta falcata	Corylus Dagger Moth	Insects: Butterflies and Moths
Ambystoma opacum	Marbled Salamander	Amphibians
Ambystoma texanum	Smallmouth Salamander	Amphibians
Basilodes pepita	Gold Moth	Insects: Butterflies and Moths
Buteo lineatus	Red-shouldered Hawk	Birds
Catocala illecta	Magdalen Underwing	Insects: Butterflies and Moths
Clemmys guttata	Spotted Turtle	Reptiles
Clonophis kirtlandii	Kirtland's Snake	Reptiles
Emydoidea blandingii	Blanding's Turtle	Reptiles
Euphyes dukesi	Dukes' Skipper	Insects: Butterflies and Moths
Gomphus quadricolor	Rapids Clubtail	Insects: Damselflies and Dragonflies
Haliaeetus leucocephalus	Bald Eagle	Birds
Heterocampa subrotata	Small Heterocampa	Insects: Butterflies and Moths
Heteropacha rileyana	Riley's Lappet Moth	Insects: Butterflies and Moths
Incisalia henrici	Henry's Elfin	Insects: Butterflies and Moths
Myotis sodalis	Indiana Bat or Indiana Myotis	Mammals
Nerodia erythrogaster neglecta	Copperbelly Watersnake	Reptiles
Nycticorax nycticorax	Black-crowned Night-heron	Birds
Pandion haliaetus	Osprey	Birds
Papaipema cerina	Golden Borer	Insects: Butterflies and Moths
Papaipema speciosissima	Regal Fern Borer	Insects: Butterflies and Moths
Protonotaria citrea	Prothonotary Warbler	Birds
Seiurus motacilla	Louisiana Waterthrush	Birds
Sistrurus catenatus catenatus	Eastern Massasauga	Reptiles
Terrapene carolina carolina	Eastern Box Turtle	Reptiles

Animals found in southern wet meadow

Scientific Name	Common Name	Taxonomic Group
Acris crepitans blanchardi	Blanchard's Cricket Frog	Amphibians
Ambystoma texanum	Smallmouth Salamander	Amphibians
Asio flammeus	Short-eared Owl	Birds
Botaurus lentiginosus	American Bittern	Birds
Calephelis mutica	Swamp Metalmark	Insects: Butterflies and Moths
Circus cyaneus	Northern Harrier	Birds
Clemmys guttata	Spotted Turtle	Reptiles
Clonophis kirtlandii	Kirtland's Snake	Reptiles
Emydoidea blandingii	Blanding's Turtle	Reptiles
Euphyes dukesi	Dukes' Skipper	Insects: Butterflies and Moths
Meropleon ambifusca	Newman's Brocade	Insects: Butterflies and Moths
Neoconocephalus lyristes	Bog Conehead	Insects: Grasshoppers and Crickets
Neoconocephalus retusus	Conehead Grasshopper	Insects: Grasshoppers and Crickets
Neonympha mitchellii mitchellii	Mitchell's Satyr	Insects: Butterflies and Moths
Nerodia erythrogaster neglecta	Copperbelly Watersnake	Reptiles
Oarisma poweshiek	Poweshiek Skipperling	Insects: Butterflies and Moths
Orchelimum concinnum	Red-faced Meadow Katydid	Insects: Grasshoppers and Crickets
Orchelimum delicatum	Delicate Meadow Katydid	Insects: Grasshoppers and Crickets
Papaipema cerina	Golden Borer	Insects: Butterflies and Moths
Papaipema maritima	Maritime Sunflower Borer	Insects: Butterflies and Moths
Papaipema speciosissima	Regal Fern Borer	Insects: Butterflies and Moths
Paroxya hoosieri	Hoosier Locust	Insects: Grasshoppers and Crickets
Phalaropus tricolor	Wilson's Phalarope	Birds
Phyciodes batesii	Tawny Crescent	Insects: Butterflies and Moths
Rallus elegans	King Rail	Birds
Sistrurus catenatus catenatus	Eastern Massasauga	Reptiles
Spartiniphaga inops	Spartina Moth	Insects: Butterflies and Moths
Speyeria idalia	Regal Fritillary	Insects: Butterflies and Moths

Animals found in submergent marsh

Scientific Name	Common Name	Taxonomic Group
Emydoidea blandingii	Blanding's Turtle	Reptiles
Fontigens nickliniana	Watercress Snail	Snails
Liodessus cantralli	Cantrall's Bog Beetle	Insects: Beetles
Planorbella multivolvis	Acorn Ramshorn	Snails
Planorbella smithi	Aquatic Snail	Snails
Stagnicola contracta	Deepwater Pondsnaail	Snails

Animals found in wet prairie

Scientific Name	Common Name	Taxonomic Group
Acris crepitans blanchardi	Blanchard's Cricket Frog	Amphibians
Ambystoma texanum	Smallmouth Salamander	Amphibians
Ammodramus savannarum	Grasshopper Sparrow	Birds
Asio flammeus	Short-eared Owl	Birds
Botaurus lentiginosus	American Bittern	Birds
Circus cyaneus	Northern Harrier	Birds
Clemmys guttata	Spotted Turtle	Reptiles
Clonophis kirtlandii	Kirtland's Snake	Reptiles
Dorydiella kansana	Leafhopper	Insects: Cicadas and Hoppers
Emydoidea blandingii	Blanding's Turtle	Reptiles
Flexamia reflexus	Leafhopper	Insects: Cicadas and Hoppers
Meropleon ambifusca	Newman's Brocade	Insects: Butterflies and Moths
Neoconocephalus lyristes	Bog Conehead	Insects: Grasshoppers and Crickets
Neoconocephalus retusus	Conehead Grasshopper	Insects: Grasshoppers and Crickets
Neonympha mitchellii mitchellii	Mitchell's Satyr	Insects: Butterflies and Moths
Orchelimum concinnum	Red-faced Meadow Katydid	Insects: Grasshoppers and Crickets
Orphulella pelidna	Green Desert Grasshopper	Insects: Grasshoppers and Crickets
Papaipema cerina	Golden Borer	Insects: Butterflies and Moths
Papaipema maritima	Maritime Sunflower	Insects: Butterflies and Moths

	Borer	
Papaipema speciosissima	Regal Fern Borer	Insects: Butterflies and Moths
Paroxya hoosieri	Hoosier Locust	Insects: Grasshoppers and Crickets
Phalaropus tricolor	Wilson's Phalarope	Birds
Sistrurus catenatus catenatus	Eastern Massasauga	Reptiles
Spartiniphaga inops	Spartina Moth	Insects: Butterflies and Moths
Spiza americana	Dickcissel	Birds
Tyto alba	Barn Owl	Birds

Animals found in wet-mesic prairie

Scientific Name	Common Name	Taxonomic Group
Ammodramus savannarum	Grasshopper Sparrow	Birds
Asio flammeus	Short-eared Owl	Birds
Botaurus lentiginosus	American Bittern	Birds
Circus cyaneus	Northern Harrier	Birds
Clemmys guttata	Spotted Turtle	Reptiles
Clonophis kirtlandii	Kirtland's Snake	Reptiles
Dorydiella kansana	Leafhopper	Insects: Cicadas and Hoppers
Emydoidea blandingii	Blanding's Turtle	Reptiles
Meropleon ambifusca	Newman's Brocade	Insects: Butterflies and Moths
Neoconocephalus lyristes	Bog Conehead	Insects: Grasshoppers and Crickets
Neoconocephalus retusus	Conehead Grasshopper	Insects: Grasshoppers and Crickets
Neonympha mitchellii mitchellii	Mitchell's Satyr	Insects: Butterflies and Moths
Orphulella pelidna	Green Desert Grasshopper	Insects: Grasshoppers and Crickets
Pantherophis spiloides	Black Rat Snake	Reptiles
Papaipema cerina	Golden Borer	Insects: Butterflies and Moths
Papaipema maritima	Maritime Sunflower Borer	Insects: Butterflies and Moths
Papaipema speciosissima	Regal Fern Borer	Insects: Butterflies and Moths
Sistrurus catenatus catenatus	Eastern Massasauga	Reptiles
Spartiniphaga inops	Spartina Moth	Insects: Butterflies and Moths
Spiza americana	Dickeissel	Birds
Tyto alba	Barn Owl	Birds

Animals found in wooded dune and swale complex

Scientific Name	Common Name	Taxonomic Group
Canis lupus	Gray Wolf	Mammals
Euxoa aurlenta	Dune Cutworm	Insects: Butterflies and Moths
Lanius ludovicianus migrans	Migrant Loggerhead Shrike	Birds

APPENDIX X-B. Rare Plants Occupying Michigan's Wetland Plant Communities.

Plants found in bog

Scientific Name	Common Name	Taxonomic Group
<u>Amerorchis rotundifolia</u>	<u>Round-leaved Orchis</u>	Monocots
<u>Carex wiegandii</u>	<u>Wiegand's Sedge</u>	Monocots
<u>Eleocharis radicans</u>	<u>Spike-rush</u>	Monocots
<u>Empetrum nigrum</u>	<u>Black Crowberry</u>	Dicots
<u>Isotria verticillata</u>	<u>Whorled Pogonia</u>	Monocots
<u>Phleum alpinum</u>	<u>Mountain Timothy</u>	Monocots
<u>Platanthera ciliaris</u>	<u>Orange or Yellow Fringed Orchid</u>	Monocots
<u>Platanthera leucophaea</u>	<u>Prairie Fringed Orchid</u>	Monocots
<u>Rubus acaulis</u>	<u>Dwarf Raspberry</u>	Dicots
<u>Sarracenia purpurea ssp. heterophylla</u>	<u>Yellow Pitcher-plant</u>	Dicots

Plants found in coastal fen

Scientific Name	Common Name	Taxonomic Group
<u>Cacalia plantaginea</u>	<u>Prairie Indian-plantain</u>	Dicots
<u>Carex scirpoidea</u>	<u>Bulrush Sedge</u>	Monocots
<u>Empetrum nigrum</u>	<u>Black Crowberry</u>	Dicots
<u>Erigeron hyssopifolius</u>	<u>Hyssop-leaved Fleabane</u>	Dicots
<u>Pinguicula vulgaris</u>	<u>Butterwort</u>	Dicots
<u>Solidago houghtonii</u>	<u>Houghton's Goldenrod</u>	Dicots

Plants found in coastal plain marsh

Scientific Name	Common Name	Taxonomic Group
<u>Bartonia paniculata</u>	<u>Panicled Screw-stem</u>	Dicots
<u>Carex albolutescens</u>	<u>Greenish-white Sedge</u>	Monocots
<u>Carex festucacea</u>	<u>Fescue Sedge</u>	Monocots
<u>Echinodorus tenellus</u>	<u>Dwarf Burhead</u>	Monocots
<u>Eleocharis atropurpurea</u>	<u>Purple Spike-rush</u>	Monocots
<u>Eleocharis engelmannii</u>	<u>Engelmann's Spike-rush</u>	Monocots
<u>Eleocharis melanocarpa</u>	<u>Black-fruited Spike-rush</u>	Monocots
<u>Eleocharis microcarpa</u>	<u>Small-fruited Spike-rush</u>	Monocots
<u>Eleocharis tricostata</u>	<u>Three-ribbed Spike-rush</u>	Monocots
<u>Fuirena squarrosa</u>	<u>Umbrella-grass</u>	Monocots
<u>Gratiola virginiana</u>	<u>Round-fruited Hedge Hyssop</u>	Dicots
<u>Hemicarpha micrantha</u>	<u>Dwarf-bulrush</u>	Monocots
<u>Isoetes engelmannii</u>	<u>Appalachian Quillwort</u>	Ferns
<u>Juncus brachycarpus</u>	<u>Short-fruited Rush</u>	Monocots
<u>Juncus scirpoides</u>	<u>Scirpus-like Rush</u>	Monocots
<u>Lechea minor</u>	<u>Least Pinweed</u>	Dicots
<u>Lechea pulchella</u>	<u>Leggett's Pinweed</u>	Dicots
<u>Ludwigia alternifolia</u>	<u>Seedbox</u>	Dicots
<u>Ludwigia sphaerocarpa</u>	<u>Globe-fruited Seedbox</u>	Dicots
<u>Lycopodiella margueriteae</u>	<u>northern prostrate clubmoss</u>	Ferns
<u>Lycopodiella subappressa</u>	<u>Northern Appressed Clubmoss</u>	Ferns
<u>Panicum longifolium</u>	<u>Long-leaved Panic-grass</u>	Monocots
<u>Panicum verrucosum</u>	<u>Warty Panic-grass</u>	Monocots
<u>Polygala cruciata</u>	<u>Cross-leaved Milkwort</u>	Dicots
<u>Polygonum careyi</u>	<u>Carey's Smartweed</u>	Dicots
<u>Potamogeton bicupulatus</u>	<u>Waterthread Pondweed</u>	Monocots
<u>Proserpinaca pectinata</u>	<u>Mermaid-weed</u>	Dicots
<u>Psilocarya scirpoides</u>	<u>Bald-rush</u>	Monocots
<u>Pycnanthemum verticillatum</u>	<u>Whorled Mountain-mint</u>	Dicots
<u>Rhexia mariana var. mariana</u>	<u>Maryland Meadow-beauty</u>	Dicots
<u>Rhexia virginica</u>	<u>Meadow-beauty</u>	Dicots
<u>Rhynchospora macrostachya</u>	<u>Tall Beak-rush</u>	Monocots
<u>Rhynchospora recognita</u>	<u>Globe Beak-rush</u>	Monocots
<u>Rotala ramosior</u>	<u>Tooth-cup</u>	Dicots

Sabatia angularis	Rose-pink	Dicots
Scirpus hallii	Hall's Bulrush	Monocots
Scleria pauciflora	Few-flowered Nut-rush	Monocots
Scleria reticularis	Netted Nut-rush	Monocots
Scleria triglomerata	Tall Nut-rush	Monocots
Sisyrinchium atlanticum	Atlantic Blue-eyed-grass	Monocots
Sisyrinchium strictum	Blue-eyed-grass	Monocots

Plants found in emergent marsh

Scientific Name	Common Name	Taxonomic Group
Armoracia lacustris	Lake Cress	Dicots
Beckmannia syzigachne	Slough Grass	Monocots
Calamagrostis stricta	Narrow-leaved Reedgrass	Monocots
Callitriche hermaphroditica	Autumnal Water-starwort	Dicots
Callitriche heterophylla	Large Water-starwort	Dicots
Carex crus-corvi	Raven's-foot Sedge	Monocots
Cuscuta campestris	Field Dodder	Dicots
Cyperus acuminatus	Nut-grass	Monocots
Cyperus flavescens	Yellow Nut-grass	Monocots
Eleocharis caribaea	Spike-rush	Monocots
Eleocharis equisetoides	Horsetail Spike-rush	Monocots
Glyceria acutiflora	Manna Grass	Monocots
Gratiola aurea	Hedge-hyssop	Dicots
Hibiscus moscheutos	Swamp Rose-mallow	Dicots
Juncus militaris	Bayonet Rush	Monocots
Justicia americana	Water-willow	Dicots
Lemna valdiviana	Pale Duckweed	Monocots
Mimulus alatus	Wing-stemmed Monkey-flower	Dicots
Myriophyllum alterniflorum	Alternate-leaved Water-milfoil	Dicots
Myriophyllum farwellii	Farwell's Water-milfoil	Dicots
Nelumbo lutea	American Lotus	Dicots
Nuphar pumila	Small Yellow Pond-lily	Dicots
Nymphaea tetragona ssp. leibergii	Pygmy Water-lily	Dicots
Potamogeton confervoides	Alga Pondweed	Monocots
Potamogeton hillii	Hill's Pondweed	Monocots

Ranunculus ambigens	Spearwort	Dicots
Ranunculus macounii	Macoun's Buttercup	Dicots
Rumex occidentalis	Western Dock	Dicots
Sabatia angularis	Rose-pink	Dicots
Sagittaria montevidensis	Arrowhead	Monocots
Salix pellita	Satiny Willow	Dicots
Strophostyles helvula	Trailing Wild Bean	Dicots
Zizania aquatica var. aquatica	Wild-rice	Monocots

Plants found in floodplain forest

Scientific Name	Common Name	Taxonomic Group
Arabis perstellata sensu lato	Rock Cress	Dicots
Aristolochia serpentaria	Virginia Snakeroot	Dicots
Aster furcatus	Forked Aster	Dicots
Camassia scilloides	Wild-hyacinth	Monocots
Carex assiniboinensis	Assiniboia Sedge	Monocots
Carex conjuncta	Sedge	Monocots
Carex crus-corvi	Raven's-foot Sedge	Monocots
Carex davisii	Davis's Sedge	Monocots
Carex decomposita	Log Sedge	Monocots
Carex frankii	Frank's Sedge	Monocots
Carex haydenii	Hayden's Sedge	Monocots
Carex lupuliformis	False Hop Sedge	Monocots
Carex oligocarpa	Eastern Few-fruited Sedge	Monocots
Carex squarrosa	Sedge	Monocots
Carex trichocarpa	Hairy-fruited Sedge	Monocots
Carex typhina	Cat-tail Sedge	Monocots
Chasmanthium latifolium	Wild-oats	Monocots
Chelone obliqua	Purple Turtlehead	Dicots
Corydalis flavula	Yellow Fumewort	Dicots
Dasistoma macrophylla	Mullein Foxglove	Dicots
Diarrhena americana	Beak Grass	Monocots
Dryopteris celsa	Log Fern	Ferns
Euonymus atropurpurea	Wahoo	Dicots
Fraxinus profunda	Pumpkin Ash	Dicots
Gentianella quinquefolia	Stiff Gentian	Dicots

Gymnocladus dioicus	Kentucky Coffee-tree	Dicots
Hybanthus concolor	Green Violet	Dicots
Hydrastis canadensis	Goldenseal	Dicots
Jeffersonia diphylla	Twinleaf	Dicots
Lithospermum latifolium	Broad-leaved Puccoon	Dicots
Lycopus virginicus	Virginia Water-horehound	Dicots
Mertensia virginica	Virginia Bluebells	Dicots
Mikania scandens	Mikania	Dicots
Monarda didyma	Oswego Tea	Dicots
Morus rubra	Red Mulberry	Dicots
Panax quinquefolius	Ginseng	Dicots
Plantago cordata	Heart-leaved Plantain	Dicots
Polemonium reptans	Jacob's Ladder or Greek-valerian	Dicots
Pycnanthemum pilosum	Hairy Mountain-mint	Dicots
Rudbeckia subtomentosa	Sweet Coneflower	Dicots
Ruellia strepens	Smooth Ruellia	Dicots
Scutellaria nervosa	Skullcap	Dicots
Scutellaria ovata	Heart-leaved Skullcap	Dicots
Silphium perfoliatum	Cup-plant	Dicots
Trillium nivale	Snow Trillium	Monocots
Trillium recurvatum	Prairie Trillium	Monocots
Trillium sessile	Toadshade	Monocots
Valerianella chenopodiifolia	Goosefoot Corn-salad	Dicots
Valerianella umblicata	Corn-salad	Dicots
Viburnum prunifolium	Black Haw	Dicots
Wisteria frutescens	Wisteria	Dicots

Plants found in great lakes marsh

Scientific Name	Common Name	Taxonomic Group
Hibiscus laevis	Smooth Rose-mallow	Dicots
Hibiscus moscheutos	Swamp Rose-mallow	Dicots
Nelumbo lutea	American Lotus	Dicots
Sagittaria montevidensis	Arrowhead	Monocots
Zizania aquatica var. aquatica	Wild-rice	Monocots

Plants found in hardwood-conifer swamp

Scientific Name	Common Name	Taxonomic Group
Carex seorsa	Sedge	Monocots

Plants found in inland salt marsh

Scientific Name	Common Name	Taxonomic Group
Eleocharis parvula	Dwarf Spike-rush	Monocots
Schoenoplectus americanus	Olney's Bulrush	Monocots

Plants found in interdunal wetland

Scientific Name	Common Name	Taxonomic Group
Lycopodiella subappressa	Northern Appressed Clubmoss	Ferns
Pinguicula vulgaris	Butterwort	Dicots
Sarracenia purpurea ssp. heterophylla	Yellow Pitcher-plant	Dicots
Solidago houghtonii	Houghton's Goldenrod	Dicots
Utricularia subulata	Zigzag Bladderwort	Dicots

Plants found in intermittent wetland [boggy seepage wetland]

Scientific Name	Common Name	Taxonomic Group
Bartonia paniculata	Panicked Screw-stem	Dicots
Carex nigra	Black Sedge	Monocots
Carex wiegandii	Wiegand's Sedge	Monocots
Eleocharis melanocarpa	Black-fruited Spike-rush	Monocots
Gentiana linearis	Narrow-leaved Gentian	Dicots
Gratiola virginiana	Round-fruited Hedge Hyssop	Dicots
Hemicarpha micrantha	Dwarf-bulrush	Monocots
Huperzia selago	Fir Clubmoss	Ferns
Juncus vaseyi	Vasey's Rush	Monocots
Ludwigia alternifolia	Seedbox	Dicots
Lycopodiella margueriteae	northern prostrate clubmoss	Ferns
Lycopodiella subappressa	Northern Appressed Clubmoss	Ferns
Polygonum careyi	Carey's Smartweed	Dicots
Potamogeton bicupulatus	Waterthread Pondweed	Monocots
Pycnanthemum verticillatum	Whorled Mountain-mint	Dicots
Ranunculus cymbalaria	Seaside Crowfoot	Dicots

