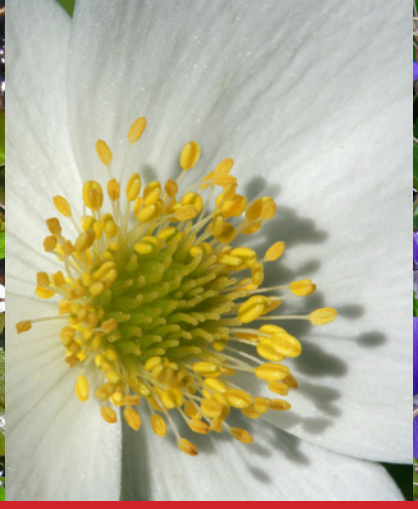



U.S. Army Corps of Engineers

Regulatory Branch
St. Paul District

WETLAND PLANTS and PLANT COMMUNITIES of MINNESOTA and WISCONSIN

Version 3.2 - July 2015

By Steve D. Eggers and Donald M. Reed

REPORT DOCUMENTATION

Title: Wetland Plants and Plant Communities of Minnesota and Wisconsin, Version 3.2

Authors: Steve D. Eggers, Donald M. Reed

Published By: U.S. Army Corps of Engineers, St. Paul District

Final Report: 2015; 478 pages, unclassified

Key Words: Bogs, fens, wet meadows, marshes, swamps, wetland plants, hydrophytes, wetland plant communities

Abstract: Wetlands of Minnesota and Wisconsin are categorized into 15 plant communities. Each community is described and illustrated by color photographs along with descriptions, color photographs and ink drawings of 317 representative plant species. Descriptions include taxonomic characteristics, habitat and notes on wildlife use and economic values.

AUTHORS

Steve D. Eggers is a senior ecologist and Professional Wetland Scientist with the Regulatory Branch of the St. Paul District Corps of Engineers. He has 36 years of experience with the Corps regulatory program under Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act of 1899 and is a member of the National Advisory Team for Wetland Delineation and the National Technical Committee for Wetland Vegetation. Mr. Eggers graduated from the University of Wisconsin-La Crosse with a Bachelor of Science degree in Biology and has completed additional coursework in plant taxonomy at the University of Minnesota. He has photographed wetland flora and fauna from the Everglades to Denali National Parks.

Donald M. Reed was the chief biologist for the Southeastern Wisconsin Regional Planning Commission until the fall of 2014. He had been with the Commission for over 42 years. Dr. Reed received a Bachelor of Science degree in Biology and Geography from Carroll College in May 1972, a Master of Science degree in Botany/Zoology from the University of Wisconsin-Milwaukee in May 1985, and a Ph.D. from the University of Wisconsin-Milwaukee in 2002. His areas of study include wetland plant ecology and soils, particularly those of calcareous fens. He is a recipient of the 1996 National Wetlands Award for Outstanding Wetlands Program Development awarded by the Environmental Law Institute and the U.S. Environmental Protection Agency. Dr. Reed was also the recipient of a Lifetime Achievement Award from the Wisconsin Coastal Management Program in 1998 for his wetland boundary identification training work.

Table of Contents

Acknowledgments

This pictorial guide to wetland plants is not an original idea. Pictorial guides covering other groups of plants have also been used as models for this guide, such as *Wildflowers of the Northern Great Plains* by Vance *et al.* (1984). Furthermore, we have borrowed extensively from the authoritative botanical references by Gleason and Cronquist (1991), Swink and Wilhelm (1994), Voss (1972, 1985, 1996), Chadde (2002, 2011), Smith (2003, 2008) and others. We acknowledge this fact by citing these references throughout the guide.

We are indebted to Charles J. Newling (formerly with the U.S. Army Corps of Engineers, Waterways Experiment Station-Vicksburg) and Dr. James H. Zimmerman who were instrumental in formulating the guide. We are also grateful to Dr. Daniel E. Wujek (Central Michigan University), Welby R. Smith (Minnesota Natural Heritage Program) and John M. Kittelson (formerly with the St. Paul District-Corps) for their review and comments on the draft manuscript. Other individuals on the staffs of the St. Paul District-Corps and Southeastern Wisconsin Regional Planning Commission who assisted in preparation of the guide are too numerous to list, but are gratefully acknowledged.

Many thanks to Dr. Gerald B. Ownbey (Professor Emeritus-University of Minnesota) for his assistance on nomenclature, and Dr. Jan A. Janssens (University of Minnesota) for his assistance in identifying *Sphagnum*. Grady E. Mann (formerly with the U.S. Fish and Wildlife Service) provided valuable assistance on the map of the Prairie Pothole Region.

In addition, we wish to thank the following artists for contributing their fine ink drawings: Vera M. Wong (taxonomic character and glossary drawings); Elsie Froeschner (grass drawings); other drawings of grasses are from Hitchcock (1950); and Anne L. Martin (plant community schematics). In addition, we thank the New York Botanical Garden for granting permission to reproduce copyrighted ink drawings from *The Illustrated Companion to Gleason and Cronquist's Manual – Illustrations of the Vascular Plants of Northeastern United States and Adjacent Canada.*

Patricia A. Trochlell (Wisconsin Department of Natural Resources) reviewed and provided valuable technical comments on the manuscript for the Third Edition. She also contributed ink drawings for the glossary.

Thanks to Michael Bourdaghs (Minnesota Pollution Control Agency) for his assistance with the key to plant communities and discussion of the Floristic Quality Assessment.

Improvements in the design and layout of the Third Edition were created by Irene Ledwith.

Finally, we express our appreciation to the University of Minnesota; specifically, the staff of the Cedar Creek Ecosystem Science Reserve, for their cooperation and assistance.

Foreword

Wetlands are very much in the news today, as their many functions and values are becoming recognized. The belated interest in this neglected natural resource has led to a flurry of efforts to protect, maintain, and restore wetlands in the face of insufficient basic knowledge and educational materials. While these deficiencies are being remedied, many questions are being raised by attempts to regulate uses and to minimize abuses and further losses of this resource. Much of the confusion over the values of wetlands and how to maintain these values arises from the great diversity of systems-hydrological and biological-that is included in the term "wetlands."

Questions that need quick, accurate answers include: How does one recognize a wetland and know what kind of wetland it is? Where does the wetland stop and the upland begin? What particular values does this wetland have -- for the owner and for the public? Which human impacts will affect these values? How might lost values be replaced? In creating or restoring a wetland, what type and/or functions should be stressed, among those that are practical? All these questions share an important principle, that of site specificity. Since each place on Earth is unique, we need "ground truth" to make wise decisions about natural resource husbandry. Thus, the decision-maker must be knowledgeable in the field.

For a start, we certainly need a detailed field guide to wetlands. Plenty of guide books exist for identifying species of plants or animals in the field. However, guides to ecosystems are rare and often too technical and specialized for general use. One reason is that a guide covering a continent or part of one would span too many geographic areas and climates to cover the same species throughout. The complexity of such a guide would thereby be unmanageable.

Here, however, we have a relatively small geographic area -- two states which share just two floristic provinces: the Great Lakes or northern conifer-hardwood forest region and the prairie-hardwood forest transition region. These provinces are separated by a comparatively narrow or steep gradient of climate and vegetation -- the "tension zone" of John Curtis. It is true that similar hydrologic systems and geologic origins may lead to different vegetation in the two zones. For example, a pothole (glacial kettle) may have marsh in the prairie and prairie-oak regions, and swamp forest in the more humid north and east regions where tree seeds can grow on downed logs and water levels fluctuate less drastically.

Nevertheless, the variation in wetlands within Wisconsin and Minnesota is small enough to be manageable, and this guide begins with a simple and workable outline-key for recognizing the main wetland types, which number only fifteen. Vegetation is the handle by which wetland types can be most easily recognized. Of course, vegetation is by no means the only element in wetlands. However, plant life is visible to the unaided eye at all seasons; it reflects the water regime and water quality faithfully; and it influences the wetland type and function. Vegetation also reflects historical factors such as climate, fires, and use/abuse intensity by animals and man. An example of human abuse is the introduction of alien pest species such as carp and purple loosestrife.

To this end, this guide provides relevant information on vegetation and does so in the best way -- by stressing groups of plant species which together characterize each wetland type. The three advantages of using floras -- that is, groups of plant species -- as indicators of wetlands, wetland types, and wetland values are:

1. An individual species used alone might be misidentified and confused with a similar upland plant or one belonging in a different kind of wetland.

2. Individual species have individual limits on their distribution that do not exactly coincide with those of any other, whereas a given wetland is sure to have several, if not all, of the characteristic species present.

3. Since one type of wetland may grade into another, so that several types may occur in a single valley or basin, the locations of groups of species will help describe the actual situation, by mapping for the eye the gradients in environmental conditions that cause the wetland and its functions to vary from place to place. (For example, a peatland may grade from fen to bog, telling you that groundwater discharges at the former end while the latter is rainfed.)

The authors — biologists respectively for the U.S. Army Corps of Engineers, St. Paul District and the Southeastern Wisconsin Regional Planning Commission, Waukesha — represent wide experience in real life situations of wetland identification and natural resource planning. In other words, they know what information is pertinent and what questions to address. In this still experimental area (in both ecology and law), we can trust the direction they give us to understanding the wetland resource.

This work will be invaluable in enabling citizens, organizations, and agency personnel to interpret and apply regulations for land use to specific sites, and to prioritize acquisition and other protection strategies. It is the perfect companion to such publications as Paulson's *Wetlands and Water Quality: A Citizen's Handbook on How to Review Section 404 Permits*. We hope this work will stimulate generation of similar guides to wetlands in other regions.

James Hall Zimmerman
November 12, 1986

Dr. James H. Zimmerman passed away on September 28, 1992. Whether in the classroom or the field, his expertise and insight had a profound influence on many ecologists and botanists, including the authors. We would like to dedicate this wetland plant guide to his memory.

SDE, DMR

SECTION 1

Introduction

PURPOSE

The primary purpose of this guide is to assist U.S. Army Corps of Engineers (Corps) personnel working with the regulatory program under Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act of 1899. It provides an easy-to-use, pictorial guide to wetlands primarily for individuals who are not botanists, although botanists may also find it useful. A secondary purpose is to provide a guide for individuals working with other agencies and programs dealing with wetlands. Finally, this guide serves to enhance public awareness of wetlands by illustrating their diversity and values.

APPLICABILITY

The guide specifically addresses wetland plants and plant communities of Minnesota and Wisconsin (Figures 1 and 2), but is applicable in general to wetlands of the entire Great Lakes Region. Note that the 317 plant species included in the guide do not represent, nor are they intended to represent, a listing of all plant species found in wetlands of Minnesota and Wisconsin. For a complete listing of these species, refer to the botanical references listed in the bibliography.

ORGANIZATION

This guide is organized by wetland plant community. In general, the wetland plant communities are organized according to water permanence, depth and degree of soil saturation. Thus, the guide progresses from deepwater wetlands (I. Shallow, Open Water Communities) to temporary water-holding wetlands (VIII. Seasonally Flooded Basins). Photographs and descriptions are provided for each of the 15 wetland plant communities along with representative plant species of each. A particular plant species can occur not only in the wetland plant community under which it is listed, but in other wetland communities, and in some cases, upland communities. The other communities in which an individual plant species may frequently occur are provided under ECOLOGICAL NOTES. Note that upland plants occasionally occur in wetlands and, conversely, wetland plants occasionally occur in upland habitats. This is especially true in transitional areas between wetlands and uplands.

WETLAND DEFINITION

The definition of wetlands used by the Corps in its regulatory program is:

> Wetlands are those areas inundated or saturated by surface or ground-water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas (33 CFR 328).

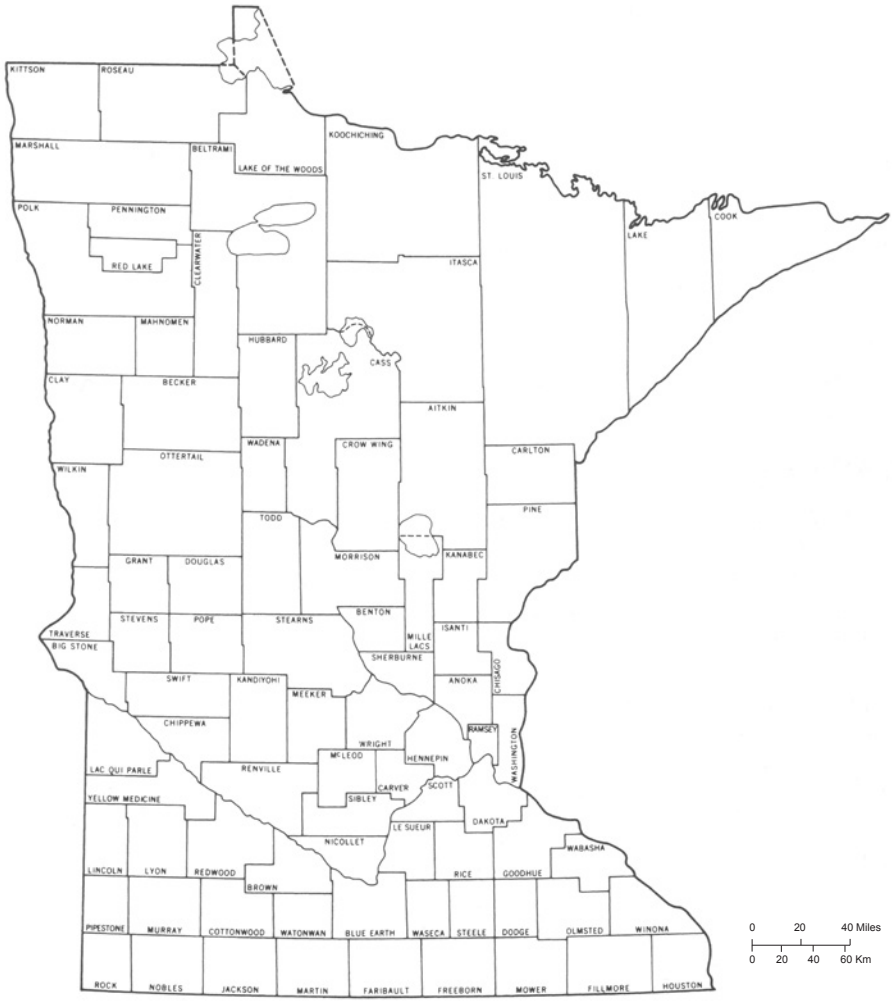


FIGURE 1 - **Counties of Minnesota**

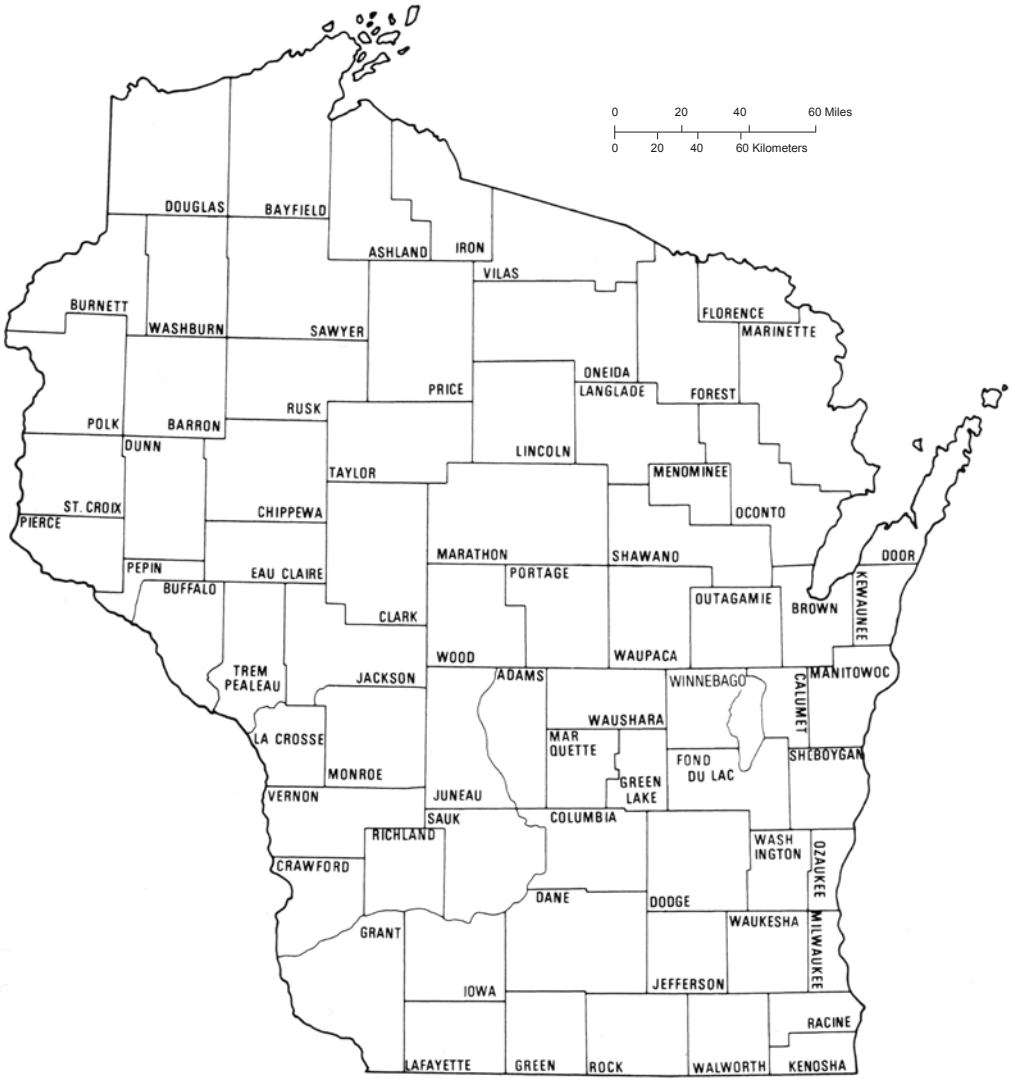


FIGURE 2 - **Counties of Wisconsin**

Refer to the current Corps of Engineers Wetland Delineation Manual, and applicable regional supplement, for a methodology to apply this definition in the field.

CONCEPT OF A HYDROPHYTE

Wetland plants are hydrophytes (hydro = water, phyte = plant).[1] These are plants growing in water or on a substrate that at least periodically is deficient in oxygen due to excessive water content. Hydrophytes have morphological, physiological and reproductive adaptations that allow them to thrive in inundated or saturated soils where non-hydrophytes (upland plants) cannot. Communities dominated by hydrophytes are referred to as hydrophytic plant communities.

CLASSIFICATION OF WETLANDS

A number of wetland classification schemes have been developed. Table 1 compares the 15 plant communities of this guide to classification systems developed by Shaw and Fredine (1971), Cowardin *et al.* (1979), Curtis (1971), and the Wisconsin Wetland Inventory. As shown in Table 1, the 15 plant communities of this guide correspond most closely to the wetland plant communities described by Curtis (1971) in *The Vegetation of Wisconsin*.

VEGETATION TENSION ZONE

Throughout the guide are references to a vegetation tension zone. The flora of Minnesota and Wisconsin is arranged in two major floristic provinces. A floristic province is a large area with a relatively uniform flora, delineated by a tension zone in which many species reach a common range boundary (Curtis 1971).

The vegetation tension zone then is a band between two floristic provinces marked by the intermingling of species from both (Curtis 1971). The two floristic provinces in Minnesota and Wisconsin are the "northern forest floristic province" and the "prairie-forest floristic province," located to the north and south of the vegetation tension zone, respectively. The vegetation tension zone and the floristic provinces are illustrated on page 8. The vegetation tension zone through Wisconsin is shown according to Curtis (1971). A tentative vegetation tension zone through Minnesota is extrapolated from the original vegetation map of Minnesota compiled by Marschner (1930).

[1] See Tiner (1991).

