

**Species Lists for  
Terrestrial and Palustrine Native Plant Communities  
in East-central Minnesota**

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## INTRODUCTION

There has been a recent surge of interest among Minnesotans in using native plants for landscaping, reclaiming disturbed lands, and restoring native species to degraded native plant communities. There has been a lack of ecologically accurate information about the appropriate plant species to use for these activities in specific environments. This project seeks to help remedy this situation by providing complete species lists derived from vegetation plot data in east-central Minnesota. The methods used for this project can be duplicated to provide similar species lists for other ecological regions in the state.

The species lists developed for this project are grouped by native plant communities. A native plant community is defined as a group of native plants that interact with each other, with animals, and with their environment in ways not greatly altered by modern human activity. They are distributed according to climate, landform, and soil patterns. Natural disturbances such as wildfires, drought, windstorms, and floods helped to shape them. These communities have evolved over time to be adapted to the environmental conditions occurring on the landscape. They contain diverse assemblages of native plants that provide important sources of food and shelter to birds, butterflies, and other animals. Diverse native plantings that attempt to replicate native plant communities also provide wildlife habitat and ecological benefits. In addition, they are relatively easy to maintain because they require less fertilizer, water, and pesticide application than non-native plantings.

The Species List Tables are lists of vascular plant species occurring in native plant communities in east-central Minnesota, with information about vegetation structure and relative species abundance and frequency. They were derived from vegetation plot data collected by plant ecologists in existing remnant native plant communities. It is hoped that these tables will help natural resource managers and landscape designers plan for ecologically accurate, site-specific plantings and better manage existing native plant communities. In addition, it is hoped that this project will promote the use of Minnesota's new native plant community classification (Minnesota Department of Natural Resources 2003) so that consistent plant community names will be used.

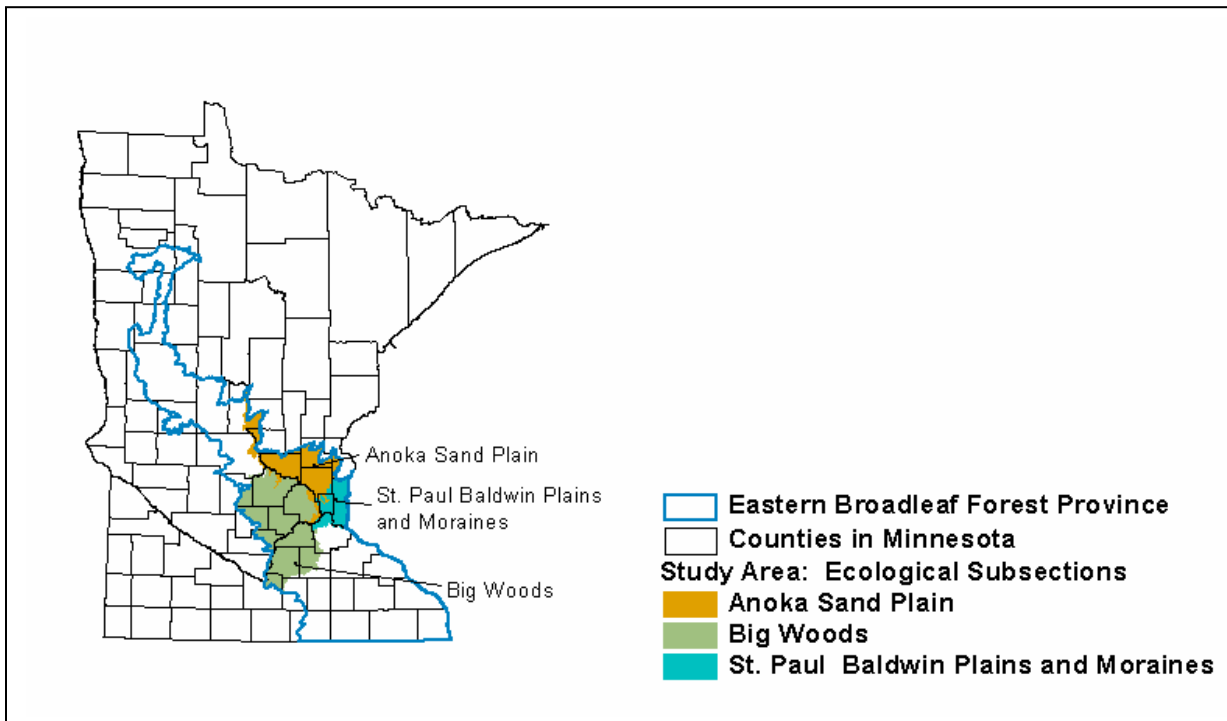
A longer and more detailed version of the text of this report with detailed methods and full references is being prepared for submission for publication by a scientific journal (Lane and Dunevitz, in preparation). Contact the authors for information about the status of the longer article.

## STUDY AREA

The study area included three ecological subsections in east-central Minnesota: the Anoka Sand Plain, St. Paul Baldwin Plains and Moraines, and Big Woods (Minnesota Department of Natural Resources 2000) (Figure 1). These three subsections are in the Eastern Broadleaf Forest province. They encompass most of the greater Twin Cities metropolitan area and include a mix of developed, developing and more rural areas. Brief descriptions of the three follow.

The Anoka Sand Plain is the northernmost of the three subsections. It consists of a flat, sandy lake plain and terraces along the Mississippi River, with areas of small dunes, kettle lakes, and tunnel valleys creating some topographic variation. Occasional low moraines are exposed above the outwash. Soils are primarily sandy in the uplands, with organic soils in ice block depressions and tunnel valleys and some poorly drained prairie soils along the Mississippi River. Presettlement vegetation was predominantly oak savanna and woodland in the uplands, and a variety of wetland communities ranging from open fens and meadows to forested swamps. The St. Paul Baldwin Plains and Moraines, the subsection on the east edge of the study area, consists of Superior Lobe end moraine with loamy soils on the north edge and a series of outwash plains with sandy soils to the south. Presettlement vegetation was variable, ranging from forests, oak savannas and prairies on uplands to a variety of wetland types in basins and floodplains. The Big Woods Subsection consists of loamy mantled end moraine associated with the Des Moines lobe. The landscape is dominated by circular, level-topped hills above a broad lower level that contains frequent depressions containing lakes and wetlands. Presettlement vegetation was primarily elm-maple-basswood forest and oak woodland on uplands, with swamps and open wetlands on organic soils in basins.

Figure 1. Ecological provinces and subsections in the study area.



## METHODS

The species lists were compiled from data collected from vegetation plots. Most of the plots were located in one of the three ecological subsections described above. A few plots were included that were just outside of these subsections in similar landscapes to increase the size of the data set. The majority of the plot data was collected between 1990 and 1999 by ecologists with the Minnesota County Biological Survey, a program of the Minnesota Department of Natural Resources (DNR). Data from several additional plots were collected in 2001 to increase the number of samples in several native plant communities. The general term “native plant community” for the purpose of this report refers to the class or type grouping chosen for each species list (see details under “New classification” on page 10).

The vegetation plot data were collected using the relevé methodology (Mueller-Dombois and Ellenberg 1974, Minnesota DNR 1999a). Each vegetation plot is called a relevé. Within a relatively high quality native plant community, the relevé plot is placed so that it is in an area of uniform vegetation typical of that community. The plots measure 10 by 10 meters for communities dominated by herbaceous vegetation, and 20 x 20 meters for forested communities. Plant species were recorded within height classes (Table 1), and cover for each species was estimated within seven cover classes (Table 2). The authority for scientific names was the University of Minnesota Herbarium (<http://www.cbs.umn.edu/herbarium>). Similar species that were difficult or impossible to classify in the field were grouped into complexes. For example, *Viola* species were lumped into four complexes of taxonomically similar groups. The complexes included in the species lists in this report are described in Table 3.

Relevé data were entered into the Natural Heritage Information System maintained by the Natural Heritage and Nongame Research Program of the Minnesota DNR. The relevé data were then compiled for each native plant community in the project area. Those relevés that were low quality or were not typical of the community were eliminated from the data set. Trees were grouped into two height classes: 1 to 10 meters tall (“understory trees”) and greater than 10 meters tall (“canopy trees”). Cover classes were converted to averaged values for analysis (Table 2).

For analysis, a minimum of five relevés per native plant community were used where possible. For each native plant community, the following calculations were made for each species. First, frequency was calculated by dividing the number of relevé plots in which the species was present by the total number of relevé plots and multiplying by 100. Second, abundance was calculated by averaging the percent cover of each species for all plots in which it was present. Several steps were required to generate these abundance values, because the number of height classes used varied between relevé samples, and because cover classes were converted to averaged values (Table 2). A more detailed description of all methods, including how the abundance values were obtained, is included in Lane and Dunevitz (in preparation). The frequency and abundance values were rounded to the nearest whole integer. An index of commonness was calculated by multiplying frequency by abundance (modified from Curtis 1959 and Anderson 1954).

Each resulting native plant community species list was reviewed by three plant ecologists with extensive field experience in that community. Ecologists reviewed the lists to evaluate, based on their field experience, whether there were species that were characteristic of the community that didn't appear on the list or if there were species that appeared on the list that they did not feel were typical for that community (but occurred only incidentally in one of the relevé plots). The lists were edited to incorporate these reviews. Those species that were added to the lists appear without any frequency, abundance, or index of commonness values.