Sabatia angularis	Rose-pink	Dicots
Scirpus clintonii	Clinton's Bulrush	Monocots
Scirpus torreyi	Torrey's Bulrush	Monocots

Plants found in inundated shrub swamp

Scientific Name	Common Name	Taxonomic Group
Wolffia papulifera	Water-meal	Monocots

Plants found in lakeplain wet prairie

Scientific Name	Common Name	Taxonomic Group
Agalinis gattereri	Gatterer's Gerardia	Dicots
Agalinis skinneriana	Skinner's Gerardia	Dicots
Arabis missouriensis var. deamii	Missouri Rock-cress	Dicots
Aristida longespica	Three-awned Grass	Monocots
Asclepias hirtella	Tall Green Milkweed	Dicots
Asclepias purpurascens	Purple Milkweed	Dicots
Asclepias sullivantii	Sullivant's Milkweed	Dicots
Aster praealtus	Willow Aster	Dicots
Cacalia plantaginea	Prairie Indian-plantain	Dicots
Carex festucacea	Fescue Sedge	Monocots
Cypripedium candidum	White Lady-slipper	Monocots
Eleocharis engelmannii	Engelmann's Spike-rush	Monocots
Fimbristylis puberula	Chestnut Sedge	Monocots
Hypericum gentianoides	Gentian-leaved St. John's-wort	Dicots
Juncus vaseyi	Vasey's Rush	Monocots
Leucospora multifida	Conohea	Dicots
Ludwigia alternifolia	Seedbox	Dicots
Lycopodiella margueriteae	northern prostrate clubmoss	Ferns
Lycopodiella subappressa	Northern Appressed Clubmoss	Ferns
Mimulus alatus	Wing-stemmed Monkey-flower	Dicots
Panicum polyanthes	Round-seed Panic Grass	Monocots
Platanthera leucophaea	Prairie Fringed Orchid	Monocots
Polygala cruciata	Cross-leaved Milkwort	Dicots
Polygala incarnata	Pink Milkwort	Dicots
Potentilla paradoxa	Sand Cinquefoil	Dicots

Scirpus clintonii	Clinton's Bulrush	Monocots
Scleria pauciflora	Few-flowered Nut-rush	Monocots
Scleria triglomerata	Tall Nut-rush	Monocots
Sisyrinchium farwellii	Farwell's Blue-eyed-grass	Monocots
Spiranthes ochroleuca	Yellow Ladies'-tresses	Monocots

Plants found in lakeplain wet-mesic prairie

Scientific Name	Common Name	Taxonomic Group
Asclepias purpurascens	Purple Milkweed	Dicots
Asclepias sullivantii	Sullivant's Milkweed	Dicots
Bartonia paniculata	Panicked Screw-stem	Dicots
Carex frankii	Frank's Sedge	Monocots
Eleocharis tricostrata	Three-ribbed Spike-rush	Monocots
Juncus brachycarpus	Short-fruited Rush	Monocots
Juncus vaseyi	Vasey's Rush	Monocots
Lactuca floridana	Woodland Lettuce	Dicots
Lechea pulchella	Leggett's Pinweed	Dicots
Ludwigia alternifolia	Seedbox	Dicots
Lycopodiella margueriteae	northern prostrate clubmoss	Ferns
Lycopodiella subappressa	Northern Appressed Clubmoss	Ferns
Mimulus alatus	Wing-stemmed Monkey-flower	Dicots
Oxalis violacea	Violet Wood-sorrel	Dicots
Panicum longifolium	Long-leaved Panic-grass	Monocots
Platanthera leucophaea	Prairie Fringed Orchid	Monocots
Potentilla paradoxa	Sand Cinquefoil	Dicots
Rhexia mariana var. mariana	Maryland Meadow-beauty	Dicots
Rhexia virginica	Meadow-beauty	Dicots
Rhynchospora macrostachya	Tall Beak-rush	Monocots
Rhynchospora recognita	Globe Beak-rush	Monocots
Rotala ramosior	Tooth-cup	Dicots
Scleria pauciflora	Few-flowered Nut-rush	Monocots
Scleria reticularis	Netted Nut-rush	Monocots
Scleria triglomerata	Tall Nut-rush	Monocots
Sisyrinchium atlanticum	Atlantic Blue-eyed-grass	Monocots
Sisyrinchium farwellii	Farwell's Blue-eyed-grass	Monocots
Spiranthes ochroleuca	Yellow Ladies'-tresses	Monocots

Plants found in muskeg

Scientific Name	Common Name	Taxonomic Group
Phleum alpinum	Mountain Timothy	Monocots

Plants found in northern fen

Scientific Name	Common Name	Taxonomic Group
Carex heleonastes	Hudson Bay Sedge	Monocots
Carex scirpoidea	Bulrush Sedge	Monocots
Drosera anglica	English Sundew	Dicots
Empetrum nigrum	Black Crowberry	Dicots
Erigeron hyssopifolius	Hyssop-leaved Fleabane	Dicots
Juncus stygius	Moor Rush	Monocots
Pinguicula vulgaris	Butterwort	Dicots
Solidago houghtonii	Houghton's Goldenrod	Dicots

Plants found in northern shrub thicket

Scientific Name	Common Name	Taxonomic Group
Equisetum telmateia	Giant Horsetail	Ferns
Listera auriculata	Auricled Twayblade	Monocots
Lonicera involucrata	Black Twinberry	Dicots
Mimulus guttatus	Western Monkey-flower	Dicots
Senecio congestus	Marsh-fleabane	Dicots
Stellaria crassifolia	Fleshy Stitchwort	Dicots
Thalictrum venulosum var. confine	Veiny Meadow-rue	Dicots

Plants found in northern swamp

Scientific Name	Common Name	Taxonomic Group
Gentiana linearis	Narrow-leaved Gentian	Dicots

Plants found in northern wet meadow

Scientific Name	Common Name	Taxonomic Group
Gentiana linearis	Narrow-leaved Gentian	Dicots
Phleum alpinum	Mountain Timothy	Monocots

Plants found in northern wet-mesic prairie

No species were found.

Plants found in patterned fen

Scientific Name	Common Name	Taxonomic Group
Amerorchis rotundifolia	Round-leaved Orchis	Monocots
Bartonia paniculata	Panicked Screw-stem	Dicots
Carex heleonastes	Hudson Bay Sedge	Monocots
Carex novae-angliae	New England Sedge	Monocots
Drosera anglica	English Sundew	Dicots
Juncus stygius	Moor Rush	Monocots
Petasites sagittatus	Sweet Coltsfoot	Dicots

Plants found in poor conifer swamp

Scientific Name	Common Name	Taxonomic Group
Carex wiegandii	Wiegand's Sedge	Monocots
Luzula parviflora	Small-flowered Woodrush	Monocots

Plants found in poor fen

Scientific Name	Common Name	Taxonomic Group
Carex nigra	Black Sedge	Monocots
Carex wiegandii	Wiegand's Sedge	Monocots
Eleocharis nitida	Slender Spike-rush	Monocots
Petasites sagittatus	Sweet Coltsfoot	Dicots

Plants found in prairie fen

Scientific Name	Common Name	Taxonomic Group
Asclepias purpurascens	Purple Milkweed	Dicots
Aster praealtus	Willow Aster	Dicots
Berula erecta	Cut-leaved Water-parsnip	Dicots
Cacalia plantaginea	Prairie Indian-plantain	Dicots
Calamagrostis stricta	Narrow-leaved Reedgrass	Monocots
Cypripedium candidum	White Lady-slipper	Monocots
Dodecatheon meadia	Shooting-star	Dicots

Drosera anglica	English Sundew	Dicots
Eryngium yuccifolium	Rattlesnake-master	Dicots
Filipendula rubra	Queen-of-the-prairie	Dicots
Helianthus hirsutus	Whiskered Sunflower	Dicots
Muhlenbergia richardsonis	Mat Muhly	Monocots
Phlox maculata	Wild Sweet William or Spotted Phlox	Dicots
Polemonium reptans	Jacob's Ladder or Greek-valerian	Dicots
Pycnanthemum muticum	Mountain-mint	Dicots
Sanguisorba canadensis	Canadian Burnet	Dicots
Sporobolus heterolepis	Prairie Dropseed	Monocots
Valeriana edulis var. ciliata	Edible Valerian	Dicots

Plants found in rich conifer swamp

Scientific Name	Common Name	Taxonomic Group
Amerorchis rotundifolia	Round-leaved Orchis	Monocots
Aster modestus	Great Northern Aster	Dicots
Calypso bulbosa	Calypso or Fairy-slipper	Monocots
Carex heleonastes	Hudson Bay Sedge	Monocots
Cypripedium arietinum	Ram's Head Lady's-slipper	Monocots
Erigeron hyssopifolius	Hyssop-leaved Fleabane	Dicots
Gymnocarpium robertianum	Limestone Oak Fern	Ferns
Lonicera involucrata	Black Twinberry	Dicots
Mimulus glabratus var. michiganensis	Michigan Monkey-flower	Dicots
Parnassia palustris	Marsh Grass-of-parnassus	Dicots
Ranunculus lapponicus	Lapland Buttercup	Dicots
Senecio indecorus	Rayless Mountain Ragwort	Dicots
Stellaria crassifolia	Fleshy Stitchwort	Dicots
Vaccinium vitis-idaea	Mountain-cranberry	Dicots

Plants found in rich tamarack swamp

Scientific Name	Common Name	Taxonomic Group
Platanthera ciliaris	Orange or Yellow Fringed Orchid	Monocots

Plants found in southern shrub-carr

Scientific Name	Common Name	Taxonomic Group
Hypericum sphaerocarpum	Round-fruited St. John's-wort	Dicots
Lygodium palmatum	Climbing Fern	Ferns
Pycnanthemum muticum	Mountain-mint	Dicots

Plants found in southern swamp

Scientific Name	Common Name	Taxonomic Group
Betula murrayana	Murray Birch	Dicots
Carex lupuliformis	False Hop Sedge	Monocots
Carex seorsa	Sedge	Monocots
Carex straminea	Straw Sedge	Monocots
Cuscuta glomerata	Rope Dodder	Dicots
Cuscuta polygonorum	Knotweed Dodder	Dicots
Dryopteris celsa	Log Fern	Ferns
Eupatorium fistulosum	Hollow-stemmed Joe-pye-weed	Dicots
Fraxinus profunda	Pumpkin Ash	Dicots
Galearis spectabilis	Showy Orchis	Monocots
Isotria medeoloides	Smaller Whorled Pogonia	Monocots
Isotria verticillata	Whorled Pogonia	Monocots
Lysimachia hybrida	Swamp Candles	Dicots
Panax quinquefolius	Ginseng	Dicots
Panicum microcarpon	Small-fruited Panic-grass	Monocots
Plantago cordata	Heart-leaved Plantain	Dicots
Poa paludigena	Bog Bluegrass	Monocots
Polymnia uvedalia	Large-flowered Leafcup	Dicots
Populus heterophylla	Swamp or Black Cottonwood	Dicots
Rudbeckia subtomentosa	Sweet Coneflower	Dicots
Trillium undulatum	Painted Trillium	Monocots
Valerianella umbilicata	Corn-salad	Dicots
Viburnum prunifolium	Black Haw	Dicots
Woodwardia areolata	Netted Chain-fern	Ferns

Plants found in southern wet meadow

Scientific Name	Common Name	Taxonomic Group
Gentianella quinquefolia	Stiff Gentian	Dicots
Mimulus alatus	Wing-stemmed Monkey-flower	Dicots
Pycnanthemum muticum	Mountain-mint	Dicots

Plants found in submergent marsh

Scientific Name	Common Name	Taxonomic Group
Littorella uniflora	American Shore-grass	Dicots
Myriophyllum alterniflorum	Alternate-leaved Water-milfoil	Dicots
Potamogeton confervoides	Alga Pondweed	Monocots
Potamogeton pulcher	Spotted Pondweed	Monocots
Potamogeton vaseyi	Vasey's Pondweed	Monocots
Ruppia maritima	Widgeon-grass	Monocots
Subularia aquatica	Awlwort	Dicots

Plants found in wet prairie

Scientific Name	Common Name	Taxonomic Group
Mimulus alatus	Wing-stemmed Monkey-flower	Dicots
Polemonium reptans	Jacob's Ladder or Greek-valerian	Dicots
Pycnanthemum muticum	Mountain-mint	Dicots
Sanguisorba canadensis	Canadian Burnet	Dicots
Sisyrinchium farwellii	Farwell's Blue-eyed-grass	Monocots

Plants found in wet-mesic prairie

Scientific Name	Common Name	Taxonomic Group
Eryngium yuccifolium	Rattlesnake-master	Dicots
Mimulus alatus	Wing-stemmed Monkey-flower	Dicots
Polygala incarnata	Pink Milkwort	Dicots
Pycnanthemum muticum	Mountain-mint	Dicots
Rudbeckia subtomentosa	Sweet Coneflower	Dicots
Scirpus clintonii	Clinton's Bulrush	Monocots
Scleria triglomerata	Tall Nut-rush	Monocots
Silphium integrifolium	Rosinweed	Dicots
Sisyrinchium farwellii	Farwell's Blue-eyed-grass	Monocots

Plants found in wooded dune and swale complex

Scientific Name	Common Name	Taxonomic Group
<u>Carex nigra</u>	<u>Black Sedge</u>	Monocots
<u>Cirsium pitcheri</u>	<u>Pitcher's Thistle</u>	Dicots
<u>Elymus glaucus</u>	<u>Blue Wild-rye</u>	Monocots
<u>Iris lacustris</u>	<u>Dwarf Lake Iris</u>	Monocots
<u>Ranunculus lapponicus</u>	<u>Lapland Buttercup</u>	Dicots
<u>Tanacetum huronense</u>	<u>Lake Huron Tansy</u>	Dicots

APPENDIX XI. Rare species and number by wetland community - Located on CD

APPENDIX XII-A. Reclassified groupings for Marsh communities based on floristic similarity.

EOid	Site	Current Community Name	Reclassified Group
387	Pine Lake	Coastal Plain Marsh	1
1078	M-82 East Coastal Plain Marsh	Coastal Plain Marsh	1
3590	Pine Island Marsh Research Natural Area	Coastal Plain Marsh	1
3683	Mullen Lake	Coastal Plain Marsh	1
5079	Grampian Lake	Coastal Plain Marsh	1
7205	Pine Island Lake	Coastal Plain Marsh	1
8574	School Lake (Hamilton Twp. Coastal Plain Marsh N.S.)	Coastal Plain Marsh	1
8646	Knickerbocker Lake	Coastal Plain Marsh	1
11224	Presser Bog	Coastal Plain Marsh	1
11484	Hidden Lake	Coastal Plain Marsh	1
12214	Eagle Lake	Coastal Plain Marsh	1
12590	Swift Lake Marsh	Coastal Plain Marsh	1
13458	Gorman Lake	Coastal Plain Marsh	1
15670	Fry Lake- Newaygo County Inventory	Coastal Plain Marsh	1
15673	Leaf Lake- Newaygo County Inventory #4a (= "E" Botany)	Coastal Plain Marsh	1
15903	Miner Lake Coastal Plain Marsh- Allegan SGA	Coastal Plain Marsh	1
6483	Grass Lake	Emergent Marsh	1
8609	Sand Point	Emergent Marsh	1
10508	Whelan Lake	Emergent Marsh	1
11774	Round Lake	Emergent Marsh	1
3851	Duck Lake	Intermittent Wetland	1
4173	Intermittent Wetland 12	Intermittent Wetland	1
4653	Michaud Lake Intermittent Wetland	Intermittent Wetland	1
4977	Swamp Lakes	Intermittent Wetland	1
5805	Water Tanks Lakes Northwest	Intermittent Wetland	1
7652	Mud Lake	Intermittent Wetland	1
7851	Lake Margrethe North	Intermittent Wetland	1
8547	Camp 10 Lakes	Intermittent Wetland	1
9538	Frog Lakes Wetland Complex	Intermittent Wetland	1
10643	Nine Mile Lake	Intermittent Wetland	1
10967	Yonkers Meadow	Intermittent Wetland	1
11227	Lake Sixteen	Intermittent Wetland	1
11724	Frog Marsh Complex	Intermittent Wetland	1
16066	Nichols Lake South- Intermittent Wetland EO #32	Intermittent Wetland	1
16145	Indian Lake	Intermittent Wetland	1
5043	Fife Lake Creek	Northern Wet Meadow	1
6427	Long Lake	Northern Wet Meadow	1
1077	Loon Lake	Coastal Plain Marsh	2
1397	113 th Avenue Marsh	Coastal Plain Marsh	2

2080	Little Robinson Lake Opportunity Area West	Coastal Plain Marsh	2
4306	41st Street	Coastal Plain Marsh	2
4460	Little Robinson Lake Opportunity Area East	Coastal Plain Marsh	2
4858	Grand Beach	Coastal Plain Marsh	2
5466	Section 23 Marsh	Coastal Plain Marsh	2
6404	Ely Lake	Coastal Plain Marsh	2
6663	Bravo Coastal Plain Marsh	Coastal Plain Marsh	2
7819	54th Street Marsh	Coastal Plain Marsh	2
8108	Ross Preserve	Coastal Plain Marsh	2
8502	Beach Hill Prairie	Coastal Plain Marsh	2
9040	Pipeline Marsh	Coastal Plain Marsh	2
9832	Dagget Lake	Coastal Plain Marsh	2
10032	Crooked Lake	Coastal Plain Marsh	2
11116	Duck Marsh	Intermittent Wetland	2
12544	North Branch Road Marsh	Intermittent Wetland	2
4	Cecil Bay	Great Lakes Marsh	44
24	Whitefish Bay	Great Lakes Marsh	44
1936	El Cajon Bay	Great Lakes Marsh	44
10157	Peck Bay	Great Lakes Marsh	44
12426	Voight Bay	Great Lakes Marsh	44
28	Huron Beach	Interdunal Wetland	44
239	Platte Bay 1	Interdunal Wetland	44
699	Eagle Harbor	Interdunal Wetland	44
2008	Kitchel Dunes	Interdunal Wetland	44
3071	Cheboygan State Park	Interdunal Wetland	44
4686	Waugoshance Point	Interdunal Wetland	44
5053	Sturgeon Bay	Interdunal Wetland	44
6089	Little Sandy Bay	Interdunal Wetland	44
6666	Platte Bay 2	Interdunal Wetland	44
7614	Pointe Aux Chenes	Interdunal Wetland	44
8003	Fisherman's Island State Park	Interdunal Wetland	44
8405	Grass Bay	Interdunal Wetland	44
10033	Saugatuck Dunes	Interdunal Wetland	44
11037	Big Knob	Interdunal Wetland	44
11697	Silver Lake Dunes	Interdunal Wetland	44
12019	Muskegon Dunes	Interdunal Wetland	44
12340	Inland Harbor	Interdunal Wetland	44
12342	Albany Creek Mouth	Interdunal Wetland	44
13759	Ponchartrain Meadows and Cedars	Interdunal Wetland	44
11804	Garden Island Harbor	Northern Wet Meadow	44
6	Churchill - Hay Point	Great Lakes Marsh	46
15	Sugar Island	Great Lakes Marsh	46
563	Roach Point	Great Lakes Marsh	46
1012	Pickford Point	Great Lakes Marsh	46
4682	Winter Point	Great Lakes Marsh	46

4683	Hursley	Great Lakes Marsh	46
5233	Gogomain River (Great Lakes Marsh)	Great Lakes Marsh	46
5394	Whipple Point	Great Lakes Marsh	46
5395	Sand Island	Great Lakes Marsh	46
9211	Scott-Paw Point	Great Lakes Marsh	46
9877	Kemps Point	Great Lakes Marsh	46
10365	Baie de Wasai	Great Lakes Marsh	46
11557	Little Fish Dam River	Great Lakes Marsh	46
11784	Munuscong River	Great Lakes Marsh	46
13013	Shingle Bay	Great Lakes Marsh	46
149	Clinton River Headwaters	Emergent Marsh	50
4981	Stafford Lake	Emergent Marsh	50
10212	Belas Lake	Emergent Marsh	50
10963	Minnehaha Creek	Emergent Marsh	50
12715	Petobego Marsh	Emergent Marsh	50
21	Cedarville Dock	Great Lakes Marsh	50
5158	Au Train	Great Lakes Marsh	50
5458	Lac La Belle	Great Lakes Marsh	50
6629	Pequaming Marsh	Great Lakes Marsh	50
8300	Sturgeon River	Great Lakes Marsh	50
8882	Portage River Marsh	Great Lakes Marsh	50
11423	Independence Lake	Great Lakes Marsh	50
16	Tobico Marsh	Great Lakes Marsh	50
8543	False Presque Isle	Great Lakes Marsh	50
1	Augres River	Great Lakes Marsh	50
2	Betsie River	Great Lakes Marsh	50
3	Big Sable River	Great Lakes Marsh	50
7	Erie	Great Lakes Marsh	50
9	Hardwood Point	Great Lakes Marsh	50
10	Muskegon River	Great Lakes Marsh	50
11	Nayanquing Point	Great Lakes Marsh	50
12	Otter Creek	Great Lakes Marsh	50
13	Pere Marquette River	Great Lakes Marsh	50
17	Whiskey Harbor	Great Lakes Marsh	50
18	Wigwamba	Great Lakes Marsh	50
19	Wildfowl Bay	Great Lakes Marsh	50
20	Bradleyville	Great Lakes Marsh	50
22	Erie Marsh	Great Lakes Marsh	50
23	Heisterman Island	Great Lakes Marsh	50
25	Pinconning Bay	Great Lakes Marsh	50
26	Pinconning Lake	Great Lakes Marsh	50
823	Pointe Mouillee North	Great Lakes Marsh	50
1566	Swan Creek	Great Lakes Marsh	50
2288	Manistee River	Great Lakes Marsh	50
3574	Pine River	Great Lakes Marsh	50
3994	Bruce Bayou	Great Lakes Marsh	50
4018	St. Clair River Delta	Great Lakes Marsh	50
5918	Stony Creek	Great Lakes Marsh	50