TABLE 1

COMPARISON OF WETLAND CLASSIFICATION SYSTEMS

Wetland Plant Community Types of this Guide	Vegetation of Wisconsin (Curtis 1971)	Wisconsin Wetland Inventory	Classification of Wetlands and Deep Water Habitats of the United States (Cowardin et al. 1979)	Fish and Wildlife Service Circular 39 (Shaw and Fredine 1971)
Shallow, Open Water	Submergent aquatic community	Aquatic bed, submergent and floating	Palustrine or lacustrine, littoral; aquatic bed; submergent, floating, and floating-leaved	Type 5: Inland open fresh water
Deep Marsh	Emergent and submergent aquatic community	Aquatic bed,sub-mergent, and floating; and persistent emergent, and nonpersistent	Palustrine or lacustrine, littoral; aquatic bed; submergent, floating, and floating-leaved; and emergent; persistent and nonpersistent	Type 4: Inland deep fresh marsh
Shallow Marsh	Emergent aquatic community	Persistent and nonpersistent, emergent	Palustrine; emergent; persistent and nonpersistent	Type 3: Inland shallow fresh marsh
Sedge Meadow	Northern and southern sedge meadow	Narrow-leaved persistent, emergent/ wet meadow	Palustrine; emergent; narrow-leaved persistent	Type 2: Inland fresh meadow
Fresh (Wet) Meadow		Broad- and narrow-leaved persistent, emergent/wet meadow	Palustrine; emergent; broad- and narrow-leaved persistent	Type 1: Seasonally flooded basin or flat; Type 2: Inland fresh meadow
Wet to Wet-Mesic Prairie	Low (wet to wet-mesic) prairie	Broad- and narrow-leaved persistent, emergent/wet meadow	Palustrine; emergent; broad- and narrow-leaved persistent	Type 1: Seasonally flooded basin or flat; Type 2: Inland fresh meadow
Calcareous Fen	Fen	Narrow-leaved, per-sistent, emergent/wet meadow; and broad-leaved deciduous, scrub/shrub	Palustrine; emergent; narrow-leaved persistent; and scrub/shrub; broad-leaved deciduous	Type 2: Inland fresh meadow; Type 6: shrub swamp
Open Bog	Open bog	Moss; and broad-leaved evergreen, scrub/shrub	Palustrine; moss/lichen; and scrub/shrub; broad-leaved evergreen	Type 8: Bog
Coniferous Bog	Northern wet forest	Needle-leaved evergreen and deciduous, forested	Palustrine; forested: needle-leaved evergreen and deciduous	Type 8: Bog

TABLE 1

COMPARISON OF WETLAND CLASSIFICATION SYSTEMS *(cont.)*

Wetland Plant Community Types of this Guide	Vegetation of Wisconsin (Curtis 1971)	Wisconsin Wetland Inventory	Classification of Wetlands and Deep Water Habitats of the United States (Cowardin et al. 1979)	Fish and Wildlife Service Circular 39 (Shaw and Fredine 1971)
Shrub-Carr	Shrub-carr	Broad-leaved deciduous, scrub/ shrub	Palustrine; scrub/shrub; broad-leaved deciduous	Type 6: Shrub swamp
Alder Thicket	Alder thicket	Broad-leaved deciduous, scrub/ shrub	Palustrine; scrub/ shrub; broad-leaved deciduous	Type 6: Shrub swamp
Hardwood Swamp	Northern wet-mesic forest and southern wet to wet-mesic forest	Broad-leaved deciduous, forested	Palustrine; forested; broad-leaved deciduous	Type 7: Wooded swamp
Coniferous Swamp	Northern wet-mesic forest	Needle-leaved deciduous and evergreen, forested	Palustrine; forested; needle-leaved deciduous and evergreen	Type 7: Wooded swamp
Floodplain Forest	Northern and southern wet-mesic forest	Broad-leaved deciduous, forested	Palustrine; forested; broad-leaved deciduous	Type 1: Seasonally flooded basin or flat
Seasonally Flooded Basin		Flats/unvegetated wet soil; and persistent and non-persistent, emergent /wet meadow	Palustrine; emergent; persistent and non - persistent	Type 1: Seasonally flooded basin or flat

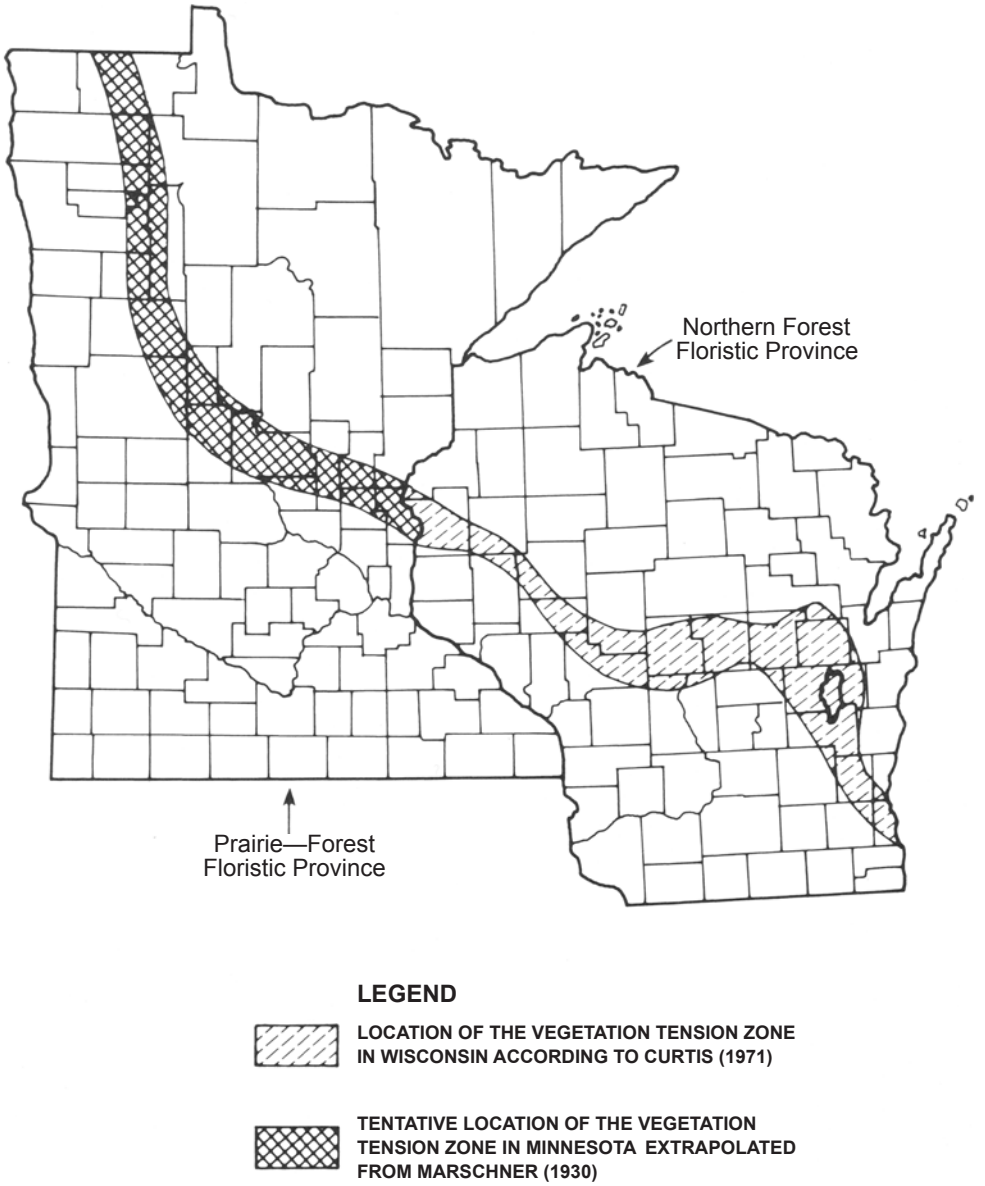


FIGURE 3

(The Wisconsin portion of this figure is adapted from an illustration copyrighted by the University of Wisconsin Press. It is used here by permission.)

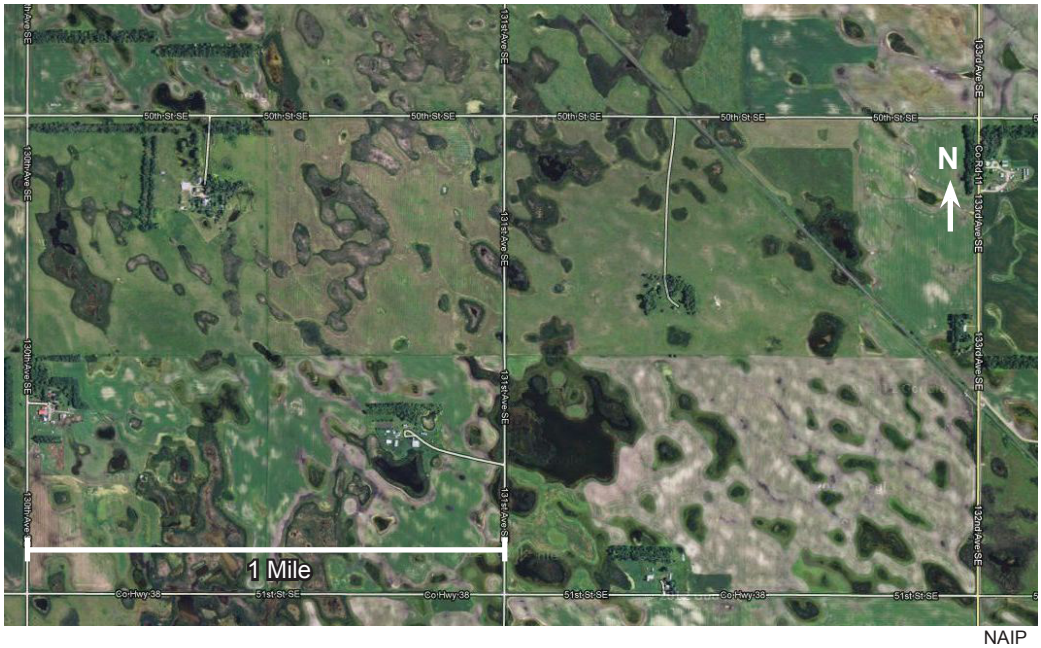
PRAIRIE POTHOLES

A portion of the "prairie-forest floristic province" in southern and western Minnesota deserves special mention. It is part of the Prairie Pothole Region (Figure 4). Prairie potholes are shallow, water-holding depressions of glacial origin found in the prairies of north-central United States and south-central Canada (Sloan 1972). These wetlands have great variability in size, depth, water permanence, and water chemistry (Sloan 1972; Stewart and Kantrud 1972). For example, prairie potholes range in size from less than one quarter acre to several thousand acres. In terms of water permanence and depth, prairie potholes range from seasonally flooded basins that hold water for only a few weeks each year, to wet prairies, to shallow and deep marshes, to permanent open water. Water chemistry ranges from fresh, mixosaline, saline, to hypersaline. Multiple year wet and drought cycles are typical in the Prairie Pothole Region.

FIGURE 4
Generalized Original Limits of the Prairie Pothole Region of the U.S. and Prairie Provinces of Canada (adapted from Sanders 1982)**.**

Prairie potholes are extremely important for North American waterfowl production. Although prairie potholes comprise only 10 percent of potential waterfowl breeding habitat in North America, it is estimated that 50 percent of waterfowl production occurs in these wetlands, with an even higher percentage occurring in wet years (Sloan 1972). Agricultural practices continue to degrade or destroy these important wetlands. However, there are federal, state and private programs and participants working to restore prairie potholes and the important functions and values they provide.

The above photograph is a deep marsh prairie pothole dominated by river bulrush (*Schoenoplectus fluviatilis*) and hardstem bulrush (*Schoenoplectus acutus*) located within the Victory Wildlife Management Area in Big Stone County, Minnesota.



NAIP

An aerial photograph illustrating a landscape view of the diversity in size and type, as well as density, of prairie potholes.

PATTERNED PEATLANDS

North of the vegetation tension zone is another group of wetlands deserving special mention. These are the patterned peatlands of northern Minnesota. A notable example is the Red Lake Peatland, which covers nearly 500 square miles (1,295 km^2) making it one of the largest continuous tracts of peatlands in the conterminous United States (Glaser *et al.* 1981). "Patterned" refers to the distinct and frequently striking landforms that compose these peatlands. Flarks, strings, ovoid islands, teardrop islands, raised bogs and fens are examples of names applied to these patterned landforms. Some of the plant associations of the patterned peatlands correspond to the communities described herein. However, other associations of patterned peatlands are not specifically described as discussion of these specialized plant associations goes beyond the scope of this generalized guide. For a detailed description of the patterned peatland communities, refer to Glaser *et al.* (1981), Wright *et al.* (1992) and Minnesota Department of Natural Resources (2003).

The following page is a color infrared aerial photograph showing a portion (approximately 16 square miles (41.4 km^2)) of the Red Lake Peatland in Beltrami County, Minnesota. Visible peat landforms and vegetation patterns include the following (numbers correspond to those on the photograph):

1. Water tract where runoff is channeled across the peat surface; includes strings (peat ridges) and flarks (pools) arranged perpendicular to the direction of water flow. Dominant vegetation includes sedges (*Carex*).

2. Streamlined tree islands (mostly tamarack with some black spruce) tapered in the direction of water movement.

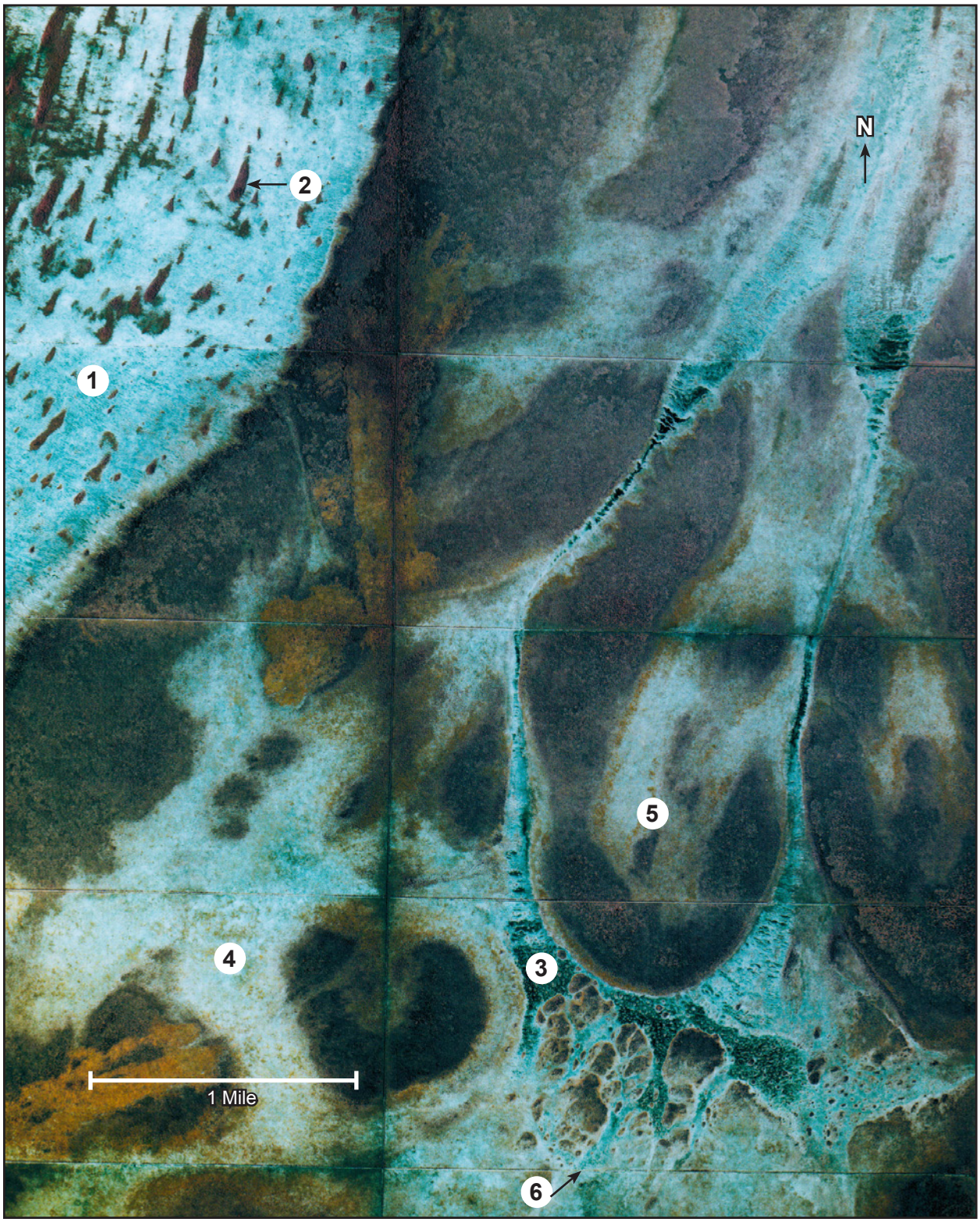
3. A smaller internal water tract.

4. A *Sphagnum* lawn.

5. Ovoid island with a horseshoe-shaped black spruce forest and a non-forested interior.

6. Straight lines are drainage ditches, the result of a failed attempt to drain the peatland during 1905-1929.

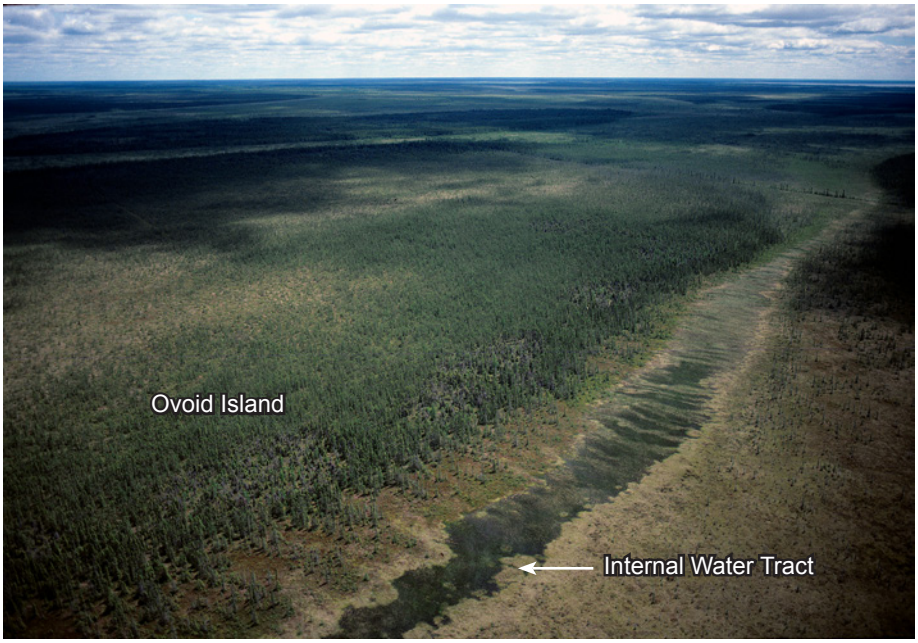
Interpretation of aerial photography is from Wright *et al.* (1992).



Minnesota DNR

Red Lake Peatland

The above is a color infrared aerial photograph illustrating an example of the striking landforms within the Red Lake Peatland in Beltrami County, Minnesota.



The above are oblique aerial photographs illustrating examples of the landforms within the Red Lake Peatland.

FARMED WETLANDS

Millions of acres of wetlands in Minnesota and Wisconsin have been effectively drained and converted to non-wetland during the past 150 years, primarily for agricultural use. Millions of additional acres of existing wetlands are: (1) partially drained and cropped; or (2) cropped under natural conditions (e.g., during dry periods). Partially drained refers to cases where wetland hydrology has been altered by ditching, tiling and/or pumping, but the area still retains sufficient hydrology to meet wetland criteria. An example is a deep marsh plant community that was ditched and converted to a fresh (wet) meadow community.

A wetland within a cropped field in Kenosha County, Wisconsin.

The example of a farmed wetland shown by the photograph below is a shallow marsh prairie pothole basin that had been plowed and planted to corn (*Zea mays*), an upland species, at the start of the growing season. By midsummer, ponding and saturated soil conditions had resulted in drown out and crop stress (yellowed, stunted corn). The dark green vegetation in the far background of the basin is softstem bulrush (*Schoenoplectus tabernaemontani*), an obligate wetland plant recolonizing the basin in spite of plowing earlier in the growing season.

A farmed wetland in Ottertail County, Minnesota.

NATIONAL WETLAND PLANT LIST

As part of the National Wetland Inventory undertaken by the U.S. Fish and Wildlife Service (Service), a wetland plant list was developed by the Service in cooperation with federal interagency review panels (Reed 1988, 1996). Responsibility for the *National Wetland Plant List* was transferred to the Corps in 2006. An updated *National Wetland Plant List* (NWPL) was developed during 2008-2012 and implemented in June 2012. Annual updates to the NWPL were effective in September 2013 and May 2014.

This list ranks individual plant species according to their probability of occurrence in wetlands as shown below:

INDICATOR CATEGORIES:

Wetland Indicator Status	**Description** (Lichvar and Gillrich 2011)	**Estimated Frequency of Occurrence in Wetlands**
Obligate (OBL)	Require standing water or seasonally saturated soils near the surface to assure adequate growth, development, and reproduction and to maintain healthy populations.	>99%
Facultative Wetland (FACW)	Depend on and predominately occur with hydric soils, standing water, or seasonally high water tables in wet habitats for assuring optimal growth, development, and reproduction and for maintaining healthy populations. These plants often grow in geomorphic locations where water saturates soils or floods the soil surface at least seasonally.	67-99%
Facultative (FAC)	These plants can occur in wetlands or nonwetlands. They can grow in hydric, mesic, or xeric habitats.	34-66%
Facultative Upland (FACU)	These plants are not wetland dependent. They can grow on hydric and seasonally saturated soils, but they develop optimal growth and healthy populations on predominately drier or more mesic sites.	1-33%
Upland (UPL)	These plants occupy mesic to xeric nonwetland habitats. They almost never occur in standing water or saturated soils.	<1%

A wetland indicator status that is in brackets [ ] reflects the opinion of the authors as to the occurrence in wetlands of that particular species.

Figure 5 illustrates the regions used by the *National Wetland Plant List* for the Lower 48 States. Three of the regions extend into Minnesota and Wisconsin: Great Plains (GP), Midwest (MW) and Northcentral/Northeast (NC/NE). In cases where a different indicator status for a particular species is assigned among the three regions, the description of that species will list all of the indicator statuses along with the abbreviation for each region.

FIGURE 5

COEFFICIENT OF CONSERVATISM (C of C)

The C of C is a numerical rating of 0 to 10 that expresses an individual species' relative fidelity, or conservatism, to specific natural habitats. High values indicate that the species is restricted to a very narrow range of habitats. For example, the white lady's-slipper (*Cypripedium candidum*) is found only in intact calcareous fens and wet prairies and has a C of C of 10 in Minnesota and Wisconsin. Conversely, low values indicate low conservatism to specific natural habitats. Species with low values tend to be more ubiquitous in their distributions, tolerating a broader range of environmental conditions including human impacts. Box elder (*Acer negundo*), which has a C of C of 1 in Minnesota and 0 in Wisconsin, is a natural component of floodplain forests; however, box elder has little fidelity to this habitat and can be found in numerous other habitats, including disturbed lands, throughout the region.

Species that are not native have not had specific C of C values assigned but are typically treated as having a C of C of 0.

The C of C is the central component of a vegetation based assessment technique called the Floristic Quality Assessment (FQA). FQA consists of a class of metrics that are derived from vegetation data and the C of C values, such as the mean C of C and the Floristic Quality Index. These metrics have

been repeatedly found to be effective wetland condition indicators (Mack and Kentula 2010). FQA could be used to assess the floristic quality of wetlands within a particular planning area or project site. It could also be used to determine compensatory mitigation requirements as well as set performance standards for compensatory mitigation. It is essential that comparisons using FQA be made on an "apples to apples" basis. In other words, FQA is only used to compare plant communities of the same type, e.g., the FQA of a sedge meadow within a project area is only compared to the FQA of other sedge meadows. As discussed by Milburn *et al.* (2007), FQA metric values and expected ranges can vary considerably between the wetland plant communities described herein. For example, the highest FQA metric values for deep marsh communities were found to be considerably lower than those for alder thicket and coniferous swamp communities. This does not mean that deep marshes have a low condition value; rather, it means that the floristic composition of deep marshes is *different* compared to other wetland plant communities and those differences are reflected in the metric scores.

Both Minnesota and Wisconsin have published C of C values for their respective wetland floras (Milburn *et al.* 2007; Bernthal 2003). The text herein will note whether each species is native or introduced as well as list its C of C. For example: **C of C:** Native (5). In some instances, different C of C values were assigned by each state. Both values are shown in those cases.