**Table 1. Height Classes Used for Relevé Vegetation Plots**

<b>Height class code</b>	<b>Range of plant height in meters</b>
8	>35 m
7	20 - 35 m
6	10 – 20 m
5	5 – 10 m
4	2 – 5 m
3	0.5 – 2 m
2	0.1 – 0.5 m
1	<0.1 m

**Table 2. Cover Classes Used for Relevé Vegetation Plots**

<b>Cover class/abundance code</b>	<b>Description</b>	<b>Range of percent cover</b>	<b>Averaged value used for calculating abundance</b>
5	continuous	75-100%	87.5
4	interrupted	50-75%	62.5
3	patchy	25-50%	37.5
2	rare	5-25%	15
1	plentiful	<5%	5
+	occasional	<5%	3
R	single occurrence	<5%	1



**Table 3. Species Complexes in East-central Minnesota**

Complex name	Species included in complex
<i>Agrimonia</i> cmx	<i>A. gryposepala, striata</i>
<i>Amelanchier</i> cmx	Species with shrub forms: <i>A. laevis, interior, humilis, arborea</i>
<i>Crataegus</i> cmx	<i>C. punctata, macracantha, succulenta, calpodendron</i>
<i>Epilobium</i> cm1	<i>E. coloratum, glandulosa</i>
<i>Epilobium</i> cm2	<i>E. leptophyllum, palustre, strictum</i>
<i>Hackelia</i> cmx	<i>H. deflexa, virginiana</i>
<i>Impatiens</i> cmx	<i>I. capensis, pallida</i>
<i>Nymphaea</i> cmx	<i>N. odorata and tuberosa</i>
<i>Oxalis</i> cmx	<i>O. acetosella, stricta, dillenii</i>
<i>Parthenocissus</i> cmx	<i>P. quinquefolia, vitacea</i>
<i>Pilea</i> cmx	<i>P. fontana, pumila</i>
<i>Rosa</i> cmx	<i>R. acicularis, blanda</i>
<i>Rubus</i> cm1	Tall blackberries: <i>R. allegheniensis</i> and similar species
<i>Rubus</i> cm2	Trailing blackberries: <i>R. flagellaris</i> and similar species
<i>Senecio</i> cmx	<i>S. aureus, pseudoaureus</i>
<i>Symphoricarpos</i> cmx	<i>S. albus, occidentalis</i>
<i>Smilax</i> cmx	Herbaceous species: <i>S. ecirrata, herbacea, illinoensis</i>
<i>Viola</i> cm1	Stemless blue violets: <i>V. cucullata, missouriensis, nephrophylla, nova-angliae, pratincola, sororia</i>
<i>Viola</i> cm2	Small white violets: <i>V. incognita, macloskeyi</i>
<i>Viola</i> cm3	Small blue violets with cauline leaves: <i>V. adunca, conspersa, labradorica</i>
<i>Viola</i> cm4	Large violets with cauline leaves: <i>V. canadensis, pubescens</i>
<i>Zigadenus</i> cmx	<i>Z. elegans, glaucus</i>

## IMPORTANT NOTES ABOUT THE SPECIES LISTS

*New classification:* The species lists included in this document are classified according to the Minnesota DNR's new native plant community classification (Minnesota Department of Natural Resources 2003). The authors used this classification to facilitate consistency between field ecologists, natural resource managers, and restoration ecologists, and to promote the use of ecological information in planning restoration projects. This new classification is organized hierarchically by considering important ecological processes, environmental features, and vegetation characteristics.

The parts of the hierarchy used in this report include systems, floristic regions, classes, and types (Tables 4 and 5). *Systems* are defined by major ecological processes such as fire, erosion, or flooding. *Floristic regions* are defined by influence of climate on plant species composition, and are indicated in community names as north, central, or south. *Classes* are defined by local environmental conditions such as moisture or nutrient regimes. *Types* are defined by canopy phase, variation in substrate, or fine-scale differences in environmental factors such as climate, moisture, or nutrients. In most cases for this project, species lists are grouped at the class level. The exceptions were the Southern Dry Prairie, Southern Dry Savanna, and Northern Wet Meadow/Carr classes, which had strong differences in species composition and/or substrates at the type level. Table 4 includes a crosswalk to aid those more accustomed to using the older natural community classification (Minnesota Department of Natural Resources 1993). Brief descriptions of the communities included in this document are included on pages 15 through 23.

*Native plant communities without species lists:* There are no species lists available for two of the native plant communities listed in Table 4. The Wet Seepage Prairie (Southern) and Mesic Oak Savanna (Southern) classes are very rare in the project area, and therefore no relevé data are available. In addition, very few relevés have been collected in native plant communities in the Cliff and Talus, Rock Outcrop, Lakeshore, and Rivershore systems (Table 5) in east-central Minnesota, so there are no species lists included for them.

*The lists are for reference condition only:* These species lists are not meant to be translated directly into planting lists. In fact, in many cases, planting species at the same proportions as those described for mature communities is not the best strategy. In conjunction with a detailed site evaluation and an understanding of plant biology and ecology, these lists can be used to develop planting schemes with the goal of achieving the reference condition. Several factors must be considered in re-vegetation planning including: how the plant community naturally regenerates, which species provide critical structure and habitat for others, which species are most invasive or difficult to establish, the environmental tolerances and preferences for each species planted, and the availability of each species in the market.

*Deciding which list to use:* There is often a range of potential native plant communities that might be appropriate for a given site. For example, a site with a dry, well-drained soil could support Southern Dry Prairie, Southern Dry Savanna, or Central Dry Oak - Aspen (Pine) Woodland depending upon the frequency and intensity of fire. A target community should be selected that best matches the site conditions, including soil type, hydrology, slope and aspect, etc., but other factors such as adjacent or nearby vegetation and land uses should also

be considered. Site size may limit the number of species that will persist. Practical factors such as site history, human use, aesthetic needs, and whether or not it will be feasible to do controlled burning must also be taken into account.

*Limitations of the data:* The relevé plots sampled only a subset of each remnant native plant community, which is only a small sample of the original extent of that community. Therefore, it is likely that some species, particularly uncommon species, are not represented on the tables simply because they were not sampled, especially where the number of relevés for that community was small. The review by experienced ecologists was meant to improve the degree to which the lists represented naturally occurring communities but it is very possible that there may be species suitable for a site that do not occur on the lists. In addition, while the communities sampled represent the highest quality remnants, even these areas have been impacted by the elimination of historically occurring natural disturbances such as fire and flooding and by modern human activities such as pollution, logging, and the introduction of invasive non-native species. However, offsetting this limitation is the fact that sites being managed or re-vegetated using these lists are typically subject to the same influences as the remnant natural areas from which the lists were developed.

The goal was to use data from at least five relevés for each native plant community. The total number of relevés used for each community is shown in the bottom right corner of each list, and in Table 4. However, the DNR's native plant community classification was in the process of being revised while this project was in process, and the changes resulted in under-sampling of four communities: Central Dry Oak-aspen (Pine) Woodland, Northern Wet Ash Swamp, Northern Wet Cedar Forest, and Northern Poor Conifer Swamp (Table 4). These four lists should be considered preliminary, and the number of relevés used should be taken into account for all lists. Revised lists will be published in the future as additional plot data become available.

*Ranges of the native plant communities:* The native plant communities included here do not all occur in all three ecological subsections. The descriptions of the classes and types on pages 15 through 23 include information about which ecological subsections each community naturally occurs in. This information is important in determining the appropriate native plant community to expect or to restore in any given place.

*Trees in herbaceous communities:* Native plant communities that are predominantly herbaceous, such as prairies and open wetlands, by definition contain few trees, though shrubs are sometimes common. However, many actual occurrences of these communities do contain trees, particularly if natural disturbance cycles have been interrupted. Trees occurring in these communities were retained in the species lists to provide information about which tree species most commonly move into each community. Ecological restoration projects for these communities would generally not include trees.

*Invasive native species:* Several native species are invasive under certain conditions and should be used with caution. A species may be invasive as a result of its biological traits, such as the ability to produce large amounts of seed or propagate vegetatively. In addition, a species that is not typically invasive may become invasive under conditions of altered hydrology, altered nutrient levels, or other environmental conditions. Examples of native species known to be invasive in some situations are Canada goldenrod (*Solidago canadensis*) and box

elder (*Acer negundo*). We did not attempt to categorize invasiveness of native species in these lists because of this variability. However, evaluating whether or not a species will be invasive in a particular restoration project is an important consideration for each planting.

*Uncertainty of native status:* Some species are represented by both native and non-native strains in Minnesota. For some other species, the native versus non-native status is poorly understood. We have used available published research and our best judgment to label each species within these groups as either native or exotic. The one species in the uncertain category that was considered native was common reed (*Phragmites australis*), which is likely present as native strains as well as exotic introduced strains. Those that were included as exotics are nearly always observed in disturbed situations; these included reed canary-grass (*Phalaris arundinacea*), Canada bluegrass (*Poa compressa*), Kentucky bluegrass (*Poa pratensis*), strawberry-weed (*Potentilla norvegica*), and heal-all (*Prunella vulgaris*). All cattail species were included as natives and were lumped in the lists because of the difficulty in discerning species and varieties in the field. However, the only species with a certain native status is the broad-leaved cattail (*Typha latifolia*). The narrow-leaved cattail (*Typha angustifolia*) and the hybrid species *Typha* × *glauca* may be exotics, and certainly occur in more disturbed habitats in Minnesota and therefore should not be included in native plantings.

*Exotic species:* Exotic (non-native) species that occurred in the vegetation plots from which the data were derived are shown at the end of each species list and are highlighted in yellow. They should not be used in plantings, and in fact some of them are noxious weeds and are illegal to sell or to plant (Minnesota DNR 1999b). They are shown here in order to provide information to ecologists and land managers about which invasive exotic species occurred in the sampled remnant native plant communities.