6116	Pentwater Marsh	Great Lakes Marsh	50
6708	Clinton River	Great Lakes Marsh	50
7138	Kalamazoo River	Great Lakes Marsh	50
7139	Saganing River Delta	Great Lakes Marsh	50
7668	Pottawattomie Bayou	Great Lakes Marsh	50
8859	Bar Lake	Great Lakes Marsh	50
10115	Duck Bay	Great Lakes Marsh	50
10604	Paw Paw River Estuary	Great Lakes Marsh	50
10798	South Lloyd Island	Great Lakes Marsh	50
11243	Coryeon Point	Great Lakes Marsh	50
11695	Wildfowl Bay Islands	Great Lakes Marsh	50
12181	Galien River Estuary	Great Lakes Marsh	50
12445	Indian Channel	Great Lakes Marsh	50
12514	White River Transects	Great Lakes Marsh	50
5	Chippewa Point	Great Lakes Marsh	50
14	Rapid River	Great Lakes Marsh	50
27	St. Martin West	Great Lakes Marsh	50
1297	Mismer Bay	Great Lakes Marsh	50
1338	Carp River, Pine River	Great Lakes Marsh	50
1522	Grand Island	Great Lakes Marsh	50
1919	Petobago Pond	Great Lakes Marsh	50
2179	Hog Island	Great Lakes Marsh	50
2786	Cheboygan SP	Great Lakes Marsh	50
4290	Squaw Bay	Great Lakes Marsh	50
5370	St. Martin Bay	Great Lakes Marsh	50
5371	Hessel Bay	Great Lakes Marsh	50
11690	Waugoshance Point	Great Lakes Marsh	50
13020	Indian Point	Great Lakes Marsh	50
13163	Big Shoal Cove	Great Lakes Marsh	50
7963	Maple River Salt Marsh 1	Inland Salt Marsh	50
9928	Maple River Salt Marsh 2	Inland Salt Marsh	50
5916	Lightfoot Bay	Interdunal Wetland	50
4222	White River North Branch	Northern Wet Meadow	50
406	Cannon Creek Meadow	Northern Wet Meadow	50
1143	Notten Lake Marsh	Southern Wet Meadow	50
1045	Indian Lake Road Fen	Southern Wet Meadow	50
1512	Portage Lake Fen	Southern Wet Meadow	50
4162	Williamsville Lake Wetland	Southern Wet Meadow	50
7101	Little Fawn River	Southern Wet Meadow	50
7926	Spring Creek Meadow	Southern Wet Meadow	50
11131	Rattalee Lake Fen	Southern Wet Meadow	50
11215	North Lake Marsh	Southern Wet Meadow	50
13389	Seymour Rd. Swamp	Southern Wet Meadow	50
13563	Indian Springs Wet Meadow	Southern Wet Meadow	50
13769	Augusta Floodplain	Southern Wet Meadow	50
13795	Dayton Wet Prairie	Southern Wet Meadow	50
14372	Mill Creek Wet Meadow	Southern Wet Meadow	50
16297	Christiana Creek	Southern Wet Meadow	50

APPENDIX XII-B. Reclassified groupings for Wet Prairie communities based on floristic similarity.

EOid	Site	Current Community Name	Reclassified Group
355	Bangor Prairie	Lakeplain Wet Prairie	1
358	Coryeon Point	Lakeplain Wet Prairie	1
7796	Dickinson Island	Lakeplain Wet Prairie	1
11699	Geiger Road	Lakeplain Wet Prairie	1
535	Harsen's Island (Voakes Road Southeast Prairie)	Lakeplain Wet Prairie	1
2188	Killarney Beach 1982	Lakeplain Wet Prairie	1
260	Sebewaing Bay South 1981	Lakeplain Wet Prairie	1
10756	Sebewaing Railroad 1981	Lakeplain Wet Prairie	1
12940	Sebewaing VFW 1983a	Lakeplain Wet Prairie	1
8228	St. John's Prairie	Lakeplain Wet Prairie	1
9017	Sumter Township Prairie	Lakeplain Wet Prairie	1
9648	Weale Road	Lakeplain Wet Prairie	1
7263	Grand Mere	Lakeplain Wet-Mesic Prairie	1
963	King Road Prairie	Lakeplain Wet-Mesic Prairie	1
3138	Middle Channel Golf Course	Lakeplain Wet-Mesic Prairie	1
16138	Shirkey's Prairie	Lakeplain Wet-Mesic Prairie	1
11469	Sibley Road Prairie	Lakeplain Wet-Mesic Prairie	1
16151	St. Clair Flats Wildlife Refuge	Lakeplain Wet-Mesic Prairie	1
5651	Thomas Prairie	Lakeplain Wet-Mesic Prairie	1
15888	Shanghai Pit	Wet Prairie	1
4887	Mattawan wet-mesic prairie	Wet-Mesic Prairie	1
9335	Parma Railroad Prairie	Wet-Mesic Prairie	1
10440	Pickney Prairie	Wet-Mesic Prairie	1
9629	Williamsville Lake Prairie	Wet-Mesic Prairie	1
2032	Channel Road	Lakeplain Wet Prairie	5
2729	Essexville Prairie	Lakeplain Wet Prairie	5
5967	Phelps Road	Lakeplain Wet-Mesic Prairie	5
12082	Independence Lake County Park Wet-mesic Prairie EO-5-12082	Wet-Mesic Prairie	5
12915	130th Avenue Prairie	Lakeplain Wet-Mesic Prairie	15

11947	36th Street Prairie	Lakeplain Wet-Mesic Prairie	15
53	Beaver Meadow	Lakeplain Wet-Mesic Prairie	15
51	Goose Lake Prairie	Lakeplain Wet-Mesic Prairie	15
15729	Muskegon SGA Section 28 Lakeplain Prairie- Newaygo County Inventory #12d	Lakeplain Wet-Mesic Prairie	15
48	Lidkey Swamp Prairie	Wet-Mesic Sand Prairie	15
50	Portage Creek Complex	Wet-Mesic Sand Prairie	15
49	Tussing Prairie	Wet-Mesic Sand Prairie	15
1549	Ann Arbor Wet Prairie EO-1-1549	Wet Prairie	28
12604	Bakertown Fen	Wet Prairie	28
8331	Concord Swale	Wet Prairie	28
10147	Painter Lake Wet Prairie	Wet Prairie	28
4542	Riverside Drive Prairie EO-4-4542	Wet Prairie	28
10768	Hudson Mills Wet Prairie	Wet-Mesic Prairie	28
4771	Turner Creek Wetlands	Wet-Mesic Prairie	28

APPENDIX XII-C. Reclassified groupings for Fen and Bog communities based on floristic similarity.

EOid	Site	Current Community Name	Reclassified Group
15965	11 Mile-Crosswell NW (Nichols Lake South?)	Bog	1
8994	Alley Lake	Bog	1
11502	Arthur Bog	Bog	1
3580	Barclay Lake Bogs	Bog	1
11974	Best Bog	Bog	1
1612	Brandy Creek Wetlands	Bog	1
11800	Brighton Bog	Bog	1
8242	Cadillac Bog	Bog	1
11098	Campbell Lake Bog	Bog	1
13370	Cassidy Rd Bog	Bog	1
6797	Dewey Bog	Bog	1
689	Fairchild Lake	Bog	1
15966	Hayes Road Bog	Bog	1
7212	Hilltop Bog	Bog	1
4809	Hoop Lake Bog	Bog	1
15902	Horsetrail Bog- Barry SGA	Bog	1
12442	Jones Bog	Bog	1
13366	Joslin Road Bog	Bog	1
7876	KEEL Bog	Bog	1
6141	Lake Lavine	Bog	1
15963	Lake Sixteen Bog	Bog	1
1747	Lovell's Bog	Bog	1
12499	MacCurdy Tract	Bog	1
229	Milford Bog	Bog	1
15904	Miner Lake Bog- Allegan SGA	Bog	1
9906	Mud Lake Bog	Bog	1
15733	Mudget Lake Bog- Newaygo County Inventory	Bog	1
15901	Otis Lake Bog- Barry SGA	Bog	1
3427	Pennfield Bog	Bog	1
15719	Pierce Drive Bog- Newaygo County Inventory #2c	Bog	1
9397	Pierson Bog	Bog	1
2220	Pitcher Lake Bog	Bog	1
13404	Purgatory Bog	Bog	1
8326	Race Road Bog	Bog	1
11717	Ryerse Lake	Bog	1
2646	Saul Lake Bog	Bog	1
7168	Section 24 Bog	Bog	1
10308	Shawnee Lake Bog	Bog	1
3463	Vaughn Lake	Bog	1

16141	Barfield Lakes- Muskeg EO #9	Muskeg	1
7430	Beavertown Lakes	Muskeg	1
16152	Blind Sucker Creek Muskeg EO-10-16152	Muskeg	1
3558	Brandy Creek Wetlands 1995	Muskeg	1
3501	Jack Pine Swamp	Muskeg	1
10471	Prison Camp Muskeg- Muskeg EO #7	Muskeg	1
4661	Barker Creek Fen	Northern Fen	1
16298	Brevort Lake Road	Northern Fen	1
4903	Lake Strangmoor North Branch	Patterned Fen	1
9904	Shingleton Bog East	Patterned Fen	1
7429	Clear Lake Southeast	Poor Fen	1
2988	Egg Lake	Poor Fen	1
9790	Jackson Trail	Poor Fen	1
10005	Lovell's Fen	Poor Fen	1
7966	Benson Bog	Bog	3
5893	Black Bog	Bog	3
6555	Brinkman Bog	Bog	3
4532	Crane Bog	Bog	3
6244	Green Road Bogs	Bog	3
1032	Jefferson Bogs	Bog	3
6243	Lake Meade	Bog	3
3494	Lake of the Woods bog	Bog	3
7554	Lasalle Bog	Bog	3
11575	Long Lake	Bog	3
11155	Modjeski Bog	Bog	3
8430	North Lost Lake Bog	Bog	3
9398	Pomeroy Bogs	Bog	3
5202	Richmond Lake Bog	Bog	3
12501	South Olga Bog	Bog	3
6754	Yonker Bog	Bog	3
33	Grass Bay	Northern Fen	62
5747	Horseshoe Bay- Northern Fen EO #9	Northern Fen	62
1093	Meridian Fen	Northern Fen	62
10574	Northcutt Bay	Northern Fen	62
34	Pintail Lake Northern Fen	Northern Fen	62
15803	Stevenson Fen	Northern Fen	62
5040	Summerby Fen/Swamp- Northern Fen EO #4	Northern Fen	62
37	Thompsons Harbor Fen	Northern Fen	62
14562	Wiregrass Lake	Northern Fen	62
2700	Captain Jenks Homestead	Patterned Fen	62
32	Creighton Marsh 1983	Patterned Fen	62

13129	Hay Meadow Fen	Patterned Fen	62
9938	McMahon Lake 1984	Patterned Fen	62
8531	Park Patterned Peatland	Patterned Fen	62
3734	Baltimore Bay	Northern Fen	64
3556	C-Shaped Depression	Northern Fen	64
8634	Perch Lake Complex	Northern Fen	64
35	Root Lake Fen	Northern Fen	64
36	Sand Lakes Northern Fen	Northern Fen	64
12367	Algoe Lake Prairie Fen	Prairie Fen	64
9742	Bakertown fen	Prairie Fen	64
3566	Blue Creek Fen	Prairie Fen	64
1208	Chamberlain Lakes	Prairie Fen	64
9488	Manito Lake Fen	Prairie Fen	64
787	Monette Street	Prairie Fen	64
9772	67th Avenue (Paw Paw Prairie Fen)	Prairie Fen	89
11201	Bayley's Fen	Prairie Fen	89
38	Bowen Mills Road Fen	Prairie Fen	89
8730	Brandt Road Fen	Prairie Fen	89
11045	Burns Lake	Prairie Fen	89
6741	Caroga Lake Prairie Fen	Prairie Fen	89
39	Concord Fen	Prairie Fen	89
4170	Culver Road Fen	Prairie Fen	89
7677	Davisburg Fen	Prairie Fen	89
10240	Dew Road Fen	Prairie Fen	89
5940	Eight Foot Lake Fen	Prairie Fen	89
9954	Glenn Road Prairie Fen	Prairie Fen	89
8240	Graham Lakes	Prairie Fen	89
15918	Hall Lake Fen- Barry SGA	Prairie Fen	89
1556	Halstead Lake	Prairie Fen	89
2830	Hankard Lake Fen	Prairie Fen	89
4177	Hartwig Fen	Prairie Fen	89
9836	Headquarters Fen	Prairie Fen	89
8310	Highland Cemetary	Prairie Fen	89
40	Hill Creek Fen	Prairie Fen	89
3568	Independence Lake County Park	Prairie Fen	89
1003	Ives Road Fen	Prairie Fen	89
3302	Jackson Lake Fen	Prairie Fen	89
5704	Lakeville Swamp	Prairie Fen	89
11737	Liberty Bowl Fen	Prairie Fen	89
222	Little Appleton Lake	Prairie Fen	89
6573	Little Fawn River	Prairie Fen	89
8490	Locker Lake Fen	Prairie Fen	89
11614	Long Lake Fen	Prairie Fen	89
41	Lost Nation State Game Area	Prairie Fen	89
42	MNA Helmer Brooks Preserve	Prairie Fen	89

10871	Marl Lake	Prairie Fen	89
15920	McDonald Lake Fen- Barry SGA	Prairie Fen	89
15907	McKibbin Fen- Barry SGA	Prairie Fen	89
328	Middleville Fen	Prairie Fen	89
7086	Mt. Hope Road Fen	Prairie Fen	89
43	Park Lyndon/Snyder Lake prairie fen EO#22	Prairie Fen	89
6678	Perry Fen	Prairie Fen	89
8131	Priest Lake Fen	Prairie Fen	89
44	Quimby Rd Fen	Prairie Fen	89
11223	Radrick Fen	Prairie Fen	89
1915	Riker Lake Prairie Fen	Prairie Fen	89
1913	Sarret Nature Center	Prairie Fen	89
8391	Somerset Fen	Prairie Fen	89
45	Thompson Lake Fen	Prairie Fen	89
46	Timberland Lake Fen	Prairie Fen	89
2260	Tiplady Fen	Prairie Fen	89
47	Tucker Lake Fen	Prairie Fen	89
12497	Vanderbilt Fen	Prairie Fen	89
10243	Whelan Lake Fen	Prairie Fen	89

APPENDIX XII-D. Reclassified groupings for Shrub Wetland communities based on floristic similarity.

EOid	Site	Current Community Name	Reclassified Group
2407	Beaver Creek	Northern Shrub Thicket	1
15900	Upper Pine Lake	Northern Shrub Thicket	1
13342	Williams Lake	Southern Shrub-Carr	1
10642	Chub Creek Swamp	Northern Shrub Thicket	2
12347	Hickey Creek Swamp	Northern Shrub Thicket	2
15886	Twinwood Lake North-Newaygo County Inventory	Northern Shrub Thicket	2

APPENDIX XII-E. Reclassified groupings for Forested Wetland communities based on floristic similarity.

EOid	Site	Current Community Name	Reclassified Group
976	Wolf Lake	Boreal Forest	1
54	Simpson Road	Floodplain Forest	1
796	Potts Road Woods	Floodplain Forest	1
929	Smokey Hollow Swamp	Floodplain Forest	1
1455	White River-Pines Point Campground	Floodplain Forest	1
3145	Big South	Floodplain Forest	1
3677	River Raisin Comfort site	Floodplain Forest	1
3753	Coon Creek Swamp	Floodplain Forest	1
4197	Sharon Hollow	Floodplain Forest	1
4781	Love Creek, St. Joseph River	Floodplain Forest	1
5746	Pipestone Creek	Floodplain Forest	1
6095	Muskegon River/Huckleberry Trail	Floodplain Forest	1
6203	Sturgeon River	Floodplain Forest	1
7010	Bowman Bridge	Floodplain Forest	1
7764	McBride Drain	Floodplain Forest	1
8095	South Branch Kakamazoo River, Brown Site	Floodplain Forest	1
8096	White River - Camp Owassippe	Floodplain Forest	1
10499	Haggerty Road Floodplain Forest (Lower Huron Metropark)	Floodplain Forest	1
10646	Muskegon River/Green Creek North	Floodplain Forest	1
11053	Augusta Floodplain	Floodplain Forest	1
11353	Archery Range Floodplain Forest	Floodplain Forest	1
11962	Pere Marquette Main and South Branch	Floodplain Forest	1
12084	Warren Woods	Floodplain Forest	1
12850	Miller's Creek Ravine	Floodplain Forest	1
13185	Waldron Woodlot	Floodplain Forest	1
13315	Maple River Floodplain	Floodplain Forest	1
13369	Sarrett Nature Center	Floodplain Forest	1
13437	Manistee River State Game Area	Floodplain Forest	1
13463	Nickel Plate Rd. Maple River Floodplain	Floodplain Forest	1
13780	Deer Creek/Galien Floodplain	Floodplain Forest	1
13783	Tri	Floodplain Forest	1
13784	Waterflet Woods I and II	Floodplain Forest	1
13785	Coloma Woods	Floodplain Forest	1
13786	Onondaga Floodplain	Floodplain Forest	1
7562	Clinton River Headwaters	Hardwood-Conifer Swamp	1
9962	Bridge Lake	Hardwood-Conifer Swamp	1
10325	Lakeville Swamp	Hardwood-Conifer Swamp	1
10363	Hagerman Swamp	Hardwood-Conifer Swamp	1
14551	Lake Ann	Hardwood-Conifer Swamp	1

5533	O'Brien Lake	Poor Conifer Swamp	1
13857	Stockbridge Swamp	Poor Conifer Swamp	1
7243	Trout Lake Swamp	Rich Conifer Swamp	1
4621	Haven Hill	Rich Tamarack Swamp	1
5064	Hudson Mills Relict Conifer Swamp	Rich Tamarack Swamp	1
7676	Huron River Wetland	Rich Tamarack Swamp	1
7778	Little Fawn River	Rich Tamarack Swamp	1
7962	M52 Tamarack Swamp	Rich Tamarack Swamp	1
13736	Tamarack Trail Swamp	Rich Tamarack Swamp	1
15946	Little Portage Lake	Rich Tamarack Swamp	1
15947	Leeke Lake	Rich Tamarack Swamp	1
4116	Tobico Swamp	Southern Hardwood Swamp	1
4395	Huron Swamp	Southern Hardwood Swamp	1
7671	Hopper's Swamp	Southern Hardwood Swamp	1
7693	Selma Swamp	Southern Hardwood Swamp	1
8259	Bear Swamp	Southern Hardwood Swamp	1
9144	Indian Bowl	Southern Hardwood Swamp	1
12460	Holdridge Lakes	Southern Hardwood Swamp	1
13307	Curtis Lake Swamp	Southern Hardwood Swamp	1
13388	Harbert Tradeland	Southern Hardwood Swamp	1
13568	Embury Road Swamp	Southern Hardwood Swamp	1
930	Van Etten Lake	Floodplain Forest	15
830	Bridge Valley	Hardwood-Conifer Swamp	15
10624	Stony Creek Cedar Swamp	Hardwood-Conifer Swamp	15
13403	Mill Creek Swamp	Hardwood-Conifer Swamp	15
15749	Dudgeon Swamp	Hardwood-Conifer Swamp	15
15879	Rattlesnake Creek Swamp- Newaygo County Inventory	Hardwood-Conifer Swamp	15
15881	Muskegon SGA Lowe Lake Swamp- Newaygo County Inventory #12h	Hardwood-Conifer Swamp	15
15883	Monroe Swamp- Newaygo County Inventory #2b	Hardwood-Conifer Swamp	15
16061	Fivemile Creek Swamp	Hardwood-Conifer Swamp	15
16065	L-NEW-11_Twinwood Lake North Pines	Hardwood-Conifer Swamp	15
12754	Brooks Lake	Rich Conifer Swamp	15
16063	Triple Lakes Creek Northeast- Rich conifer swamp EO #55	Rich Conifer Swamp	15
16064	Heald Creek- Rich conifer swamp EO #56	Rich Conifer Swamp	15
13246	Toft Lake EO-32-13246	Rich Tamarack Swamp	15
15887	Pierce Cedar Creek Institute	Rich Tamarack Swamp	15
16130	Kirchner Lake- Relict conifer swamp EO #18	Rich Tamarack Swamp	15
3093	Cemetary Complex Seeps	Southern Hardwood Swamp	15

12852	AuSable Islands	Floodplain Forest	36
317	Central Cedar Swamp	Rich Conifer Swamp	36
669	McKinley Swamp	Rich Conifer Swamp	36
730	Boardwalk	Rich Conifer Swamp	36
964	Noble Lake_Rich Conifer Swamp_EO_5_964	Rich Conifer Swamp	36
1185	Blockhouse Swamp	Rich Conifer Swamp	36
5676	El Cajon Bay Rich Conifer Swamp	Rich Conifer Swamp	36
6020	Watson Swamp	Rich Conifer Swamp	36
6318	Loud Creek	Rich Conifer Swamp	36
7811	Tahquamenon River Cedar Swamp	Rich Conifer Swamp	36
8303	Trout Unlimited	Rich Conifer Swamp	36
10486	Barfield Lakes	Rich Conifer Swamp	36
14555	Little West Branch	Rich Conifer Swamp	36
15952	rich conifer swamp 51	Rich Conifer Swamp	36
1867	Point Betsie	Boreal Forest	63
2127	Cap's Cabin	Boreal Forest	63
4498	Ausable Point	Boreal Forest	63
7487	Garden Island/East Whitney Bay	Boreal Forest	63
8473	Lime Kiln Point Boreal Forest	Boreal Forest	63
9821	Fairview Cove	Boreal Forest	63
9909	Lasalle Island	Boreal Forest	63
10330	Barbed Point	Boreal Forest	63
12329	Waugoshance Point	Boreal Forest	63
14549	Boreal #7	Boreal Forest	63
10054	Beavertown Lakes	Hardwood-Conifer Swamp	63
4046	Circle Lake	Poor Conifer Swamp	63
6177	Cemetary Swamp	Poor Conifer Swamp	63
7478	Fairchild Lake	Poor Conifer Swamp	63
7781	Huckleberry Lake	Poor Conifer Swamp	63
9497	Selma Center	Poor Conifer Swamp	63
10823	Ingerman Bog	Poor Conifer Swamp	63
11444	Stagecoach Road Muskeg	Poor Conifer Swamp	63
13247	Pearl Lake EO-16-13247	Poor Conifer Swamp	63
13405	Fausett Rd. Swamp	Poor Conifer Swamp	63
15899	Hobart Swamp	Poor Conifer Swamp	63
15949	Spruce Lake	Poor Conifer Swamp	63
15958	J Avenue Tamarack Swamp	Poor Conifer Swamp	63
16086	Toman Lake EO-24-16086	Poor Conifer Swamp	63
16293	Voelker Lake	Poor Conifer Swamp	63
16294	Skidmore Branch	Poor Conifer Swamp	63
16296	Lumberman's Bay	Poor Conifer Swamp	63
1186	McMasters Bridge Road West	Rich Conifer Swamp	63
10789	Beavertown Lakes	Rich Conifer Swamp	63
1127	Pratt Lake	Southern Hardwood Swamp	63

APPENDIX XIII-A. Importance Values > 50 for species in Shrub Wetland community group, by group number. Values are high because the sample size is small.