WETLANDS DOMINATED by FACULTATIVE UPLAND SPECIES

FACU species can, in some cases, be dominant species in wetlands. Examples include white pine (*Pinus strobus*) and jack pine (*Pinus banksiana*) swamps. The photograph below shows a swamp dom-

A white pine swamp in Monroe County, Wisconsin.

inated by white pine in Monroe County, Wisconsin. Soils are Dawson peat, a very poorly-drained organic soil. Hydrology is primarily groundwater seepages. No hydrologic modifications (e.g., ditching, tiling, groundwater extraction) have occurred. Other plant species present are OBL or FACW species including speckled alder (*Alnus incana* ssp. *rugosa*), skunk cabbage (*Symplocarpus foetidus*) and cinnamon fern (*Osmundastrum cinnamomeum*). Mature white pines have formed raised hummocks caused by shallow rooting, an apparent response to saturated soil conditions.

Another case where FACU species can dominate are seasonally flooded basins and vernal pools that are ponded early in the growing season, but are dry for much of the remainder of the growing season. In addition, FACU species can become established and even dominate wetland basins during periods of drought, such as the multiple year drought cycles experienced in the Prairie Pothole Region.

NOMENCLATURE

Nomenclature generally follows that of the Biota of North America Program (Kartesz 1994), which is used for the *National Wetland Plant List*. One difference is that some varieties and subspecies are used herein. For purposes of assigning an indicator status, the *National Wetland Plant List* does not recognize varieties and subspecies due to insufficient data to assign different indicator statuses within the same species. Common names were selected at the discretion of the authors.

MEASUREMENTS

Occasionally, the following format is used for listing measurements of a given character: (2)3-5(6) mm. This means the character is typically 3 to 5 mm. in size, but can range from a minimum of 2 mm. to a maximum of 6 mm.

ABBREVIATIONS

The following abbreviations are used in the text.
mm. -- millimeter(s)
cm. -- centimeter(s)
m. -- meter(s)
km. -- kilometer
sp. and spp. -- species (singular) and species (plural)
ssp. -- subspecies
var. -- variety
dbh -- diameter at breast height
GP -- Great Plains Region (see Figure 5)
MW -- Midwest Region
NC/NE -- Northcentral/Northeast Region

PHOTOGRAPHY CREDITS

Photography is by Steve D. Eggers except for the following:
Gary B. Walton: Swamp red currant, dark-scale cottongrass, bristle-berry, clustered bur-reed and rough bedstraw.
Keith Bowman: *Sphagnum capillifolium, S. teres, S. fuscum* and *S. wolfii*.
Minnesota Department of Natural Resources: high altitude aerial photograph of the Red Lake Peatland.

SECTION 2

Key to the Wetland Plant Communities

Key to the Wetland Plant Communities

1A. Mature trees (dbh >6 inches) are present and form closed stands (>17 trees/acre; >50 percent areal cover)…….....……...…….……..……2

2A. Hardwood trees are dominant (>50 percent areal cover or basal area of the tree stratum); soils are alluvial, peaty/mucky, or poorly-drained mineral...…….…….....……3

3A. Floodplains that are temporarily inundated during flood events, but are relatively well-drained for much of the growing season; silver maple, American elm, river birch, green ash, black willow, swamp white oak, box elder and/or plains cottonwood are dominant ….....……
……...…..….**FLOODPLAIN FOREST**

3B. Ancient lake basins, closed depressions, or retired riverine oxbows, that have longer term inundation/saturation during the growing season..…….…….……..……4

4A. Black ash, green ash, yellow birch, red maple, quaking aspen, balsam poplar, silver maple, black willow and/or plains cottonwood are dominant; northern white cedar may be subdominant; growing on poorly-drained mineral or peat/muck soils often associated with ancient lake basins and retired riverine oxbows.……**HARDWOOD SWAMP**

4B. Quaking aspen, plains cottonwood, red maple, American elm, silver maple, yellow-bud hickory and/or green ash are dominant growing in seasonally ponded depressions……
…….……..…..**HARDWOOD SWAMP (Vernal Pool Subtype)**

2B. Coniferous trees are dominant (>50 percent areal cover or basal area of the tree stratum); soils usually mucky/peaty...……5

5A. Tamarack and/or black spruce are dominant; growing on a nearly continuous *Sphagnum* moss mat and acidic, mineral-poor, peat soils.….....……..……....**CONIFEROUS BOG**

5B. Northern white cedar and/or tamarack are dominant; nearly continuous *Sphagnum* moss mat absent; usually growing on neutral to alkaline, minerotrophic, peats or mucks.....
.....**CONIFEROUS SWAMP**

1B. Mature trees are absent or, if present, form open, sparse stands; other woody plants, if present, are shrubs, saplings, or pole size trees (dbh <6 inches) less than 20 feet in height…….....……..……6

6A. Community dominated (>50 percent areal cover) by woody shrubs…….……7

7A. Low, woody shrubs usually <3 feet in height; *Sphagnum* moss mat layer may or may not be present…….....……8

8A. Shrubs are ericaceous (Heath family) and evergreen growing on a *Sphagnum* moss mat and acidic, mineral-poor, peat soils; common…...……**OPEN BOG**

8B. Shrubs are deciduous, mostly shrubby cinquefoil, often growing on sloping sites with a spring-fed supply of internally flowing, calcareous waters; calcium-tolerant plants (calciphiles) are dominant; *Sphagnum* moss mat layer absent; muck soils are alkaline and minerotrophic; rare..... **CALCAREOUS FEN**

7B. Tall, deciduous shrubs usually >3 feet in height; *Sphagnum* moss mat absent..... 9

9A. Speckled alder is dominant; usually growing on acidic hydric soils in and north of the vegetation tension zone..... **ALDER THICKET**

9B. Willows, red-osier dogwood, silky dogwood, meadowsweet and/or steeplebush are dominant; usually growing on neutral to alkaline hydric soils; found both north and south of the vegetation tension zone. NOTE: Non-native buckthorns (*Rhamnus cathartica* and *Frangula alnus*) can occur as dominant shrubs or small trees in disturbed sites ..... **SHRUB-CARR**

6B. Community dominated (>50 percent areal cover) by herbaceous plants..... 10

10A. Aquatic emergent and terrestrial vegetation layers absent; dominated by floating, floating-leaved and/or submergent species; water depths up to 6.6 feet..... **SHALLOW, OPEN WATER COMMUNITIES**

10B. Aquatic emergent and/or terrestrial vegetation layers present; standing water may or may not be present..... 11

11A. Permanently to seasonally inundated by water depths up to 3 feet or more during most growing seasons; dominated by perennial aquatic emergent, floating, floating-leaved and/or submergent vegetation layers[1]..... 12

12A. Inundated by water depths of 6 inches to 3 feet or more throughout the growing season in most years; community a mixture of aquatic emergent, floating, floating-leaved and/or submergent layers..... **DEEP MARSH**

12B. Inundated by water depths up to 6 inches, often drying down to saturated soils during the latter half of most growing seasons; aquatic emergent layer is dominant; floating and floating-leaved layers may be present but not dominant..... **SHALLOW MARSH**

11B. Temporarily inundated to saturated soils during most growing seasons; floating, floating-leaved and submergent layers absent..... 13

13A. Temporarily inundated for a few weeks in spring giving way to mudflats and then dry for the remainder of the growing season; annuals (e.g., smartweeds, wild millet) typically dominate by the late growing season; often cultivated for row crops; geomorphic position consists of basins or flats..... **SEASONALLY FLOODED BASIN**

[1] Wild rice, an annual, can also be a dominant in marshes.

13B. Saturated soils, at most briefly inundated; typically 75-100 percent of total areal cover is by perennial vegetation; geomorphic position variable.....14

14A. Nearly continuous *Sphagnum* moss mat on acidic, peat soils; sedges and forbs tolerant of low nutrient/mineral conditions are characteristic…...……**OPEN BOG**

14B. Nearly continuous *Sphagnum* moss mat absent or sparse; soils typically circumneutral to alkaline peats, mucks or hydric mineral soils…….....…..……..……..15

15A. Spring-fed supply of internally flowing, calcareous groundwater; dominated by calcium-tolerant species (calciphiles) such as sterile sedge, Grass of Parnassus and beaked spike-rush; typically on sloping or domed muck soils; rare…….…….**CALCAREOUS FEN**

15B. Calciphiles not dominant; water source/chemistry/soils not restricted to the above; both common and rare communities…….……16

16A. Dominated by sedges, primarily *Carex*..…….…....…..……17

17A. A floating mat primarily composed of wiregrass sedge (*Carex lasiocarpa*) and/or bog sedge (*C. oligosperma*); common associates are other sedges, Canada blue-joint grass, marsh fern and various forbs…….....…….....**SEDGE MEADOW (Sedge Mat Subtype)**

17B. Floating mat absent; well developed peat, muck or hydric mineral soils dominated by hummock sedge (*Carex stricta*) and/or other sedges[2]…...……**SEDGE MEADOW**

16B. Dominated by grasses and/or forbs ....…..……..……..18

18A. Dominated by native prairie grasses (e.g., prairie cord-grass, big bluestem, narrow reedgrass, switch grass) with native prairie forbs; growing on hydric mineral soils; predominately occurs south of the vegetation tension zone; rare...**WET to WET-MESIC PRAIRIE**

18B. Dominated by Canada blue-joint grass, non-native grasses (e.g., reed canary grass, redtop) and/or forbs not restricted to prairies; soils are peats, mucks or hydric mineral; occurs in both floristic provinces and tension zone; common..……...……19

19A. Dominated by Canada blue-joint grass and/or native forbs ....……**FRESH (WET) MEADOW (Native Subtype)**

19B. Dominated by non-native grasses and/or forbs indicative of disturbance (e.g., stinging nettle, giant ragweed)…… ……..….**FRESH (WET) MEADOW (Disturbed Subtype)**

[2]Some sedges (e.g., *Carex lacustris*) can dominate shallow marshes. Use couplet 11 to differentiate sedge-dominated shallow marshes from sedge meadows.

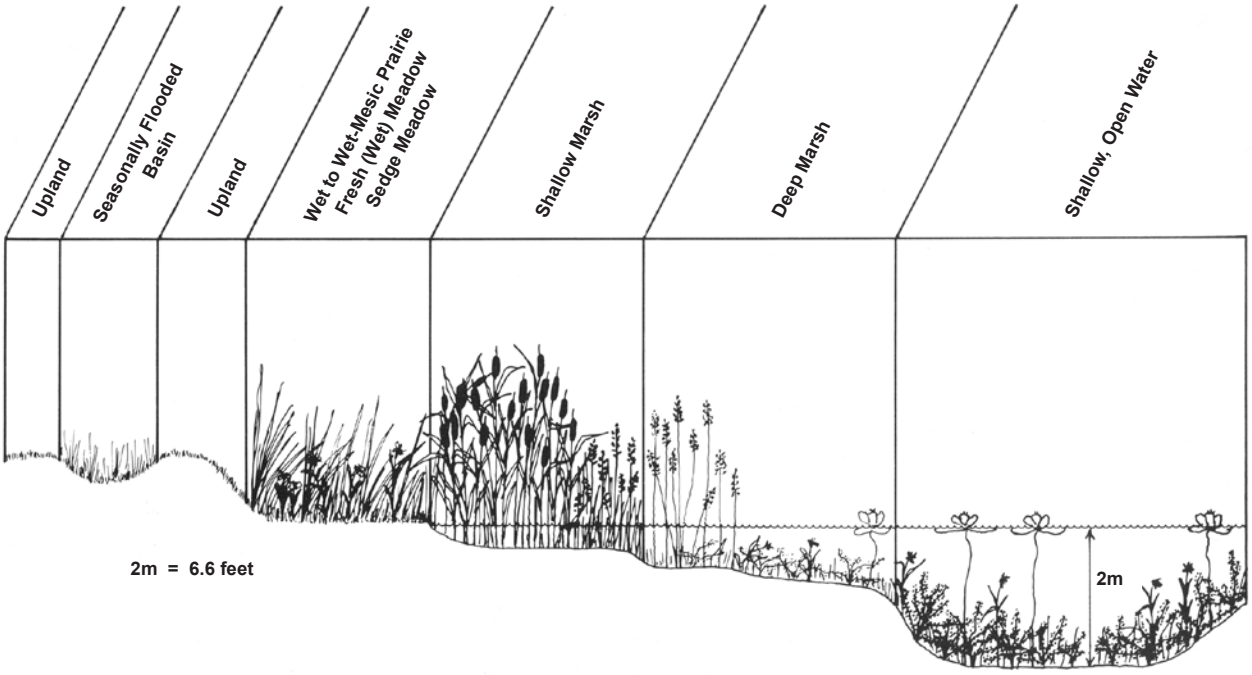


FIGURE 6 - **Generalized Cross Section of a Meadow-Marsh-Open Water Complex**

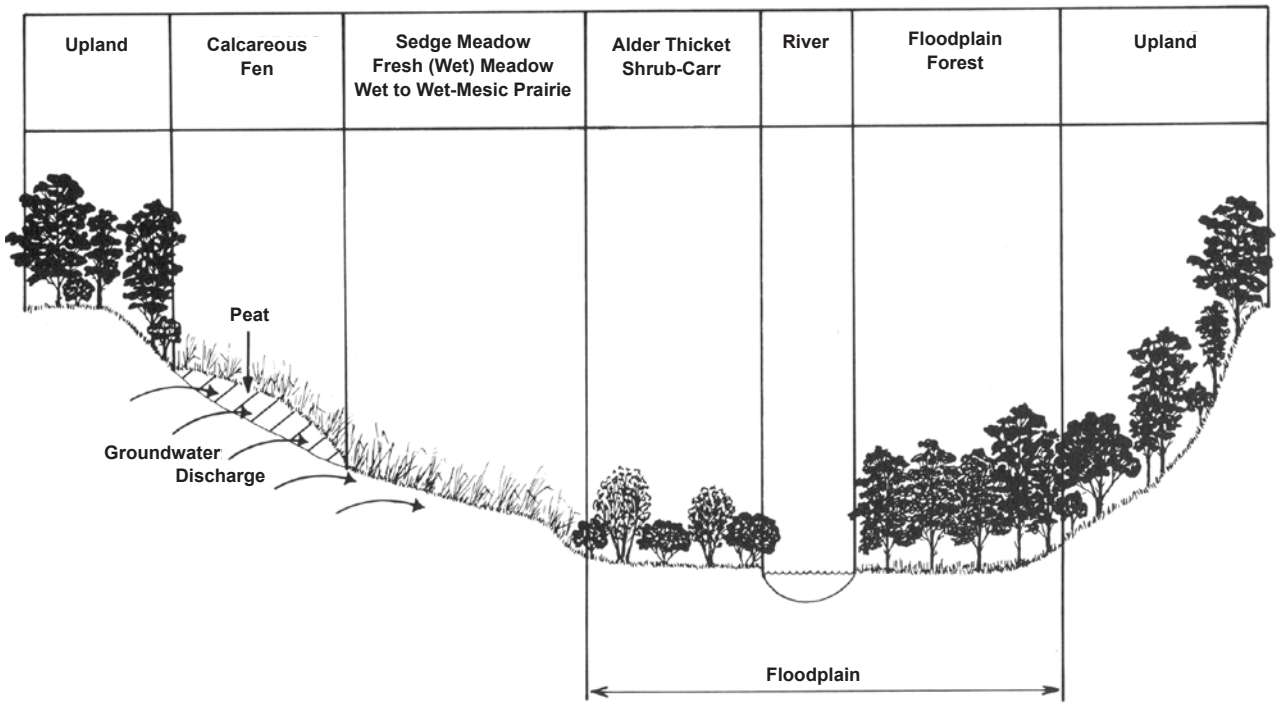


FIGURE 7 - **Generalized Cross Section of Wetland Plant Communities in a River Valley**

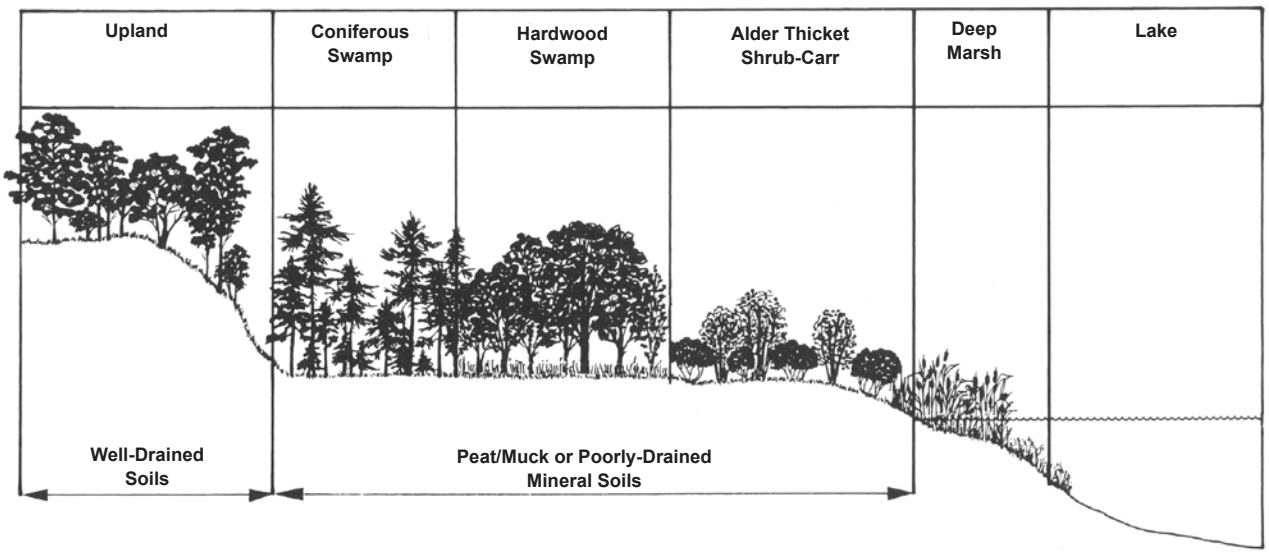


FIGURE 8 - **Generalized Cross Section of Wetland Plant Communities in a Lake Basin**

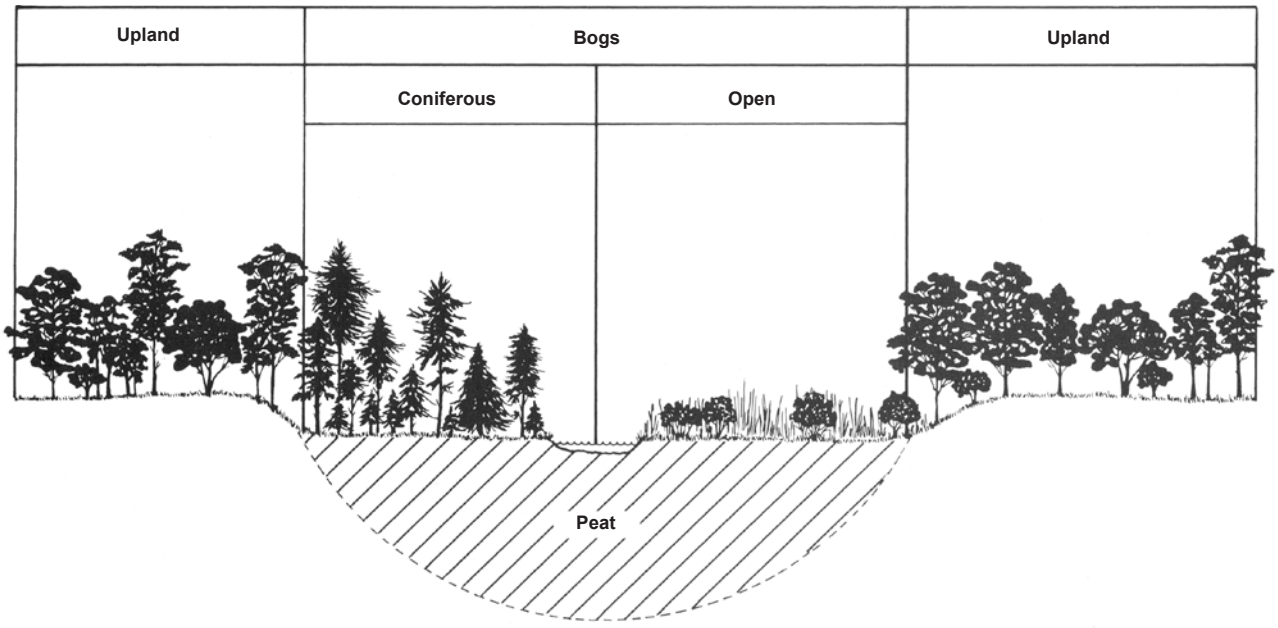


FIGURE 9 - **Generalized Cross Section of a Bog**

SECTION 3

Wetland Plants and Plant Communities

I. Shallow, Open Water Communities

Shallow, open water plant communities generally have water depths of less than 6.6 feet (2 meters). Submergent, floating and floating-leaved aquatic vegetation including pondweeds, water-lilies, water milfoil, coontail and duckweeds characterize this wetland type. Size can vary from a one-quarter acre pond, to a long oxbow of a river, or shallow bay of a lake. The presence or absence of floating vegetation depends upon the effects of the season, wind, availability of nutrients, and aquatic weed control efforts.

Shallow, open water communities differ from deep and shallow marshes in that they are seldom, if ever, drawn down. As a result, emergent aquatic vegetation cannot establish and persist.

Shallow, open water communities provide important habitat for waterfowl, terns, furbearers, fish, frogs, turtles and aquatic invertebrates. For example, the submergent plants and aquatic invertebrates provide food for waterfowl, which is especially important during migration. The permanent to semi-permanent water regime of these deep-water wetlands results in their being especially important for waterfowl production in drought years when other wetlands become dry. Also provided is habitat for spawning beds and nursery areas for both game and nongame fish. Finally, these areas of open water provide a valuable aesthetic resource important to municipalities and landowners.

Franklin's gulls and white pelicans using habitat provided by a shallow, open water wetland.

VEGETATION: White water-lily (*Nymphaea odorata*), yellow water-lily (*Nuphar variegata*), flat-stem pondweed (*Potamogeton zosteriformis*), curly pondweed (*Potamogeton crispus*), common water-milfoil (*Myriophyllum sibiricum*), coontail (*Ceratophyllum demersum*), common bladderwort (*Utricularia macrorhiza*), white water crowfoot (*Ranunculus longirostris*), water star-grass (*Heteranthera dubia*), elodea (*Elodea canadensis*), water smartweed (*Persicaria amphibia*), big duckweed (*Spirodela polyrhiza*), lesser duckweed (*Lemna minor*), watermeal (*Wolffia columbiana*) and star duckweed (*Lemna trisulca*).