*State-listed rare species:* The species noted to have a rarity status and shown in red in the lists are plant species designated as endangered, threatened, or special concern by state law (Minnesota Statutes, Section 84.0895; Minnesota DNR 1996). It is illegal to take, import, transport, or sell any portion of an endangered or threatened species. In addition, there are a number of reasons not to plant rare species. One is that many of these species have been reduced to a small number of fragile populations that could be damaged by the introduction of genes from plants from a different geographic area (Havens 1999). Another is that since many rare plants have very specific habitat requirements, it is likely that planting or transplanting will not be successful. While it is not illegal to plant special concern species, caution is advised in using these species. No state-endangered or threatened species should be included in restoration plans without the consent and advice of the Natural Heritage and Nongame Research Program of the DNR.

## UNDERSTANDING THE SPECIES LISTS

### Life Form Groups

The species in each list are grouped according to life form groups. The life form groups used for this project are consistent with those assigned in the DNR's Natural Heritage Information System. While some species occur in nature in more than one life form group, each species was assigned to one life form group to make the species list tables consistent. The vine category includes only woody climbing plants, so herbaceous plants with a vine-like growth form are included as forbs. Trees that are more than 10 meters tall are classified as canopy trees. Trees that are less than 10 meters tall are classified as understory trees; it should be noted that in some open communities such as prairies, there may be understory trees, but no canopy trees.

### Scientific Name

The first six columns of the species list tables include the components of the scientific names of the plant species, complete with species authorities (titled "Species Author" and "Variety or Subspecies Author"). The authority is an abbreviation for the name of the botanist(s) who described the species, variety, or subspecies. Scientific names and authorities are included to avoid the confusion that sometimes results from just using common names, which are not standardized.

### Rarity Status

The column labeled "Rarity Status" includes codes for those plant species included in *Minnesota's List of Endangered, Threatened, and Special Concern Species* (Minnesota DNR 1996). It is illegal to take, import, transport, or sell any portion of an endangered or threatened species. The DNR urges caution in planting special concern species, as well. Codes are as follows:

- E: Endangered. Species is threatened with extinction throughout all or a significant portion of its range within Minnesota.
  
- T: Threatened. Species is likely to become endangered within the foreseeable future throughout all or a significant portion of its range within Minnesota.
  
- SC: Special Concern. Species is extremely uncommon in Minnesota, or has unique or highly specific habitat requirements and deserves careful monitoring of its status.

### Numerical Summaries

The last three columns show relative numerical summaries for each species within the plots for that particular native plant community. They are defined as follows:

Freq: Frequency. Calculated by dividing the total number of relevé plots in which the species was present by the total number of relevé plots, multiplied by 100.

Abund: Abundance. Calculated by averaging the percent cover of each species for all plots in which it was present. It is most appropriate to interpret each value as a cover class similar to those used for original data collection (Table 2). Trees are divided into two height classes.

Index: Index of Commonness. Calculated by multiplying frequency by abundance.

### **Unknown Species and Species Complexes**

In cases where the field ecologist recorded the genus but not the species, or where identification of a species is believed to be unreliable, the abbreviation “spp” is shown in the “Species” column. For groups of species within a particular genus that are difficult to distinguish from one another, or where nomenclature and species concepts have changed during the period of relevé collection, species complexes have been formed that reflect ecologists’ knowledge of the relevé data. These complexes are indicated by the abbreviation “cmx” or “cm1,2,3, or 4” in the “Species” column. Those complexes included in the species lists for this project are listed in Table 3 along with the species included in each complex. All complexes listed include only species that occur in the study area (Figure 1).

## DESCRIPTIONS OF CLASSES AND TYPES

The descriptions on the following pages cover the native plant community classes for which species lists are provided in this report. The descriptions reflect conditions of these communities within the three ecological subsections covered in this report (Figure 1). Communities *not* included in this report include aquatic communities and primary (sparsely vegetated) communities. Communities are grouped according to the hierarchical scheme in the new native plant community classification for the state. Definitions pertaining to this new classification are in the “New classification” section on page 10 of this report. For northern classes and types, descriptions are condensed from those included in the *Field Guide to the Native Plant Communities of Minnesota: the Laurentian Mixed Forest Province* (Minnesota DNR 2003). The other descriptions were written by Dan Wovcha, Minnesota County Biological Survey Program, or the authors. A complete list of all the system groups, systems, classes and types in the state is included in Table 5. The code listed at the beginning of each class description includes abbreviations for system, floristic region (northern, central, or southern), and a unique numeric code (Minnesota DNR 2003).

### UPLAND FORESTS AND WOODLANDS SYSTEM GROUP

#### Fire Dependent Forest/Woodland System

FDc25        The *Central Dry Oak - Aspen (Pine) Woodland* class includes woodlands on level, sandy terrace and outwash deposits. The Oak-Aspen Woodland is the type in our area, and in East-Central Minnesota it occurs only in the Anoka Sand Plain. Crown fires and mild surface fires were common historically. Canopies have 50 to 75% cover, and are generally dominated by northern pin oak with semi-open grown forms, with quaking aspen, paper birch, big-toothed aspen, and bur oak less common. Jack pine and/or red pine are sometimes common in this class north of the area covered by this report, but are seldom present in the Anoka Sand Plain. Subcanopies are sparse, with red maple the most frequent species. Shrub layers are dense (50 to 100% cover), with abundant American hazelnut and tall blackberries. Ground layers often contain bracken fern, Pennsylvania sedge, and large-leaved aster.

FDs37        The *Southern Dry-Mesic Oak (Maple) Forest* class consists of dry-mesic hardwood forests on gently undulating, sandy outwash and terrace deposits and rolling sandy or gravelly glacial till. The Oak - (Red Maple) Forest is the type in our area. It occurs throughout the Anoka Sand Plain and St. Paul Baldwin Plains and Moraines subsections on well-drained, acidic, nutrient-poor soils. Canopies are continuous (>75% cover), and are dominated by bur oak, northern pin oak, northern red oak, white oak, or a combination of these species. Common or occasional canopy species include red maple, black cherry, quaking aspen, paper birch, and green ash. The subcanopy is patchy with red maple, black cherry, and bur oak common; ironwood is abundant in some stands. The shrub layer is patchy to dense and diverse, typically with American hazel, chokecherry, and gray dogwood. The ground layer is composed mainly of widespread forest or woodland herbs, including pointed-leaved tick trefoil, pale bellwort, and wild geranium.

## Mesic Hardwood Forest System

MHc36        The *Central Mesic Hardwood Forest (Eastern)* class consists of hardwood and hardwood-conifer forests on loamy or sandy loam soils on moraines and rolling till plains. The type in our area, Red Oak – Basswood Forest (Non-calcareous Till), occurs in the Anoka Sand Plain and St. Paul Baldwin Plains and Moraines subsections. The continuous (>75%) canopy is usually dominated by basswood and northern red oak, and often contains sugar maple. White pine, bur oak, quaking aspen, and white oak are important in the canopy on some sites. Paper birch, green ash, big-toothed aspen, and red maple are often present in the canopy but seldom abundant. The subcanopy cover is variable; sugar maple is the most important species, followed by ironwood and basswood. Shrub cover is variable. Ground layer cover is 25 to 75%, and consists of species typical of mesic oak forests such as early meadow-rue, lady fern, Clayton's sweet cicely, and hog-peanut.

MHs37        The *Southern Dry-Mesic Oak Forest* class consists of dry-mesic forests on sandy or gravelly moraine or outwash deposits, and on slopes with thin soil over bedrock along the Mississippi River bluffs. They developed on moist to somewhat drought or fire-prone sites. The type in our area is Red Oak – White Oak Forest. They occur throughout the Anoka Sand Plain and St. Paul Baldwin Plains and Moraines subsections. The canopy is patchy to interrupted and is dominated by forest-grown northern red oak and white oak with occasional basswood and elm. The patchy subcanopy includes basswood, black cherry, box elder, and elm. Shrub layers are diverse with patchy to continuous cover. The ground layer is characterized by forest herbs that compete well in filtered sunlight on sites with variable soil moisture. Typical ground layer species include pointed-leaved tick trefoil, Canada enchanter's nightshade, lopseed, cleavers, and wild sarsaparilla.

MHs39        The *Southern Mesic Maple-Basswood Forest* class consists of mesic hardwood forests on level to gently rolling, loamy glacial till and north- to east-facing slopes adjacent to wetlands or rivers. They are on well-drained, silt loam to sandy loam soils. These are the classic Big Woods forests of the Big Woods Subsection, but they also occur sparsely in the other subsections in our region. There are two types in our area: Sugar Maple - Basswood – (Bitternut Hickory) Forests and Sugar Maple Forest (Big Woods). The types are combined for this project. The canopy is continuous, and is dominated by sugar maple, basswood, and northern red oak. Other canopy species include occasional slippery elm, American elm, bitternut hickory, black ash, green ash, and/or white oak. There is a well-developed subcanopy with sugar maple and ironwood common along with basswood, which usually occurs as stem sprouts. Forests are generally open below with sparse shrub layers. Herbaceous ground layers are patchy to continuous and are composed of species adapted to moist soils and dense shade. Common wildflowers include Virginia waterleaf, yellow violet, bloodroot, yellow bellwort, and blue cohosh, with wood-nettle dense in some stands. Spring ephemeral species such as cut-leaved toothwort, Dutchman's breeches, and Virginia spring beauty are characteristic of this class.