Scientific	Group	Imp Value	Mean	S.Dev	p
<i>Aronia prunifolia</i>	1	100	49.7	16.37	0.1
<i>Eriophorum virginicum</i>	1	66.7	37.2	24.62	0.41
<i>Larix laricina</i>	1	60	59.9	1.9	1
<i>Pyrus melanocarpa</i>	1	100	49.7	16.37	0.1
<i>Sarracenia purpurea</i>	1	66.7	37.2	24.62	0.41
<i>Solidago uliginosa</i>	1	66.7	37.2	24.62	0.41
<i>Alnus rugosa</i>	2	60	59.9	1.9	1
<i>Asclepias incarnata</i>	2	66.7	36.9	24.58	0.41
<i>Asclepias quadrifolia</i>	2	66.7	36.9	24.58	0.41
<i>Aster lucidulus</i>	2	66.7	35.7	24.31	0.38
<i>Aster puniceus</i>	2	66.7	35.7	24.31	0.38
<i>Betula papyrifera</i>	2	66.7	36.8	24.56	0.4
<i>Brachyelytrum erectum</i>	2	66.7	35.7	24.31	0.38
<i>Caltha palustris</i>	2	66.7	36.8	24.56	0.4
<i>Carex comosa</i>	2	100	49.7	16.37	0.1
<i>Carex stricta</i>	2	60	59.9	1.9	1
<i>Cicuta bulbifera</i>	2	66.7	36.8	24.56	0.4
<i>Cirsium muticum</i>	2	66.7	36.9	24.58	0.41
<i>Cornus canadensis</i>	2	66.7	35.7	24.31	0.38
<i>Dryopteris cristata</i>	2	100	49.7	16.37	0.1
<i>Dryopteris thelypteris</i>	2	60	59.9	1.9	1
<i>Epilobium coloratum</i>	2	66.7	36.8	24.56	0.4
<i>Epilobium leptophyllum</i>	2	66.7	36.9	24.58	0.41
<i>Eupatorium maculatum</i>	2	100	49.7	16.37	0.1
<i>Eupatorium perfoliatum</i>	2	66.7	36.9	24.58	0.41
<i>Glyceria canadensis</i>	2	66.7	35.7	24.31	0.38
<i>Glyceria striata</i>	2	66.7	35.7	24.31	0.38
<i>Impatiens capensis</i>	2	100	49.7	16.37	0.1
<i>Lemna minor</i>	2	66.7	36.8	24.56	0.4
<i>Lycopus uniflorus</i>	2	75	49.1	20.27	0.38
<i>Mentha arvensis</i>	2	66.7	36.9	24.58	0.41
<i>Onoclea sensibilis</i>	2	66.7	36.9	24.58	0.41
<i>Osmunda cinnamomea</i>	2	66.7	35.7	24.31	0.38
<i>Osmunda regalis</i>	2	75	49.1	20.27	0.38
<i>Polygonum amphibium</i>	2	66.7	36.8	24.56	0.4
<i>Polygonum hydropiperoides</i>	2	66.7	36.9	24.58	0.41
<i>Rubus strigosus</i>	2	66.7	35.7	24.31	0.38
<i>Rumex orbiculatus</i>	2	66.7	36.9	24.58	0.41
<i>Scirpus atrovirens</i>	2	66.7	36.9	24.58	0.41
<i>Scirpus cyperinus</i>	2	66.7	36.9	24.58	0.41

Solidago rugosa	2	66.7	36.9	24.58	0.41
Typha angustifolia	2	66.7	36.8	24.56	0.4
Thelypteris palustris	2	60	59.9	1.9	1
Typha angustifolia	2	66.7	36.8	24.56	0.4
Viburnum lentago	2	66.7	36.8	24.56	0.4

APPENDIX XIII-B. Importance Values > 25 for species in Forested Wetland community group, by group number.

Scientific	Group	Imp Value	Mean	S.Dev	p
<i>Acer saccharinum</i>	1	34	13	4	0.002
<i>Fraxinus pennsylvanica</i>	1	40.5	12.9	4.13	0.002
<i>Lysimachia nummularia</i>	1	26.7	8.5	3.44	0.002
<i>Ulmus americana</i>	1	25.3	15.4	3.9	0.029
<i>Acer rubrum</i>	15	28.7	22.3	3.08	0.039
<i>Actaea pachypoda</i>	15	29.1	7.9	3.61	0.001
<i>Adiantum pedatum</i>	15	43	10	3.73	0.001
<i>Agrimonia gryposepala</i>	15	58.8	6.8	3.31	0.001
<i>Amphicarpaea bracteata</i>	15	68.5	10.7	3.76	0.001
<i>Anemone quinquefolia</i>	15	27.2	6.4	3.14	0.001
<i>Apios americana</i>	15	33.1	7.5	3.39	0.001
<i>Aquilegia canadensis</i>	15	26.3	6.6	3.03	0.001
<i>Arisaema triphyllum</i>	15	46.1	15.5	4.11	0.001
<i>Asclepias incarnata</i>	15	33.9	9.5	3.75	0.002
<i>Asclepias quadrifolia</i>	15	33.9	9.5	3.75	0.002
<i>Asclepias syriaca</i>	15	37.4	7.4	3.52	0.001
<i>Aster lateriflorus</i>	15	64.4	11.5	3.81	0.001
<i>Aster umbellatus</i>	15	39.1	8.2	3.4	0.001
<i>Athyrium filix-femina</i>	15	30.7	11.2	3.71	0.001
<i>Betula alleghaniensis</i>	15	39.8	15.2	3.97	0.001
<i>Boehmeria cylindrica</i>	15	59	14	3.91	0.001
<i>Carex folliculata</i>	15	29.4	4.9	2.92	0.001
<i>Carex hystericina</i>	15	27.3	7.6	3.59	0.003
<i>Carex stricta</i>	15	28.9	13.3	4.11	0.009
<i>Carpinus caroliniana</i>	15	45.5	14.6	3.85	0.001
<i>Chrysosplenium americanum</i>	15	54.2	7.6	3.62	0.001
<i>Cicuta maculata</i>	15	43.9	10.3	4.08	0.001
<i>Cinna arundinacea</i>	15	49.8	7.1	3.37	0.001
<i>Circaea alpina</i>	15	44.6	10.5	3.78	0.001
<i>Circaea lutetiana</i>	15	29.8	9.8	3.73	0.001
<i>Cirsium muticum</i>	15	31	11.5	4.01	0.003
<i>Clematis virginiana</i>	15	42.3	8.5	3.64	0.001
<i>Coptis trifolia</i>	15	43.4	14.8	3.8	0.001
<i>Cornus alternifolia</i>	15	26.5	7.8	3.57	0.002
<i>Cornus foemina</i>	15	33.9	9.5	3.79	0.001
<i>Cornus racemosa</i>	15	33.9	9.5	3.79	0.001
<i>Cryptotaenia canadensis</i>	15	31.1	8.2	3.53	0.002
<i>Dryopteris cristata</i>	15	27.4	12.2	3.83	0.006
<i>Elaeagnus umbellata</i>	15	27.2	6.6	3.39	0.001
<i>Epipactis helleborine</i>	15	35.1	6.8	3.22	0.001

<i>Epilobium coloratum</i>	15	26.6	7.9	3.63	0.002
<i>Equisetum fluviatile</i>	15	25.4	9.1	3.69	0.005
<i>Eupatorium maculatum</i>	15	36.1	13.6	3.96	0.001
<i>Eupatorium perfoliatum</i>	15	54.4	10.7	3.96	0.001
<i>Eupatorium rugosum</i>	15	29.7	6.8	3.08	0.001
<i>Euthamia graminifolia</i>	15	32.2	6.3	3.34	0.001
<i>Euthamia remota</i>	15	32.2	6.3	3.34	0.001
<i>Fagus grandifolia</i>	15	40.3	10.1	3.59	0.001
<i>Fraxinus nigra</i>	15	30	20	3.46	0.012
<i>Galium asprellum</i>	15	33.4	7.7	3.45	0.001
<i>Galium triflorum</i>	15	47	13.2	4.05	0.001
<i>Geum canadense</i>	15	39.3	9.5	3.44	0.001
<i>Geum canadense/laciniatum</i>	15	25.7	10.1	3.77	0.006
<i>Geum rivale</i>	15	25.7	10.1	3.77	0.006
<i>Glyceria striata</i>	15	27.2	15.5	3.71	0.009
<i>Hamamelis virginiana</i>	15	36.7	6.9	3.34	0.001
<i>Hepatica americana</i>	15	31.8	7.2	3.51	0.001
<i>Hydrocotyle americana</i>	15	35.3	5.3	3.01	0.001
<i>Hystrix patula</i>	15	47.6	8.2	3.63	0.001
<i>Impatiens capensis</i>	15	46.6	18.6	3.71	0.001
<i>Larix laricina</i>	15	32.5	17	3.68	0.004
<i>Leersia oryzoides</i>	15	31.5	10.7	3.73	0.002
<i>Lemna minor</i>	15	32	9.2	3.9	0.002
<i>Lindera benzoin</i>	15	46.6	17.1	3.95	0.001
<i>Lobelia siphilitica</i>	15	35.7	9.2	3.95	0.001
<i>Lycopus uniflorus</i>	15	33.7	14.3	3.64	0.004
<i>Medeola virginiana</i>	15	52.9	6.4	3.16	0.001
<i>Mitchella repens</i>	15	54	12.4	4	0.002
<i>Mitella diphylla</i>	15	63.2	11.6	3.74	0.001
<i>Mitella nuda</i>	15	39	12.3	3.81	0.001
<i>Nasturtium officinale</i>	15	27.3	7.5	3.39	0.001
<i>Onoclea sensibilis</i>	15	36.6	20.2	3.55	0.001
<i>Osmorhiza claytonii</i>	15	28.3	7.5	3.51	0.001
<i>Osmunda cinnamomea</i>	15	37.8	16.7	4	0.001
<i>Osmunda regalis</i>	15	39.9	16.7	4.01	0.001
<i>Prunella vulgaris</i>	15	33.6	11.6	3.87	0.002
<i>Parthenocissus quinquefolia</i>	15	50.4	15.2	3.95	0.001
<i>Pinus strobus</i>	15	38.9	15	4	0.002
<i>Podophyllum peltatum</i>	15	25.6	7.9	3.32	0.001
<i>Polygonatum pubescens</i>	15	46.8	10.6	3.67	0.001
<i>Polygonum sagittatum</i>	15	52.9	6.3	3.28	0.001
<i>Populus tremuloides</i>	15	29.1	11.6	3.62	0.002
<i>Prunus serotina</i>	15	35	9.9	3.71	0.002
<i>Pyrola elliptica</i>	15	33.4	7.5	3.64	0.001
<i>Quercus alba</i>	15	26.5	7.7	3.36	0.001
<i>Quercus borealis</i>	15	36	14.2	4.01	0.001
<i>Quercus rubra</i>	15	36	14.2	4.01	0.001

Ranunculus recurvatus	15	63.9	10.1	3.83	0.001
Rhamnus alnifolia	15	27.1	10.7	3.88	0.005
Ribes hirtellum	15	30.9	6.7	3.21	0.002
Ribes triste	15	41.4	8.4	3.51	0.001
Rubus pubescens	15	35	15.6	3.97	0.002
Rumex orbiculatus	15	27.8	10	3.71	0.002
Solanum dulcamara	15	28.2	11	3.85	0.004
Saxifraga pensylvanica	15	26.4	5.8	3.38	0.001
Scirpus atrovirens	15	32.8	8.5	3.44	0.001
Scutellaria galericulata	15	25.1	6.2	3.24	0.002
Scutellaria lateriflora	15	27.2	10.8	3.69	0.002
Senecio aureus	15	58.1	11.7	3.92	0.001
Smilax hispida	15	30.2	8.7	3.54	0.001
Smilax tamnoides	15	30.2	8.7	3.54	0.001
Solidago patula	15	55.5	11.6	3.98	0.001
Solidago rugosa	15	55.5	11.5	3.87	0.001
Symplocarpus foetidus	15	38	15.7	4.03	0.002
Taraxacum officinale	15	31.1	8.1	3.85	0.002
Thalictrum dasycarpum	15	29.2	11.1	4.05	0.005
Tilia americana	15	46.1	14.6	3.9	0.001
Toxicodendron radicans	15	34.7	17.2	3.7	0.003
Trientalis borealis	15	31.9	16.9	3.74	0.002
Trillium grandiflorum	15	27.5	7.4	3.34	0.001
Tsuga canadensis	15	34	10.4	3.86	0.001
Typha latifolia	15	40.7	11.6	3.93	0.001
Urtica dioica	15	28.1	10.8	3.76	0.004
Uvularia grandiflora	15	31.8	7	3.29	0.001
Viola cucullata	15	33.1	7.6	3.45	0.001
Vitis riparia	15	46.3	12.4	3.89	0.001
Abies balsamea	36	61.8	13	3.9	0.001
Alnus rugosa	36	31	16.6	3.78	0.006
Aralia nudicaulis	36	36.2	14.3	3.78	0.001
Aster macrophyllus	36	42.4	11	3.67	0.001
Betula papyrifera	36	27.4	14.5	3.87	0.012
Botrychium virginianum	36	39.9	12.1	3.81	0.001
Brachyelytrum erectum	36	33.4	10	3.7	0.002
Caltha palustris	36	29.8	15	3.86	0.004
Carex interior	36	25.6	5.3	3.17	0.002
Carex intumescens	36	34.5	12.4	3.75	0.003
Carex trisperma	36	37.8	12.1	4.01	0.001
Clintonia borealis	36	41.5	12.7	3.98	0.001
Cornus canadensis	36	49.3	14.4	4.07	0.001
Cornus stolonifera	36	25.5	13.1	4.01	0.015
Epigaea repens	36	43.7	7.6	3.51	0.001
Equisetum sylvaticum	36	41.8	7.5	3.34	0.001
Gaultheria hispida	36	47.4	12.3	3.96	0.001

<i>Gymnocarpium dryopteris</i>	36	50.2	9.9	3.76	0.001
<i>Ledum groenlandicum</i>	36	29.1	9.3	3.58	0.001
<i>Linnaea borealis</i>	36	36.4	11.2	3.67	0.001
<i>Lycopodium annotinum</i>	36	37.1	6.2	3.15	0.001
<i>Maianthemum canadense</i>	36	38.1	18.4	3.9	0.001
<i>Petasites palmatus</i>	36	44.7	6.3	3.45	0.001
<i>Picea mariana</i>	36	28.9	11	3.78	0.003
<i>Polygala paucifolia</i>	36	36.6	10.8	3.82	0.001
<i>Populus balsamifera</i>	36	30.9	7.2	3.37	0.001
<i>Smilacina trifolia</i>	36	25.6	9.3	3.46	0.002
<i>Thuja occidentalis</i>	36	34.4	16.2	3.63	0.002
<i>Viola renifolia</i>	36	33.6	6.3	3.36	0.001
<i>Chamaedaphne calyculata</i>	63	30.2	8.5	3.49	0.001
<i>Nemopanthus mucronata</i>	63	26	8.4	3.48	0.002

RAPID WETLAND ASSESSMENT FOR MICHIGAN
SECTION 2: WILDLIFE SPECIES ASSOCIATIONS WITH
SPECIFIC ATTRIBUTES OF THE WETLAND VEGETATION
COMMUNITIES OF MICHIGAN

by

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Michigan Natural Features Inventory

for

Michigan Department of Transportation

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Contents

1.0 Introduction.....	3
2.0 Predicting the Composition and Richness of Wildlife Communities in Michigan Wetlands	4
2.1 Extensive and/or Deep Surface Water.....	5
2.2 Shallow Persistent Surface Water with Herbaceous Vegetation.....	6
2.3 Shallow Seasonal (Vernal) Surface Water with Herbaceous Vegetation.....	6
2.4 Surface Water Absent and Herbaceous Vegetation Dominates	7
2.5 Moss Substrate; Acidic Conditions; Limited Surface Water; Few Trees.....	8
2.6 Robust Emergents.....	8
2.7 Deciduous Shrub Cover.....	9
2.8 Evergreen Shrub Cover.....	9
2.9 Deciduous Trees	10
2.10 Evergreen Trees.....	10
2.11 Large-diameter Trees.....	11
2.12 Snags.....	12
2.13 Downed Wood.....	12
2.14 Seasonally Predictable Water Levels.....	13
2.15 Proximity to Exposed Bare Substrate.....	13
2.16 Proximity to Flowing Water	14
2.17 Proximity to Exposed Banks	14
2.18 Proximity to Island	14
2.19 Proximity to Artificial Structures for Nesting	15
2.20 Proximity to Openland.....	15
2.21 Proximity and Connection to Large Vegetated Patches and/or Corridors.....	15
3.0 Synthesis: General Factors Important to Species Groups.....	40
3.1 Amphibians.....	40
3.2 Reptiles, Mammals	40
3.3 Birds.....	41
4.0 Future Directions	42
Literature References.....	43

1.0 Introduction

This report is intended to provide a foundation for eventually developing one module of the Michigan Rapid Assessment Method (MiRAM). Specifically, it provides information on specific attributes of wetlands that can be used, along with information on species ranges, to help predict the assemblage of wildlife species most likely to be found in a particular wetland or wetland community type. Such information is important for determining which wetlands may contribute the most to regional biodiversity, and which might be enhanced to improve that capacity. In turn, that information is important to decisions regarding assessment of impacts, mitigation requirements, and design of compensatory wetlands.

This report does not provide a ready-to-go set of integrated models for scoring the habitat functions of a specific wetland. Developing that capacity would require considerably more resources than were available for this initial phase. Nonetheless, the information presented herein will greatly expedite the future development of such a module as part of MiRAM, as resources may become available.

This report is organized as follows. Section 2.0 provides information for predicting individual species likely to occur regularly, either as migrants or breeders, within various wetland vegetation communities and within wetlands having specific attributes. This information is also compiled in an accompanying electronic database. Section 3.0 provides a brief synthesis of this information, summarizing the key factors important to each of the major groups (guilds) of wildlife.