SOILS: Lacustrine deposits and sediments.

HYDROLOGY: Permanently inundated.

LOCATION: Lake Marion, Dakota County, Minnesota.

VEGETATION: Water shield (*Brasenia schreberi*) is the dominant species. Also present are ribbon-leaf pondweed (*Potamogeton epihydrus*), flat-stem pondweed (*Potamogeton zosteriformis*), common water-milfoil (*Myriophyllum sibiricum*), coontail (*Ceratophyllum demersum*), water purslane (*Didiplis diandra*), common bladderwort (*Utricularia macrorhiza*), elodea (*Elodea canadensis*), big duckweed (*Spirodela polyrhiza*), lesser duckweed (*Lemna minor*) and star duckweed (*Lemna trisulca*). A fringe of greenfruit bur-reed (*Sparganium emersum*) is present.

SOILS: Twelve to 36 inches of peat over sand.

HYDROLOGY: Permanently inundated (a man-made impoundment of a tamarack swamp).

LOCATION: Jackson County, Wisconsin.

VEGETATION: Long-leaf pondweed (*Potamogeton nodosus*), leafy pondweed (*Potamogeton foliosus*) and wild celery (*Vallisneria americana*) dominate this example. Also present are curly pondweed (*Potamogeton crispus*), wavy water-nymph (*Najas flexilis*), common bladderwort (*Utricularia macrorhiza*), Eurasian water-milfoil (*Myriophyllum spicatum*), elodea (*Elodea canadensis*), coontail (*Ceratopyllum demersum*), big duckweed (*Spirodela polyrhiza*), lesser duckweed (*Lemna minor*) and watermeal (*Wolffia columbiana*).

SOILS: Lacustrine and riverine sediments.

HYDROLOGY: Permanently inundated; impoundment of the Mississippi River.

LOCATION: Weaver Bottoms, Pool 5 of the Mississippi River, Wabasha County, Minnesota.

SAGO PONDWEED

(*Stuckenia pectinata* (L.) Boerner)

PONDWEED FAMILY (Potamogetonaceae) **C of C:** Native (3) **IND. STATUS:** OBL

SYNONYM: *Potamogeton pectinatus* L.

FIELD CHARACTERISTICS: An aquatic, perennial herb from rhizomes tipped with a tuber. Stems are 30-100 cm. long and 1-2 mm. wide. This pondweed has a bushy appearance because of its much-branched stems and numerous thread-like leaves spreading in a fan-like fashion. Leaves are all submerged and very narrow (0.2-1(1.7) mm. wide) tapering to sharply pointed tips. Flowers are in submergent, cylindrical spikes 1-5 cm. long with 2-5 whorls of flowers. Nutlets are (2.5)3-4.5 mm. long not including the tiny beak. In flower June-September.

ECOLOGICAL NOTES: Sago pondweed is found in marshes, lakes, streams, Mississippi River backwaters, and prairie potholes, usually at depths to 5 feet, rarely to 10 feet, especially in calcareous, mixosaline and saline waters. The pondweeds (*Stuckenia* spp. and *Potamogeton* spp.) in general are among the most important of all aquatic plants for wildlife food, and sago pondweed may be the most important because of its abundant production of fruit and tubers. The entire plant is relished as food by waterfowl and it provides good fish habitat.

SOURCE: Martin *et al.* (1951); Chadde (2002); and Voss (1972).

FLOATING-LEAF PONDWEED

(*Potamogeton natans* L.)

PONDWEED FAMILY (Potamogetonaceae) **C of C:** Native (5) **IND. STATUS:** OBL

FIELD CHARACTERISTICS: An aquatic, perennial herb. Stems (labeled 3 on the photograph above right) are usually unbranched and 50-200 cm. long and 1-2 mm. wide. Blades of the floating leaves (labeled 1 above) are heart-shaped to somewhat heart-shaped at the base, and 2-4.7 cm. wide and (3.2)3.7-9(10) cm. long. Larger leaves have (18)21-35 nerves. Submerged leaves (labeled 2 above) are linear and 10-30 cm. long and only 1-2 mm. wide. Flowers are on emerged, cylindrical spikes 2-5 cm. long. Mature nutlets are (3.6)3.7-4.5 mm. long (including the beak). In flower July-September.

ECOLOGICAL NOTES: Floating-leaf pondweed is common in marshes, lakes, rivers, ditches and bog ponds — typically in water depths to 5 feet — but it can be found at more than twice that depth. Good fish habitat is provided by this aquatic plant.

SOURCE: Voss (1972); and Gleason and Cronquist (1991).

ILLINOIS PONDWEED

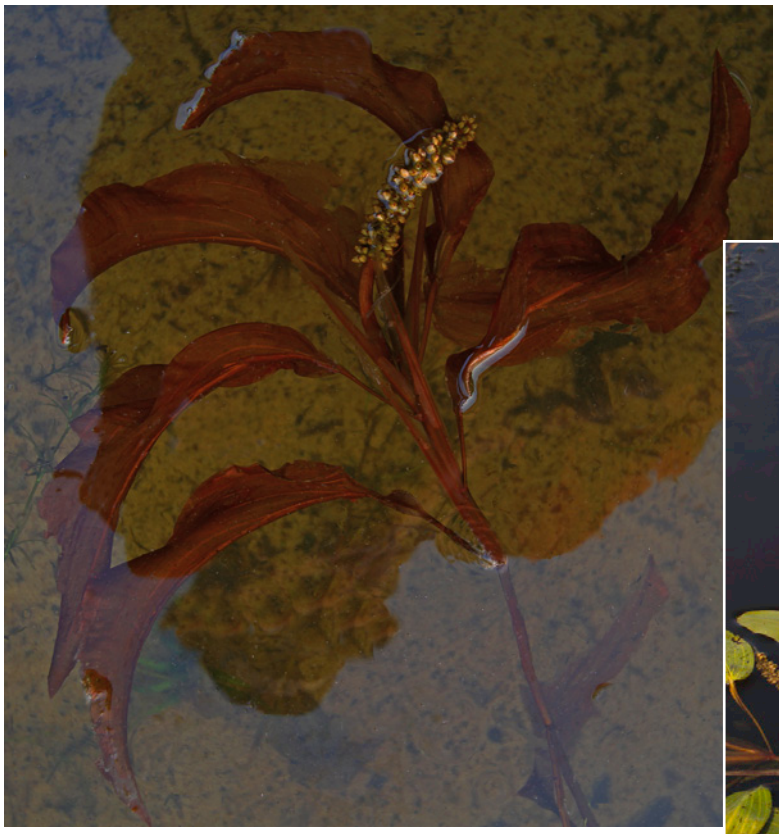
(*Potamogeton illinoensis* Morong)

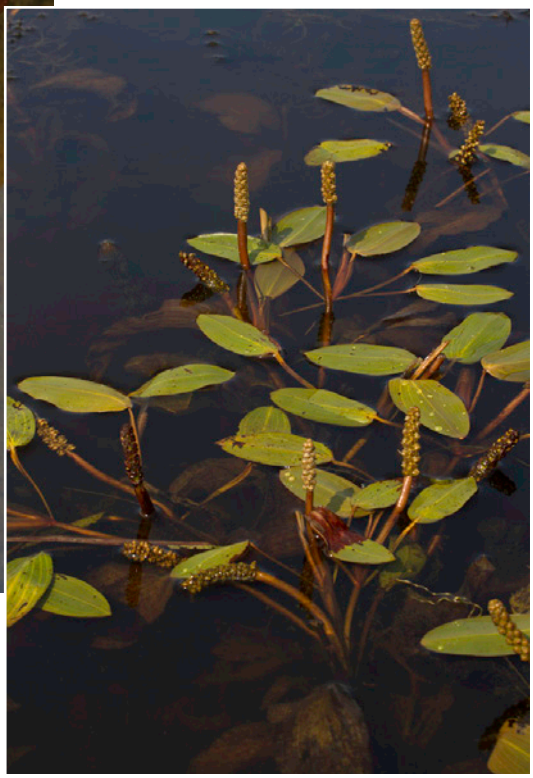
PONDWEED FAMILY (Potamogetonaceae) **C of C:** Native (6) **IND. STATUS:** OBL

FIELD CHARACTERISTICS: An aquatic, perennial herb with stems to 2 m. long and 2-5 mm. wide. Submerged leaves are sessile or on petioles not over 2 cm. long. Submerged leaves are 0.8-3.2(5) cm. wide with (7)9-19 nerves and have a pointed tip that can be up to 4(5) mm. long. Floating leaves (if present) have blades 1.7-3(3.5) cm. wide with petioles that are shorter than the blades. Flowers are on emerged, cylindrical spikes 2-6 cm. long. The olive-green nutlets are 3-4 mm. long and somewhat sharply keeled. In flower July-September.

ECOLOGICAL NOTES: Illinois pondweed is found in lakes and rivers, especially calcareous waters, in depths to 15 feet.

SOURCE: Fernald (1970); Chadde (2002); and Voss (1972).





LARGE-LEAF PONDWEED

(*Potamogeton amplifolius* Tuckerman)

PONDWEED FAMILY (Potamogetonaceae) **C of C:** Native (7) **IND. STATUS:** OBL

FIELD CHARACTERISTICS: An aquatic, perennial herb with usually unbranched stems to 1 m. or more long and 2-4 mm. wide. Fully developed submerged leaves have a characteristic quarter-moon shape because of their strongly-arched, folded condition. Submerged leaves are (2.5)3.5-7.2 cm. wide with 24-40(52) nerves. Floating leaves (if present) are elliptical, 4-10 cm. long with 28-50 nerves. Flowers are in dense, cylindric spikes 3-6 cm. long. Nutlets are green brown to brown and 4-5 mm. long including the 1 mm. beak. In flower July-September.

ECOLOGICAL NOTES: Large-leaf pondweed is found in lakes and rivers, usually at depths less than 9 feet, but it has been found in waters to 18 feet in depth.

SOURCE: Fernald (1970); Chadde (2002); and Voss (1972).

LEAFY PONDWEED
(*Potamogeton foliosus* Raf.)

PONDWEED FAMILY (Potamogetonaceae) **C of C:** Native (6) **IND. STATUS:** OBL

FIELD CHARACTERISTICS: An aquatic, perennial herb growing to 80 cm. in length. Stems are only 1 mm. wide and slightly compressed. Leaves are all submersed, linear, 1.5-8 x 0.5-2 mm., 1- to 3-veined, with an acute tip. Stipules are free and 0.5-2 cm. long. Glands are usually absent at the base of stipules. Flowers are in rounded to short-cylindric spikes 2-7 mm. long with axillary stalks 5-15 mm. long. Nutlets (achenes) are green-brown, winged, 1.5-3 mm. long with a beak of 0.5 mm. In flower June-August.

ECOLOGICAL NOTES: Leafy pondweed is occasional to common in lakes, ponds, rivers and Mississippi River backwaters in water depths up to 12 feet.

SOURCE: Gleason and Cronquist (1991); Chadde (2002); and Voss (1972).

CURLY PONDWEED
(*Potamogeton crispus* L.)

PONDWEED FAMILY (Potamogetonaceae) **C of C:** Introduced, invasive (0) **IND. STATUS:** OBL

FIELD CHARACTERISTICS: An aquatic, perennial herb with stems growing to 80 cm. long and 1-2 mm. wide. Leaves are all submersed, oblong, 3-9 cm. long and 5-10 mm. wide, rounded at the tip, stalkless, 3-5 veined with wavy, crisped margins that are finely serrate. Stipules are 4-10 mm. long and joined at the base of the leaf. Flowers are in dense, cylindrical spikes 1-2 cm. long on stalks 2-6 cm. long. Nutlet (achene) is brown, ovoid, 3 mm. long, shallowly pitted, with 3 round, dorsal keels and a prominent beak 2-2.5 mm. long. In flower April-June, noticeably earlier than native pondweeds.

ECOLOGICAL NOTES: Curly pondweed is a native of Europe that has become widely established in our waters, especially those with high nutrient levels. It inhabits shallow to deep waters of lakes, ponds, rivers and ditches, including the Great Lakes and Mississippi River backwaters, and can become a nuisance to fishing, boating and swimming.

SOURCE: Gleason and Cronquist (1991); Chadde (2002); and Voss (1972).

RIBBON-LEAF PONDWEED

(*Potamogeton epihydrus* Raf.)

PONDWEED FAMILY (Potamogetonaceae) **C of C:** Native (8) **IND. STATUS:** OBL

FIELD CHARACTERISTICS: An aquatic, perennial herb to 2 m. in length. Leaves are of two types. Submersed leaves are linear, ribbon-like, 10-20 cm. long and 3-8 mm. wide with the midrib flanked by a pair of conspicuous bands of pale green to translucent cells. Stipules are 1-3 cm. long and not joined to the leaf. Floating leaves are usually present and are oval to obovate, 3-8 cm. long and 1-2 cm. wide, mostly obtuse to abruptly short-awned at the tip, and 11-25 veined. Stipules are 1-3 cm. long and free from the leaf. Flowers are in dense, cylindric spikes 2-3 cm. long on stalks 2-6 cm. long. Nutlets (achenes) are olive to brown, 2-3 mm. long, shallowly pitted, with three dorsal keels and a tiny beak. In flower July-September.

ECOLOGICAL NOTES: Ribbon-leaf pondweed is found in deep marshes, lakes, rivers, ponds and cranberry operation impoundments in water depths to 6 feet.

SOURCE: Gleason and Cronquist (1991); Chadde (2002); and Voss (1972).

Submersed leaf

LONG-LEAF PONDWEED
(*Potamogeton nodosus* Poir.)

PONDWEED FAMILY (Potamogetonaceae) **C of C:** Native (7 WI)(6 MN) **IND. STATUS:** OBL

FIELD CHARACTERISTICS: An aquatic, perennial herb with stems to 2 m. in length and 1-2 mm. wide. Leaves are of two types. Larger submersed leaves with blades 1-2.5(3) cm. wide on petioles 4-11 cm. long, 7-15 veined, translucent and usually decayed by fruiting time. Floating leaves are oval, 5-12 cm. long and 1-5 cm. wide, tapered at both ends and many veined. Petioles are somewhat winged, 5-20 cm. long and 2-3 mm. wide. Stipules are not joined with the leaf. Flowers are in emergent, dense, cylindric spikes 2-6 cm. long on stalks 3-15 cm. long. Nutlets (achenes) are red-brown to brown, 3-4 mm. long with a short beak. In flower July-August.

ECOLOGICAL NOTES: Long-leaf pondweed is occasional to common in deep marshes, lakes and rivers to a depth of 6 feet. It can be a dominant in Mississippi River backwaters (see photograph on page 29).

SOURCE: Gleason and Cronquist (1991); Chadde (2002); and Voss (1972).

VASEY'S PONDWEED

(*Potamogeton vaseyi* J.W. Robbins)

PONDWEED FAMILY (Potamogetonaceae) **IND. STATUS:** OBL

C of C: Native (10), a species of special concern in Wisconsin

FIELD CHARACTERISTICS: An aquatic, annual herb with threadlike stems 20-100 cm. long. Leaves are of two types. Submersed leaves are linear, transparent, 2-6 cm. long, up to 1 mm. wide and tapered to a sharp tip. Stipules are free, linear, white and 1-2 cm. long. Floating leaves are sparingly produced on some plants of a colony. Blades of floating leaves are spatulate to obovate, 8-15 mm. long, 5-9 veined, leathery, the veins sunken on the underside. Flowers are in cylindric spikes 3-8 mm. long. Nutlets (achenes) are 2-3 mm. long with a short beak.

ECOLOGICAL NOTES: Vasey's pondweed is rare to uncommon in lakes in northern Minnesota and Wisconsin.

SOURCE: Gleason and Cronquist (1991); Chadde (2002); and Voss (1972).

FLAT-STEM PONDWEED

(*Potamogeton zosteriformis* Fern.)

PONDWEED FAMILY (Potamogetonaceae) **C of C:** Native (6) **IND. STATUS:** OBL

FIELD CHARACTERISTICS: An aquatic, perennial herb with strongly flattened, sometimes winged, stems to 1 m. long and 1-3 mm. wide. Leaves are all submersed and linear, 5-20 cm. long and 3-5 mm. wide, and taper to a tip or sharp point. Stipules are free, white and 1-4 cm. long. Flowers are in cylindric spikes 1-2.5 cm. long. Nutlets (achenes) are dark green to brown, 4-5 mm. long with a short, blunt beak. In flower July-August.

ECOLOGICAL NOTES: Flat-stem pondweed is one of the most common and distinctive pondweeds (Voss 1972). It is found in streams and shallow to deep lakes.

SOURCE: Gleason and Cronquist (1991); Chadde (2011); and Voss (1972).

GRASS-LEAF PONDWEED

(*Potamogeton gramineus* L.)

PONDWEED FAMILY (Potamogetonaceae) **C of C:** Native (7) **IND. STATUS:** OBL

FIELD CHARACTERISTICS: An aquatic, perennial herb with slender stems to 80 cm. long and 1 mm. wide. Leaves are of two types. Submersed leaves are variable in shape from linear to lance-shaped to oblong lance-shaped, 3-9 cm. long and 3-12 mm. wide, with 3-7 veins. Floating leaves are oval, 2-6 cm. long and 1-3 cm. wide with 11-19 veins. Stipules are free, persistent and 1-4 cm. long. Flowers are in cylindric spikes 1.5-4 cm. long. Nutlets (achenes) are dull green and 2-3 mm. long. In flower June-August.

ECOLOGICAL NOTES: Grass-leaf pondweed is found in shallow to deep waters of ponds, lakes and streams.

SOURCE: Gleason and Cronquist (1991); Chadde (2011); and Voss (1972).

CLASPING-LEAF PONDWEED

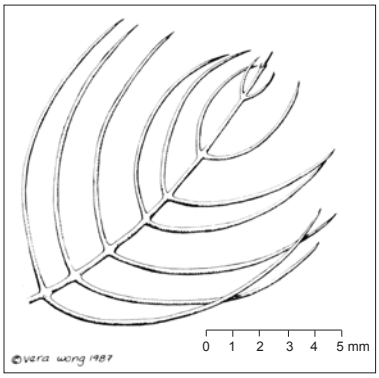
(*Potamogeton richardsonii* (Benn.) Rydb.)

PONDWEED FAMILY (Potamogetonaceae) **C of C:** Native (5) **IND. STATUS:** OBL

FIELD CHARACTERISTICS: An aquatic, perennial herb with round stems 30-100 cm. long and 1-2.5 mm. wide. Leaves are all submersed, lance-shaped, 5-12 cm. long and 1-2.5 cm. wide, with 13 or more prominent veins. Leaves have a heart-shaped base clasping the stem. Leaf margins are entire and wavy. Stipules are free, 1-2 cm. long, then shredding and persisting as fibers (stipular fibers). Flowers are in cylindric spikes 1.5-4 cm. long. Nutlets (achenes) are green to brown, 2-4 mm. long, with a short beak. In flower July-August.

ECOLOGICAL NOTES: Clasping-leaf pondweed is found in shallow to deep waters of streams and lakes.

SOURCE: Gleason and Cronquist (1991); Chadde (2011); and Voss (1972).



Leaf shape

Emersed flower spikes

COMMON WATER-MILFOIL

(*Myriophyllum sibiricum* Komarov)

WATER-MILFOIL FAMILY (Haloragaceae) **C of C:** Native (6 WI)(7 MN) **IND. STATUS:** OBL

SYNONYM: *Myriophyllum exalbescens* Fern.

FIELD CHARACTERISTICS: A perennial, aquatic herb with stems 1 m. or more in length. Leaves are in whorls of 3-4, 1-4 cm. long, with mostly 5-10 thread-like segments on each side of the midrib. Flowers are in emerged spikes 4-10 cm. long. Flowers and bracts are whorled. Staminate and pistillate flowers are separate with the uppermost flower whorls being staminate and lower being pistillate. Staminate flowers have pinkish petals 2-3 mm. long. Floral bracts are much smaller than the leaves and are entire (not segmented). Fruit is 2-3 mm. long. In flower June-September.

ECOLOGICAL NOTES: Common water-milfoil is found in shallow to deep water of lakes, ponds, marshes, ditches and slow moving streams.

SOURCE: Gleason and Cronquist (1991); Swink and Wilhelm (1994); and Voss (1985).

EURASIAN WATER-MILFOIL

(*Myriophyllum spicatum* L.)

WATER-MILFOIL FAMILY (Haloragaceae) **IND. STATUS:** OBL

C of C: Introduced, invasive (0)

FIELD CHARACTERISTICS: A perennial, aquatic herb very similar to the native common water-milfoil (*M. sibiricum*). To distinguish the two species:

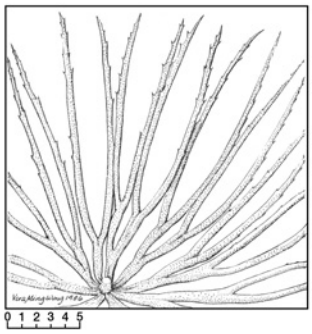
Leaves with 5-10 thread-like segments on each side of the midrib; submerged leaves stiff when removed from the water ..... *M. sibiricum*

Leaves with 12-22 thread-like segments on each side of the midrib; submerged leaves collapse when removed from the water . . . . . *M. spicatum*

ECOLOGICAL NOTES: Eurasian water-milfoil is found in shallow to deep water of lakes, ponds and Mississippi River backwaters. This highly invasive species can become a nuisance by forming dense mats that interfere with boating, fishing and swimming.

SOURCE: Gleason and Cronquist (1991); Chadde (2002); and Voss (1985).

Nutlet, 4-6 mm. long, with one terminal and two basal spines.



Leaves

COONTAIL

(*Ceratophyllum demersum* L.)