MHs38        The *Southern Mesic Oak-Basswood Forest* consists of mesic hardwood and mesic hardwood-conifer forests on level to rolling moraines and on rich north-facing lower slopes along the Mississippi River and its tributary streams. The type in our area, Red Oak – Sugar Maple – Basswood – (Bitternut Hickory) Forest, occurs in all three subsections. The



continuous canopy is dominated by northern red oak and sugar maple with lesser amounts of basswood. Occasional stands along the Mississippi River have white pine in the canopy or in a supercanopy above the hardwoods. The subcanopy is patchy to dense, with ironwood and sugar maple common and usually abundant. Sugar maple often forms dense patches in the tall shrub layer and/or as seedlings. Patchy to interrupted ground layers are characterized by species adapted to moist soils and filtered light, including Clayton's sweet cicely, zig-zag goldenrod, wild geranium, and early meadow-rue.

MHs49        The *Southern Wet-Mesic Hardwood Forest* class consists of wet-mesic hardwood forests on level silty alluvium or glacial till. They occur on moist silty soils with mottling or a gley layer, a high water table, or other conditions that cause moisture retention in the rooting zone for most of the growing season. Many occur in stream valleys. The type in our area, Elm – Basswood – Black Ash – (Hackberry) Forest, occurs in the Big Woods subsection. Canopies are patchy to continuous, with basswood, black ash, sugar maple, slippery elm, rock elm, and occasional bur oak. Subcanopies are patchy, with black ash, sugar maple, elm species, and basswood common. Shrubs are often sparse. The ground layer is patchy to continuous, with shade-tolerant species adapted to rich silty soils, including cleavers, Virginia waterleaf, wood-nettle, false rue-anemone, and blue phlox.

## **WETLAND FORESTS SYSTEM GROUP**

### **Floodplain Forest System**

FFs58        The *Southern Floodplain Forest* class consists of deciduous riparian forests on low, level, annually flooded sites along medium and large rivers. They occur on silty or sandy alluvium and are typically inundated for several weeks during spring floods, but are well-drained later in the growing season. They are characterized by wet backwater channels, windrowed debris, and recently deposited silt and sand. The type in our area, Silver Maple – (Virginia Creeper) Floodplain Forest, occurs in all three subsections. Many stands have dense continuous canopies, but canopy gaps are frequent in other stands due to the death of American elms. Canopies are dominated by silver maple with occasional green ash. These forests are open below the canopy, with patchy subcanopies and occasional saplings and shrubs. Herbaceous ground layers are variable in cover in response to flooding regime. They often have dense patches of wood-nettle; other species that are sometimes abundant include clearweed, Ontario aster, white grass and rice cut grass. Woody vines are characteristic, with wild grape, Canada moonseed, and Virginia creeper most common.

FFs59        The *Southern Terrace Forest* class consists of wet-mesic forests occurring on sites with seasonally high water tables that do not flood regularly and that have mineral rather than peat soils. Soils are generally saturated but without standing water in the spring. They occur most commonly on river terraces above normal flood levels. There are two types in our area: Silver Maple – Green Ash – Cottonwood Terrace Forest and Elm – Ash – Basswood Terrace Forest, which are combined into one species list for this project. They occur most commonly in the Big Woods subsection. Canopies are generally dominated by a mixture of species that may include green ash, black ash, silver maple, cottonwood, slippery elm, and basswood in any combination. Box elder, hackberry, and American elm are often present in canopies and in subcanopies. Shrubs are generally sparse. Herbaceous

groundlayers are composed mostly of upland herbs that do not root to the water-table but that tolerate saturated soils, such as wood-nettle, Virginia waterleaf, honewort, goldenglow, ostrich-fern and Sprengel's sedge.

## Wet Forest System

WFn64        The *Northern Very Wet Ash Swamp* class consists of very wet hardwood or hardwood-conifer forests on peat soils in small closed depressions or around the edges of large peatlands. They typically have standing water present throughout spring and summer. The type in our area, Black Ash - Yellow Birch - Red Maple - Alder Swamp (Eastcentral), occurs in the Anoka Sand Plain. The canopy is dominated by black ash, often mixed with yellow birch, red maple, or paper-birch. In some stands, tamarack may also be abundant in the canopy. The subcanopy typically contains black ash, red maple, and yellow birch. Speckled alder and winterberry are common in the shrub layer and may be abundant. Common species in the ground layer include dwarf raspberry, Canada mayflower, touch-me-not, crested fern, Virginia creeper, cinnamon fern and royal fern. Mosses generally are sparse, except on black ash trunks.

WFn55        The *Northern Wet Ash Swamp* class consists of wet hardwood or hardwood-conifer forests on mucky mineral soils. They occur in shallow basins, groundwater seepage areas, or on low, level terrain near rivers, lakes, or other wetlands. They typically have standing water in the spring but have drained by late summer. The type in our area, Black Ash – Yellow Birch – Red Maple – Basswood Swamp (Eastcentral), occurs in the Anoka Sand Plain. The canopy is typically dominated by black ash, usually with yellow birch or red maple as canopy co-dominants. Some areas are strongly dominated by red maple and a few have abundant tamarack. The subcanopy is patchy and is composed mainly of black ash. Shrub cover is patchy to interrupted. The ground-layer cover is continuous, with upland forest herbs on hummocks, decaying logs, and around tree bases, and wetland forest species in pools and mucky hollows. Cinnamon fern, lady-fern and dwarf raspberry are common and often abundant in the ground layer. Northern herbaceous species such as goldthread and starflower are often present. Moss cover is highly variable.

WFn53        The *Northern Wet Cedar Forest* class consists of wet conifer or conifer-hardwood forests on muck or peat soils. They occur in depressions and in low level terrain along lakes, where saturated soils are present throughout the growing season. The type in our area is Lowland White Cedar Forest (Northern), which occurs rarely in the Anoka Sand Plain. The canopy is patchy to interrupted (25-75% cover), dominated by white cedar, sometimes with abundant black ash. Yellow birch and paper birch are occasionally present in the canopy. White cedar and black ash are abundant in the subcanopy in some stands, but most often the community is relatively open below the canopy. Shrubs are sparse to patchy. Ground layers include upland forest herbs on hummocks, decaying logs, and around tree bases, and wetland forest species in pools and mucky hollows. The most common ground-layer species are naked miterwort, starflower, dwarf raspberry, and wild sarsaparilla. Brown mosses cover hummocks and logs, and are also present in hollows.

WFs57        The *Southern Wet Ash Swamp* class consists of wet hardwood forests on muck or peat soils in areas with continuously flowing cold groundwater. They usually occur on level river terraces at the bases of steep slopes. The type in our area, Black Ash - (Red

Maple) Seepage Swamp, occurs in the St. Paul Baldwin Plains and Moraines and the Big Woods subsections. The canopy is patchy to interrupted and is dominated by black ash, sometimes with basswood and American elm, and rarely with green ash and yellow birch. The subcanopy, when present, is patchy to interrupted and generally not well differentiated from the canopy. The shrub layer is sparse. The ground layer is characterized by raised peat hummocks, with open pools and rivulets in seepage areas. Wetland species such as swamp marsh-marigold and fowl manna-grass are common in wet areas, with touch-me-not, Virginia creeper, jack-in-the-pulpit, wood-nettle, wild geranium, goldenglow, and other mesic or wet-mesic forest species present on hummocks. Skunk-cabbage and other obligate seepage plants are often present in seepage zones.

### **Forested Rich Peatland System**

FPs63            The *Southern Rich Conifer Swamp* class consists of tamarack-dominated swamps on shallow to deep peat in basins on moraines and outwash plains; they occasionally occur on floating mats at the edges of lakes and ponds. They occur on peat substrates that are poor in nutrients, but are influenced by mineral-rich groundwater that keeps the pH of surface water above 5.5. There is only one type described in this class in the state: Tamarack Swamp (Southern), and it occurs in all three subsections. The canopy is patchy to interrupted and is dominated by tamarack, with deciduous trees such as red maple and paper-birch occasionally present. Subcanopy trees commonly include red maple, tamarack, and elms. Common tall shrubs include red-osier dogwood, bog-birch and willows. The low-shrub layer is dominated by red raspberry and Virginia creeper. The herbaceous ground-layer usually includes northern marsh-fern, with dwarf raspberry, touch-me-not, swamp marsh-marigold, great water dock, and tufted loosestrife common. Mosses are frequently present.

### **Acid Peatland System**

APn81            The *Northern Poor Conifer Swamp* class consists of conifer-dominated peatlands. The surface water is acidic (pH between 4.2 and 5.5) and low in minerals. Water-table fluctuations are generally more variable than in poor fens. In our region this class occurs on the Anoka Sand Plain, and include two types: Poor Black Spruce Swamp and Poor Tamarack/Black Spruce Swamp, which are combined into one species list for this project. The sparse canopies of forests in this class are dominated by stunted black spruce and/or tamarack. Paper-birch is also occasionally present in the canopy. Tall shrubs are infrequent. There is a low-shrub layer dominated by shrubs in the heath family, with Labrador tea and leather-leaf most abundant. The herbaceous ground-layer is dominated by fine-leaved sedges, including three-fruited sedge, wire-sedge, and species of cotton-grass. The cover and species diversity of forbs are low; typical species include pitcher-plant, wild calla, and buckbean.