The basic process used to prepare this report proceeded as follows:

1. Paul Adamus created a database of the wetland communities vs. counties from maps provided by the MNFI.
2. Based on professional judgment, 348 of the 399 species in the MIWILD database were selected as being “wetland-associated” during their breeding season. Several wetland-dependent bird species that do not breed in Michigan, but which occur regularly during migration and/or winter, were also included. The MIWILD database that was consulted was developed by Scott Thomasma and others, with sponsorship by the USDA Forest Service and Michigan Department of Natural Resources.
3. Based on professional knowledge, some literature, and multiple queries of the MIWILD database (which does not use the new MNFI classification), each of the 348 species was associated with one or more of the 33 wetland community types (indicating present or absent).
4. Using the MIWILD species-county database and the databases from #1 and #3 above, a query was conducted to create a database that lists a species as occurring in a county only if at least one of the vegetation community types it associates with is also present in the county. Maps showing the estimated county distribution of the community types had been drafted by the MNFI. The resulting database has 119,815 records and is sorted by community type. This table was reformatted by Thea Cook and Dennis Albert to make it more easily interpreted by users. The distributions of species was then reviewed by Dennis Albert to identify species that might not regularly utilize habitat.
5. From experience as a wildlife biologist, Paul Adamus identified 21 additional attributes needed to predict the particular assemblage of species likely to occur regularly in a given wetland. These were then cross-walked with the community types and with each of the 348 wildlife species, and described the associations narratively (Section 2.0). These attributes were then further reviewed and modified by Dennis Albert to verify attribute correspondence for each wetland type.

6. The synthesis (Section 3.0) was then prepared from professional knowledge and a review of the database outputs.

2.0 Predicting the Composition and Richness of Wildlife Communities in Michigan Wetlands

The particular species that occur regularly in any given wetland in Michigan are determined primarily by geography and climate; the depth, seasonal persistence, and extent of surface water; and the forms and spacing of vegetation. In concept, these factors and observable attributes that define and augment them can be used to predict the species and species groups (guilds) most likely to occur in a given wetland. In this section, specific attributes that predict species composition are described, their occurrence within the various wetland community types is described (Table 1), and species whose occurrence they can help predict are listed (Table 2). This approach was taken, rather than printing lists of species directly by community type, because of the considerable variation in these attributes within any given community type. This list of attributes is not all-inclusive, but rather focuses on attributes that together are important predictors of the largest numbers of wetland-dependent wildlife species.

Table 1. Estimated degree of association of various habitat attributes with Michigan's 33 wetland community types

For column headings see abbreviations at end. Occurrences based on professional opinion only.
1= primary association; 2= secondary association; blank= usually absent or very limited association

	Deep	Shallow	Vernal	SatHerb	Moss	Robust	SSdecid	SSever	TreeDecid	TreeEver	BigTree	Snags	LWD	Stable	Mud	Flow	Bank
Submergent Marsh	1																
Emergent Marsh	2	1	2	2		1									1		
Great Lakes Marsh	2	1	2	2		1						2	2		1		2
Wooded Dune & Swale Complex		2	2	2	1,2	2	1		2		2	2	2		2		
Coastal Plain Marsh		1	2	2		1	2								1		
Inland Salt Marsh			1	1		1									1		
Interdunal Wetland		2	1	1	2	1	2	2		2					1		
Coastal Fen		1	2	2		1	1	1				1			1		
Northern Fen		1	2	2	1,2	2	2	2		2				1	1		
Patterned Fen		1	2	2	1	2		2		2				1	2		
Poor Fen		1	2	2	1,2			2		2				1	2		
Prairie Fen		1	2	2					2					1	2		
Lakeplain Wet-Mesic Prairie		2	1	1													
Lakeplain Wet Prairie		2	1	1													
Wet-Mesic Prairie		2	1	1			2							2	2		
Wet-Mesic Sand Prairie		2	1	1										2	2		
Wet Prairie		2	1	1											2		
Intermittent Wetland			1	1	2		2	2		2					1		
Northern Wet Meadow		2	1	1		2	2	2			2	2	2	2			

	Deep	Shallow	Vernal	SatHerb	Moss	Robust	SSdecid	SSever	TreeDecid	TreeEver	BigTree	Snags	LWD	Stable	Mud	Flow	Bank
Southern Wet Meadow		2	1	1		2						2	2	2			
Bog		2	1	1	1	2		1						1			
Muskeg		2	1	1	1	2		1		1				1			
Northern Shrub Thicket							1	1	2	2	2	2	2	2			
Poor Conifer Swamp								1		1		1	1	2			
Northern Hardwood Swamp							2	2	1		1	1	1	2			
Rich Tamarack Swamp								1		1		1	1	2			
Rich Conifer Swamp							2	1	2	1	1	1	1	2			
Hardwood-Conifer Swamp							2	1	2	1	1	1	1	2			
Southern Hardwood Swamp							2		1		1	1	1	2			
Southern Shrub-Carr						2	1		2			2	2				
Inundated Shrub Swamp							1		2			1					
Wet-Mesic Flatwoods							2		1		1	1	1				
Floodplain Forest							2		1		1	1	1		1	1	1

Abbreviations of the habitat attributes (column headings):

Deep= Extensive and/or Deep Surface Water

Shallow= Shallow Persistent Surface Water with Herbaceous Vegetation

Vernal= Shallow Seasonal (Vernal) Surface Water with Herbaceous Vegetation

SatHerb= Surface Water Absent and Herbaceous Vegetation Dominates

Moss= Moss Substrate; Acidic Conditions; Limited Surface Water; Few Trees

Robust= Robust Emergents

SSdecid= Deciduous Shrub Cover

SSever= Evergreen Shrub Cover

TreeDecid= Deciduous Trees

TreeEver= Evergreen Trees

BigTree= Large-diameter Trees

Snags= Snags

LWD= Downed Wood

Stable= Seasonally Predictable Water Levels

Mud= Proximity to Exposed Bare Substrate

Flow= Proximity to Flowing Water

Bank= Proximity to Exposed Banks

2.1 Extensive and/or Deep Surface Water

Species associated with this attribute mostly feed below the water surface on fish and aquatic invertebrates. Thus, the wetland type in which they are most likely to occur is Submergent Marsh, and secondarily in Emergent Marshes and Great Lakes Marshes that contain or adjoin large, deep, open bodies of water. For most of the species that associate with this attribute, their use of wetlands is facultative – that is, they may use the deeper non-wetland waters as much or more than wetlands. Some of these species occur only in coastal locations. The species that are most likely to associate with this attribute are marked in the “Deep” column of Table 2a.

2.2 Shallow Persistent Surface Water with Herbaceous Vegetation

This attribute consists of areas dominated by emergent herbaceous vegetation, in which lentic surface water persists through at least mid-summer during most years. This attribute is assumed to occur most commonly within the following wetland communities:

- Emergent Marsh
- Great Lakes Marsh
- Coastal Plain Marsh
- Coastal Fen
- Northern Fen
- Patterned Fen
- Poor Fen
- Prairie Fen

It is assumed to occur less consistently within other wetland types that include:

- Northern Wet Meadow
- Southern Wet Meadow
- Lakeplain Wet Prairie
- Lakeplain Wet-mesic Prairie
- Wet Prairie
- Wet-mesic Prairie
- Wet-mesic Sand Prairie
- Interdunal Wetland
- Bog
- Muskeg
- Wooded Dune and Swale Complex

The species that are most likely to associate with this attribute are shown in Table 2a. This wetland community type may contribute the most to biodiversity in regions dominated by forest cover, because of complementarity of characterizing species.

2.3 Shallow Seasonal (Vernal) Surface Water with Herbaceous Vegetation

This attribute consists of areas dominated by emergent herbaceous vegetation, but lentic surface water does not persist through at least mid-summer during most years, and in some cases may be present only for 2 weeks following heavy precipitation or runoff. This attribute is assumed to occur most commonly within the following wetland communities:

- Intermittent Wetland
- Northern Wet Meadow
- Southern Wet Meadow
- Lakeplain Wet Prairie
- Lakeplain Wet-mesic Prairie
- Wet Prairie

Wet-mesic Prairie
Wet-mesic Sand Prairie
Inland Salt Marsh
Interdunal Wetland
Bog
Muskeg

Perhaps less frequently, it occurs within other wetland types, especially along their upland edge, and those types may include:

Coastal Fen
Northern Fen
Patterned Fen
Poor Fen
Prairie Fen
Emergent Marsh
Great Lakes Marsh
Coastal Plain Marsh
Wooded Dune and Swale Complex

When this attribute comprises the entirety of a wetland, and the wetland lacks a surface water connection to other water bodies, many amphibians and aquatic invertebrates which do not tolerate well the presence of fish can thrive, because the lack of persistent surface water eliminates most fish.

This wetland community type may contribute the most to biodiversity in regions dominated by forest cover, because of complementarity of characterizing species. Species that are most likely to associate with this attribute are shown in Table 2a.

2.4 Surface Water Absent and Herbaceous Vegetation Dominates

This attribute consists of areas dominated by emergent herbaceous vegetation, but lentic surface water is almost always absent. Yet, these areas are considered wetlands if the upper soil layers remain saturated for periods that are sufficiently long to exclude upland vegetation. The prolonged saturation discourages colonization and persistence of many tree species. This attribute is assumed to occur most commonly within the following wetland communities:

Intermittent Wetland
Northern Wet Meadow
Southern Wet Meadow
Lakeplain Wet Prairie
Lakeplain Wet-mesic Prairie
Wet Prairie
Wet-mesic Prairie
Wet-mesic Sand Prairie
Inland Salt Marsh
Interdunal Wetland
Bog
Muskeg

Perhaps less frequently, it occurs within other wetland types, especially along their upland edge, and those types may include:

- Coastal Fen
- Northern Fen
- Patterned Fen
- Poor Fen
- Prairie Fen
- Emergent Marsh
- Great Lakes Marsh
- Coastal Plain Marsh
- Wooded Dune and Swale Complex

This wetland community type may contribute the most to biodiversity in regions dominated by forest cover, because of complementarity of characterizing species. Species most likely to associate with this attribute are shown in Table 2a.

2.5 Moss Substrate; Acidic Conditions; Limited Surface Water; Few Trees

This attribute consists of naturally acidic areas dominated by mosses, with little or no surface water at any season, and without significant tree cover. This attribute defines Bog and Muskeg, the latter assumed to have greater (but still limited) tree cover. Poor Fens are often dominated by mosses, although moss cover is often not continuous. Secondly, smaller patches are often associated with Patterned Fen, Northern Fen, Wooded Dune and Swale Complex, and Intermittent Wetland. Species most likely to associate with this attribute are shown in Table 2a.

2.6 Robust Emergents

This attribute consists of tall, robust, herbaceous plant species such as bulrush, cattail, and common reed (*Phragmites*). Surface water is often present for long durations beneath a sometimes-dense and nearly monotypic canopy provided by these plants. This attribute is assumed to occur most commonly within the following wetland communities:

- Emergent Marsh
- Great Lakes Marsh
- Inland Salt Marsh
- Interdunal Wetland
- Coastal Plain Marsh
- Coastal Fen
- Wooded Dune and Swale Complex

Perhaps less frequently, it can occur within some other wetland types, and those may include:

- Northern Wet Meadow
- Southern Wet Meadow
- Northern Fen
- Patterned Fen
- Poor Fen
- Southern Shrub-carr
- Bog
- Muskeg

Species most likely to favor wetlands having this attribute are so marked in Table 2a.

2.7 Deciduous Shrub Cover

This attribute consists of deciduous woody vegetation less than 20 ft in height, and excluding Tamarack. If present at all, surface water is present only for short durations (seldom more than a few months annually). This attribute is assumed to occur most commonly within the following wetland communities:

- Northern Shrub Thicket
- Southern Shrub-carr
- Wooded Dune and Swale Complex
- Inundated Shrub Swamp
- Coastal Fen

Less frequently, it can occur within (and especially along upland edges of) other wetland types which may include:

- Northern Wet Meadow
- Intermittent Wetland
- Interdunal Wetland
- Hardwood-conifer Swamp
- Northern Hardwood Swamp
- Rich Conifer Swamp
- Southern Hardwood Swamp
- Wet-mesic Flatwoods
- Floodplain Forest
- Coastal Plain Marsh
- Northern Fen
- Prairie Fen
- Wet-mesic Prairie

For most of the species that associate with this attribute, their use of wetlands is facultative – that is, they may use the deciduous shrub areas in nearby uplands as much or more than those in wetlands. Thus, whether the deciduous shrubs occur within the wetland or in nearby uplands matters little to many species. Species most likely to associate with this attribute are shown in Table 2. This wetland community type may contribute the most to biodiversity in regions dominated by openlands or evergreen shrubland, because of complementarity of characterizing species.

2.8 Evergreen Shrub Cover

This attribute consists of evergreen woody vegetation or Tamarack less than 20 ft in height. If present at all, surface water is present only for short durations (seldom more than a few months annually). This attribute is assumed to occur most commonly within the following wetland communities:

- Northern Shrub Thicket
- Hardwood-conifer Swamp
- Poor Conifer Swamp
- Rich Conifer Swamp
- Rich Tamarack Swamp
- Bog

Muskeg
Coastal Fen

Less frequently, it occurs within (and especially along upland edges of) other wetland types which may include:

Northern Hardwood Swamp
Patterned Fen
Poor Fen
Northern Fen
Interdunal Wetland
Intermittent Wetland
Northern Wet Meadow

For most of the species that associate with this attribute, their use of wetlands is facultative – that is, they may use the evergreen shrub areas in nearby uplands as much or more than those in wetlands. Thus, whether the evergreen shrubs occur within the wetland or in nearby uplands matters little to many species. Species most likely to associate with this attribute are shown in Table 2b. This wetland community type may contribute the most to biodiversity in regions dominated by openlands and deciduous shrubland, because of complementarity of characterizing species.

2.9 Deciduous Trees

This attribute consists of deciduous woody vegetation (excluding Tamarack) taller than 20 ft. If present at all, surface water occurs only for short durations (seldom more than a few weeks annually). This attribute is assumed to be present most commonly within the following wetland communities:

Wet-mesic Flatwoods
Floodplain Forest
Southern Hardwood Swamp
Northern Hardwood Swamp

Less frequently, it occurs within (and especially along upland edges of) other wetland types which may include:

Northern Shrub Thicket
Southern Shrub-carr
Wooded Dune and Swale Complex
Inundated Shrub Swamp
Hardwood-conifer Swamp
Rich Conifer Swamp

For most of the species that associate with this attribute, their use of wetlands is facultative – that is, they may use the deciduous forested areas in nearby uplands as much or more than those in wetlands. Thus, whether the deciduous trees occur within the wetland or in nearby uplands matters little to many of these species. Species most likely to associate with this attribute are shown in Table 2b. This wetland community type may contribute the most to biodiversity in regions dominated by openlands or evergreen forest cover, because of complementarity of characterizing species.

2.10 Evergreen Trees

This attribute consists of evergreen woody vegetation or Tamarack taller than 20 ft. If present at all, surface water is present only for short durations (seldom more than a few weeks annually). This attribute is assumed to occur most commonly within the following wetland communities:

- Rich Conifer Swamp
- Rich Tamarack Swamp
- Poor Conifer Swamp
- Hardwood-conifer Swamp
- Muskeg
- Northern Fen

It is assumed to occur less consistently within other wetland types which may include but are not limited to the following (especially along their upland edges):

- Northern Shrub Thicket
- Patterned Fen
- Poor Fen
- Intermittent Wetland
- Interdunal Wetland

For most of the species that associate with this attribute, their use of wetlands is facultative – that is, they may use the evergreen forested areas in nearby uplands as much or more than those in wetlands. Thus, whether the evergreen trees occur within the wetland or in nearby uplands matters little to many of these species. Species most likely to associate with this attribute are shown in Table 2. This wetland community type may contribute the most to biodiversity in regions dominated by openlands or deciduous forest cover, because of complementarity of characterizing species.

2.11 Large-diameter Trees

This attribute consists of stands of mature trees with diameters (dbh) larger than about 21 inches. If present at all, surface water is present only for short durations (seldom more than a few weeks annually). This attribute is assumed to occur most commonly within the following wetland communities:

- Floodplain Forest
- Southern Hardwood Swamp
- Northern Hardwood Swamp
- Hardwood-conifer Swamp
- Rich Conifer Swamp
- Wet-mesic Flatwoods

It is assumed to occur less consistently within or along the edges of other wetland types which may include the following:

- Northern Shrub Thicket
- Northern Wet Meadow
- Wooded Dune and Swale Complex

Whether the large trees occur within the wetland or in nearby uplands matters little to many wildlife species. Species most likely to associate with this attribute are shown in Table 2b. This wetland community type may contribute the most to biodiversity in regions dominated by openlands, because of complementarity of characterizing species.

2.12 Snags

This attribute consists of standing dead trees with diameters (dbh) larger than about 8 inches. Often, the trees are dead because of past or ongoing water level increases within the wetland, e.g., due to beaver or rising lake levels. This attribute is assumed to occur most commonly within the following wetland communities:

- Floodplain Forest
- Wet-mesic Flatwoods
- Inundated Shrub Swamp
- Southern Hardwood Swamp
- Northern Hardwood Swamp
- Hardwood-conifer Swamp
- Rich Conifer Swamp
- Poor Conifer Swamp
- Rich Tamarack Swamp
- Coastal Fen

It is assumed to occur less consistently within (or along the edges of) other wetland types which may include the following:

- Northern Shrub Thicket
- Southern Shrub-carr
- Northern Wet Meadow
- Southern Wet Meadow
- Wooded Dune and Swale Complex

Whether the snags occur within the wetland or in nearby uplands matters little to many wildlife species. Species most likely to associate with this attribute are shown in Table 2.

2.13 Downed Wood

This attribute consists of logs and other pieces of downed wood, mostly with diameters (dbh) larger than a few inches. Accumulations often occur when woody vegetation has been killed by past or ongoing water level increases within the wetland. This attribute is assumed to occur most commonly within the following wetland communities:

- Floodplain Forest
- Wet-mesic Flatwoods
- Southern Hardwood Swamp
- Northern Hardwood Swamp
- Hardwood-conifer Swamp
- Rich Conifer Swamp
- Poor Conifer Swamp
- Rich Tamarack Swamp

It is assumed to occur less consistently within (or along the edges of) other wetland types which may include the following:

- Northern Shrub Thicket
- Southern Shrub-carr
- Northern Wet Meadow
- Southern Wet Meadow
- Great Lakes Marsh

Wooded Dune and Swale Complex

Species most likely to associate with this attribute are shown in Table 2b.

Whether the downed wood occurs within the wetland or in nearby uplands matters little to many wildlife species. However, for some species, downed wood that is partly submerged (i.e., partly above the water surface) is particularly important. Such horizontal pieces provide perches to Green Heron, Spotted Sandpiper, Northern Waterthrush, Louisiana Waterthrush, Belted Kingfisher, turtles, cormorants, and a few other species.

2.14 Seasonally Predictable Water Levels

This attribute consists of surface water areas that experience little vertical fluctuation during the breeding seasons of amphibians and shoreline-nesting birds. What constitutes little fluctuation, and the specific seasonal dates during which that must occur, depends on the species. Michigan wetlands that proportionally have the largest inputs of ground water tend to have the most seasonally-predictable water levels. These are assumed to include the following:

- Northern Fen
- Patterned Fen
- Poor Fen
- Prairie Fen
- Bog
- Muskeg

It is assumed to occur less consistently in the following wetland types:

- Northern Wet Meadow
- Southern Wet Meadow
- Wet-mesic Prairie
- Wet-mesic Sand Prairie
- Northern Shrub Thicket
- Southern Hardwood Swamp
- Northern Hardwood Swamp
- Hardwood-conifer Swamp
- Rich Conifer Swamp
- Poor Conifer Swamp
- Rich Tamarack Swamp

Species most likely to associate with this attribute are shown in Table 2c.

2.15 Proximity to Exposed Bare Substrate

This attribute consists of patches of sand or mud that are unvegetated or vegetated only very sparsely, and saturated but not water-covered for long periods. Technically, such areas are not considered jurisdictional wetlands unless they are very small and delineated as inclusions within a wetland-nonwetland mosaic. The paucity of vegetation can be due to frequent scouring by floods, frequent and severe water level fluctuations, intense grazing, tillage, very low soil fertility, or other factors. This attribute is assumed to be associated most commonly with the following wetland communities:

- Intermittent Wetland
- Emergent Marsh
- Great Lakes Marsh

Coastal Plain Marsh
Inland Salt Marsh
Coastal Fen
Interdunal Wetland
Northern Fen
Floodplain Forest

It is assumed to occur less consistently within (or along the edges of) other wetland types which may include the following:

Wet Prairie
Wet-mesic Prairie
Wet-mesic Sand Prairie
Wooded Dune and Swale Complex
Patterned Fen
Poor Fen
Prairie Fen

Species most likely to associate with this attribute are shown in Table 2c.

Whether the exposed substrate occurs within the wetland or adjoins it matters little to many wildlife species. Of particular importance are large (>5 acres) mudflats that are exposed as the result of gradually falling water levels during the migrations of shorebirds (generally May and July-September), riverine bars important to nesting Piping Plover, Spotted Sandpiper, and some other species, and mudflats that are near structures suitable for species that use mud for nest construction, e.g., Cliff Swallow.

2.16 Proximity to Flowing Water

This attribute consists of surface water that visibly flows, usually in channels, during any time of the year, and lacks vegetation (except for perhaps some submerged aquatic plants). Technically, such areas are not considered jurisdictional wetlands unless they are delineated as inclusions within a wetland-nonwetland mosaic. Whether the flowing water occurs within the wetland or adjoins it matters little to many wildlife species. This attribute can occur within or adjoining any wetland community type, but is most likely to characterize Floodplain Forest. Species that may prefer this attribute are so marked in Table 2c.