HORNWORT FAMILY (Ceratophyllaceae) **C of C:** Native (3 WI)(2 MN) **IND. STATUS:** OBL

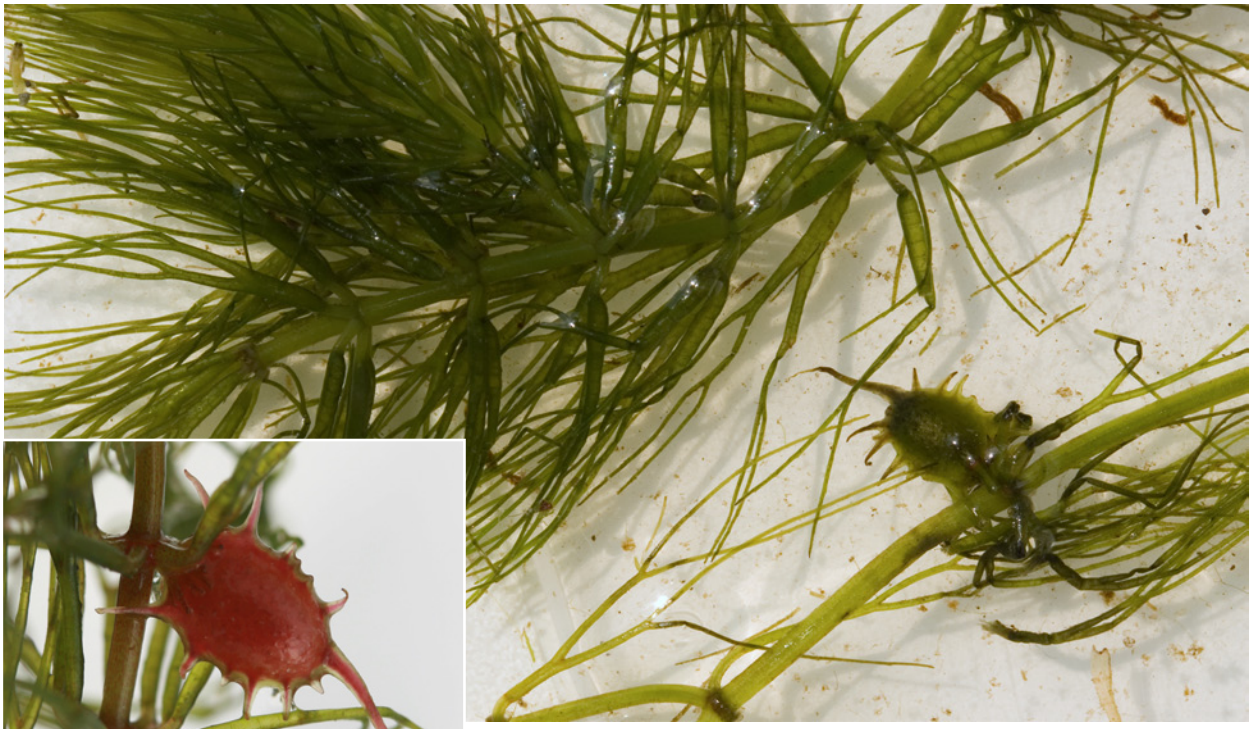
FIELD CHARACTERISTICS: A submerged herb lacking true roots, but may be anchored by modified leaves. Leaves are in whorls of 5-12 and are stiff and dichotomously forked. Leaves have thread-like divisions with teeth along one side. The leaves are usually much more crowded toward the tip; thus, the "coontail" appearance. There is great variability in the length and crowding of the leaves. Flowers are unisexual. Fruit is a nutlet 4-6 mm. long with two spines near the base and a terminal spine. In flower July-September.

ECOLOGICAL NOTES: Coontail is one of the most abundant submergent plants in lakes, streams, marshes, ditches, stormwater ponds, and Mississippi River backwaters, in shallow water to depths of 18 feet. Coontail is tolerant of nutrient-rich waters and fluctuating water levels. It can become a nuisance by forming thick masses that interfere with swimming, fishing and boating.

Most reproduction is by fragmentation of the stem. Pollination is by a unique method. The staminate flowers are released underwater and float to the surface. Pollen is then released and drifts downward through the water column where it may, by chance, land on a pistillate flower.

SOURCE: Fassett (1957); Gleason and Cronquist (1991); Martin *et al.* (1951); and Voss (1985).

Coontail
(*Ceratophyllum demersum*)



© Photos by Steve D. Eggers

Nutlet, 4-6 mm. long, with many spines along the margin.

SPINY COONTAIL

(*Ceratophyllum echinatum* Gray)

HORNWORT FAMILY (Ceratophyllaceae) **IND. STATUS:** OBL

C of C: Native (10), a species of special concern in Wisconsin

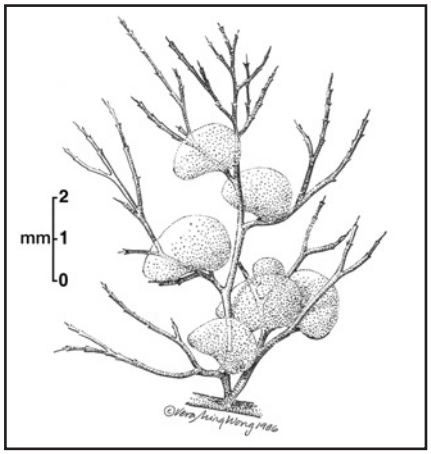
FIELD CHARACTERISTICS: A floating, perennial, rootless, aquatic herb with elongate stems. Much like coontail (*C. demersum*). To distinguish between the two species:

Leaves usually stiff, forked 1-2 times, margins coarsely toothed; nutlets with two basal spines . . . . . *C. demersum*

Leaves limp, some larger leaves forked 3-4 times, margins not toothed; nutlets with several spines along each margin . . . . . *C. echinatum*

ECOLOGICAL NOTES: Spiny coontail is rare to uncommon in lakes, ponds and quiet waters of rivers and streams, preferring acidic waters.

SOURCE: Gleason and Cronquist (1991); and Chadde (2002).



Leaf and bladders

© Photos by Steve D. Eggers

COMMON BLADDERWORT

(*Utricularia macrorhiza* Le Conte)

BLADDERWORT FAMILY (Lentibulariaceae) **IND. STATUS:** OBL

C of C: Native (7 WI)(5 MN) **SYNONYM:** *Utricularia vulgaris* L.

FIELD CHARACTERISTICS: An aquatic, free-floating herb. Leaves are numerous and highly dissected with bladders scattered throughout. The naked (leafless) stems are emergent, 6-20 cm. high, with 6-20 flowers. Flowers are bright yellow and composed of 2 lips 1-2 cm. long, and a short spur, which is about two-thirds as long as the lower lip. In flower June-August.

ECOLOGICAL NOTES: This bladderwort is found in quiet waters of lakes, rivers and marshes. Other species of bladderworts (*Utricularia* spp.) inhabit bogs and calcareous fens. See Appendix C for a key to bladderworts in our area. Bladderworts are insectivorous plants that derive their name from the small bladders used to capture minute animal life. The bladders have "trigger hairs" which, when brushed by a small aquatic invertebrate, cause the bladder to rapidly inflate and draw in the unfortunate organism. The victim is then "digested" as glands absorb nutrients and expel water.

SOURCE: Gleason and Cronquist (1991); and Kartesz (1994).

WAVY WATER-NYMPH

(*Najas flexilis* (Willd.) Rostk. & Schmidt)

WATER-NYMPH FAMILY (Najadaceae) **C of C:** Native (6 WI)(5 MN) **IND. STATUS:** OBL

FIELD CHARACTERISTICS: An annual, aquatic herb with branched stems 5-40 cm. long. Leaves are linear, 1-4 cm. long and up to 0.5 mm. wide, densely clustered at the tips of stems. Margins of leaves have tiny serrations. Flowers are unisexual, separate on the same plant. Nutlets (achenes) are oval, olive-green to red, with a beak 1 mm. or more long. In flower July-September.

ECOLOGICAL NOTES: Wavy water-nymph found in shallow to deep water of lakes, ponds, streams and Mississippi River backwaters.

SOURCE: Gleason and Cronquist (1991); and Chadde (2002).

ELODEA

(*Elodea canadensis* Michx.)

FROG'S-BIT FAMILY (Hydrocharitaceae) **C of C:** Native (3 WI)(4 MN) **IND. STATUS:** OBL

SYNONYM: *Anacharis canadensis* (Michx.) Rich

FIELD CHARACTERISTICS: A submerged, perennial herb with stems 20-100 cm. long. Leaves are whorled in 3's (rarely some opposite), 1.5-4(5) mm. wide (averaging about 2 mm.), entire and 2-5 times as long as wide. The plants are unisexual. Pistillate flowers are in spathes from upper leaf axils, the spathes 10-20 mm. long, and extended to the water's surface by a long, thread-like stalk. The staminate flowers are in an elongated spathe about 10 mm. long and 4 mm. wide that is also extended to the water's surface on a thread-like stalk. Fruit is a capsule 5-6 mm. long tapered to a beak 4-5 mm. long. In flower June-September.

ECOLOGICAL NOTES: Elodea is found in marshes, lakes, rivers and Mississippi River backwaters, often forming large masses. It has been recorded in water deeper than 25 feet.

The staminate flowers split open spreading pollen onto the water's surface where it drifts and may, by chance, reach a pistillate flower. Pollination occurs at the water's surface; however, most reproduction is vegetative via fragmentation of the stem.

SOURCE: Fernald (1970); Chadde (2002); and Voss (1972).

MUSKGRASS

(*Chara vulgaris* L.)

MUSKGRASS FAMILY (Characeae) **IND. STATUS:** [OBL]

FIELD CHARACTERISTICS: A macroscopic alga with cylindrical, whorled branches. Each joint of the "stem" consists of a single cell. The common name comes from the strong, musk-like odor of this alga.

ECOLOGICAL NOTES: Muskgrass is almost always found in mineral-rich waters and it often has incrustations of lime. The muskgrasses (*Chara* spp.) are an important food for ducks, especially when they bear their microscopic, spore-like oogonia. No C of C values have been assigned by either Minnesota or Wisconsin.

SOURCE: Fassett (1957); and Martin *et al.* (1951).

WATER PURSLANE

(*Didiplis diandra* (Nutt. ex DC.) Wood)

LOOSESTRIFE FAMILY (Lythraceae) **IND. STATUS:** OBL

C of C: Native (5), a species of special concern in Wisconsin

FIELD CHARACTERISTICS: An aquatic, annual herb submersed or rooting in mud. Stems are weak and branched growing to 10-40 cm. in length. Leaves are of two types. Submersed leaves are linear, sessile, 1-2.5 cm. long and truncate at the base. Emersed leaves, if present, are shorter and more broad being narrowly elliptic, and tapering to the base. Minute greenish flowers are solitary in leaf axils. Fruit is a globose capsule. In flower July-August.

ECOLOGICAL NOTES: Water purslane is an uncommon species of quiet waters of lakes, impoundments and streams.

SOURCE: Gleason and Cronquist (1991); and Chadde (2002).

Staminate plant

WILD CELERY

(*Vallisneria americana* Michx.)

FROG'S-BIT FAMILY (Hydrocharitaceae) **C of C:** Native (6) **IND. STATUS:** OBL

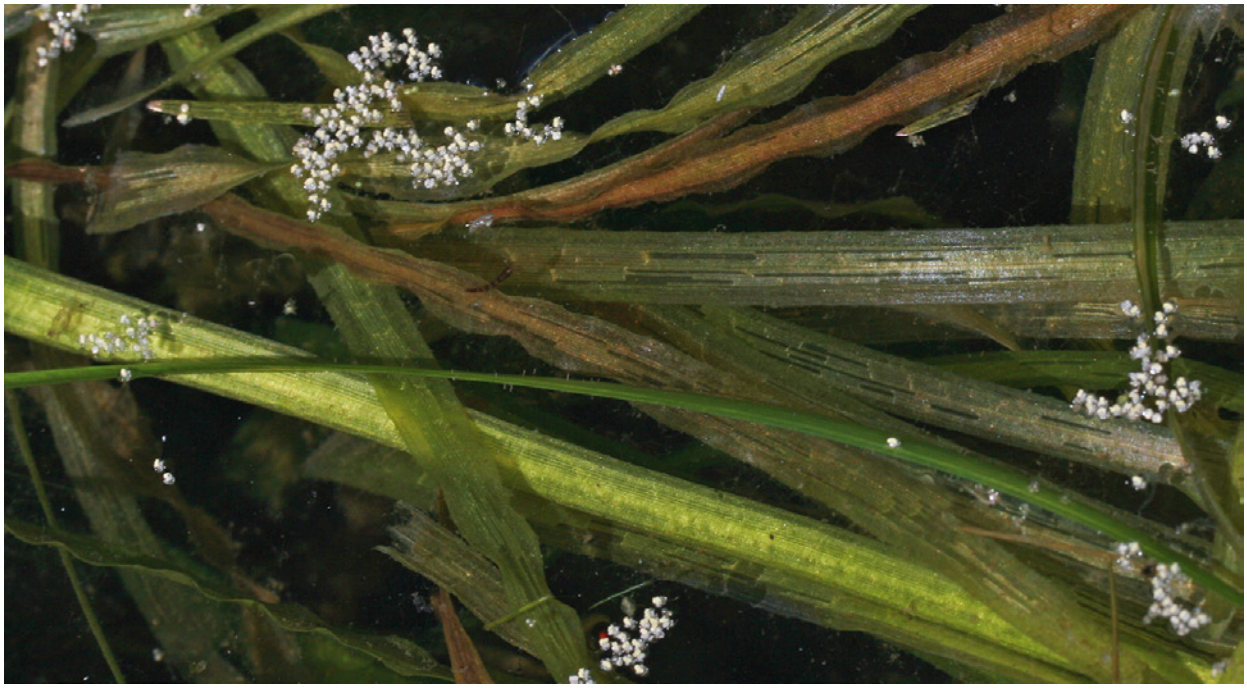
FIELD CHARACTERISTICS: An aquatic, perennial herb with long, ribbon-like leaves (mostly 3-11 mm. wide and 2 m. or more long) in a basal rosette. The leaves have a characteristic three-zoned appearance that distinguishes wild celery from other plants that produce rosettes of ribbon-like, submerged leaves. Plants are unisexual. The pistillate flower is tubular and on a long stalk that carries it to the water's surface. Staminate flowers are densely packed in a submerged spathe. In flower from July-October.

ECOLOGICAL NOTES: Wild celery is found in lakes, streams and Mississippi River backwaters, often in deep water (to 20 feet). It spreads by rhizomes with tuberous tips which, like the fruit and other parts of the plant, are relished as food by waterfowl, especially the canvasback (*Aythya valisineria*), as well as by fish. Staminate flowers are released under water each containing an air bubble that causes it to rise to the surface. Once on the surface, part of the flower opens and acts as a "sail." If the staminate flower randomly floats to a pistillate flower, pollination occurs at the water's surface. The long stalk of the pistillate flower then becomes coiled, pulling the flower below the surface where it develops into the mature fruit (see photograph on following page).

SOURCE: Fernald (1970); and Voss (1972).

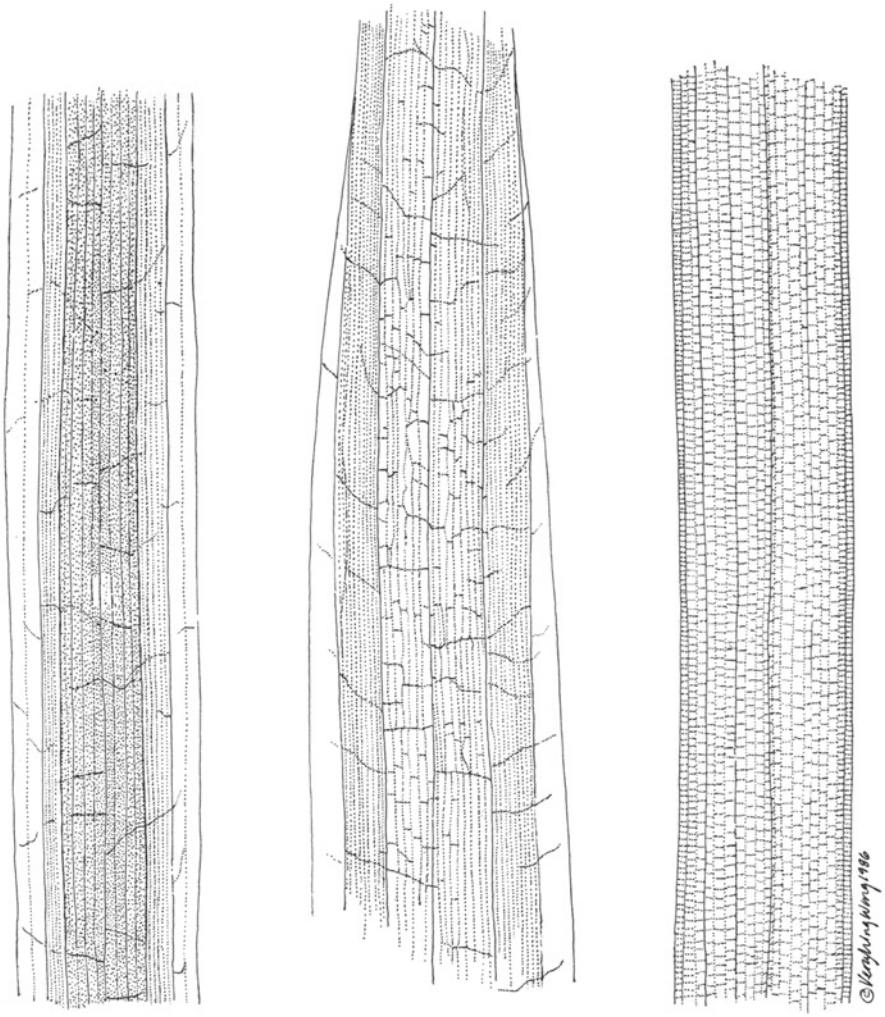
Staminate flowers

Leaf and a pistillate flower maturing into fruit.



Wild Celery
(*Vallisneria americana*)

Comparison of Leaf Venation



Vallisneria americana *Sagittaria* spp. *Sparganium* spp.

YELLOW WATER CROWFOOT

(*Ranunculus flabellaris* Raf.)

BUTTERCUP FAMILY (Ranunculaceae) **C of C:** Native (8 WI)(6 MN) **IND. STATUS:** OBL

FIELD CHARACTERISTICS: An aquatic, perennial herb, either floating or submerged. Stems are hollow, smooth and elongate growing to 30-70 cm. in length. Leaves are highly variable. The submerged leaves are flattened and dissected into many segments 1-2 mm. wide. Emergent leaves, if present, are 3-parted. Flowers are on emergent, long, thick stalks. Petals number 5-8 and are (6.5)7-14(16) mm. long and golden yellow. Nutlets are 1.7-2.2 mm. long and are arranged in a densely-packed, fruiting head with 50-75 nutlets. Nutlets have a corky margin at maturity. In flower May-June.

ECOLOGICAL NOTES: Yellow water crowfoot is found in shallow, open water and in marshes; sometimes stranded on muddy shores.

SOURCE: Fernald (1970); Gleason and Cronquist (1991); and Voss (1985).

WHITE WATER CROWFOOT

(*Ranunculus longirostris* Godr.)

BUTTERCUP FAMILY (Ranunculaceae) **C of C:** Native (8 WI)(7 MN) **IND. STATUS:** OBL

FIELD CHARACTERISTICS: An aquatic, perennial herb with submersed stems and leaves and emerged flowers. Leaves are highly dissected into filiform (thread-like) segments, 1-2 cm. long, relatively stiff, not collapsing when withdrawn from water. Flowers are white, 1-1.5 cm. wide; stamens number 10-20. Nutlets (achenes) number (7)15-25 per flower and are 0.7-1.5 mm. long with a straight, slender beak. In flower June-August.

ECOLOGICAL NOTES: White water crowfoot occurs in quiet waters of lakes and streams.

SOURCE: Gleason and Cronquist (1991); Chadde (2002); and Voss (1985).

WATER MARIGOLD

(*Bidens beckii* Torr. ex Spreng.)

ASTER FAMILY (Asteraceae or Compositae) **C of C:** Native (8) **IND. STATUS:** OBL

SYNONYM: *Megalodonta beckii* (Torr. ex Spreng.) Greene

FIELD CHARACTERISTICS: An aquatic, perennial herb from rhizomes. Stems grow 40-200 cm. long with little branching. Leaves are of two types. Submersed leaves are thread-like (filiform) and in whorls around the stem. Emersed leaves are simple, lanceolate to ovate, sessile, serrate and 2-4 cm. long. Flower heads are solitary and terminal with a disc 1 cm. wide. Rays are golden-yellow and 1-1.5 cm. long. Nutlets (achenes) are 10-14 mm. in length with 3-6 awns that are longer than the nutlet and retrorsely-barbed (i.e., barbs are backward facing).

ECOLOGICAL NOTES: Water marigold is infrequent in lakes, ponds and impoundments.

SOURCE: Gleason and Cronquist (1991); and Voss (1985).

Rhizome. This example is 2 inches (5 cm.) in diameter.

WHITE WATER-LILY

(*Nymphaea odorata* Ait.)

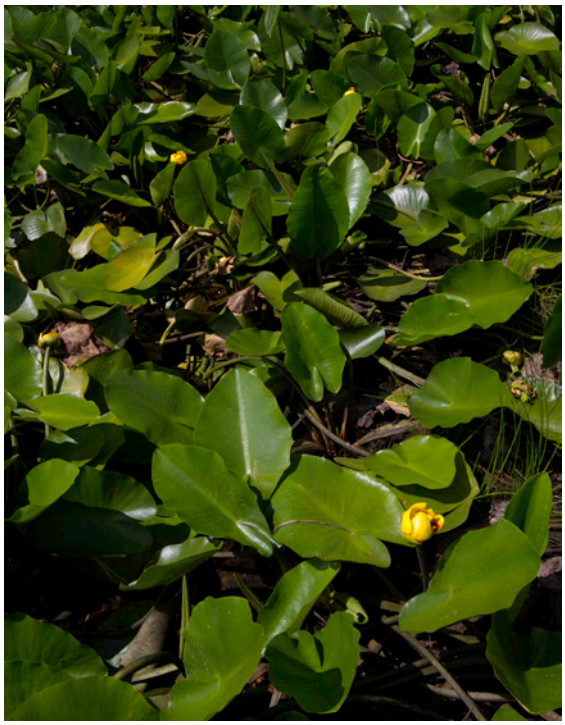
WATER-LILY FAMILY (Nymphaeaceae) **C of C:** Native (6) **IND. STATUS:** OBL

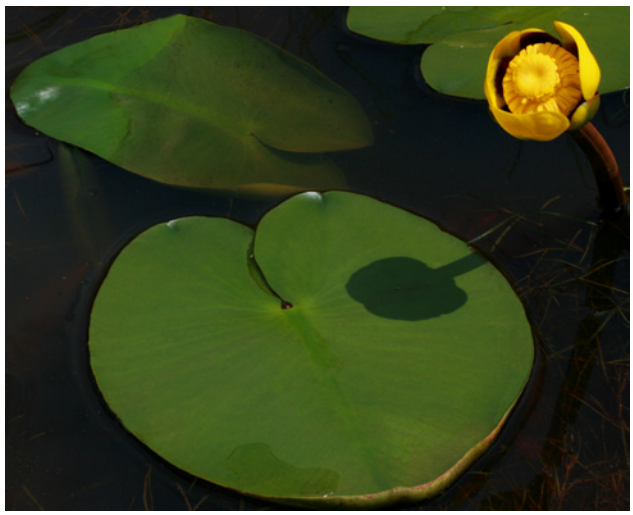
SYNONYM: *Nymphaea tuberosa* Paine

FIELD CHARACTERISTICS: An aquatic, perennial herb with a thick rhizome with many tuber-like branches (see photo). Leaves float on the water's surface or are slightly elevated above it. Leaves are semi-circular with a narrow notch and palmate venation. Leaves can be up to 40 cm. wide. Flowers are white (sometimes pink), 10-20 cm. wide with many petals and float on the water's surface. Flowers are usually fragrant. In flower June-September.