## WETLAND GRASSLANDS, SHRUBLANDS AND MARSHES SYSTEM GROUP

### Forested Rich Peatland System

FPn73        The *Northern Alder Swamp* class consists of tall shrub wetlands dominated by speckled alder on mineral, muck, or peat soils. They occur in wetland basins on glacial moraines and till plains, along streams and drainage ways, or in depressions along peatland and upland borders. Water tables can fluctuate, but they remain at or near the ground surface for much of the year. They receive some mineral-rich surface or subsurface flow, which maintains surface water with nearly neutral pH. The dense, nearly continuous shrub canopy creates shaded conditions that favor shade-tolerant species in the ground layer. There is one type in this class: Alder Swamp. It is most prevalent in the Anoka Sand Plain, but occurs occasionally in the other two subsections as well. The tall-shrub layer is dominated by dense cover (>50%) of speckled alder, with red-osier dogwood common and swamp gooseberry, poison sumac, and winterberry occasionally present but sparse. Trees are commonly present but have low (<25%) cover, with paper-birch most common. The low-shrub layer is sparse, with red raspberry typical and lowbush blueberry occasionally present. The graminoid layer is variable, but is frequently dominated by bluejoint. The forb layer commonly has between 5% and 50% cover, with dwarf raspberry and northern bugleweed usually present.

### Wet Meadow/Carr System

WMn82        The *Northern Wet Meadow/Carr* class consists of open wetlands dominated by a dense cover of broad-leaved graminoids or tall shrubs. They occur throughout our area on mineral, muck, or sapric peat soils in basins or along streams and drainageways, or on semi-floating mats on lakes. Peat depth is typically shallow but can be deep (>40cm) in basins. They contain standing water following spring runoff and heavy rains, but go through periodic drawdowns during the summer. Because surface water is derived from runoff, stream flow, and groundwater sources, it has circumneutral pH (6.0 – 8.0) and high mineral and nutrient content. There are separate species lists for the two types that occur in our area. The Sedge Meadow type has less than 25% shrub cover, and is dominated by bluejoint or by wide-leaved sedges, including tussock-sedge, beaked sedge, or lake-sedge. The Willow-Dogwood Shrub Swamp type has greater than 25% shrub cover; abundant shrubs can include willows, red-osier dogwood, speckled alder, or bog-birch. Herbaceous dominants are the same as those of Sedge Meadow. Forbs in both types often include marsh bellflower, tufted loosestrife, marsh skullcap, great water dock, and northern marsh-fern.

WMs83        The *Southern Seepage Meadow/Carr* class consists of open peatlands with continuous cold groundwater discharge. In our region, they often occur in wetland complexes with calcareous fens at the bases of Minnesota River bluffs, at some distance from the calcium-rich discharge areas. They also occur rarely in seepage areas along the Minnesota, Crow, and St. Croix Rivers and their tributaries. There is one type in our region: Seepage Meadow (Southern). Shrubs are often present, with slender willow and red-osier dogwood most common. Herbaceous layers are generally dominated by graminoids, including one or more of the following: bluejoint, tussock sedge, prairie sedge, water sedge, and hard-stemmed bulrush. Forbs are less abundant but often diverse; dominants include

species with affinities for cold-water seeps, including skunk-cabbage, swamp marsh-marigold, and touch-me-not.

### **Acid Peatland System**

APn91        The *Northern Poor Fen* class consists of low-nutrient peatlands with some development of hummocks and pools. Northern Poor Fens occur where the peat surface is becoming isolated from mineral-rich runoff and is becoming increasingly acidic (pH 4.2 to 5.5). They are transitional between bogs and rich fens. The type in our area is the Low Shrub Poor Fen, which occurs primarily in the Anoka Sand Plain in basins, and often on floating mats. The soil is peat, typically >1 m deep, though it can be shallower, and is usually saturated. Northern poor fens are dominated by low shrubs, including leather-leaf and bog-birch, with bog-rosemary and small cranberry often present. Wire-sedge is the dominant graminoid, though species of cottongrass can be abundant. Other herbaceous species are generally sparse, but sometimes include pitcher-plant and round-leaved sundew. Scattered low tamarack are sometimes present. Overall species diversity is low. Hummocks of sphagnum moss are moderately well developed.

### **Open Rich Peatland System**

OPn92        The *Northern Rich Fen (Basin)* class consists of open peatlands with circumneutral pH (>5.5). They can occur on deep, well-decomposed peat, on floating peat mats in basins adjacent to lakes and ponds. Groundwater in basins is usually stagnant, with minimal lateral movement of subsurface water through the peat. Northern Rich Fens include two types: Graminoid Rich Fen (Basin) and Graminoid – Sphagnum Rich Fen (Basin); both occur in all three subsections but are most common in the Anoka Sand Plain. Trees are generally absent. Northern Rich Fens are dominated by fine-leaved graminoids, especially wire-sedge and species of cotton grasses, or shrubs, including steeple-bush, slender willow, and bog-birch. Forb cover is variable. Species commonly present include marsh St. John's-wort, tufted loosestrife, northern marsh-fern, and marsh bellflower. Sphagnum moss cover is generally absent or less than 25%. A community that occurs on shallow organic soil over saturated fine sand on the Anoka Sand Plain has some affinities with Northern Rich Fens and some with Wet Prairies; typical species include great blazing star, wire-sedge, and a number of state-listed rare plant species including twisted yellow-eyed grass. This community is not typical of other Northern Rich Fens and needs more study, and therefore data from these communities was not included in the species lists for this project.

OPp93        The *Prairie Extremely Rich Fen* class consists of open peatlands dominated by tussocks of fine-leaved graminoids scattered in channels of standing water, present in areas of calcium-rich groundwater discharge. There is only one type in our region, the Calcareous Fen (Southeastern), which occurs in the Big Woods subsection in our area. Calcareous Fens develop in areas where highly calcareous groundwater is discharged from underlying calcareous mineral soil and forced through peat by artesian pressure. Water is characterized by high pH (>7.0) and high calcium concentrations. It is believed that cold water temperatures, low dissolved oxygen content, and high water levels minimize competition from species that normally dominate open wetlands. The unique hydrological conditions where Calcareous Fens occur are uncommon, and the community is very rare. Shrubs are generally uncommon, though species that thrive in these high-mineral environments such as

shrubby cinquefoil and several willow species are often present. Groundlayers are dominated by narrow-leaved sedges including prairie sedge, tussock-sedge, sterile sedge, and beaked spike-rush. Forb cover is variable, but generally includes diagnostic species such as American grass-of-Parnassus, seaside arrow-grass, and Kalm's lobelia.

## **Marsh System**

MRs83        The *Southern Mixed Cattail Marsh* class consists of emergent marsh communities dominated by cattails. They occur on floating mats along shorelines in lakes, ponds, and river backwaters, or rooted in mineral soil in shallow wetland basins, in places where water is present most of the year. The two types in our region, Cattail-Sedge Marsh (Southern) and Cattail Marsh (Southern), occur throughout the three subsections. They are combined for the purpose of this report. These communities often include areas of open water. They are strongly dominated by cattails, usually with greater than 50% cover. Associated forbs are highly variable. Graminoid cover is variable, with bluejoint commonly present. Shrubs are absent or sparse, with willows and red-osier dogwood most common.

MRs93        The *Southern Bulrush-Arrowhead Marsh* class consists of emergent marsh communities, typically dominated by bulrushes or spikerushes. They are present along lake shores and stream borders, in areas where water is present most of the year. The three types in this class, which are combined into one species list for this project, occur throughout the three subsections. They include Bulrush Marsh (Southern), Spikerush-Bur Reed Marsh (Southern), and Arrowhead Marsh (Southern). Forb cover is low, with typical species including broad-leaved arrowhead and bur-reeds. Graminoid cover often consists of dense, clonal, single-species patches interspersed with areas of open water. Common species may include softstem bulrush, river bulrush, and hard-stemmed bulrush. Floating-leaved submergent aquatic plant cover is variable. Typical species include duckweeds, common bladderwort, and northern water milfoil. Shrubs and trees are absent or sparse.

## **Lowland Prairie System**

WPs54        A description of the *Southern Wet Prairie* class can be found in *Minnesota's Native Vegetation: A Key to Natural Communities* on pages 71 and 72 (Minnesota DNR 1993). The Southern Wet Prairie class occurs in all three subsections. There are two types in this class in our region, including the Wet Prairie (Southern) type and the Wet Seepage Prairie (Southern) type. A species list is included for the Wet Prairie (Southern) type. The Wet Seepage Prairie (Southern) type is distinguished by the presence of constant seepage, but no plot data or detailed descriptions are available at this time, so there are no species lists included in this report.

## **UPLAND GRASSLANDS AND SAVANNAS SYSTEM GROUP**

### **Upland Prairie System**

The upland prairies and oak savannas have not changed in the newest native plant community classification, except that subtypes have been elevated to types. Descriptions of the following types, which all occur in the greater metro area described in this report, can be

found in *Minnesota's Native Vegetation: A Key to Natural Communities* (Minnesota DNR 1993).  
All classes and types occur throughout the three subsections.