2.17 Proximity to Exposed Banks

This attribute consists of vertical or nearly-vertical banks of sand or mud that are unvegetated, and adjoin streams, rivers, or lakes. Technically, such areas are not considered jurisdictional wetlands but are often delineated as inclusions within a wetland-nonwetland mosaic. The paucity of vegetation can be due to frequent scouring by floods, frequent and severe water level fluctuations, intense grazing, very low soil fertility, excessive shade, chronic erosion, or other factors. This attribute is assumed to be associated most commonly with Floodplain Forest, but can be associated with any wetland that adjoins flowing water or a lake, such as Great Lakes Marsh. Species most likely to require or prefer this attribute are shown in Table 2c.

2.18 Proximity to Island

This attribute describes lands surrounded by perennial water of sufficient depth and width to discourage access by mammalian predators. Technically, some such areas are not considered jurisdictional wetlands but are often delineated as inclusions within a wetland-nonwetland mosaic. Use by particular species will depend on the density of vegetation, with some species preferring bare substrate. The paucity of vegetation can be due to frequent scouring by floods, frequent and severe water level fluctuations, very low soil fertility, chronic erosion, or other factors. This attribute is assumed to be associated most commonly with Floodplain Forest and Great Lakes Marsh, but can be associated with any lake or river. Species most likely to require or prefer this attribute are shown in Table 2c.

2.19 Proximity to Artificial Structures for Nesting

This attribute concerns the proximity of a wetland to artificial structures used by nesting birds and mammals, whether those structures be placed intentionally for wildlife (e.g., nest boxes) or used incidentally (e.g., barns, bridges). Such structures logically tend to be more available in developed areas, but can occur anywhere. Species likely to use this attribute are listed in Table 2c.

2.20 Proximity to Openland

This attribute concerns the proximity of a wetland to openland, which is herbaceous-vegetated land with little or no tree cover and minor shrub cover. This attribute can be associated with any wetland community type, but may be *least* likely to occur with the following types due to their coincidence with land use patterns in Michigan:

- Bog
- Muskeg
- Patterned Fen
- Poor Fen
- Rich Tamarack Swamp
- Poor Conifer Swamp

Species most likely to require or prefer this attribute are so marked in Table 2c. A subset of these species make heavy use of **cropland**, especially particular types of cropland. These include many waterfowl, which during the winter may supplement the foods found in wetlands with crop residues.

2.21 Proximity and Connection to Large Vegetated Patches and/or Corridors

This attribute concerns the inclusion of a wetland within, or its proximity and/or degree of connection to, a large patch of native vegetation. Many wildlife species are believed to be area-sensitive but exact relationships of population size and viability to patch size have been determined empirically for only a few species. Even then, such relationships are confounded by many interacting habitat quality variables, e.g., within-patch structural diversity, outside-patch land use patterns and intensity. For the most area-sensitive species, larger patches provide isolation from nest parasitizers, some predators, and chronic human disturbance, as well as providing a more Predictable microclimate and structural diversity. Among wetland species, limited evidence suggests that those marked in Table 2c might be the ones least likely to occur in very small isolated patches of their preferred habitat, i.e., are the most area-sensitive.

Table 2a. Species associations with hydroperiod attributes and herbaceous vegetation

Abbreviations of the habitat attributes (column headings):

Deep= Extensive and/or Deep Surface Water

Shallow= Shallow Persistent Surface Water with Herbaceous Vegetation

Vernal= Shallow Seasonal (Vernal) Surface Water with Herbaceous Vegetation

SatHerb= Surface Water Absent and Herbaceous Vegetation Dominates

Moss= Moss Substrate; Acidic Conditions; Limited Surface Water; Few Trees

Robust= Robust Emergents

Bold font indicates species of special importance in Michigan due to rarity or limited distribution.

	Deep	Shallow	Vernal	SatHerb	Moss	Robust	Distribution
AMPHIBIANS							
Blue-spotted Salamander	1	1	1	1			Statewide
Spotted Salamander	1	1					Statewide
Marbled Salamander							Region VI
Smallmouth Salamander			1	1			Region VI
Tiger Salamander	1	1	1	1			Region VI, VII, VIII
Four-toed Salamander	1	1	1	1	1		Statewide
Eastern Redback Salamander							Statewide
Mudpuppy	1	1					Statewide
Eastern Newt	1	1	1	1	1		Statewide
Lesser Siren	1	1					Region VI
American Toad	1	1	1	1	1		Statewide
Fowler's Toad	1	1	1	1			Region VI, VII
Northern Cricket Frog		1	1	1	1		Region VI
Gray Treefrog	1	1	1	1	1		Statewide
Western Chorus Frog	1	1	1	1	1		Region VI, VII, Menominee Co.
Spring Peeper	1	1	1	1	1		Statewide
Bullfrog	1	1	1	1			Statewide
Green Frog	1	1	1	1	1		Statewide
Pickerel Frog	1	1	1	1	1		Statewide
Northern Leopard Frog	1	1	1	1			Statewide
Mink Frog	1	1			1		Region VIII, IX
Wood Frog	1	1	1	1	1		Statewide
BIRDS							
Common Loon	1	1					Region VII, VIII, IX
Pied-billed Grebe	1	1	1				Statewide
Horned Grebe	1	1	1				mostly coastal; locally common migrant
Red-necked Grebe	1						VIII (rare breeder); locally common migrant, mostly along coast
Double-crested Cormorant	1	1					Region VII, VIII, IX
American Bittern		1	1	1	1	1	Statewide
Least Bittern		1	1	1		1	Statewide
Great Blue Heron		1	1	1			Statewide
Great Egret		1	1	1			Region VI, VII
Cattle Egret		1	1	1			Region VI, VII
Green Heron	1	1	1				Region VI, VII
Black-crowned Night-Heron	1	1	1				Region VI

	Deep	Shallow	Vernal	SatHerb	Moss	Robust	Distribution
Yellow-crowned Night-Heron	1	1	1				Region VI
Tundra Swan		1	1	1			mostly coastal; uncommon to abundant migrant
Trumpeter Swan		1	1	1			rare resident; VI, VII, VIII,
Mute Swan		1	1				Statewide
Snow Goose		1	1	1			Statewide; rare to locally common migrant
Canada Goose	1	1	1	1			Statewide
Wood Duck	1	1	1	1			Statewide
Green-winged Teal	1	1	1	1			Region VI
American Black Duck	1	1	1	1	1		Statewide
Mallard	1	1	1	1			Statewide
Northern Pintail	1	1	1	1			Region VI
Blue-winged Teal	1	1	1	1			Statewide
Northern Shoveler	1	1	1	1			Region VII, VIII
Gadwall	1	1	1	1			Region VI, VII
American Wigeon	1	1	1	1			Rare breeder VI, VIII, IX; common migrant statewide
Canvasback	1	1					Region VI
Redhead	1	1					Region VI, VII
Ring-necked Duck	1	1			1		Region VII, VIII, IX
Greater Scaup	1	1					common migrant statewide
Lesser Scaup	1	1					Region VI
Long-tailed Duck	1						common migrant mainly on coast
Common Goldeneye	1	1					Region VII, VIII, IX
Bufflehead	1	1					Region VI
Hooded Merganser	1	1					Statewide
Common Merganser	1	1					Region VII, VIII, IX
Red-breasted Merganser	1	1					Region VII, VIII, IX
Ruddy Duck	1	1	1				Region VI
Turkey Vulture		1	1	1	1		Region VI, VII
Osprey	1	1	1	1			Statewide
Bald Eagle	1	1	1	1			Statewide
Northern Harrier		1	1	1	1		Statewide
Sharp-shinned Hawk		1	1	1			Statewide
Cooper's Hawk			1	1			Statewide
Northern Goshawk							Statewide
Red-shouldered Hawk		1	1	1			Statewide
Broad-winged Hawk		1	1	1			Statewide
Red-tailed Hawk		1	1	1			Statewide
Rough-legged Hawk		1	1	1			Region VI, VII
Golden Eagle		1	1	1			Region IX
American Kestrel		1	1	1			Statewide
Merlin		1	1	1			Region VIII, IX
Peregrine Falcon	1	1	1	1			Region VIII, IX
Ring-necked Pheasant		1	1	1		1	Region VI, VII
Spruce Grouse				1	1		Region VII, VIII, IX
Ruffed Grouse				1			Statewide
Sharp-tailed Grouse			1	1			Region VIII, IX
Wild Turkey			1	1			Region VI, VII
Northern Bobwhite			1	1			Region VI
Yellow Rail			1	1	1		Statewide
King Rail		1	1	1		1	Region VI

	Deep	Shallow	Vernal	SatHerb	Moss	Robust	Distribution
Virginia Rail		1	1	1		1	Statewide
Sora		1	1	1	1	1	Statewide
Common Moorhen	1	1	1			1	Region VI, VII
American Coot	1	1	1		1	1	Statewide
Sandhill Crane		1	1	1	1		Statewide
Black-bellied Plover		1	1	1			uncommon migrant statewide
American Golden-Plover		1	1	1			uncommon migrant statewide
Semipalmated Plover		1	1				common migrant mainly on coast
Piping Plover							Region VI, VII, VIII
Killdeer		1	1	1			Statewide
Greater Yellowlegs		1	1				Statewide
Lesser Yellowlegs		1	1				Statewide
Solitary Sandpiper		1	1				Statewide
Spotted Sandpiper		1	1				Statewide
Upland Sandpiper			1	1			Statewide
Ruddy Turnstone		1	1				Statewide
Semipalmated Sandpiper		1	1				Statewide
Western Sandpiper		1	1				Statewide
Least Sandpiper		1	1				Statewide
White-rumped Sandpiper		1	1				Statewide
Baird's Sandpiper		1	1				uncommon migrant statewide
Pectoral Sandpiper		1	1				Statewide
Dunlin		1	1				Statewide
Stilt Sandpiper		1	1				Statewide
Short-billed Dowitcher		1	1				uncommon migrant mainly on coast
Common Snipe		1	1	1	1	1	Statewide
American Woodcock			1	1			Statewide
Wilson's Phalarope	1	1	1				Region VI
Bonaparte's Gull	1	1					Region VI
Ring-billed Gull	1	1	1	1			Statewide
Herring Gull	1	1	1	1			Statewide
Great Black-backed Gull	1	1	1				Region VI, VII
Caspian Tern	1	1					Region VII, VIII
Common Tern	1						Statewide
Forster's Tern	1	1	1				Region VII, VIII
Black Tern	1	1	1				Statewide
Mourning Dove			1	1			Statewide
Black-billed Cuckoo							Statewide
Yellow-billed Cuckoo							Region VI, VII
Barn Owl		1	1	1			Region VI
Eastern Screech-Owl			1	1			Statewide
Great Horned Owl		1	1	1			Statewide
Snowy Owl			1	1			Region VIII, IX
Barred Owl			1	1			Statewide
Great Gray Owl			1	1			Region IX
Long-eared Owl			1	1			Statewide
Short-eared Owl		1	1	1			Statewide
Boreal Owl			1	1			Region VII, VIII, IX
Northern Saw-whet Owl			1	1			Statewide
Common Nighthawk		1	1	1			Statewide
Chimney Swift		1	1	1			Statewide

	Deep	Shallow	Vernal	SatHerb	Moss	Robust	Distribution
Ruby-throated Hummingbird			1	1	1		Statewide
Belted Kingfisher	1	1	1	1			Statewide
Red-headed Woodpecker							Statewide
Red-bellied Woodpecker							Region VI
Yellow-bellied Sapsucker							Region VII, VIII, IX
Downy Woodpecker							Statewide
Hairy Woodpecker							Statewide
Black-backed Woodpecker							Region VII, VIII, IX
Northern Flicker			1	1			Statewide
Pileated Woodpecker							Statewide
Olive-sided Flycatcher		1	1	1			Region VII, VIII, IX
Eastern Wood-Pewee		1	1	1			Statewide
Yellow-bellied Flycatcher		1	1	1			Region VIII, IX
Acadian Flycatcher		1	1	1			Region VI
Alder Flycatcher		1	1	1			Region VII, VIII, IX
Willow Flycatcher		1	1	1			Region VI
Least Flycatcher		1	1	1			Statewide
Eastern Phoebe		1	1	1			Statewide
Great Crested Flycatcher		1	1	1			Statewide
Eastern Kingbird		1	1	1			Statewide
Purple Martin	1	1	1	1			Statewide
Tree Swallow	1	1	1	1			Statewide
Northern Rough-winged Swallow	1	1	1	1			Statewide
Bank Swallow	1	1	1	1			Statewide
Cliff Swallow	1	1	1	1			Statewide
Barn Swallow	1	1	1	1			Statewide
Gray Jay							Region VIII, IX
Blue Jay							Statewide
American Crow		1	1	1			Statewide
Common Raven		1	1	1	1		Region VII, VIII, IX
Black-capped Chickadee							Statewide
Boreal Chickadee							Region VIII, IX
Tufted Titmouse							Region VI
Red-breasted Nuthatch					1		Statewide
White-breasted Nuthatch							Statewide
Brown Creeper							Statewide
Carolina Wren							Region VI
House Wren							Statewide
Winter Wren							Region VII, VIII, IX
Sedge Wren		1	1	1			Statewide
Marsh Wren		1				1	Statewide
Golden-crowned Kinglet							Statewide
Ruby-crowned Kinglet							Region VIII, IX
Blue-gray Gnatcatcher							Region VI
Eastern Bluebird							Statewide
Veery							Statewide
Swainson's Thrush							Region VII, VIII, IX
Wood Thrush							Statewide
American Robin		1	1	1	1		Statewide
Gray Catbird							Statewide
American Pipit		1	1	1			Statewide

	Deep	Shallow	Vernal	SatHerb	Moss	Robust	Distribution
Cedar Waxwing		1	1	1			Statewide
Northern Shrike			1	1			Statewide
Loggerhead Shrike			1	1			Region VI
European Starling		1	1	1			Statewide
White-eyed Vireo							Region VI
Blue-headed Vireo							Statewide
Yellow-throated Vireo							Region VI
Warbling Vireo							Statewide
Philadelphia Vireo							Region VII, VIII, IX
Red-eyed Vireo							Statewide
Blue-winged Warbler							Region VI
Golden-winged Warbler							Statewide
Tennessee Warbler					1		Region VIII, IX
Orange-crowned Warbler							Statewide
Nashville Warbler					1		Region VII, VIII, IX
Northern Parula					1		Region VIII, IX
Yellow Warbler							Statewide
Chestnut-sided Warbler							Statewide
Magnolia Warbler							Region VII, VIII, IX
Cape May Warbler							Region VIII, IX
Black-throated Blue Warbler							Statewide
Yellow-rumped Warbler					1		Region VII, VIII, IX
Black-throated Green Warbler							Statewide
Blackburnian Warbler							Statewide
Yellow-throated Warbler							Region VI
Palm Warbler					1		Region VII, VIII, IX
Bay-breasted Warbler							Region VIII, IX
Blackpoll Warbler							common migrant statewide
Cerulean Warbler							Region VI
Black-and-white Warbler							Statewide
American Redstart							Statewide
Prothonotary Warbler							Region VI
Worm-eating Warbler							VI
Northern Waterthrush		1	1		1		Statewide
Louisiana Waterthrush		1	1				Region VI
Kentucky Warbler							VI
Connecticut Warbler			1	1			Region VII, VIII, IX
Mourning Warbler			1	1			Statewide
Common Yellowthroat		1	1	1	1	1	Statewide
Hooded Warbler							Region VI
Wilson's Warbler					1		VIII
Canada Warbler							Region VII, VIII, IX
Yellow-breasted Chat							Region VI
Scarlet Tanager							Statewide
Northern Cardinal							Statewide
Rose-breasted Grosbeak							Statewide
Indigo Bunting							Statewide
Dickcissel			1	1			Region VI
Eastern Towhee							Statewide
American Tree Sparrow			1	1		1	Statewide
Savannah Sparrow			1	1			Statewide

	Deep	Shallow	Vernal	SatHerb	Moss	Robust	Distribution
Grasshopper Sparrow				1			Statewide
Henslow's Sparrow			1	1			Region VI, VII
Le Conte's Sparrow		1	1	1			Region VII, VIII, IX
Fox Sparrow				1			common migrant
Song Sparrow		1	1	1	1		Statewide
Lincoln's Sparrow		1	1	1	1	1	Region VII, VIII, IX
Swamp Sparrow		1	1	1	1	1	Statewide
White-throated Sparrow					1		Statewide
White-crowned Sparrow			1	1			Region VI
Dark-eyed Junco			1	1			Statewide
Lapland Longspur			1	1			Region VI
Snow Bunting			1	1			Statewide
Bobolink			1	1			Statewide
Red-winged Blackbird		1	1	1		1	Statewide
Eastern Meadowlark		1	1	1			Statewide
Western Meadowlark			1	1			Statewide
Yellow-headed Blackbird		1	1	1		1	Region VI
Rusty Blackbird			1	1			Region VI
Brewer's Blackbird		1	1	1		1	Statewide
Common Grackle		1	1	1		1	Statewide
Brown-headed Cowbird		1	1	1			Statewide
Baltimore Oriole							Statewide
Purple Finch							Statewide
Red Crossbill							Region VII, VIII, IX
White-winged Crossbill							Region VIII, IX
Common Redpoll							Statewide in winter
Pine Siskin							Statewide
American Goldfinch			1	1			Statewide
							Statewide
MAMMALS							Statewide
Virginia Opossum		1	1	1			Statewide
Masked Shrew		1	1	1	1		Statewide
Water Shrew	1	1	1	1	1		Statewide
Arctic Shrew		1	1	1	1		Region VIII, IX
Pygmy Shrew			1	1	1		Region VIII, IX
Northern Short-tailed Shrew		1	1	1			Statewide
Eastern Mole		1	1	1			Statewide
Star-nosed Mole		1	1	1	1		Statewide
Little Brown Myotis		1	1	1			Statewide
Indiana (Social) Myotis		1	1	1			Region VI, VII
Northern Myotis		1	1	1			Statewide
Silver-haired Bat		1	1	1			Statewide
Eastern Pipistrelle			1	1			Region VIII, IX
Big Brown Bat		1	1	1			Statewide
Eastern Red Bat		1	1	1			Statewide
Hoary Bat		1	1	1			Statewide
Eastern Cottontail			1	1			Statewide
Snowshoe Hare			1	1			Statewide
Least Chipmunk			1	1			Region VIII, IX
Eastern Chipmunk		1	1	1			Statewide

	Deep	Shallow	Vernal	SatHerb	Moss	Robust	Distribution
Eastern Gray Squirrel							Statewide
Eastern Fox Squirrel							Statewide
Red Squirrel							Statewide
Southern Flying Squirrel			1	1			Region VI
Northern Flying Squirrel			1	1			Statewide
American Beaver	1	1	1	1			Statewide
Deer Mouse		1	1	1	1		Statewide
White-footed Mouse		1	1	1			Statewide
Southern Red-backed Vole			1	1	1		Region VII, VIII, IX
Meadow Vole			1	1			Statewide
Prairie Vole			1	1			Region VI
Woodland Vole							Statewide
Muskrat	1	1	1	1		1	Statewide
Southern Bog Lemming		1	1	1	1		Statewide
Meadow Jumping Mouse		1	1	1			Statewide
Woodland Jumping Mouse							Region VII, VIII, IX
Common Porcupine							Statewide
Coyote		1	1	1	1		Statewide
Gray Wolf		1	1	1	1		Region VIII, IX
Red Fox		1	1	1	1		Statewide
Common Gray Fox			1	1			Statewide
Black Bear			1	1	1		Statewide
Common Raccoon		1	1	1	1		Statewide
American Marten							Region VII, VIII, IX
Fisher							Region VII, VIII, IX
Ermine		1	1	1	1		Statewide
Least Weasel		1	1	1			Statewide
Long-tailed Weasel		1	1	1	1		Statewide
Mink	1	1	1	1			Statewide
Striped Skunk		1	1	1	1		Statewide
Northern River Otter	1	1	1	1			Statewide
Lynx			1	1			Region VII, VIII, IX
Bobcat			1	1	1		Statewide
Elk (Wapiti)			1	1	1		Region VII
White-tailed Deer			1	1	1		Statewide
Moose	1	1	1	1	1		Region VIII, IX
							Statewide
REPTILES							Statewide
Snapping Turtle	1	1			1		Statewide
Painted Turtle	1	1	1	1	1		Statewide
Spotted Turtle	1	1	1	1	1		Region VI, VII
Wood Turtle	1	1	1	1	1		Region VII, VIII, IX
Blanding's Turtle	1	1	1	1			Statewide
Common Map Turtle	1	1					Region VI, VII
Common Box Turtle		1	1	1			Region VI, VII
Slider	1	1					Region VI
Common Musk Turtle	1	1					Region VI, VII
Spiny Softshell	1	1					Statewide
Kirtland's Snake		1	1	1			Region VI
Ringneck Snake			1	1			Statewide
Rat Snake			1	1			Region VI

	Deep	Shallow	Vernal	SatHerb	Moss	Robust	Distribution
Western Fox Snake			1	1			Region VIII, IX
Eastern Fox Snake		1	1	1			Statewide
Eastern Hognose Snake			1	1			Region VI, VII, VIII
Milk Snake			1	1	1		Statewide
Plainbelly Water Snake	1	1	1	1			Statewide
Northern Water Snake	1	1	1	1	1		Region VI, VII, VIII
Queen Snake			1	1			Region VI, VII
Brown Snake		1	1	1	1		Statewide
Redbelly Snake		1	1	1	1		Statewide
Butler's Garter Snake		1	1	1			Region VI, VII
Eastern Ribbon Snake		1	1	1	1		Region VI, VII
Common Garter Snake		1	1	1	1		Statewide
Smooth Green Snake		1	1	1	1		Statewide
Massasauga		1	1	1			Region VI, VII

Table 2b. Species associations with woody vegetation attributes

Abbreviations of the habitat attributes (column headings):

SSdecid= Deciduous Shrub Cover

SSever= Evergreen Shrub Cover

TreeDecid= Deciduous Trees

TreeEver= Evergreen Trees

BigTree= Large-diameter Trees

Snags= Snags

LWD= Downed Wood

Bold font indicates species of special importance in Michigan due to rarity or limited distribution.