ECOLOGICAL NOTES: White water-lily is common to dominant in lakes, ponds, marshes, slow moving streams and Mississippi River backwaters.

SOURCE: Fernald (1970); Gleason and Cronquist (1991); and Voss (1985).





YELLOW WATER-LILY

(*Nuphar variegata* Dur.)

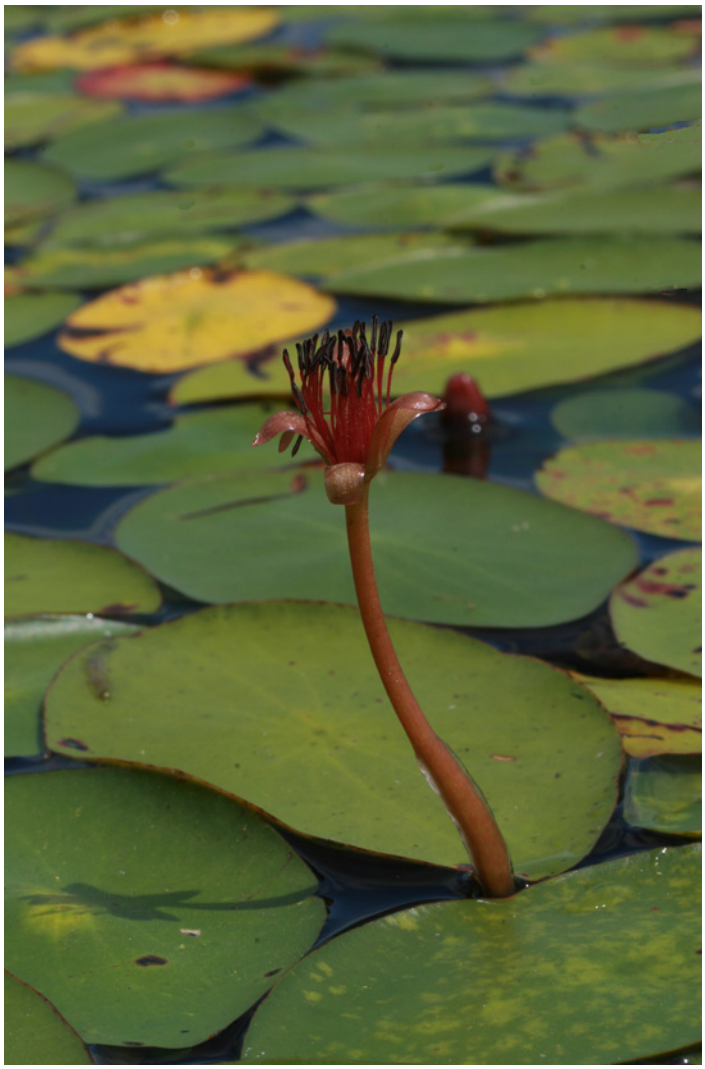
WATER-LILY FAMILY (Nymphaeaceae) **C of C:** Native (6) **IND. STATUS:** OBL

SYNONYM: *Nuphar lutea* (L.) Sm.

FIELD CHARACTERISTICS: An aquatic, perennial herb. Leaves are elliptical with pinnate venation and a deep notch. Leaves can be floating, emerged or submerged. Floating leaves are 7-35 cm. long and 5-25 cm. wide. Flowers are yellow and (2.5)3.5-5 cm. wide. Sepals, usually 6, are petal-like and are usually red within at the base. Petals are small and scale-like. Petioles are flattened on the upper side or even winged. Rhizomes are very thick (to 10 cm.) and spongy with semi-circular to triangular scars of petioles and circular scars of flower stalks. In flower June-September.

ECOLOGICAL NOTES: Yellow water-lily is found in lakes, ponds, streams, marshes, bog ponds and Mississippi River backwaters. The flowers are a favorite food of muskrats. Other common names are cow-lily and spatter dock.

SOURCE: Fernald (1970); Gleason and Cronquist (1991); and Voss (1985).



WATER SHIELD

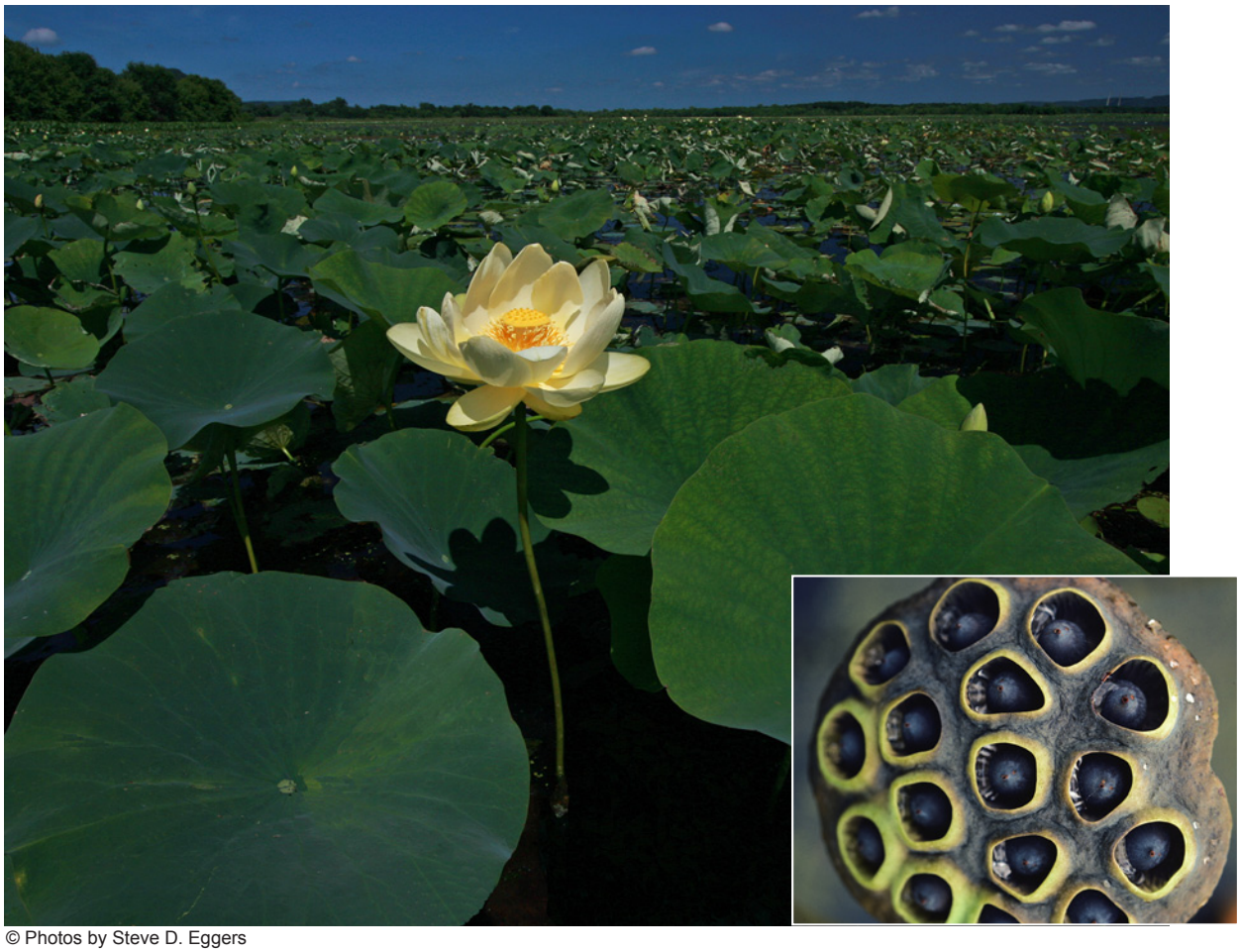
(*Brasenia schreberi* J.F. Gmel.)

WATER SHIELD FAMILY (Cabombaceae) **C of C:** Native (6 WI)(7 MN) **IND. STATUS:** OBL

FIELD CHARACTERISTICS: An aquatic, perennial herb. Leaves are floating, lack a notch and have petioles that are attached to the middle of the blade. Leaves are 10 cm. or less in diameter and more or less elliptical, scattered on a stem that trails through the water. Flowers are dull purple and 2-3 cm. wide. Sepals and petals usually number 3, sometimes 4. In flower June-September.

ECOLOGICAL NOTES: Water shield is found in lakes, impoundments, marshes, and ponds, including bog ponds. A gelatinous coat covers the stem, petioles and lower surfaces of the leaves.

SOURCE: Fassett (1957); Fernald (1970); Gleason and Cronquist (1991); and Voss (1985).



LOTUS

(*Nelumbo lutea* Willd.)

LOTUS-LILY FAMILY (Nelumbonaceae) **C of C:** Native (7 WI)(8 MN) **IND. STATUS:** OBL

FIELD CHARACTERISTICS: An aquatic, perennial herb with very large leaves (30-70 cm. wide) that are normally emerged, but can be floating. Leaves are unnotched, bluish-green and semi-circular. The center of emerged leaves is cupped or depressed. Flowers are pale yellow, 15-25 cm. wide, with numerous petals and sepals, and elevated on emerged, stout stalks. Fruits, when mature, are acorn-like and embedded in a fleshy, top-shaped receptacle that later becomes dry and woody (inset photo). In flower July-August.

ECOLOGICAL NOTES: In Minnesota and Wisconsin, lotus is primarily found in backwaters of the Mississippi River and its major tributaries. However, it is also found in other rivers and scattered lakes; some of these stands may have been planted. It forms extensive colonies that can cover many acres. The leaves repel water.

SOURCE: Fernald (1970); and Gleason and Cronquist (1991).

THE DUCKWEED FAMILY

The duckweed family consists of floating plants, without leaves; instead with a flattened or globose frond. Plants may or may not have roots. Most reproduction is vegetative by budding. However, the duckweeds do produce flowers and are the world's smallest flowering plants.

Key to the Genera of the Duckweed Family

1A. Roots are usually present and/or plants float beneath the surface. 2

2A. A single root per frond is usually present . . . . *Lemna*

2B. Several roots per frond are present . . . . *Spirodela*

1B. Roots are absent and plant floats at the surface 3

3A. Plants are globular, tiny (0.3-1 mm. long). . . . . *Wolffia*

3B. Plants are strap-shaped, larger (6-8 mm. long). . . . . *Wolffiella*

LESSER DUCKWEED

(*Lemna minor* L.)

DUCKWEED FAMILY (Lemnaceae) **C of C:** Native (4 WI)(5 MN) **IND. STATUS:** OBL

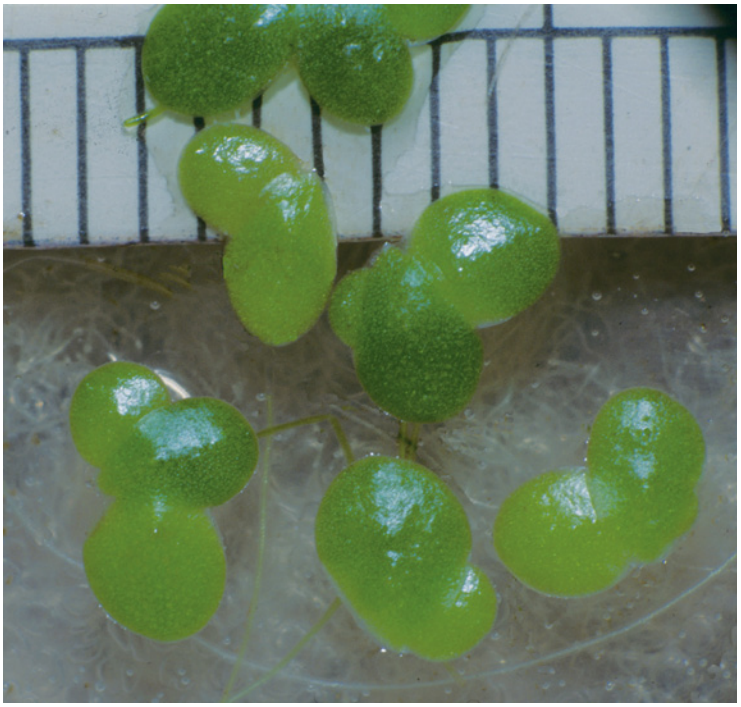
FIELD CHARACTERISTICS: This duckweed has flattened fronds 2-5 mm. long with 3-5 nerves. Frond surfaces are green above and below and each frond has a single root. Microscopic flowers occur in small pouches on the edge of the frond or on its upper surface

ECOLOGICAL NOTES: Lesser duckweed is found in quiet waters, frequently associated with big duckweed (*Spirodela polyrhiza*) and watermeal (*Wolffia* spp.) forming thick mats on the water's surface.

Waterfowl feed on the duckweeds, probably obtaining substantial numbers of minute animal organisms associated with the plants. Some authorities have split *L. minor* into multiple additional species; however, other authorities have not adopted this approach. See discussion in Swink and Wilhelm (1994).

SOURCE: Fassett (1957); Gleason and Cronquist (1991); Swink and Wilhelm (1994) and Martin *et al.* (1951).

A pond covered with duckweeds (*Lemna minor* and *Wolffia columbiana*) in late summer.



Lesser duckweed (*Lemna minor*)
Scale is in mm.

STAR DUCKWEED

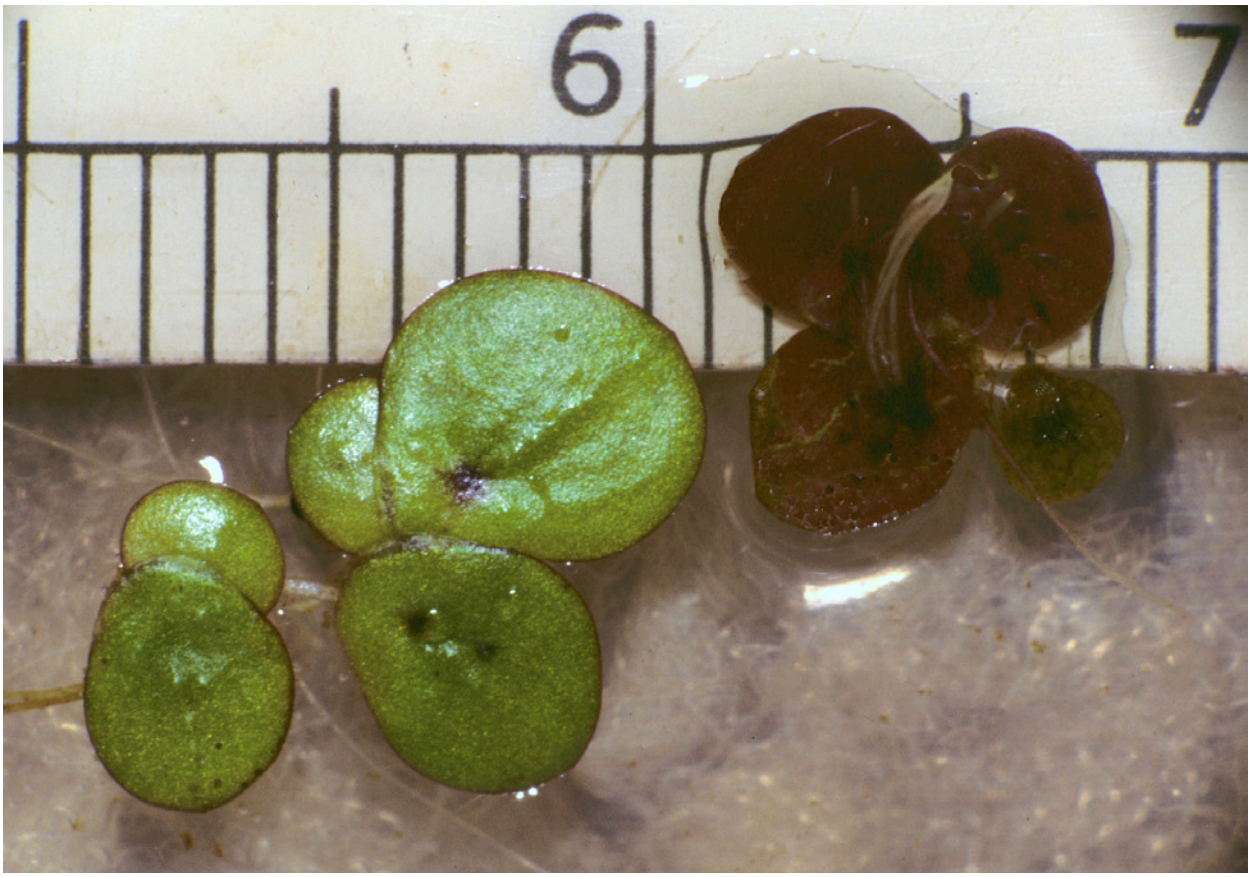
(*Lemna trisulca* L.)

DUCKWEED FAMILY (Lemnaceae) **C of C:** Native (6 WI)(5 MN) **IND. STATUS:** OBL

FIELD CHARACTERISTICS: Star duckweed floats just beneath the surface and has fronds shaped like canoe paddles. Fronds are 4-10 mm. long, tapering to a 4-16 mm. stipe that remains attached to the parent plant. At least some fronds have roots.

ECOLOGICAL NOTES: Star duckweed, or forked duckweed, is found in quiet waters of lakes, impoundments and marshes. It commonly forms tangled colonies beneath the water's surface.

SOURCE: Fassett (1957); Gleason and Cronquist (1991); and Martin *et al.* (1951).



Scale is in cm./mm.

BIG DUCKWEED

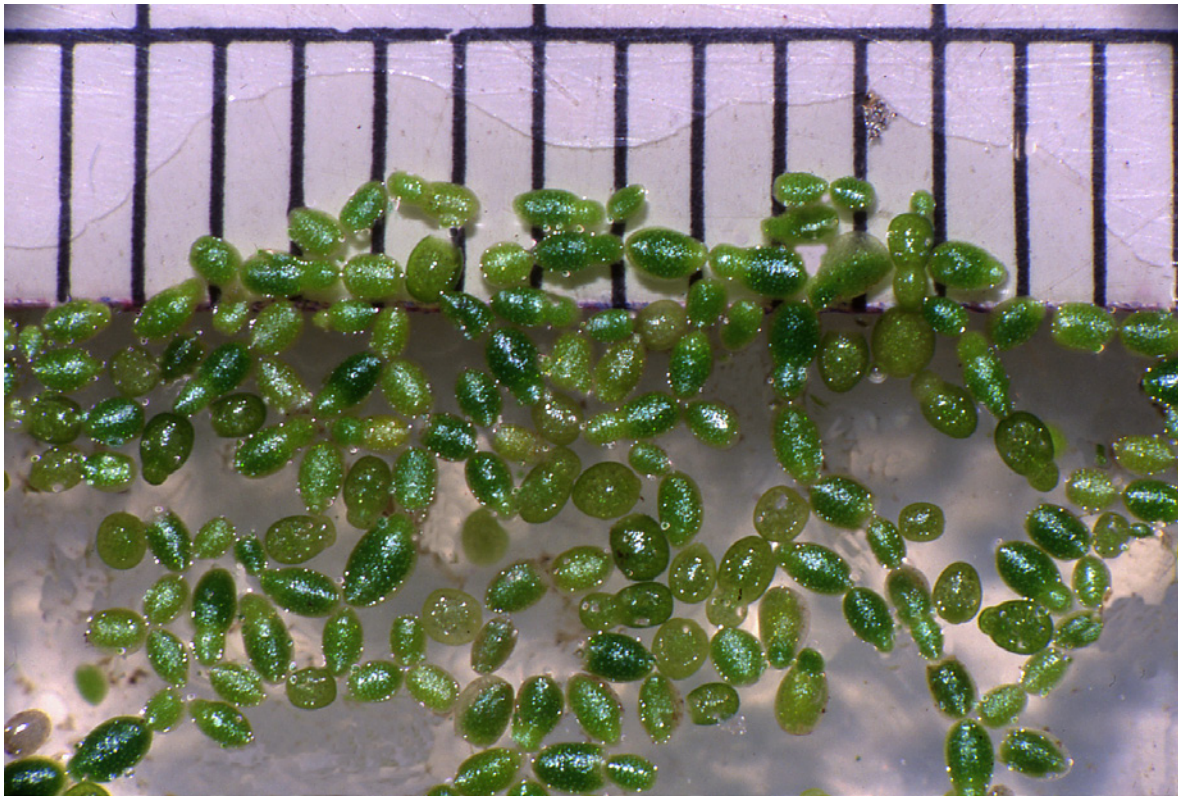
(*Spirodela polyrhiza* (L.) Schleid.)

DUCKWEED FAMILY (Lemnaceae) **C of C:** Native (5) **IND. STATUS:** OBL

FIELD CHARACTERISTICS: This duckweed has flattened fronds 3-10 mm. long, usually with 7 nerves (but can be 5-15 nerved). Frond surfaces are green above and purplish below. Each frond has several to many roots. Flowers are produced in reproductive pouches.

ECOLOGICAL NOTES: Big duckweed occurs in quiet waters of lakes and marshes, frequently forming thick, floating mats with lesser duckweed (*Lemna minor*) and watermeal (*Wolffia* spp.).

SOURCE: Fassett (1957); Gleason and Cronquist (1991); and Martin *et al.* (1951).



Scale is in mm.