UPs13 *Southern Dry Prairie* class

Dry Sand-Gravel Prairie (Southern) type  
Dry Bedrock Bluff Prairie (Southern) type  
Dry Barrens Prairie (Southern) type

UPs14 *Southern Dry Savanna* class

Dry Sand-Gravel Oak Savanna (Southern) type  
Dry Barrens Oak Savanna (Southern) type

UPs23 *Southern Mesic Prairie* class

Mesic Prairie (Southern) type

UPs24 *Southern Mesic Savanna* class

Mesic Oak Savanna (Southern) type

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**Table 4. <sup>1</sup>Native Plant Communities in East-central Minnesota  
With Crosswalk to 1993 Native Plant Community Classification**

System Group and System	Class Name	Type Name	Crosswalk to Old Type Name (Minnesota DNR 1993)	# Relevés	
<b>Upland Forests and Woodlands System Group</b>					
Fire-Dependent Forest/Woodland System	Central Dry Oak-Aspen (Pine) Woodland	Oak - Aspen Woodland	Aspen Woodland, Oak Woodland-Brushland	3	
	Southern Dry-Mesic Oak (Maple) Forest	Oak - (Red Maple) Forest	Oak Forest (dry subtype)	21	
Mesic Hardwood Forest System	Central Mesic Hardwood Forest (Eastern)	Red Oak - Basswood Forest (Non-calcareous Till)	Oak Forest (mesic subtype)	5	
	Southern Dry-Mesic Oak Forest	Red Oak - White Oak Forest	Oak Forest (mesic subtype)	5	
	Southern Mesic Maple-Basswood Forest	Southern Mesic Maple-Basswood Forest	Sugar Maple - Basswood - (Bitternut Hickory) Forest	Maple Basswood Forest	38
		Southern Mesic Maple-Basswood Forest	Sugar Maple Forest (Big Woods)	Maple Basswood Forest	
	Southern Mesic Oak-Basswood Forest	Red Oak - Sugar Maple - Basswood - (Bitternut Hickory) Forest	Oak Forest (mesic subtype)	18	
	Southern Wet-mesic Hardwood Forest	Elm - Basswood - Black Ash - (Hackberry) Forest	Lowland Hardwood Forest	7	
<b>Wetland Forests System Group</b>					
Floodplain Forest System	Southern Floodplain Forest	Silver Maple - (Virginia Creeper) Floodplain Forest	Floodplain Forest (silver maple subtype)	8	
	Southern Terrace Forest	Elm - Ash - Basswood Terrace Forest	Floodplain Forest	7	
	Southern Terrace Forest	Silver Maple - Green Ash - Cottonwood Terrace Forest	Floodplain Forest		
Wet Forest System	Northern Very Wet Ash Swamp	Black Ash - Yellow Birch - Red Maple - Alder Swamp (Eastcentral)	Mixed Hardwood Swamp	5	
	Northern Wet Ash Swamp	Black Ash - Yellow Birch - Red Maple - Basswood Swamp (Eastcentral)	Mixed Hardwood Swamp	3	
	Northern Wet Cedar Forest	Lowland White Cedar Forest (Northern)	White Cedar Swamp	3	
	Southern Wet Ash Swamp	Black Ash - (Red Maple) Seepage Swamp	Black Ash Swamp (seepage subtype)	5	
Forested Rich Peatland System	Southern Rich Conifer Swamp	Tamarack Swamp (Southern)	Tamarack Swamp	13	
Acid Peatland System	Northern Poor Conifer Swamp	Poor Black Spruce Swamp	Black Spruce Swamp	4	
	Northern Poor Conifer Swamp	Poor Tamarack/Black Spruce Swamp	Tamarack Swamp		
<b>Wetland Grasslands, Shrublands and Marshes System Group</b>					
Forested Rich Peatland System	Northern Alder Swamp	Alder Swamp	Alder Swamp	6	
Wet Meadow/Carr System	Northern Wet Meadow/Carr	Sedge Meadow	Wet Meadow	21	
	Northern Wet Meadow/Carr	Willow - Dogwood Shrub Swamp	Willow Swamp	8	
	Southern Seepage Meadow/Carr	Seepage Meadow (Southern)	Seepage Meadow	19	
Acid Peatland System	Northern Poor Fen	Low Shrub Poor Fen		6	
Open Rich Peatland System	Northern Rich Fen (Basin)	Graminoid Rich Fen (Basin)	Rich Fen	9	

<sup>1</sup> The System Group, System, Class Name and Type Name are from the revised native plant community classification for Minnesota (Minnesota DNR 2003).

	Prairie Extremely Rich Fen	Calcareous Fen (Southeastern)	Calcareous Seepage Fen	15
Marsh System	Southern Mixed Cattail Marsh	Cattail Marsh (Southern)	Cattail Marsh	10
	Southern Mixed Cattail Marsh	Cattail - Sedge Marsh (Southern)	Cattail Marsh	
	Southern Bulrush - Arrowhead Marsh	Bulrush Marsh (Southern)	Mixed Emergent Marsh	12
	Southern Bulrush - Arrowhead Marsh	Spikerush-Bur Reed Marsh (Southern)	Mixed Emergent Marsh	
	Southern Bulrush - Arrowhead Marsh	Arrowhead Marsh (Southern)	Mixed Emergent Marsh	
Lowland Prairie System	Southern Wet Prairie	Wet Prairie (Southern)	Wet Prairie	10
	Southern Wet Prairie	Wet Seepage Prairie (Southern)	Wet Prairie (seepage subtype)	0
<b>Upland Grasslands, Shrublands, and Sparse Vegetation System Group</b>				
Upland Prairie System	Southern Dry Prairie	Dry Sand - Gravel Prairie (Southern)	Dry Prairie (sand-gravel subtype)	11
	Southern Dry Prairie	Dry Bedrock Bluff Prairie (Southern)	Dry Prairie (bedrock bluff subtype)	9
	Southern Dry Prairie	Dry Barrens Prairie (Southern)	Dry Prairie (barrens subtype)	11
	Southern Dry Savanna	Dry Barrens Oak Savanna (Southern)	Dry Oak Savanna (barrens subtype)	12
	Southern Dry Savanna	Dry Sand - Gravel Oak Savanna (Southern)	Dry Oak Savanna (sand-gravel subtype)	9
	Southern Mesic Prairie	Mesic Prairie (Southern)	Mesic Prairie	12
	Southern Mesic Savanna	Mesic Oak Savanna (Southern)	Mesic Oak Savanna	0

**Table 5. Minnesota Native Plant Community Classification  
Systems, Classes, Types, and Subtypes**

class code    class name  
type code    type name  
subtype code

**A. Upland Forests and Woodlands**

Fire-Dependent Forest/Woodland System	
<b>FDn12    Northern Dry-Sand Pine Woodland</b>	<b>FDc24    Central Rich Dry Pine Woodland</b>
FDn12a    Jack Pine Woodland (Sand)	FDc24a    Jack Pine - (Bush Honeysuckle) Woodland
FDn12b    Red Pine Woodland (Sand)	FDc24a1 <i>Bracken Subtype</i>
<b>FDn22    Northern Dry-Bedrock Pine (Oak) Woodland</b>	FDc24a2 <i>Bur Oak - Carrion-Flower Subtype</i>
FDn22a    Jack Pine Woodland (Bedrock)	<b>FDc25    Central Dry Oak-Aspen (Pine) Woodland</b>
FDn22b    Red Pine - White Pine Woodland (Northeastern Bedrock)	FDc25a    Jack Pine - Oak Woodland
FDn22c    Pin Oak Woodland (Bedrock)	FDc25b    Oak - Aspen Woodland
FDn22d    Red Pine - White Pine Woodland (Eastcentral Bedrock)	<b>FDc34    Central Dry-Mesic Pine-Hardwood Forest</b>
<b>FDn32    Northern Poor Dry-Mesic Mixed Woodland</b>	FDc34a    Red Pine - White Pine Forest
FDn32a    Red Pine - White Pine Woodland (Canadian Shield)	FDc34b    Oak - Aspen Forest
FDn32b    Red Pine - White Pine Woodland (Minnesota Point)	<b>FDs27    Southern Dry-Mesic Pine-Oak Woodland</b>
FDn32c    Black Spruce - Jack Pine Woodland	FDs27a    Jack Pine - Oak Woodland (Sand)
FDn32c1 <i>Jack Pine - Balsam Fir Subtype</i>	FDs27b    White Pine - Oak Woodland (Sand)
FDn32c2 <i>Black Spruce - Feathermoss Subtype</i>	FDs27c    Black Oak - White Oak Woodland (Sand)
FDn32c3 <i>Jack Pine - Black Spruce - Aspen Subtype</i>	<b>FDs36    Southern Dry-Mesic Oak-Aspen Forest</b>
FDn32d    Jack Pine - Black Spruce Woodland (Sand)	FDs36a    Aspen - Bur Oak Forest
FDn32e    Spruce - Fir Woodland (North Shore)	FDs36b    Bur Oak - Aspen Forest
<b>FDn33    Northern Dry-Mesic Mixed Woodland</b>	<b>FDs37    Southern Dry-Mesic Oak (Maple) Forest</b>
FDn33a    Red Pine - White Pine Woodland	FDs37a    Oak - (Red Maple) Forest
FDn33a1 <i>Balsam Fir Subtype</i>	<b>FDs38    Southern Dry-Mesic Oak Woodland</b>
FDn33a2 <i>Mountain Maple Subtype</i>	FDs38a    Bur Oak - (Pin Oak) Woodland
FDn33b    Aspen - Birch Woodland	FDs38b    Oak - Shagbark Hickory Woodland
FDn33c    Black Spruce Woodland	<b>FDw24    Northwestern Dry-Mesic Oak Woodland</b>
<b>FDn43    Northern Mesic Mixed Forest</b>	FDw24a    Bur Oak - (Prairie Herb) Woodland
FDn43a    White Pine - Red Pine Forest	FDw24b    Bur Oak - (Forest Herb) Woodland
FDn43b    Aspen - Birch Forest	<b>FDw34    Northwestern Mesic Aspen-Oak Woodland</b>
FDn43b1 <i>Balsam Fir Subtype</i>	FDw34a    Aspen - (Prairie Herb) Woodland
FDn43b2 <i>Hardwood Subtype</i>	FDw34b    Aspen - (Beaked Hazel) Woodland
FDn43c    Upland White Cedar Forest	<b>FDw44    Northwestern Wet-Mesic Aspen Woodland</b>
<b>FDc12    Central Poor Dry Pine Woodland</b>	FDw44a    Aspen - (Cordgrass) Woodland
FDc12a    Jack Pine - (Bearberry) Woodland	FDw44b    Aspen - (Chokecherry) Woodland
<b>FDc23    Central Dry Pine Woodland</b>	
FDc23a    Jack Pine - (Yarrow) Woodland	
FDc23a1 <i>Ericaceous Shrub Subtype</i>	
FDc23a2 <i>Bur Oak - Aspen Subtype</i>	