	SSdecid	SSever	TreeDecid	TreeEver	BigTree	Snags	LWD	Distribution
AMPHIBIANS								
Blue-spotted Salamander	1		1	1			1	Statewide
Spotted Salamander	1	1	1				1	Statewide
Marbled Salamander		1	1				1	Region VI
Smallmouth Salamander			1				1	Region VI
Tiger Salamander		1	1	1			1	Region VI, VII, VIII
Four-toed Salamander		1	1				1	Statewide
Eastern Redback Salamander		1	1	1			1	Statewide
Mudpuppy							1	Statewide
Eastern Newt	1		1	1			1	Statewide
Lesser Siren							1	Region VI
American Toad	1	1	1	1			1	Statewide
Fowler's Toad	1	1	1				1	Region VI, VII
Northern Cricket Frog	1		1				1	Region VI
Gray Treefrog	1		1	1			1	Statewide
Western Chorus Frog		1	1	1			1	Region VI, VII, Menominee Co.
Spring Peeper	1	1	1	1			1	Statewide
Bullfrog			1				1	Statewide
Green Frog			1				1	Statewide
Pickerel Frog			1				1	Statewide
Northern Leopard Frog			1				1	Statewide
Mink Frog			1				1	Region VIII, IX
Wood Frog	1		1	1			1	Statewide
BIRDS								
Common Loon								Region VII, VIII, IX
Pied-billed Grebe								Statewide
Horned Grebe								Mostly coastal; locally common migrant
Red-necked Grebe								VIII (rare breeder); locally common migrant mostly along coast
Double-crested Cormorant			1			1		Region VII, VIII, IX
American Bittern								Statewide
Least Bittern								Statewide
Great Blue Heron				1	1	1		Statewide
Great Egret								Region VI, VII
Cattle Egret								Region VI, VII
Green Heron	1		1					Region VI, VII

	SSdecid	SSever	TreeDecid	TreeEver	BigTree	Snags	LWD	Distribution
Black-crowned Night-Heron	1		1	1				Region VI
Yellow-crowned Night-Heron	1		1					Region VI
Tundra Swan								Mostly coastal; uncommon to abundant migrant
Trumpeter Swan								Rare resident; Region VI, VII, VIII
Mute Swan								Statewide
Snow Goose								Statewide; rare to locally common migrant
Canada Goose								Statewide
Wood Duck			1		1	1		Statewide
Green-winged Teal								Region VI
American Black Duck	1							Statewide
Mallard	1							Statewide
Northern Pintail								Region VI
Blue-winged Teal								Statewide
Northern Shoveler								Region VII, VIII
Gadwall								Region VI, VII
American Wigeon								Rare breeder; Region VI, VIII, IX; common migrant statewide
Canvasback								Region VI
Redhead								Region VI, VII
Ring-necked Duck								Region VII, VIII, IX
Greater Scaup								Statewide; common migrant
Lesser Scaup								Region VI
Long-tailed Duck								Common coastal migrant
Common Goldeneye			1		1	1		Region VII, VIII, IX
Bufflehead								Region VI
Hooded Merganser			1		1	1		Statewide
Common Merganser								Region VII, VIII, IX
Red-breasted Merganser								Region VII, VIII, IX
Ruddy Duck								Region VI
Turkey Vulture	1	1	1	1	1	1		Region VI, VII
Osprey			1	1	1	1		Statewide
Bald Eagle			1	1	1			Statewide
Northern Harrier								Statewide
Sharp-shinned Hawk	1	1	1	1				Statewide
Cooper's Hawk	1	1	1	1				Statewide
Northern Goshawk		1	1	1				Statewide
Red-shouldered Hawk			1					Statewide
Broad-winged Hawk			1	1				Statewide
Red-tailed Hawk			1	1				Statewide
Rough-legged Hawk								Region VI, VII
Golden Eagle								Region IX
American Kestrel					1	1		Statewide
Merlin			1	1				Region VIII, IX
Peregrine Falcon			1					Region VIII, IX
Ring-necked Pheasant	1							Region VI, VII
Spruce Grouse		1		1				Region VII, VIII, IX
Ruffed Grouse	1		1					Statewide
Sharp-tailed Grouse	1							Region VIII, IX
Wild Turkey			1					Region VI, VII

	SSdecid	SSever	Treedecid	TreeEver	BigTree	Snags	LWD	Distribution
Northern Bobwhite	1							Region VI
Yellow Rail								Statewide
King Rail								Region VI
Virginia Rail								Statewide
Sora								Statewide
Common Moorhen								Region VI, VII
American Coot								Statewide
Sandhill Crane								Statewide
Black-bellied Plover								Statewide, uncommon migrant
American Golden-Plover								Statewide, uncommon migrant
Semipalmated Plover								Common migrant mainly on coast
Piping Plover								Region VI, VII, VIII
Killdeer								Statewide
Greater Yellowlegs								Statewide
Lesser Yellowlegs								Statewide
Solitary Sandpiper								Statewide
Spotted Sandpiper			1					Statewide
Upland Sandpiper								Statewide
Ruddy Turnstone								Statewide
Semipalmated Sandpiper								Statewide
Western Sandpiper								Statewide
Least Sandpiper								Statewide
White-rumped Sandpiper								Statewide
Baird's Sandpiper								Statewide, uncommon migrant
Pectoral Sandpiper								Statewide
Dunlin								Statewide
Stilt Sandpiper								Statewide
Short-billed Dowitcher								Uncommon migrant mainly on coast
Common Snipe	1	1	1					Statewide
American Woodcock	1	1	1					Statewide
Wilson's Phalarope								Region VI
Bonaparte's Gull								Region VI
Ring-billed Gull								Statewide
Herring Gull								Statewide
Great Black-backed Gull								Region VI, VII
Caspian Tern								Region VII, VIII
Common Tern								Statewide
Forster's Tern								Region VII, VIII
Black Tern								Statewide
Mourning Dove			1					Statewide
Black-billed Cuckoo	1		1					Statewide
Yellow-billed Cuckoo	1							Region VI, VII
Barn Owl						1		Region VI
Eastern Screech-Owl			1			1		Statewide
Great Horned Owl			1	1				Statewide
Snowy Owl								Region VIII, IX
Barred Owl			1	1	1	1		Statewide
Great Gray Owl				1	1	1		Region IX
Long-eared Owl			1	1				Statewide
Short-eared Owl								Statewide

	SSdecid	SSever	TreeDecid	TreeEver	BigTree	Snags	LWD	Distribution
Boreal Owl				1				Region VII, VIII, IX
Northern Saw-whet Owl				1		1		Statewide
Common Nighthawk			1					Statewide
Chimney Swift			1					Statewide
Ruby-throated Hummingbird	1		1					Statewide
Belted Kingfisher			1					Statewide
Red-headed Woodpecker			1			1		Statewide
Red-bellied Woodpecker			1			1		Region VI
Yellow-bellied Sapsucker			1			1		Region VII, VIII, IX
Downy Woodpecker	1		1	1		1		Statewide
Hairy Woodpecker			1	1		1		Statewide
Black-backed Woodpecker				1		1		Region VII, VIII, IX
Northern Flicker			1	1		1		Statewide
Pileated Woodpecker			1	1	1	1		Statewide
Olive-sided Flycatcher	1	1	1	1				Region VII, VIII, IX
Eastern Wood-Pewee			1					Statewide
Yellow-bellied Flycatcher		1		1				Region VIII, IX
Acadian Flycatcher			1					Region VI
Alder Flycatcher	1	1	1					Region VII, VIII, IX
Willow Flycatcher	1	1	1					Region VI
Least Flycatcher	1		1					Statewide
Eastern Phoebe	1		1					Statewide
Great Crested Flycatcher			1			1		Statewide
Eastern Kingbird	1	1	1					Statewide
Purple Martin			1		1	1		Statewide
Tree Swallow			1			1		Statewide
Northern Rough-winged Swallow			1					Statewide
Bank Swallow								Statewide
Cliff Swallow								Statewide
Barn Swallow								Statewide
Gray Jay		1		1				Region VIII, IX
Blue Jay	1		1					Statewide
American Crow	1	1	1	1				Statewide
Common Raven	1	1	1	1				Region VII, VIII, IX
Black-capped Chickadee	1	1	1	1		1		Statewide
Boreal Chickadee		1		1		1		Region VIII, IX
Tufted Titmouse			1			1		Region VI
Red-breasted Nuthatch				1		1		Statewide
White-breasted Nuthatch			1			1		Statewide
Brown Creeper			1	1	1	1		Statewide
Carolina Wren	1		1				1	Region VI
House Wren	1		1				1	Statewide
Winter Wren		1	1	1			1	Region VII, VIII, IX
Sedge Wren								Statewide
Marsh Wren								Statewide
Golden-crowned Kinglet				1				Statewide
Ruby-crowned Kinglet		1		1				Region VIII, IX
Blue-gray Gnatcatcher	1		1					Region VI
Eastern Bluebird			1			1		Statewide
Veery	1	1	1	1				Statewide

	SSdecid	SSever	TreeDecid	TreeEver	BigTree	Snags	LWD	Distribution
Swainson's Thrush	1	1		1				Region VII, VIII, IX
Wood Thrush			1					Statewide
American Robin	1	1	1	1				Statewide
Gray Catbird	1	1	1					Statewide
American Pipit								Statewide
Cedar Waxwing	1	1	1	1				Statewide
Northern Shrike	1	1						Statewide
Loggerhead Shrike	1							Region VI
European Starling	1	1	1	1		1		Statewide
White-eyed Vireo	1	1						Region VI
Blue-headed Vireo	1	1	1	1				Statewide
Yellow-throated Vireo			1					Region VI
Warbling Vireo			1					Statewide
Philadelphia Vireo	1		1					Region VII, VIII, IX
Red-eyed Vireo	1		1	1				Statewide
Blue-winged Warbler	1							Region VI
Golden-winged Warbler	1							Statewide
Tennessee Warbler	1	1		1				Region VIII, IX
Orange-crowned Warbler	1							Statewide
Nashville Warbler	1	1	1	1				Region VII, VIII, IX
Northern Parula				1				Region VIII, IX
Yellow Warbler	1		1					Statewide
Chestnut-sided Warbler	1							Statewide
Magnolia Warbler		1		1				Region VII, VIII, IX
Cape May Warbler				1				Region VIII, IX
Black-throated Blue Warbler			1					Statewide
Yellow-rumped Warbler				1				Region VII, VIII, IX
Black-throated Green Warbler			1	1				Statewide
Blackburnian Warbler				1	1			Statewide
Yellow-throated Warbler			1					Region VI
Palm Warbler		1						Region VII, VIII, IX
Bay-breasted Warbler				1				Region VIII, IX
Blackpoll Warbler				1		1		Statewide, common migrant
Cerulean Warbler			1		1			Region VI
Black-and-white Warbler			1	1		1		Statewide
American Redstart	1							Statewide
Prothonotary Warbler			1			1		Region VI
Worm-eating Warbler			1					Region VI
Northern Waterthrush	1	1	1	1			1	Statewide
Louisiana Waterthrush	1		1				1	Region VI
Kentucky Warbler	1		1					Region VI
Connecticut Warbler	1	1	1					Region VII, VIII, IX
Mourning Warbler	1	1						Statewide
Common Yellowthroat	1	1						Statewide
Hooded Warbler			1					Region VI
Wilson's Warbler	1			1				Region VIII
Canada Warbler	1			1				Region VII, VIII, IX
Yellow-breasted Chat	1							Region VI
Scarlet Tanager			1	1				Statewide
Northern Cardinal	1		1					Statewide

	SSdecid	SSever	TreeDecid	TreeEver	BigTree	Snags	LWD	Distribution
Rose-breasted Grosbeak			1					Statewide
Indigo Bunting	1		1					Statewide
Dickcissel								Region VI
Eastern Towhee	1	1					1	Statewide
American Tree Sparrow	1						1	Statewide
Savannah Sparrow								Statewide
Grasshopper Sparrow								Statewide
Henslow's Sparrow								Region VI, VII
Le Conte's Sparrow								Region VII, VIII, IX
Fox Sparrow	1	1					1	Statewide, common migrant
Song Sparrow	1	1					1	Statewide
Lincoln's Sparrow		1					1	Region VII, VIII, IX
Swamp Sparrow	1	1					1	Statewide
White-throated Sparrow	1	1						Statewide
White-crowned Sparrow								Region VI
Dark-eyed Junco		1	1	1				Statewide
Lapland Longspur								Region VI
Snow Bunting								Statewide
Bobolink								Statewide
Red-winged Blackbird	1							Statewide
Eastern Meadowlark								Statewide
Western Meadowlark								Statewide
Yellow-headed Blackbird								Region VI
Rusty Blackbird		1		1			1	Region VI
Brewer's Blackbird								Statewide
Common Grackle	1	1						Statewide
Brown-headed Cowbird	1	1	1	1				Statewide
Baltimore Oriole			1					Statewide
Purple Finch	1	1		1				Statewide
Red Crossbill				1				Region VII, VIII, IX
White-winged Crossbill				1				Region VIII, IX
Common Redpoll	1							?
Pine Siskin	1	1		1				Statewide
American Goldfinch								Statewide
MAMMALS								
Virginia Opossum	1	1	1	1				Statewide
Masked Shrew	1	1	1	1		1		Statewide
Water Shrew	1	1	1	1		1		Statewide
Arctic Shrew	1	1	1	1				Region VIII, IX
Pygmy Shrew	1	1	1	1		1		Region VIII, IX
Northern Short-tailed Shrew		1	1	1		1		Statewide
Eastern Mole	1		1					Statewide
Star-nosed Mole	1	1	1	1				Statewide
Little Brown Myotis		1	1	1		1		Statewide
Indiana (Social) Myotis			1		1	1		Region VI, VII
Northern Myotis			1	1		1		Statewide
Silver-haired Bat			1	1		1		Statewide
Eastern Pipistrelle		1				1		Region VIII, IX
Big Brown Bat						1		Statewide

	SSdecid	SSever	TreeDecid	TreeEver	BigTree	Snags	LWD	Distribution
Eastern Red Bat			1	1		1		Statewide
Hoary Bat			1	1		1		Statewide
Eastern Cottontail	1							Statewide
Snowshoe Hare	1	1	1	1				Statewide
Least Chipmunk				1				Region VIII, IX
Eastern Chipmunk	1		1	1				Statewide
Eastern Gray Squirrel			1					Statewide
Eastern Fox Squirrel			1					Statewide
Red Squirrel				1		1		Statewide
Southern Flying Squirrel			1		1	1		Region VI
Northern Flying Squirrel				1	1	1		Statewide
American Beaver	1	1	1	1				Statewide
Deer Mouse		1	1	1				Statewide
White-footed Mouse	1	1	1	1		1		Statewide
Southern Red-backed Vole	1	1	1	1		1		Region VII, VIII, IX
Meadow Vole								Statewide
Prairie Vole								Region VI
Woodland Vole			1			1		Statewide
Muskrat								Statewide
Southern Bog Lemming			1					Statewide
Meadow Jumping Mouse	1	1						Statewide
Woodland Jumping Mouse			1			1		Region VII, VIII, IX
Common Porcupine			1	1		1		Statewide
Coyote	1	1	1	1				Statewide
Gray Wolf		1		1				Region VIII, IX
Red Fox	1	1	1					Statewide
Common Gray Fox			1					Statewide
Black Bear	1	1	1	1	1	1		Statewide
Common Raccoon	1	1	1	1	1	1		Statewide
American Marten		1		1	1		1	Region VII, VIII, IX
Fisher	1	1		1	1		1	Region VII, VIII, IX
Ermine	1	1	1	1			1	Statewide
Least Weasel	1	1					1	Statewide
Long-tailed Weasel	1	1	1	1			1	Statewide
Mink	1	1	1	1			1	Statewide
Striped Skunk	1	1	1	1			1	Statewide
Northern River Otter	1	1	1				1	Statewide
Lynx		1		1				Region VII, VIII, IX
Bobcat	1	1	1	1				Statewide
Elk (Wapiti)		1		1				Region VII
White-tailed Deer	1	1		1				Statewide
Moose		1		1				Region VIII, IX
REPTILES								
Snapping Turtle							1	Statewide
Painted Turtle							1	Statewide
Spotted Turtle	1	1	1	1			1	Region VI, VII
Wood Turtle	1	1	1	1			1	Region VII, VIII, IX
Blanding's Turtle	1	1	1	1			1	Statewide
Common Map Turtle							1	Region VI, VII

	SSdecid	SSever	TreeDecid	TreeEver	BigTree	Snags	LWD	Distribution
Common Box Turtle	1		1				1	Region VI, VII
Slider							1	Region VI
Common Musk Turtle							1	Region VI, VII
Spiny Softshell							1	Statewide
Kirtland's Snake			1	1			1	Region VI
Ringneck Snake	1	1	1				1	Statewide
Rat Snake	1	1	1				1	Region VI
Western Fox Snake	1	1	1				1	Region VIII, IX
Eastern Fox Snake	1	1	1				1	Statewide
Eastern Hognose Snake	1	1	1				1	Region VI, VII, VIII
Milk Snake	1	1	1				1	Statewide
Plainbelly Water Snake	1	1	1				1	Statewide
Northern Water Snake	1	1	1	1			1	Region VI, VII, VIII
Queen Snake	1	1	1				1	Region VI, VII
Brown Snake	1	1	1	1			1	Statewide
Redbelly Snake	1	1	1				1	Statewide
Butler's Garter Snake	1	1	1				1	Region VI, VII
Eastern Ribbon Snake	1	1	1				1	Region VI, VII
Common Garter Snake	1	1	1				1	Statewide
Smooth Green Snake	1	1	1				1	Statewide
Massasauga	1	1	1	1			1	Region VI, VII

Table 2c: Species associations with other important habitat attributes

Abbreviations of the habitat attributes (column headings):

Stable= Seasonally Predictable Water Levels

Mud= Proximity to Exposed Bare Substrate

Flow= Proximity to Flowing Water

Bank= Proximity to Exposed Banks

Island= Proximity to an Island

Struc= Proximity to Artificial Structures (e.g., nest box or platform, bridge, building)

Open= Surrounding landscape is mainly open land (fields, etc.)

Patch= Species breeds successfully mainly in moderate or large-sized patches of suitable habitat (i.e., is especially area-sensitive)

Bold font indicates species of special importance in Michigan due to rarity or limited distribution.