WATERMEAL

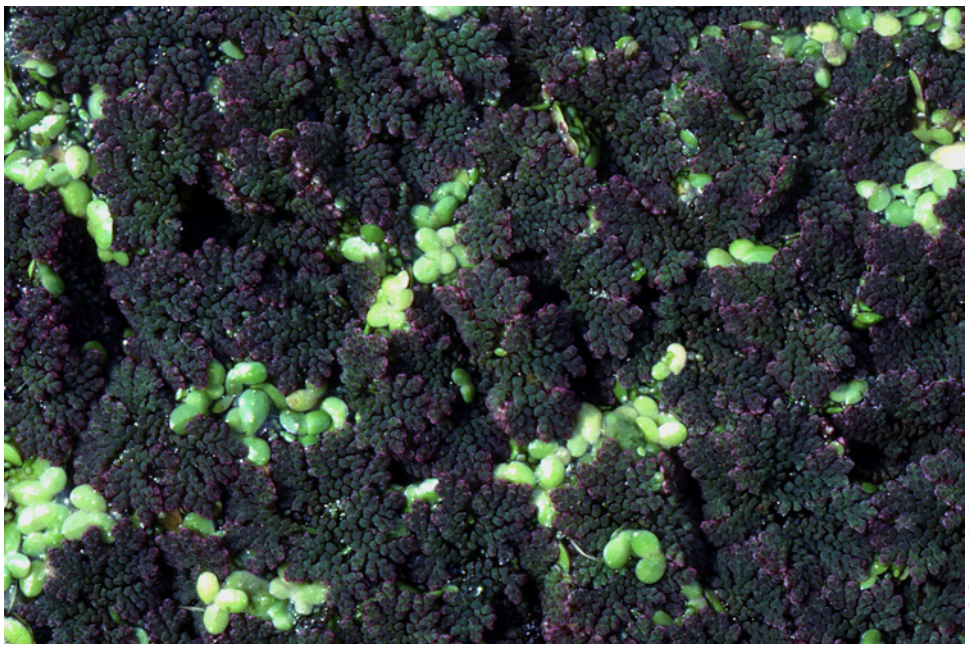
(*Wolffia columbiana* Karst.)

DUCKWEED FAMILY (Lemnaceae) **C of C:** Native (5) **IND. STATUS:** OBL

FIELD CHARACTERISTICS: Tiny plants with a globular frond just 0.3-1 mm. long and floating partially above and partially below the water's surface.

ECOLOGICAL NOTES: Watermeal is abundant in quiet waters of lakes and marshes, frequently associated with other members of the duckweed family. This genus is the world's smallest flowering plants.

SOURCE: Fassett (1957); Gleason and Cronquist (1991); and Martin *et al.* (1951).



A floating mat consisting of mosquito fern (dark green and purple) and lesser duckweed (bright green).

MOSQUITO FERN

(*Azolla microphylla* Kaulfuss)

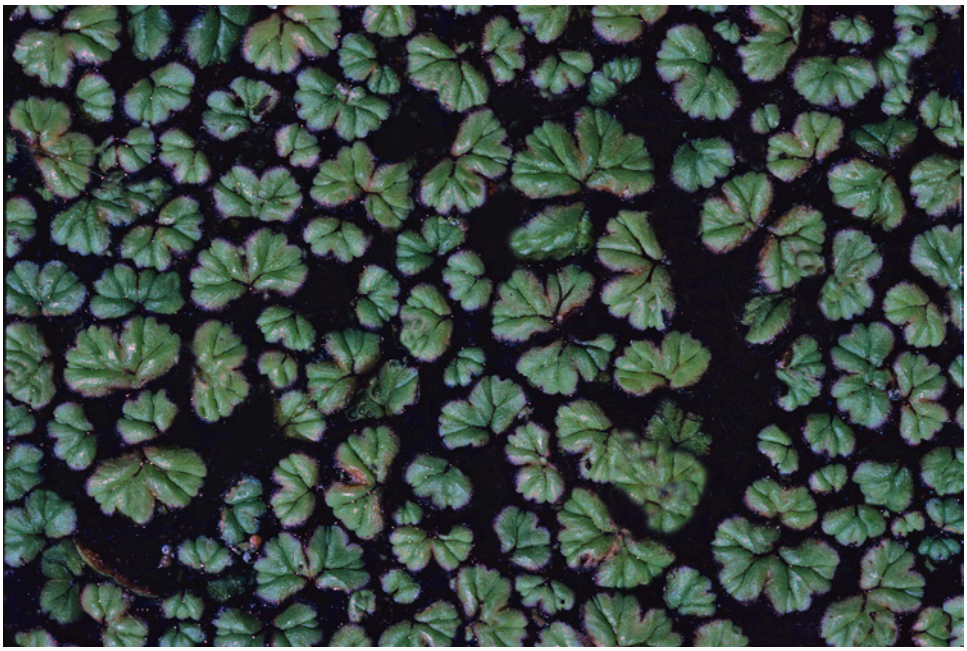
MOSQUITO FERN FAMILY (Azollaceae) **C of C:** Native (10 WI)(3 MN) **IND. STATUS:** OBL

SYNONYM: *Azolla mexicana* Schlecht. & Cham. ex K. Presl

FIELD CHARACTERISTICS: A tiny, annual, aquatic fern that is free-floating (often forming mats) or stranded on mud. Stems are flat and 1-1.5 cm. long, dark green or red, and covered with two rows of overlapping leaves. Upper lobes of leaves are above the water line while lower leaves are larger and below the water line. Roots are few and unbranched.

ECOLOGICAL NOTES: In Minnesota and Wisconsin, mosquito fern is an uncommon species that primarily occurs in quiet backwaters of the Mississippi River downstream of St. Paul, Minnesota.

SOURCE: Fassett (1957); Gleason and Cronquist (1991); and Tryon (1980).



PURPLE-FRINGED RICCIA

(*Ricciocarpus natans* (L.) Corda)

THALLOSE LIVERWORT FAMILY (Ricciaceae) **IND. STATUS:** [OBL]

FIELD CHARACTERISTICS: A free-floating liverwort with fan-shaped leaves (thallus) to 1 cm. long. Leaves are deeply furrowed above and have scalloped edges. Numerous dangling, purplish, root-like structures (rhizoids) are present.

ECOLOGICAL NOTES: Purple-fringed riccia is a non-vascular plant that reproduces by spores and budding. This species frequently occurs with duckweeds (*Lemna, Spirodela, Wolffia*), none of which have the purplish rhizoids. Purple-fringed riccia is found in quiet waters of lakes, ponds and backwaters of streams.

No C of C values have been assigned to this species for Minnesota or Wisconsin.

SOURCE: Fassett (1957); and State of Washington, Department of Ecology.

SECTION 3

Deep and Shallow Marshes

II. Marshes

Marshes are characterized by emergent aquatic plants growing in permanent to seasonal, shallow water. Species of shallow, open water communities, as well as those found in sedge meadows and seasonally flooded basins, also occur in marshes. Species of sedge meadows and seasonally flooded basins colonize muskrat lodges, floating mats and exposed substrates during droughts or artificial draw downs. Emergent aquatic plants typically become established and spread when water levels are low or when the marsh substrate is exposed, and then persist when water levels rise. However, if water levels rise too quickly, or rise to levels higher than normal, emergent vegetation may not survive, or may rise to the water surface as floating mats. Muskrats can "eat out" emergent vegetation, creating open water areas within the marsh that favor waterfowl use. Unchecked, however, muskrats can eliminate emergent vegetation, leaving an open water area until the next drought or drawdown allows emergent vegetation to recover.

Marshes are among the most productive of all wetlands for water birds and furbearers and also provide spawning and nursery habitat for some fish species. Birds that use marshes for breeding and feeding include swans, ducks, geese, rails, herons, egrets, terns and songbirds. Raptors such as the osprey, bald eagle and northern harrier frequent marshes in search of prey. Important furbearers inhabiting marshes include muskrat and mink. Excellent winter habitat is provided for upland wildlife, including ring-necked pheasant and eastern cottontail. Marshes help replenish and maintain fish populations in adjacent lakes and rivers by providing spawning habitat, most notably for northern pike and muskellunge.

Additional important functions provided by marshes include detention of floodwaters, protection of shorelines from erosion, aesthetics, and improvement of water quality by trapping sediments and assimilating nutrients.

Marshes in Minnesota and Wisconsin are divided into deep and shallow marshes depending on water permanence and depth, and degree of soil saturation during the growing season. Because of the similarity of plant species, the discussion of the individual species occurring in deep and shallow marshes is combined.

II.A. Deep Marshes

Deep marsh plant communities have standing water depths between 6 inches and 3 or more feet during the growing season (Shaw and Fredine 1971). Herbaceous emergent, floating, floating-leaved and submergent vegetation compose this community, with the major dominance by cattails, bulrushes, pickerelweed, giant bur-reed, common reed, wild rice, pondweeds and/or water-lilies.

VEGETATION: This deep marsh community includes hardstem bulrush (*Schoenoplectus acutus*), broad-leaf cattail (*Typha latifolia*), white water-lily (*Nymphaea odorata*), yellow water-lily (*Nuphar variegata*), water shield (*Brasenia schreberi*), lesser duckweed (*Lemna minor*), floating-leaf pondweed (*Potamogeton natans*), flat-stem pondweed (*Potamogeton zosteriformis*), grass-leaf pondweed (*Potamogeton gramineus*), coontail (*Ceratophyllum demersum*), common bladderwort (*Utricularia macrorhiza*) and water milfoil (*Myriophyllum* sp.).

SOILS: Lacustrine deposits.

HYDROLOGY: Permanently to semi-permanently inundated.

LOCATION: Beaver Dam Lake, Waukesha County, Wisconsin.

VEGETATION: The emergent layer of this deep marsh community is dominated by northern wild rice (*Zizania palustris*), pickerelweed (*Pontederia cordata*), hardstem bulrush (*Schoenoplectus acutus*), river bulrush (*Schoenoplectus fluviatilis*) and giant bur-reed (*Sparganium eurycarpum*). The submergent and floating layers include common bladderwort (*Utricularia macrorhiza*), large-leaf pondweed (*Potamogeton amplifolius*), flat-stem pondweed (*Potamogeton zosteriformis*), lesser duckweed (*Lemna minor*) and big duckweed (*Spirodela polyrhiza*).

SOILS: Lacustrine deposits.

HYDROLOGY: Permanently to semi-permanently inundated.

LOCATION: Rice Lake, Rice Lake National Wildlife Refuge, Aitkin County, Minnesota.

II.B. Shallow Marshes

Shallow marsh plant communities typically have saturated soils throughout the growing season, often with up to 6 inches of inundation (Shaw and Fredine 1971). Herbaceous emergent vegetation such as cattails, bulrushes, arrowheads and lake sedges characterize this community. Floating and floating-leaved vegetation strata are typically reduced and the submergent vegetation stratum is absent.

VEGETATION: The above shallow marsh is dominated by broad-leaf cattail (*Typha latifolia*), narrow-leaf cattail (*Typha angustifolia*), hybrid cattail (*Typha* x *glauca*), giant bur-reed (*Sparganium eurycarpum*), common reed (*Phragmites australis*) and river bulrush (*Schoenoplectus fluviatilis*). Other species include softstem bulrush (*Schoenoplectus tabernaemontani*), lake sedge (*Carex lacustris*), broad-leaf arrowhead (*Sagittaria latifolia*), lesser duckweed (*Lemma minor*), star duckweed (*Lemna trisulca*), water smartweed (*Persicaria amphibia*), bulblet-bearing water hemlock (*Cicuta bulbifera*), rice cut-grass (*Leersia oryzoides*), great water dock (*Rumex orbiculatus*) and indigo bush (*Amorpha fruticosa*). During the past 20 years, a purple loosestrife (*Lythrum salicaria*) infestation has occurred, but has been slow to expand. Hybrid cattail and common reed have been more problematic in that both species have expanded aggressively by replacing bulrushes and giant bur-reed as dominants in some portions of the wetland complex.

SOILS: Seelyeville muck (Typic Haplosaprists), a very poorly-drained soil with an upper organic layer greater than 51 inches in depth (and can be many feet in depth). Landscape position is a backwater lake and marsh complex within the broad valley of the Minnesota River.

HYDROLOGY: This backwater area is primarily groundwater fed, but is also inundated during flood events of the Minnesota River. Inundation up to 6 inches in depth is typical for this shallow marsh.

LOCATION: Gun Club Lake, Fort Snelling State Park, Dakota County, Minnesota.

VEGETATION: The above shallow marsh community includes bottlebrush sedge (*Carex comosa*), broad-leaf arrowhead (*Sagittaria latifolia*), slough sedge (*Carex atherodes*), lake sedge (*Carex lacustris*), soft rush (*Juncus effusus*), rice cut-grass (*Leersia oryzoides*), giant mana grass (*Glyceria grandis*), softstem bulrush (*Schoenoplectus tabernaemontani*), marsh spike-rush (*Eleocharis palustris*), great water dock (*Rumex orbiculatus*), broad-leaf cattail (*Typha latifolia*), beggartick (*Bidens cernua*), common bladderwort (*Utricularia macrorhiza*), common bugleweed (*Lycopus americanus*) and a border of reed canary grass (*Phalaris arundinacea*).

SOILS: Palms muck (Terric Haplosaprists) with 16 to 51 inches of muck over loamy deposits.

HYDROLOGY: Saturated soils at or near the surface and shallow inundation up to 6 inches. Primarily supported by groundwater seepages, but also influenced by water levels in Lake Marion. A small, groundwater-fed, perennial stream flows through this community.

LOCATION: Adjacent to Lake Marion, Ritter Farm Park, Dakota County, Minnesota.

BROAD-LEAF CATTAIL

(*Typha latifolia* L.)

CATTAIL FAMILY (Typhaceae) **C of C:** Native (1 WI)(2 MN) **IND. STATUS:** OBL

FIELD CHARACTERISTICS: An erect, perennial herb 1-3 m. high with long, linear leaves sheathing at the base. Leaves are D-shaped in cross section, 1-2 cm. wide, pale green, and typically do not extend above the spike. Flowers are packed into dense, cylindrical spikes, the upper portion consisting of the staminate flowers and the lower portion the pistillate flowers. The two portions of the spike are continuous or nearly so. Fruit is a tiny, tufted nutlet. In flower during May-June.

ECOLOGICAL NOTES: One of the most recognizable wetland species, broad-leaf cattail is a persistent emergent found in almost all of our wetland plant communities from deep marshes to open bogs, growing on wet substrates and often in one to two feet or more of standing water. It spreads extensively by rhizomes so that an acre of cattails may consist of only a few individual plants. Broad-leaf cattail also forms floating mats. Cattail stands provide important food and cover for wildlife. For example, the rhizomes are eaten by geese and muskrats. Muskrats also use the foliage to construct their lodges, which in turn provide resting and nesting sites for water birds. Yellow-headed blackbirds, red-winged blackbirds and marsh wrens build their nests in cattail vegetation.

Cattails are tolerant of high sediment and nutrient inputs as well as fluctuating water levels. Urban stormwater inputs and runoff from agricultural lands favors expansion and dominance by cattails. Cattails can form extensive monotypes that may be considered undesirable because they lack species diversity.

SOURCE: Fassett (1957); Fernald (1970); Gleason and Cronquist (1991); and Voss (1972).

NARROW-LEAF CATTAIL

(*Typha angustifolia* L.)

CATTAIL FAMILY (Typhaceae) **C of C:** Introduced, invasive (0) **IND. STATUS:** OBL

FIELD CHARACTERISTICS: Similar to broad-leaf cattail (*T. latifolia*) except that the staminate and pistillate portions of the spike are separated by 2 cm. or more of bare stem, the leaves are narrower (4-12 mm. wide vs. 10-20 mm. wide), and the leaves typically extend beyond the spike. Overall, the plant is less robust than *T. latifolia*.

ECOLOGICAL NOTES: Similar to broad-leaf cattail; however, narrow-leaf cattail tolerates more mixosaline and calcareous waters, as well as more degraded conditions, compared to broad-leaf cattail. Narrow-leaf cattail also tends to be very invasive in less disturbed sites. It may form floating mats. Wildlife values are similar to those described for broad-leaf cattail. Broad-leaf and narrow-leaf cattail freely hybridize to form the hybrid, *Typha* x *glauca* Godr.

SOURCE: Fassett (1957); Fernald (1979); Gleason and Cronquist (1991); and Voss (1972).

HYBRID CATTAIL

(*Typha* x *glauca* Godr.)

CATTAIL FAMILY (Typhaceae) **C of C:** Introduced, invasive (0) **IND. STATUS:** OBL

FIELD CHARACTERISTICS: Hybrid cattail is usually larger than either parent, *T. latifolia* and *T. angustifolia*, growing to 3-4 m. in height. Staminate and pistillate portions of the spike are usually separated by up to 4 cm. of bare stem. The pistillate portion of the spike is often greater than 15 cm. (6 inches) in length whereas this length is almost never exceeded by either parent (see photograph on next page). *T.* x *glauca* reproduces vigorously by rhizomes.

ECOLOGICAL NOTES: Hybrid cattail is a highly invasive species expanding into deep and shallow marshes, inland fresh meadows, lakeshores and ditches. The three species of cattails often occur together with eventual dominance by hybrid cattail. As a result, pure stands of the native cattail, *T. latifolia*, are becoming increasingly uncommon in agricultural and urban regions of Minnesota and Wisconsin.

SOURCE: Gleason and Cronquist (1991); Chadde (2002); Crow and Hellquist (2000); and Swink and Wilhelm (1994).

Broad-leaf cattail (*Typha latifolia*) [left], narrow-leaf cattail (*T. angustifolia*) [center] and hybrid cattail (*T.* x *glauca*) [right]. In *T. latifolia*, the pistillate portion of a spike is typically more than 15 mm. (0.6 inch) thick and less than 15 cm. (6 inches) long. *T. angustifolia* pistillate spikes are much narrower and also less than 15 cm. long. In contrast, the pistillate portion of a spike in *T.* x *glauca* often exceeds 15 cm. in length. The surest way to differentiate cattails, however, is to examine the stigmas under 10x or greater magnification. See key in Swink and Wilhelm (1994).

Scale is in inches.

Comparison of the Pistillate Portion of Cattail Spikes

SWEET FLAG

(*Acorus americanus* (Raf.) Raf.)

SWEET FLAG FAMILY (Acoraceae) **C of C:** Native (7) **IND. STATUS:** OBL

FIELD CHARACERISTICS: A perennial herb with elongated, erect, sword-shaped linear leaves up to 2 m. tall. Leaves are 8-25 mm. wide and crowded at the base along a horizontal rhizome. The midvein and 1-5 additional veins are noticeably raised. A sweet, fragrant odor arises from crushed or bruised leaf bases and rhizomes. A three-angled flowering stem arises directly from the leaf base. It forms a 20-60 cm. long, spathe-like, modified leaf. A cylindrical, linear spadix, 5-10 cm. long, is covered with yellowish-brown flowers. Fruit is a gelatinous, few-seeded berry. In flower June-July.

Very similar to *Acorus calamus* L. which has only one midvein of the leaf prominently raised.

ECOLOGICAL NOTES: Sweet flag is uncommon in shallow marshes, wet swales and shallow water along shores.

SOURCE: Crow and Hellquist (2000); Gleason and Cronquist (1991); Swink and Wilhelm (1994); and Voss (1972).

GIANT BUR-REED

(*Sparganium eurycarpum* Engelm. ex Gray)

BUR-REED FAMILY (Sparganiaceae) **C of C:** Native (5) **IND. STATUS:** OBL

FIELD CHARACTERISTICS: A stout, perennial herb usually 50-150 cm. in height. Inflorescence has zigzag branches and flowers in unisexual heads; lower heads consist of the pistillate flowers which are bur-like at maturity, while upper heads consist of staminate flowers. Pistillate heads are 2-2.5 cm. in diameter. Leaves are usually erect, 6-12 mm. wide, and strongly keeled so that they are flattened-triangular in cross section. However, ribbon-like floating and submerged leaves can also be produced. Mature fruit is 6-8 mm. long and square-topped with a sharp beak. In flower June-July.

Giant bur-reed is our most common and robust bur-reed. It can be distinguished from all other bur-reeds because it has 2 stigmas and the fruit is nearly square across the top. Other bur-reeds have 1 stigma and the fruit tapers to the base and apex.

At first glance, giant bur-reed may resemble cattail (*Typha* spp.) when not in flower or fruit; however, the strongly keeled leaves (flattened-triangular in cross section) of giant bur-reed will distinguish it from the flattened leaves (D-shaped in cross section) of cattails.

ECOLOGICAL NOTES: Giant bur-reed is a persistent emergent found in shallow water and on wet substrates in marshes, bogs and margins of lakes and streams. It is characteristic of silty, nutrient-rich waters, especially south of the vegetation tension zone, while other species of bur-reed (*Sparganium* spp.) characterize low-nutrient waters primarily north of the tension zone.

Muskrats use the entire plant and the seeds are commonly eaten by waterfowl and marsh birds.

SOURCE: Fernald (1970); Gleason and Cronquist (1991); and Voss (1972).

Giant Bur-Reed
(*Sparganium eurycarpum*)

GREENFRUIT BUR-REED

(*Sparganium emersum* Rehmann)

BUR-REED FAMILY (Sparganiaceae) **C of C:** Native (8) **IND. STATUS:** OBL

SYNONYM: *Sparganium chlorocarpum* Rydb.

FIELD CHARACTERISTICS: A perennial herb typically emersed, but sometimes lax and trailing in water, with stems growing to 20-60 cm. long. Leaves are linear, flat to keeled, and 30-70 cm. long x 3-6 mm. wide. Inflorescence is unbranched and 10-20 cm. long. Pistillate and staminate flowers are in separate heads. Pistillate heads number 1-4 and are 1.5-2.5 cm. wide. At least one of the pistillate heads is borne above the leaf axils. Staminate heads number 2-5 and are 1.5-2 cm. wide at flowering time. Nutlets (achenes) are 4-5 mm. long, shiny green, widest at the middle and taper to both ends. The prominent beak is 3-5 mm. long. In flower June-August.

ECOLOGICAL NOTES: Greenfruit bur-reed is a persistent emergent found in shallow and deep marshes, open bogs and along lakeshores.

SOURCE: Chadde (2002); Gleason and Cronquist (1991); and Black and Judziewicz (2009).

CLUSTERED BUR-REED

(*Sparganium glomeratum* (Beurling ex Laestad.) L. Neum.)