Mesic Hardwood Forest System	
<b>MHn35    Northern Mesic Hardwood Forest</b>	<b>MHc37    Central Mesic Hardwood Forest (Western)</b>
MHn35a    Aspen - Birch - Basswood Forest	MHc37a    Aspen - (Sugar Maple - Basswood) Forest
MHn35b    Red Oak - Sugar Maple - Basswood - (Bluebead Lily) Forest	MHc37b    Sugar Maple - Basswood - (Aspen) Forest
<b>MHn44    Northern Wet-Mesic Boreal Hardwood-Conifer Forest</b>	<b>MHc38    Central Mesic Cold-Slope Hardwood-Conifer Forest</b>
MHn44a    Aspen - Birch - Red Maple Forest	MHc38a    White Pine - Sugar Maple - Basswood Forest (Cold Slope)
MHn44b    White Pine - White Spruce - Paper Birch Forest	<b>MHc47    Central Wet-Mesic Hardwood Forest</b>
MHn44c    Aspen - Fir Forest	MHc47a    Basswood - Black Ash Forest
MHn44d    Aspen - Birch - Fir Forest	<b>MHs37    Southern Dry-Mesic Oak Forest</b>
<b>MHn45    Northern Mesic Hardwood (Cedar) Forest</b>	MHs37a    Bur Oak - (Pin Oak) Forest
MHn45a    Paper Birch - Sugar Maple Forest (North Shore)	MHs37b    Red Oak - White Oak Forest
MHn45b    White Cedar - Yellow Birch Forest	<b>MHs38    Southern Mesic Oak-Basswood Forest</b>
MHn45c    Sugar Maple Forest (North Shore)	MHs38a    White Pine - Oak - Sugar Maple Forest
<b>MHn46    Northern Wet-Mesic Hardwood Forest</b>	MHs38b    Basswood - Bur Oak - (Green Ash) Forest
MHn46a    Aspen - Ash Forest	MHs38c    Red Oak - Sugar Maple - Basswood - (Bitternut Hickory) Forest
MHn46b    Black Ash - Basswood Forest	<b>MHs39    Southern Mesic Maple-Basswood Forest</b>
<b>MHn47    Northern Rich Mesic Hardwood Forest</b>	MHs39a    Sugar Maple - Basswood - (Bitternut Hickory) Forest
MHn47a    Sugar Maple - Basswood - (Bluebead Lily) Forest	MHs39b    Sugar Maple - Basswood - Red Oak - (Blue Beech) Forest
MHn47b    Sugar Maple - Basswood - (Horsetail) Forest	MHs39c    Sugar Maple Forest (Big Woods)
<b>MHc26    Central Dry-Mesic Oak-Aspen Forest</b>	<b>MHs49    Southern Wet-Mesic Hardwood Forest</b>
MHc26a    Oak - Aspen - Red Maple Forest	MHs49a    Elm - Basswood - Black Ash - (Hackberry) Forest
MHc26b    Red Oak - Sugar Maple - Basswood - (Large-Flowered Trillium) Forest	MHs49b    Elm - Basswood - Black Ash - (Blue Beech) Forest
<b>MHc36    Central Mesic Hardwood Forest (Eastern)</b>	<b>MHw36    Northwestern Wet-Mesic Hardwood Forest</b>
MHc36a    Red Oak - Basswood Forest (Noncalcareous Till)	MHw36a    Green Ash - Bur Oak - Elm Forest
MHc36b    Red Oak - Basswood Forest (Calcareous Till)	

## B. Wetland Forests

### Floodplain Forest System

<b>FFn57 Northern Terrace Forest</b> FFn57a Black Ash - Silver Maple Terrace Forest	<b>FFs58 Southern Floodplain Forest</b> FFs58a Silver Maple - (Virginia Creeper) Floodplain Forest
<b>FFn67 Northern Floodplain Forest</b> FFn67a Silver Maple - (Sensitive Fern) Floodplain Forest	<b>FFs59 Southern Terrace Forest</b> FFs59a Silver Maple - Green Ash - Cottonwood Terrace Forest FFs59b Swamp White Oak Terrace Forest FFs59c Elm - Ash - Basswood Terrace Forest

### Wet Forest System

<b>WFn53 Northern Wet Cedar Forest</b> WFn53a Lowland White Cedar Forest (North Shore) WFn53b Lowland White Cedar Forest (Northern)	<b>WFs55 Southern Wet Aspen Forest</b> WFs55a Lowland Aspen Forest
<b>WFn55 Northern Wet Ash Swamp</b> WFn55a Black Ash - Aspen - Balsam Poplar Swamp (Northeastern) WFn55b Black Ash - Yellow Birch - Red Maple - Basswood Swamp (Eastcentral) WFn55c Black Ash - Mountain Maple Swamp (Northern)	<b>WFs57 Southern Wet Ash Swamp</b> WFs57a Black Ash - (Red Maple) Seepage Swamp WFs57b Black Ash - Sugar Maple - Basswood - (Blue Beech) Seepage Swamp WFs57c Black Ash - Basswood Seepage Swamp
<b>WFn64 Northern Very Wet Ash Swamp</b> WFn64a Black Ash - Conifer Swamp (Northeastern) WFn64b Black Ash - Yellow Birch - Red Maple - Alder Swamp (Eastcentral) WFn64c Black Ash - Alder Swamp (Northern)	<b>WFw54 Northwestern Wet Aspen Forest</b> WFw54a Lowland Black Ash - Aspen - Balsam Poplar Forest

### Forested Rich Peatland System

<b>FPn62 Northern Rich Spruce Swamp (Basin)</b> FPn62a Rich Black Spruce Swamp (Basin)	<b>FPn82 Northern Rich Tamarack Swamp (Western Basin)</b> FPn82a Rich Tamarack - (Alder) Swamp FPn82b Extremely Rich Tamarack Swamp
<b>FPn63 Northern Cedar Swamp</b> FPn63a White Cedar Swamp (Northeastern) FPn63b White Cedar Swamp (Northcentral) FPn63c White Cedar Swamp (Northwestern)	<b>FPs63 Southern Rich Conifer Swamp</b> FPs63a Tamarack Swamp (Southern)
<b>FPn71 Northern Rich Spruce Swamp (Water Track)</b> FPn71a Rich Black Spruce Swamp (Water Track)	<b>FPw63 Northwestern Rich Conifer Swamp</b> FPw63a Tamarack - Black Spruce Swamp (Aspen Parkland) FPw63b Tamarack Seepage Swamp (Aspen Parkland)
<b>FPn72 Northern Rich Tamarack Swamp (Eastern Basin)</b> FPn72a Rich Tamarack Swamp (Eastcentral)	
<b>FPn81 Northern Rich Tamarack Swamp (Water Track)</b> FPn81a Rich Tamarack (Sundew - Pitcher Plant) Swamp	

### Acid Peatland System

<b>APn80 Northern Spruce Bog</b> APn80a Black Spruce Bog APn80a1 Treed Subtype APn80a2 Semi-Treed Subtype	<b>APn81 Northern Poor Conifer Swamp</b> APn81a Poor Black Spruce Swamp APn81b Poor Tamarack - Black Spruce Swamp APn81b1 Black Spruce Subtype APn81b2 Tamarack Subtype
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**C. Upland Grasslands, Shrublands, and Sparse Vegetation**

**Cliff/Talus System**

<b>CTn11 Northern Dry Cliff</b>	<b>CTu22 Lake Superior Cliff</b>
CTn11a Dry Mafic Cliff (Northern)	CTu22a Exposed Mafic Cliff (Lake Superior)
CTn11b Dry Rove Cliff (Northern)	CTu22b Exposed Felsic Cliff (Lake Superior)
CTn11c Dry Thomson Cliff (Northern)	CTu22c Sheltered Mafic Cliff (Lake Superior)
CTn11d Dry Felsic Cliff (Northern)	<b>CTs12 Southern Dry Cliff</b>
CTn11e Dry Sandstone Cliff (Northern)	CTs12a Dry Sandstone Cliff (Southern)
<b>CTn12 Northern Open Talus</b>	CTs12b Dry Limestone - Dolomite Cliff
CTn12a Dry Open Talus (Northern)	<b>CTs23 Southern Open Talus</b>
CTn12b Mesic Open Talus (Northern)	CTs23a Limestone - Dolomite Talus
<b>CTn24 Northern Scrub Talus</b>	<b>CTs33 Southern Mesic Cliff</b>
CTn24a Dry Scrub Talus (Northern)	CTs33a Mesic Sandstone Cliff (Southern)
CTn24b Mesic Scrub Talus (Northern)	CTs33b Mesic Limestone - Dolomite Cliff
<b>CTn32 Northern Mesic Cliff</b>	<b>CTs43 Southern Maderate Cliff</b>
CTn32a Mesic Mafic Cliff (Northern)	CTs43a Maderate Cliff
CTn32b Mesic Rove Cliff (Northern)	CTs43a1 Limestone Subtype
CTn32c Mesic Thomson Cliff (Northern)	CTs43a2 Dolomite Subtype
CTn32d Mesic Felsic Cliff (Northern)	<b>CTs46 Southern Algific Talus</b>
CTn32e Mesic Sandstone Cliff (Northern)	CTs46a Algific Talus
<b>CTn42 Northern Wet Cliff</b>	CTs46a1 Limestone Subtype
CTn42a Wet Mafic Cliff (Northern)	CTs46a2 Dolomite Subtype
CTn42b Wet Rove Cliff (Northern)	<b>CTs53 Southern Wet Cliff</b>
CTn42c Wet Felsic Cliff (Northern)	CTs53a Wet Sandstone Cliff
CTn42d Wet Sandstone Cliff (Northern)	CTs53b Wet Limestone - Dolomite Cliff