	Stable	Mud	Flow	Bank	Island	Struc	Open	Patch	Distribution
AMPHIBIANS									
Blue-spotted Salamander	1								Statewide
Spotted Salamander	1								Statewide
Marbled Salamander	1								Region VI
Smallmouth Salamander	1								Region VI
Tiger Salamander	1						1		Region VI, VII, VIII
Four-toed Salamander	1								Statewide
Eastern Redback Salamander	1								Statewide
Mudpuppy	1								Statewide
Eastern Newt	1								Statewide
Lesser Siren	1								Region VI
American Toad	1						1		Statewide
Fowler's Toad	1						1		Region VI, VII
Northern Cricket Frog	1								Region VI
Gray Treefrog	1								Statewide
Western Chorus Frog	1						1		Region VI, VII, Menominee Co.
Spring Peeper	1								Statewide
Bullfrog	1								Statewide
Green Frog	1								Statewide
Pickerel Frog	1						1		Statewide
Northern Leopard Frog	1						1		Statewide
Mink Frog	1								Region VIII, IX
Wood Frog	1								Statewide
BIRDS									
Red-throated Loon									
Common Loon	1				1				Region VII, VIII, IX
Pied-billed Grebe	1								Statewide
Horned Grebe	1								Mostly coastal, locally common migrant
Red-necked Grebe	1								Region VIII (rare breeder); locally common migrant mostly along coast
Double-crested Cormorant					1				Region VII, VIII, IX
American Bittern									Statewide
Least Bittern									Statewide

	Stable	Mud	Flow	Bank	Island	Struc	Open	Patch	Distribution
Great Blue Heron		1			1				Statewide
Great Egret		1			1				Region VI, VII
Cattle Egret					1		1		Region VI, VII
Green Heron									Region VI, VII
Black-crowned Night-Heron					1				Region VI
Yellow-crowned Night-Heron					1				Region VI
Tundra Swan		1					1		Mostly coastal common to uncommon migrant
Trumpeter Swan		1							Region VI, VII, VIII; rare resident
Mute Swan									Statewide
Snow Goose		1					1		Statewide; rare to locally common migrant
Canada Goose		1			1		1		Statewide
Wood Duck						1			Statewide
Green-winged Teal	1	1					1		Region VI
American Black Duck	1	1							Statewide
Mallard	1	1			1		1		Statewide
Northern Pintail		1					1		Region VI
Blue-winged Teal	1	1					1		Statewide
Northern Shoveler	1	1					1		Region VII, VIII
Gadwall	1	1					1		Region VI, VII
American Wigeon	1	1					1		Region VI, VIII, IX (rare breeder); common migrant statewide
Canvasback	1								Region VI
Redhead	1								Region VI, VII
Ring-necked Duck	1								Region VII, VIII, IX
Greater Scaup									Statewide common migrant
Lesser Scaup									Region VI
Long-tailed Duck									Common migrant along coast
Common Goldeneye							1		Region VII, VIII, IX
Bufflehead									Region VI
Hooded Merganser							1		Statewide
Common Merganser	1		1						Region VII, VIII, IX
Red-breasted Merganser	1		1						Region VII, VIII, IX
Ruddy Duck	1								Region VI
Turkey Vulture							1		Region VI, VII
Osprey			1			1			Statewide
Bald Eagle			1						Statewide
Northern Harrier							1	1	Statewide
Sharp-shinned Hawk									Statewide
Cooper's Hawk							1		Statewide
Northern Goshawk									Statewide
Red-shouldered Hawk								1	Statewide
Broad-winged Hawk							1	1	Statewide
Red-tailed Hawk							1		Statewide
Rough-legged Hawk							1		Region VI, VII
Golden Eagle							1		Region IX
American Kestrel						1	1		Statewide
Merlin									Region VIII, IX
Peregrine Falcon									Region VIII, IX
Ring-necked Pheasant							1		Region VI, VII
Spruce Grouse									Region VII, VIII, IX

	Stable	Mud	Flow	Bank	Island	Struc	Open	Patch	Distribution
Ruffed Grouse									Statewide
Sharp-tailed Grouse									Region VIII, IX
Wild Turkey							1		Region VI, VII
Northern Bobwhite							1		Region VI
Yellow Rail									Statewide
King Rail									Region VI
Virginia Rail									Statewide
Sora									Statewide
Common Moorhen	1								Region VI, VII
American Coot	1								Statewide
Sandhill Crane							1		Statewide
Black-bellied Plover		1					1		Statewide, uncommon migrant
American Golden-Plover		1					1		Statewide, uncommon migrant
Semipalmated Plover		1					1		Common migrant, mainly on coast
Piping Plover					1		1		Region VI, VII, VIII
Killdeer		1					1		Statewide
Greater Yellowlegs		1					1		Statewide
Lesser Yellowlegs		1					1		Statewide
Solitary Sandpiper		1					1		Statewide
Spotted Sandpiper		1	1		1				Statewide
Upland Sandpiper							1	1	Statewide
Ruddy Turnstone		1					1		Statewide
Semipalmated Sandpiper		1					1		Statewide
Western Sandpiper		1					1		Statewide
Least Sandpiper		1					1		Statewide
White-rumped Sandpiper		1					1		Statewide
Baird's Sandpiper		1					1		Statewide, uncommon migrant
Pectoral Sandpiper							1		Statewide
Dunlin		1					1		Statewide
Stilt Sandpiper		1					1		Statewide
Short-billed Dowitcher		1					1		Uncommon migrant mainly on coast
Common Snipe									Statewide
American Woodcock							1		Statewide
Wilson's Phalarope		1					1		Region VI
Bonaparte's Gull		1			1		1		Region VI
Ring-billed Gull		1			1		1		Statewide
Herring Gull		1			1		1		Statewide
Great Black-backed Gull		1			1		1		Region VI, VII
Caspian Tern					1				Region VII, VIII
Common Tern					1				Statewide
Forster's Tern									Region VII, VIII
Black Tern									Statewide
Mourning Dove							1		Statewide
Black-billed Cuckoo								1	Statewide
Yellow-billed Cuckoo								1	Region VI, VII
Barn Owl				1		1	1		Region VI
Eastern Screech-Owl						1	1		Statewide
Great Horned Owl									Statewide
Snowy Owl							1		Region VIII, IX
Barred Owl									Statewide
Great Gray Owl									Region IX

	Stable	Mud	Flow	Bank	Island	Struc	Open	Patch	Distribution
Long-eared Owl							1		Statewide
Short-eared Owl							1	1	Statewide
Boreal Owl									Region VII, VIII, IX
Northern Saw-whet Owl									Statewide
Common Nighthawk						1	1		Statewide
Chimney Swift						1	1		Statewide
Ruby-throated Hummingbird							1		Statewide
Belted Kingfisher			1	1					Statewide
Red-headed Woodpecker							1		Statewide
Red-bellied Woodpecker									Region VI
Yellow-bellied Sapsucker									Region VII, VIII, IX
Downy Woodpecker									Statewide
Hairy Woodpecker								1	Statewide
Black-backed Woodpecker									Region VII, VIII, IX
Northern Flicker						1	1		Statewide
Pileated Woodpecker								1	Statewide
Olive-sided Flycatcher									Region VII, VIII, IX
Eastern Wood-Pewee									Statewide
Yellow-bellied Flycatcher									Region VIII, IX
Acadian Flycatcher								1	Region VI
Alder Flycatcher									Region VII, VIII, IX
Willow Flycatcher									Region VI
Least Flycatcher							1	1	Statewide
Eastern Phoebe						1			Statewide
Great Crested Flycatcher						1			Statewide
Eastern Kingbird							1		Statewide
Purple Martin						1	1		Statewide
Tree Swallow						1	1		Statewide
Northern Rough-winged Swallow				1		1	1		Statewide
Bank Swallow				1			1		Statewide
Cliff Swallow				1		1	1		Statewide
Barn Swallow						1	1		Statewide
Gray Jay									Region VIII, IX
Blue Jay									Statewide
American Crow		1					1		Statewide
Common Raven									Region VII, VIII, IX
Black-capped Chickadee						1			Statewide
Boreal Chickadee									Region VIII, IX
Tufted Titmouse						1		1	Region VI
Red-breasted Nuthatch									Statewide
White-breasted Nuthatch								1	Statewide
Brown Creeper								1	Statewide
Carolina Wren									Region VI
House Wren						1	1		Statewide
Winter Wren									Region VII, VIII, IX
Sedge Wren							1	1	Statewide
Marsh Wren									Statewide
Golden-crowned Kinglet									Statewide
Ruby-crowned Kinglet									Region VIII, IX
Blue-gray Gnatcatcher								1	Region VI
Eastern Bluebird						1	1		Statewide

	Stable	Mud	Flow	Bank	Island	Struc	Open	Patch	Distribution
Veery								1	Statewide
Swainson's Thrush									Region VII, VIII, IX
Wood Thrush								1	Statewide
American Robin									Statewide
Gray Catbird									Statewide
American Pipit		1						1	Statewide
Cedar Waxwing								1	Statewide
Northern Shrike								1	Statewide
Loggerhead Shrike								1	Region VI
European Starling						1	1		Statewide
White-eyed Vireo									Region VI
Blue-headed Vireo									Statewide
Yellow-throated Vireo								1	Region VI
Warbling Vireo									Statewide
Philadelphia Vireo									Region VII, VIII, IX
Red-eyed Vireo								1	Statewide
Blue-winged Warbler								1	Region VI
Golden-winged Warbler								1	Statewide
Tennessee Warbler									Region VIII, IX
Orange-crowned Warbler									Statewide
Nashville Warbler									Region VII, VIII, IX
Northern Parula								1	Region VIII, IX
Yellow Warbler									Statewide
Chestnut-sided Warbler									Statewide
Magnolia Warbler									Region VII, VIII, IX
Cape May Warbler									Region VIII, IX
Black-throated Blue Warbler								1	Statewide
Yellow-rumped Warbler									Region VII, VIII, IX
Black-throated Green Warbler								1	Statewide
Blackburnian Warbler								1	Statewide
Yellow-throated Warbler								1	Region VI
Palm Warbler									Region VII, VIII, IX
Bay-breasted Warbler									Region VIII, IX
Blackpoll Warbler									Statewide, common migrant
Cerulean Warbler								1	Region VI
Black-and-white Warbler								1	Statewide
American Redstart								1	Statewide
Prothonotary Warbler						1			Region VI
Worm-eating Warbler								1	Region VI
Northern Waterthrush			1						Statewide
Louisiana Waterthrush			1					1	Region VI
Kentucky Warbler								1	Region VI
Connecticut Warbler									Region VII, VIII, IX
Mourning Warbler								1	Statewide
Common Yellowthroat									Statewide
Hooded Warbler								1	Region VI
Wilson's Warbler									Region VIII
Canada Warbler									Region VII, VIII, IX
Yellow-breasted Chat									Region VI
Scarlet Tanager								1	Statewide
Northern Cardinal								1	Statewide

	Stable	Mud	Flow	Bank	Island	Struc	Open	Patch	Distribution
Rose-breasted Grosbeak									Statewide
Indigo Bunting							1		Statewide
Dickcissel							1		Region VI
Eastern Towhee							1		Statewide
American Tree Sparrow							1		Statewide
Savannah Sparrow							1		Statewide
Grasshopper Sparrow							1	1	Statewide
Henslow's Sparrow							1	1	Region VI, VII
Le Conte's Sparrow							1		Region VII, VIII, IX
Fox Sparrow									Common migrant
Song Sparrow									Statewide
Lincoln's Sparrow									Region VII, VIII, IX
Swamp Sparrow									Statewide
White-throated Sparrow									Statewide
White-crowned Sparrow							1		Region VI
Dark-eyed Junco							1		Statewide
Lapland Longspur							1		Region VI
Snow Bunting							1		Statewide
Bobolink							1	1	Statewide
Red-winged Blackbird							1		Statewide
Eastern Meadowlark							1	1	Statewide
Western Meadowlark							1	1	Statewide
Yellow-headed Blackbird							1		Region VI
Rusty Blackbird									Region VI
Brewer's Blackbird							1		Statewide
Common Grackle							1		Statewide
Brown-headed Cowbird							1		Statewide
Baltimore Oriole							1		Statewide
Purple Finch									Statewide
Red Crossbill									Region VII, VIII, IX
White-winged Crossbill									Region VIII, IX
Common Redpoll									Statewide in winter
Pine Siskin									Statewide
American Goldfinch							1		Statewide
MAMMALS									
Virginia Opossum							1		Statewide
Masked Shrew							1		Statewide
Water Shrew			1						Statewide
Arctic Shrew									Region VIII, IX
Pygmy Shrew									Region VIII, IX
Northern Short-tailed Shrew							1		Statewide
Eastern Mole							1		Statewide
Star-nosed Mole							1		Statewide
Little Brown Myotis						1	1		Statewide
Indiana (Social) Myotis						1	1		Region VI, VII
Northern Myotis							1		Statewide
Silver-haired Bat							1		Statewide
Eastern Pipistrelle						1	1		Region VIII, IX
Big Brown Bat						1	1		Statewide
Eastern Red Bat							1		Statewide

	Stable	Mud	Flow	Bank	Island	Struc	Open	Patch	Distribution
Hoary Bat							1		Statewide
Eastern Cottontail							1		Statewide
Snowshoe Hare									Statewide
Least Chipmunk									Region VIII, IX
Eastern Chipmunk									Statewide
Eastern Gray Squirrel									Statewide
Eastern Fox Squirrel							1		Statewide
Red Squirrel									Statewide
Southern Flying Squirrel						1			Region VI
Northern Flying Squirrel						1			Statewide
American Beaver			1	1					Statewide
Deer Mouse									Statewide
White-footed Mouse									Statewide
Southern Red-backed Vole									Region VII, VIII, IX
Meadow Vole							1		Statewide
Prairie Vole							1		Region VI
Woodland Vole									Statewide
Muskrat									Statewide
Southern Bog Lemming							1		Statewide
Meadow Jumping Mouse									Statewide
Woodland Jumping Mouse									Region VII, VIII, IX
Common Porcupine									Statewide
Coyote							1		Statewide
Gray Wolf							1	1	Region VIII, IX
Red Fox							1		Statewide
Common Gray Fox							1		Statewide
Black Bear								1	Statewide
Common Raccoon									Statewide
American Marten								1	Region VII, VIII, IX
Fisher								1	Region VII, VIII, IX
Ermine							1		Statewide
Least Weasel							1		Statewide
Long-tailed Weasel							1		Statewide
Mink									Statewide
Striped Skunk							1		Statewide
Northern River Otter			1						Statewide
Lynx								1	Region VII, VIII, IX
Bobcat								1	Statewide
Elk (Wapiti)							1		Region VII
White-tailed Deer							1		Statewide
Moose									Region VIII, IX
REPTILES									
Snapping Turtle									Statewide
Painted Turtle									Statewide
Spotted Turtle									Region VI, VII
Wood Turtle									Region VII, VIII, IX
Blanding's Turtle									Statewide
Common Map Turtle									Region VI, VII
Common Box Turtle									Region VI, VII
Slider									Region VI

	Stable	Mud	Flow	Bank	Island	Struc	Open	Patch	Distribution
Common Musk Turtle									Region VI, VII
Spiny Softshell									Statewide
Kirtland's Snake							1		Region VI
Ringneck Snake									Statewide
Rat Snake							1		Region VI
Western Fox Snake							1		Region VIII, IX
Eastern Fox Snake									Statewide
Eastern Hognose Snake							1		Region VI, VII, VIII
Milk Snake							1		Statewide
Plainbelly Water Snake									Statewide
Northern Water Snake									Region VI, VII, VIII
Queen Snake									Region VI, VII
Brown Snake							1		Statewide
Redbelly Snake							1		Statewide
Butler's Garter Snake							1		Region VI, VII
Eastern Ribbon Snake							1		Region VI, VII
Common Garter Snake							1		Statewide
Smooth Green Snake							1		Statewide
Massasauga							1		Region VI, VII

3.0 Synthesis: General Factors Important to Species Groups

3.1 Amphibians

The occurrence and sustainability of amphibian populations in wetlands is influenced by several factors, the chief of these usually being the wetland's water regime (hydroperiod), isolation from predatory fish, water quality (chemistry, acidity, temperature), and proportion of the surrounding upland landscape that is naturally vegetated. With regard to water regime, amphibians can be functionally grouped as those that breed earlier in the year and often in wetlands that dry up early (temporary wetlands), and those that breed later and usually in more permanently-inundated wetlands. The first group includes species such as Blue-spotted Salamander, Wood Frog, Spring Peeper, and Boreal Chorus Frog. The second includes American Toad, Northern Leopard Frog, Mink Frog, Gray Treefrog, Green Frog, and Bullfrog. The relationship to hydroperiod is at least partly due to the tendency of temporary wetlands to be free of predatory fish. Temporary wetlands (e.g., vernal pools) also may tend to warm up sooner in the spring and frequently have high densities of algae and invertebrates required by subadult amphibians. Among permanent wetlands, those that have not been stocked by (and are inaccessible to) predatory fish are especially important, as are those that experience no rapid water level decline during the period when the aquatic eggs of amphibians (which are often attached to stems of wetland plants near the water surface)

Warmer water and surrounding microclimate accelerates the growth of some amphibians, and those species may thus occur primarily where natal wetlands are not surrounded by a closed forest canopy. The tree canopy reduces water temperature and sometimes causes shorter hydroperiods (less water available to wetlands due to higher evapotranspiration from trees). Connectivity with natural vegetation in the upland landscape is important to many species (e.g., American Toad) which breed in wetlands but depend, for food resources, just as much on uplands during the late summer and autumn. Wide paved roads can interrupt that connectivity. Extensive downed wood and dense ground cover in the adjoining upland is important in maintaining a microclimate favorable for amphibians as they move seasonally among wetlands. Wetlands with circumneutral pH and moderate nutrient levels also are more favorable, although some species (e.g., Mink Frog) can tolerate the acidic conditions found in bogs.

3.2 Reptiles, Mammals

Like amphibians, most aquatic turtles thrive best where wetlands are fishless, forest canopy is not closed, and the surrounding landscape is vegetated naturally. Partly submerged downed wood is important as basking sites to some species. In drier parts of a wetland, downed wood and dense ground cover is important to many small mammals and snakes. Persistent flooding makes parts of many wetlands uninhabitable by most snakes and mammals, although a few (e.g., Northern Water Snake, Water Shrew, Beaver) favor such conditions. For nearly all species, the connectivity with other wetlands is important, as defined by presence of road-free upland areas of natural vegetation. Some species with large home ranges (e.g., American Martin) may be particularly sensitive in this regard. The presence of many species also is determined by wetland proximity to sites for denning (e.g., Black Bear, many snakes) or roosting (e.g., bats, in tree cavities or abandoned buildings).

3.3 Birds

The hundreds of birds species that occur in Michigan can be grouped functionally based on feeding habits and habitat preferences. Dozens of such groups can be defined using the 21 attributes described above, but for the discussion here, a simplistic categorization is used: Waterfowl, Wading Birds, Raptors, and Songbirds.

“Waterbirds” as used here includes ducks, geese, swans, grebes, loons, herons, bitterns, rails, gulls, terns.

“Shorebirds” includes most sandpipers, plovers.

“Raptors” includes hawks, eagles, owls.

“Songbirds” includes passerines and upland game birds (grouse, quail).

Waterbird breeding occurrence in specific wetlands is influenced largely by hydroperiod and surrounding land cover. Most species prefer to nest in wetlands that have permanent and relatively stable water levels during the nesting period. Exceptions are species that nest in tree cavities (e.g., Wood Duck) or in uplands near the wetland (e.g., Blue-winged Teal). During migration and winter, however, the larger temporary wetlands are used extensively by many species. An abundance of emergent or shrub cover for concealing nests is important to most species although a few species (Double-crested Cormorant, some gulls and terns) prefer bare or sparsely-vegetated shores and islands that are free of mammalian predators. Within wetlands, a relatively equal mix of vegetation and unvegetated open water is important to many species, as is the proximity of other wetlands, ponds, and lakes. Waterbirds can also be grouped according to food preferences, e.g., loons, cormorants, mergansers, and terns that prefer wetlands with fish access.

Shorebirds in Michigan are mainly long-distance migrants. Most prefer extensive mudflats along rivers and lakes, vernal pools, or other bare or sparsely-vegetated wetlands. The seasonal timing of water level changes is critical to shorebird use of wetlands. Most require water depths of less than a few inches during the late spring and late summer periods.

Raptors are found in wetlands with high densities of rodents, frogs, snakes, and small birds. These tend to be wetlands that are well-vegetated. A few species (e.g., Osprey, Bald Eagle) feed to a greater degree on fish. Availability of perches (e.g., tall trees, fence posts) influences the occurrence of most species. Several species require tree cavities for nesting (e.g., American Kestrel, Northern Saw-whet Owl).

Songbirds are the most species-diverse group and have the widest variety of habitat requirements. Among those that depend most heavily on wetlands (e.g., Marsh Wren, Lincoln’s Sparrow), scattered shrubs or robust herbaceous vegetation interspersed at least seasonally with water is important. The presence of snags, either in the wetland or nearby uplands, is essential to several species, e.g., Downy Woodpecker.

4.0 Future Directions

The tables and database provided with this report do not by themselves provide a final, practical tool needed to rapidly assess the habitat functions of wetlands for wildlife. To complete that objective, the following would need to occur:

1. The predicted species associations (1's and 0's representing probable associations with the various attributes and community types) need to be converted to scores on a broader scale (e.g., 0 to 5) in order to provide greater sensitivity to actual differences in habitat suitability and use. This will require additional literature review, analysis of existing data sets, and further input and review from wildlife biologists and birders. To refine the associations of all species to ecoregion may require incorporation of data from the Michigan Breeding Bird Atlas Project and other sources.
2. The scores then need to be structured as predictive models for individual species or, where possible and appropriate, for species groups. Although tempting, the scores for each species' habitat attributes should not simply be summed to obtain habitat suitability predictions for a species, but rather should be combined in a logical and ecologically defensible manner appropriate to the species. For some species, it is likely that different scoring models will be needed for different seasons or functions (e.g., breeding vs. wintering, feeding vs. roosting) and perhaps, for different regions of Michigan (e.g., coastal vs. inland wetlands).
3. Ideally, the scoring models should be field-verified through multi-season wildlife surveys of a geographically-balanced sample of wetlands representing the full spectrum of wetland community types and attribute conditions.
4. A "wildlife habitat condition index" that is similar conceptually to the floristic quality index, and comprising one component of an overall "wetland condition index" might be the ultimate objective. Such an index should accord high priority to wetlands most likely to have the greatest wildlife species richness based on the predictive models, but should not penalize wetlands that have few species yet contain species that are regionally rare and/or sensitive to disturbance. Also, such an index must be sensitive to the fact that greatest diversity and/or the regionally-rarest wildlife species do not always occur solely in the least-altered, most-intact wetlands or landscapes of a particular type.

Literature References

Thomasma, S.A., L.E. Thomasma, M.J. Twery, S. Burton, and R. Doepker. 2007. MIWILD version 1.0.1.4. USDA Forest Service and Michigan Dept. of Natural Resources.