**Rock Outcrop System**

<b>ROn12 Northern Bedrock Outcrop</b>	<b>ROs12 Southern Bedrock Outcrop</b>
ROn12a Sandstone Outcrop (Northern)	ROs12a Sandstone Outcrop (Southern)
ROn12b Crystalline Bedrock Outcrop (Northern)	ROs12b Limestone - Dolomite Outcrop
<b>ROn23 Northern Bedrock Shrubland</b>	ROs12c Crystalline Bedrock Outcrop (Southern)
ROn23a Bedrock Shrubland (Inland)	
ROn23b Bedrock Shrubland (Lake Superior)	

**Lake Shore System**

<b>LKi32 Inland Lake Sand/Gravel/Cobble Shore</b>	<b>LKu32 Lake Superior Sand/Gravel/Cobble Shore</b>
LKi32a Sand Beach (Inland Lake)	LKu32a Beachgrass Dune (Lake Superior)
LKi32b Gravel/Cobble Beach (Inland Lake)	LKu32b Juniper Dune Shrubland (Lake Superior)
<b>LKi43 Inland Lake Rocky Shore</b>	LKu32c Sand Beach (Lake Superior)
LKi43a Boulder Shore (Inland Lake)	LKu32d Beach Ridge Shrubland (Lake Superior)
LKi43b Bedrock Shore (Inland Lake)	LKu32e Gravel/Cobble Beach (Lake Superior)
<b>LKi54 Inland Lake Clay/Mud Shore</b>	<b>LKu43 Lake Superior Rocky Shore</b>
LKi54a Clay/Mud Shore (Inland Lake)	LKu43a Dry Bedrock Shore (Lake Superior)
LKi54b Mud Flat (Inland Lake)	LKu43b Wet Rocky Shore (Lake Superior)
LKi54b1 Saline Subtype	LKu43b1 Cobble Subtype
LKi54b2 Non-Saline Subtype	LKu43b2 Bedrock Subtype

**River Shore System**

<b>RVx32 Sand/Gravel/Cobble River Shore</b>	<b>RVx43 Rocky River Shore</b>
RVx32a Willow Sandbar Shrubland (River)	RVx43a Bedrock/Boulder Shore (River)
RVx32b Sand Beach/Sandbar (River)	RVx43a1 Intermittent Streambed Subtype
RVx32b1 Intermittent Streambed Subtype	RVx43a2 Permanent Stream Subtype
RVx32b2 Permanent Stream Subtype	<b>RVx54 Clay/Mud River Shore</b>
RVx32c Gravel/Cobble Beach (River)	RVx54a Slumping Clay/Mud Slope (River)
RVx32c1 Intermittent Streambed Subtype	RVx54b Clay/Mud Shore (River)
RVx32c2 Permanent Stream Subtype	RVx54b1 Intermittent Streambed Subtype
	RVx54b2 Permanent Stream Subtype

**Upland Prairie System****UPn12 Northern Dry Prairie**

- UPn12a Dry Barrens Prairie (Northern)
- UPn12b Dry Sand - Gravel Prairie (Northern)
- UPn12c Dry Sand - Gravel Brush-Prairie (Northern)
- UPn12d Dry Hill Prairie (Northern)

**UPn13 Northern Dry Savanna**

- UPn13a Dry Barrens Jack Pine Savanna (Northern)
- UPn13b Dry Barrens Oak Savanna (Northern)
- UPn13c Dry Sand - Gravel Oak Savanna (Northern)
- UPn13d Dry Hill Oak Savanna (Northern)

**UPn23 Northern Mesic Prairie**

- UPn23a Mesic Brush-Prairie (Northern)
- UPn23b Mesic Prairie (Northern)

**UPn24 Northern Mesic Savanna**

- UPn24a Mesic Oak Savanna (Northern)
- UPn24b Aspen Openings (Northern)

**UPs13 Southern Dry Prairie**

- UPs13a Dry Barrens Prairie (Southern)
- UPs13b Dry Sand - Gravel Prairie (Southern)
- UPs13c Dry Bedrock Bluff Prairie (Southern)
- UPs13d Dry Hill Prairie (Southern)

**UPs14 Southern Dry Savanna**

- UPs14a Dry Barrens Oak Savanna (Southern)
- UPs14a1 Jack Pine Subtype*
- UPs14a2 Oak Subtype*
- UPs14b Dry Sand - Gravel Oak Savanna (Southern)
- UPs14c Dry Hill Oak Savanna (Southern)

**UPs23 Southern Mesic Prairie**

- UPs23a Mesic Prairie (Southern)

**UPs24 Southern Mesic Savanna**

- UPs24a Mesic Oak Savanna (Southern)

## D. Wetland Grasslands, Shrublands, and Marshes

### Acid Peatland System

#### APn90 Northern Open Bog

- APn90a Low Shrub Bog
- APn90b Graminoid Bog
- APn90b1 *Typic Subtype*
- APn90b2 *Schlenke Subtype*

#### APn91 Northern Poor Fen

- APn91a Low Shrub Poor Fen
- APn91b Graminoid Poor Fen (Basin)
- APn91c Graminoid Poor Fen (Water Track)
- APn91c1 *Featureless Water Track Subtype*
- APn91c2 *Flark Subtype*

### Open Rich Peatland System

#### OPn81 Northern Shrub Shore Fen

- OPn81a Bog birch - Alder Shore Fen
- OPn81b Leatherleaf - Sweet Gale Shore Fen

#### OPn91 Northern Rich Fen (Water Track)

- OPn91a Shrub Rich Fen (Water Track)
- OPn91b Graminoid Rich Fen (Water Track)
- OPn91b1 *Featureless Water Track Subtype*
- OPn91b2 *Flark Subtype*

#### OPn92 Northern Rich Fen (Basin)

- OPn92a Graminoid Rich Fen (Basin)
- OPn92b Graminoid - Sphagnum Rich Fen (Basin)

#### OPn93 Northern Extremely Rich Fen

- OPn93a Spring Fen

#### OPp91 Prairie Rich Fen

- OPp91a Rich Fen (Mineral Soil)
- OPp91b Rich Fen (Peatland)
- OPp91c Rich Fen (Prairie Seepage)

#### OPp93 Prairie Extremely Rich Fen

- OPp93a Calcareous Fen (Northwestern)
- OPp93b Calcareous Fen (Southwestern)
- OPp93c Calcareous Fen (Southeastern)

### Forested Rich Peatland System

#### FPn73 Northern Alder Swamp

- FPn73a Alder Swamp

### Wet Meadow/Carr System

#### WMn82 Northern Wet Meadow/Carr

- WMn82a Willow - Dogwood Shrub Swamp
- WMn82b Sedge Meadow
- WMn82b1 *Bluejoint Subtype*
- WMn82b2 *Tussock Sedge Subtype*
- WMn82b3 *Beaked Sedge Subtype*
- WMn82b4 *Lake Sedge Subtype*

#### WMs83 Southern Seepage Meadow/Carr

- WMs83a Seepage Shrub Meadow (Northwestern)
- WMs83b Seepage Meadow (Southern)
- WMs83b1 *Minnesota River Valley Subtype*
- WMs83b2 *Southeastern Subtype*

#### WMp73 Prairie Wet Meadow/Carr

- WMp73a Prairie Meadow

### Marsh System

#### MRn83 Northern Mixed Cattail Marsh

- MRn83a Cattail - Sedge Marsh (Northern)
- MRn83b Cattail Marsh (Northern)

#### MRn93 Northern Bulrush-Spikerush Marsh

- MRn93a Bulrush Marsh (Northern)
- MRn93b Spikerush - Bur Reed Marsh (Northern)

#### MRu94 Lake Superior Coastal Marsh

- MRu94a Estuary Marsh (Lake Superior)

#### MRs83 Southern Mixed Cattail Marsh

- MRs83a Cattail - Sedge Marsh (Southern)
- MRs83b Cattail Marsh (Southern)

#### MRs93 Southern Bulrush-Arrowhead Marsh

- MRs93a Bulrush Marsh (Southern)
- MRs93b Spikerush - Bur Reed Marsh (Southern)
- MRs93c Arrowhead Marsh (Southern)

### Lowland Prairie System

#### WPn53 Northern Wet Prairie

- WPn53a Wet Seepage Prairie (Northern)
- WPn53b Wet Brush-Prairie (Northern)
- WPn53c Wet Prairie (Northern)
- WPn53d Wet Saline Prairie (Northern)

#### WPs54 Southern Wet Prairie

- WPs54a Wet Seepage Prairie (Southern)
- WPs54b Wet Prairie (Southern)
- WPs54c Wet Saline Prairie (Southern)