BUR-REED FAMILY (Sparganiaceae) **IND. STATUS:** OBL

C of C: Native (8 WI)(7 MN), a threatened species in Wisconsin

FIELD CHARACTERISTICS: A perennial herb with an emersed or floating stem 20-40 cm. long. Leaves are linear, more or less flat and 3-8 mm. wide. Inflorescence is usually unbranched with several sessile, pistillate heads clustered together. Pistillate heads are 1.5-2 cm. wide when mature. Staminate heads number 1-2 and are located above the pistillate heads. Nutlets (achenes) are 3-8 mm. long, widest at the middle, tapering to both ends and shiny brown with a straight beak 1-2 mm. long.

ECOLOGICAL NOTES: Clustered bur-reed is a rare species of northern shallow marshes, alder thickets and bogs. In Wisconsin it has only been found in four counties in the northwestern part of the state. In Minnesota it has been found widely scattered across the northern part of the state.

SOURCE: Chadde (2002); and Black and Judziewicz (2009).

Stem and Leaf Cross Sections

Cattail Leaf
(*Typha*)

Bur-Reed Leaf
(*Sparganium*)

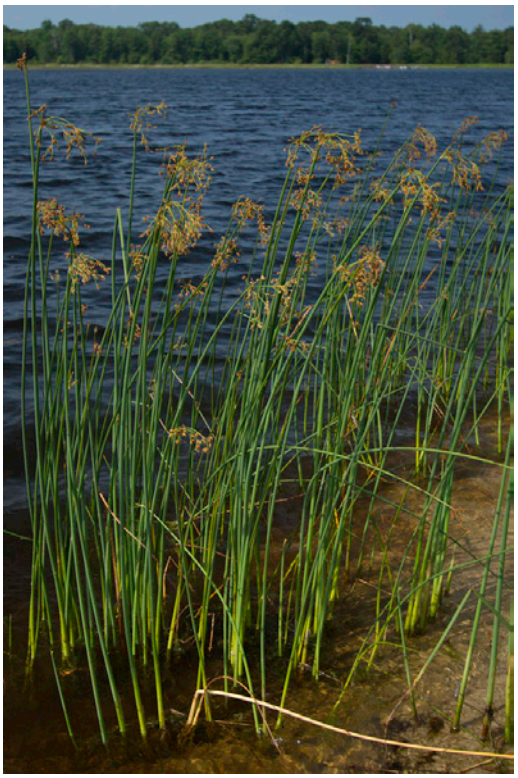
Iris Leaf
(*Iris*)

Sweet Flag Leaf
(*Acorus*)

Sedge Stem
(*Carex, Scirpus, Schoenoplectus*)

Bulrush or Spike-Rush Stem
(*Schoenoplectus, Eleocharis*)

Grass Stem
(Gramineae)



SOFTSTEM BULRUSH

(*Schoenoplectus tabernaemontani* (K.C. Gmel.) Palla)

SEDGE FAMILY (Cyperaceae) **C of C:** Native (4) **IND. STATUS:** OBL

SYNONYM: *Scirpus validus* Vahl.

FIELD CHARACTERISTICS: A perennial sedge from slender rhizomes. Stems are 1-3 m. in height, cylindrical, light green, with a few sheathing vestigial leaves at the base. Stems are 1-1.5 cm. thick and large-chambered so they can be easily crushed between the thumb and index finger. Spikelets number several to many and are 5-10 mm. long and oval. A specialized leaf that appears to be a continuation of the stem exceeds the spikelets. Nutlets are 1.6-2.1(2.4) mm. long with 6 basal bristles about equal in length to the nutlet. Scales are shiny orange to brown, often with a conspicuous green midrib. Scales are slightly greater in length than the nutlet itself. In flower June-September.

ECOLOGICAL NOTES: Softstem bulrush is a persistent emergent found in deep and shallow marshes, lakes, streams and occasionally bogs. It can form large stands or be intermixed with other emergent species. Softstem bulrush usually prefers mucky substrates with more stagnant conditions than those preferred by hardstem bulrush (*Schoenoplectus acutus*). It provides valuable nesting cover for water birds and food for muskrats.

SOURCE: Gleason and Cronquist (1991); and Voss (1972).

HARDSTEM BULRUSH

(*Schoenoplectus acutus* (Muhl. ex Bigelow) A. & D. Love)

SEDGE FAMILY (Cyperaceae) **C of C:** Native (6) **IND. STATUS:** OBL

SYNONYM: *Scirpus acutus* Muhl.

FIELD CHARACTERISTICS: A perennial sedge from stout rhizomes. Stems are 1-3(4.4) m. in height, cylindrical, and dark olive green with a few sheathing vestigial leaves at the base. Stems are 0.5-1 cm. thick and small chambered so that they are stiff and not easily crushed between the thumb and index finger. There may be one spikelet or many, on stalks 7-20 mm. long. Spikelets are oval to cylindrical, exceeded by a specialized leaf that appears to be a continuation of the stem. Nutlets are 2.2-2.7 mm. long, totally covered by whitish-brown scales, and have 6 basal bristles. Scales have marginal hairs and red dots on the back. In flower June-September.

ECOLOGICAL NOTES: Hardstem bulrush is a persistent emergent found in deep and shallow marshes, lakes, streams, and occasionally bog lakes; generally in water depths to 5 feet, but it has been found in much deeper depths. It prefers sandy to marly substrates with good water circulation in the root zone. It is also found in calcareous fens, another mineral-rich habitat. Hardstem bulrush can form colonial stands or be intermixed with other emergents. It has a higher tolerance of mixosaline conditions than softstem bulrush (*S. tabernaemontani*). Hybrids between hardstem and softstem bulrush occur.

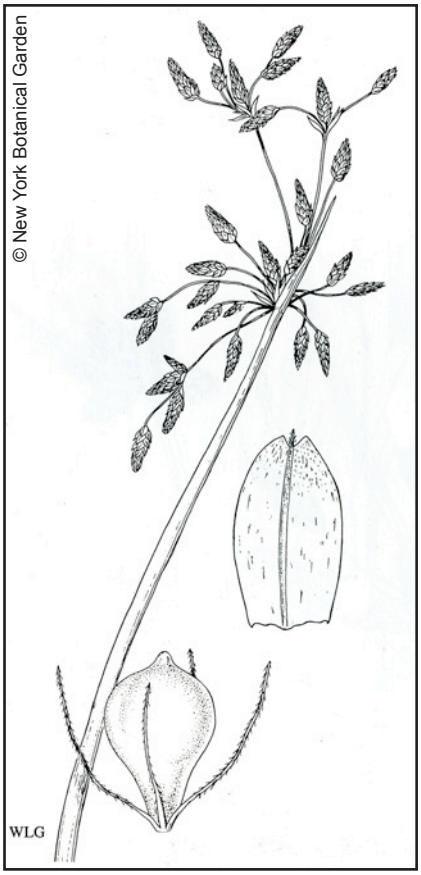
Waterfowl and shorebirds eat the nutlets, which are an important and frequently used food. Muskrats and geese eat the rhizomes and stems. In general, bulrushes (*Schoenoplectus* spp., *Scirpus* spp.) provide nesting habitat and cover for a wide variety of birds and furbearers, as well as spawning and nursery habitat for northern pike and other fish species.

SOURCE: Gleason and Cronquist (1991); and Voss (1972).

Comparison of Stem Cross Sections

Softstem Bulrush
(*Schoenoplectus tabernaemontani*)

Hardstem Bulrush
(*Schoenoplectus acutus*)



Hardstem Bulrush (*Schoenoplectus acutus*)

Stem cross section

RIVER BULRUSH

(*Schoenoplectus fluviatilis* (Torr.) M.T. Strong)

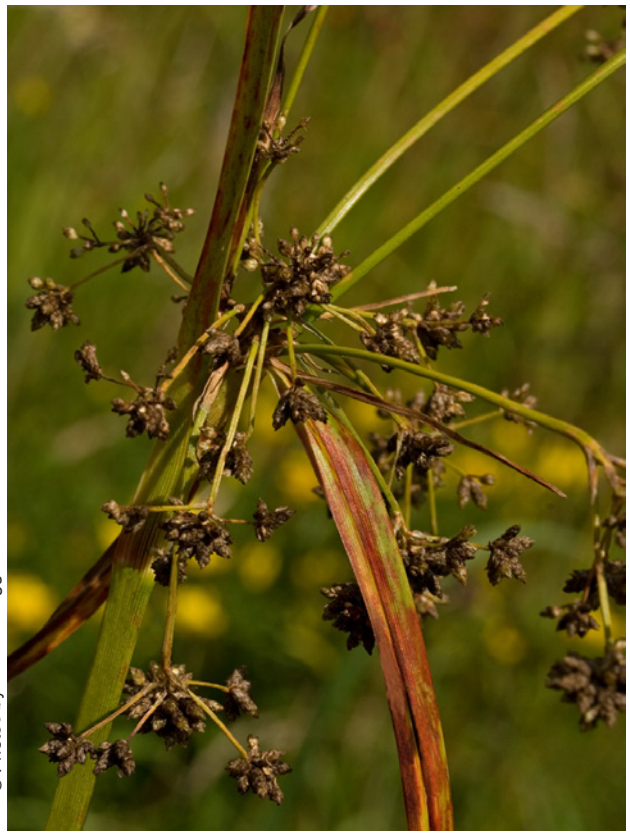
SEDGE FAMILY (Cyperaceae) **C of C:** Native (6 WI)(4 MN) **IND. STATUS:** OBL

SYNONYMS: *Scirpus fluviatilis* (Torr.) Gray; *Bolboschoenus fluviatilis* (Torr.) Sojak

FIELD CHARACTERISTICS: A stout, perennial sedge from a thick rhizome with tuber-like enlargements (corm). Stems are sharply triangular and leafy, growing to a height of 2 m. Leaf blades are 8-12 mm. wide and strongly M-shaped in cross section. Spikelets are 10-25 mm. long, and sessile or on stalks to 10 cm. long. Nutlets are 4-5 mm. long, distinctly 3-angled, with a beak and 6 barbed bristles at the base. In flower July-September.

ECOLOGICAL NOTES: River bulrush is a persistent emergent of deep and shallow marshes; wet shores and riverbanks; in fresh and mixosaline waters. It is a common dominant in Mississippi River backwaters and prairie potholes. River bulrush is a favorite food of muskrats. Wildlife values are similar to those described for other bulrushes.

SOURCE: Fernald (1970); Gleason and Cronquist (1991); and Voss (1972).



PANICLED BULRUSH

(*Scirpus microcarpus* J. & K. Presl)

SEDGE FAMILY (Cyperaceae) **C of C:** Native (6) **IND. STATUS:** OBL

SYNONYM: *Scirpus rubrotinctus* Fern.

FIELD CHARACTERISTICS: A perennial sedge with stems 60-150 cm. tall. The coarse, stout stems are roundly triangular with several flat, grass-like leaves. Stem leaves are 4-15 mm. wide and arise singularly or in small groups from creeping rhizomes. The terminal inflorescence contains numerous sessile spikelets crowded into dense clusters of umbel-like cymes. Spikelets are 3-6 mm. long and 1-2 mm. wide. Nutlets are biconvex and about 1 mm. long with a tiny beak.

Panicled bulrush (*Scirpus microcarpus*) can be confused with green bulrush (*S. atrovirens*) but the reddish-tinged leaf sheaths and stouter stems of *S. microcarpus* distinguish it.

ECOLOGICAL NOTES: Panicled bulrush is found in wet meadows, shallow marshes, sandy lake shores, and in ditches and swales. Often it is observed along the edges of alder thickets, shrub-carrs and riverbanks.

SOURCE: Crow and Hellquist (2000); Fassett (1976); Gleason and Cronquist (1991); Swink and Wilhelm (1994); and Voss (1972).

THREE-SQUARE BULRUSH

(*Schoenoplectus pungens* (Vahl) Palla)

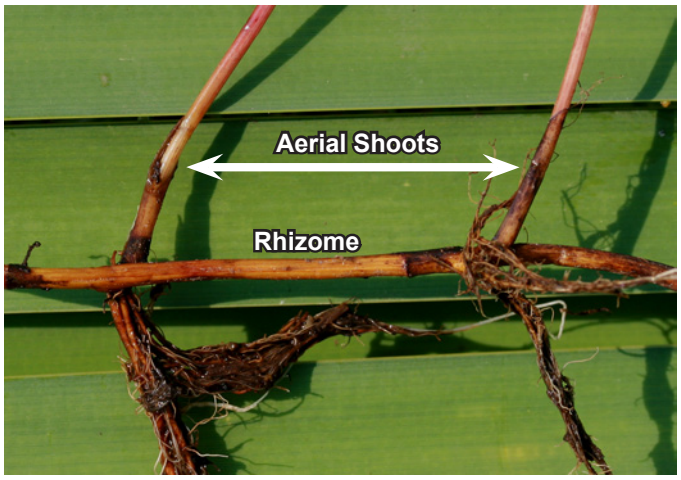
SEDGE FAMILY (Cyperaceae) **C of C:** Native (5 WI)(6 MN) **IND. STATUS:** OBL

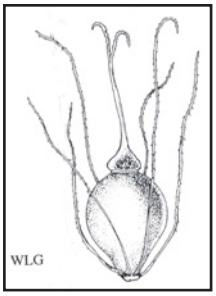
SYNONYMS: *Scirpus pungens* Vahl; *Scirpus americanus* Pers.

FIELD CHARACTERISTICS: A perennial sedge from long rhizomes. Stems are sharply triangular with 2 or 3 concave sides, and grow to a height of 1.5 m. Leaves form basal sheaths and are less than half the height of the stems. Spikelets number 1-8 and are 7-20 mm. long, sessile, crowded, and oblong oval. A specialized leaf resembles a continuation of the stem beyond the spikelets. Nutlets are (2.3)2.5-3 mm. long, with bristles that are as long to two-thirds as long as the nutlet. In flower July-September.

ECOLOGICAL NOTES: Three-square bulrush is a persistent emergent found in deep and shallow marshes, calcareous fens, and borders of lakes and streams, often in water depths of 1 foot and up to 2.5 feet. It is frequently found in mixosaline waters. Three-square bulrush is an excellent wildlife food plant.

SOURCE: Fernald (1970); Gleason and Cronquist (1991); and Voss (1972).





Nutlet

MARSH SPIKE-RUSH

(*Eleocharis palustris* (L.) Roemer & J.A. Schultes)

SEDGE FAMILY (Cyperaceae) **C of C:** Native (6 WI)(5 MN) **IND. STATUS:** OBL

SYNONYM: *Eleocharis smallii* Britt.; see Ecological Notes

FIELD CHARACTERISTICS: A perennial sedge from long rhizomes. Stems are stout, round, 10-100 cm. tall and 1-3 mm. wide. Stems can be solitary or in small clusters. Spikelets are lance-ovate in shape, wider than the stems, 5-40 mm. long by 2-4 mm. wide. The lowest 1-2 scales of the spikelet are sterile and encircle the stem. Fertile scales are lanceolate to ovate and 2-5 mm. long, brown to red-brown with a green or light colored midvien. Nutlets (achenes) are lens shaped, yellow to brown, 1-2 mm. long with a distinct, deltoid-shaped tubercule that is constricted at the base. Nutlets are usually subtended by 4-6 barbed bristles.

ECOLOGICAL NOTES: Marsh spike-rush is a common, persistent emergent found in deep and shallow marshes, ditches, and borders of lakes and streams. To a lesser extent it occurs in bogs and wet meadows as well. The *National Wetland Plant List* (2014) lumps *E. erythropoda* Steud. and *E. macrostachya* Britt. under *E. palustris* while the *Flora of North America* (2002) considers all three to be separate species.

SOURCE: Fernald (1970); Gleason and Cronquist (1991); and Voss (1972).

PICKERELWEED

(*Pontederia cordata* L.)

PICKERELWEED FAMILY (Pontederiaceae) **C of C:** Native (8) **IND. STATUS:** OBL

FIELD CHARACTERISTICS: A perennial herb, usually emergent to a height of 1 m. Rhizomes are thick and creeping. Leaves are heart-shaped to lanceolate and up to 18 cm. long. However, rosettes of submerged, ribbon-like leaves can also be produced. Leaves are long-petioled (petioles averaging 4.5 cm.). The violet-blue flowers (rarely white) are packed into a dense spike. In flower June-August.

ECOLOGICAL NOTES: Pickerelweed is a nonpersistent emergent found in shallow water (rarely more than 3 feet in depth) or saturated substrates of marshes, bogs, margins of lakes and streams, and Mississippi River backwaters. It often forms large colonies.

SOURCE: Fernald (1970); Gleason and Cronquist (1991); and Voss (1972).

WATER STAR-GRASS

(*Heteranthera dubia* (Jacq.) MacM.)

PICKERELWEED FAMILY (Pontederiaceae) **C of C:** Native (6) **IND. STATUS:** OBL

SYNONYM: *Zosterella dubia* (Jacq.) Small

FIELD CHARACTERISTICS: A perennial, aquatic herb usually submersed, but can also be stranded on mudflats where it forms small rosettes (as illustrated by the photograph). Stems of submersed plants are forked, often rooting at the nodes and up to 1 m. long. Leaves lack a petiole or midrib and are linear, obtuse, to 15 cm. long by 2-6 mm. wide, or smaller and thicker if emersed. Flowers are yellow and enclosed in a spathe, which is 2-5 cm. long. The 6 perianth segments are linear and 4-6 mm. long. Fruit is a many-seeded capsule about 1 cm. in length. In flower July-September.

ECOLOGICAL NOTES: Water star-grass occurs in shallow waters and muddy shores of marshes, ponds, lakes and streams. When not in flower or fruit, the lack of a midrib distinguishes this species from the linear-leaved pondweeds (*Potamogeton* spp.).

SOURCE: Chadde (2002); and Gleason and Cronquist (1991).

BROAD-LEAF ARROWHEAD

(*Sagittaria latifolia* Willd.)

WATER PLANTAIN FAMILY (Alismataceae) **C of C:** Native (3) **IND. STATUS:** OBL

FIELD CHARACTERISTICS: A typically erect perennial herb with a naked stem 10-120 cm. high. The generally arrowhead-shaped leaves have great variability in width, which may be a response to varying water depths. Flowers are in whorls of 2-15 borne on the naked stem with 3 green sepals, and 3 white (or rarely pink) petals. Male flowers have many stamens. Flattened nutlets are packed into a dense head. Nutlets are 2.5-4 mm. long, winged on the margins, and have a horizontal beak 0.5-1.5(2.3) mm. long. Rhizomes end in an edible tuber. In flower July-August.

Arrowheads (*Sagittaria* spp.) in general can produce arrowhead-shaped, elliptical, or ribbon-like leaves. Like the bur-reeds (*Sparganium* spp.), pickerelweed (*Pontederia cordata*), and wild celery (*Vallisneria americana*), the arrowheads produce submerged rosettes of ribbon-like leaves that can be distinguished from the other genera by their venation (see ink drawing on page 54).

ECOLOGICAL NOTES: Broad-leaf arrowhead is a nonpersistent emergent found in shallow water and on saturated soils of marshes, shrub swamps, wooded swamps, bog ponds, and stream and lake margins.

The tubers (duck potatoes) are of considerable value to wildlife. Native Americans and early European settlers collected these starchy tubers for food. Other common names for this plant are duck potato and wapato.

SOURCE: Fassett (1957); Gleason and Cronquist (1991); and Voss (1972).

Broad-Leaf Arrowhead
(*Sagittaria latifolia*)

Tuber ("duck potato")

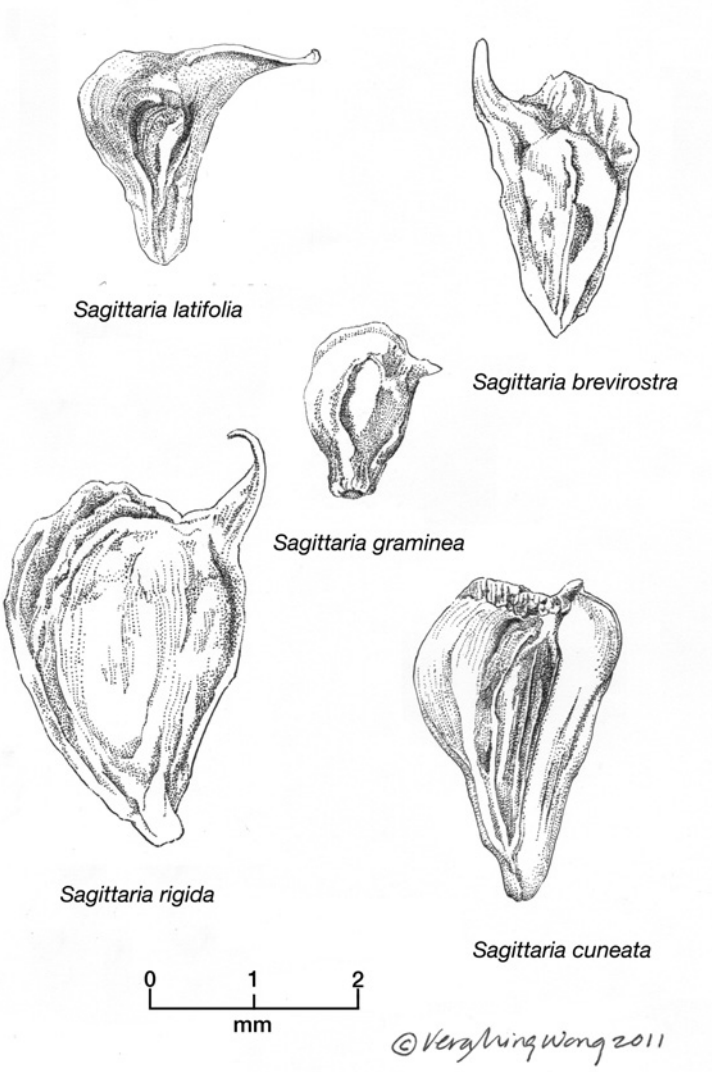
Cut-away of pistillate head with ripening nutlets

April - May

Broad-leaf arrowhead is an example of a non-persistent emergent meaning that the stems and leaves die-back at the end of the growing season leaving an open water condition. Stems and leaves re-emerge by June of the following growing season and may form nearly 100 percent areal cover as illustrated by the June - October photograph.

June - October

Nutlets of *Sagittaria*



STIFF ARROWHEAD

(*Sagittaria rigida* Pursh)

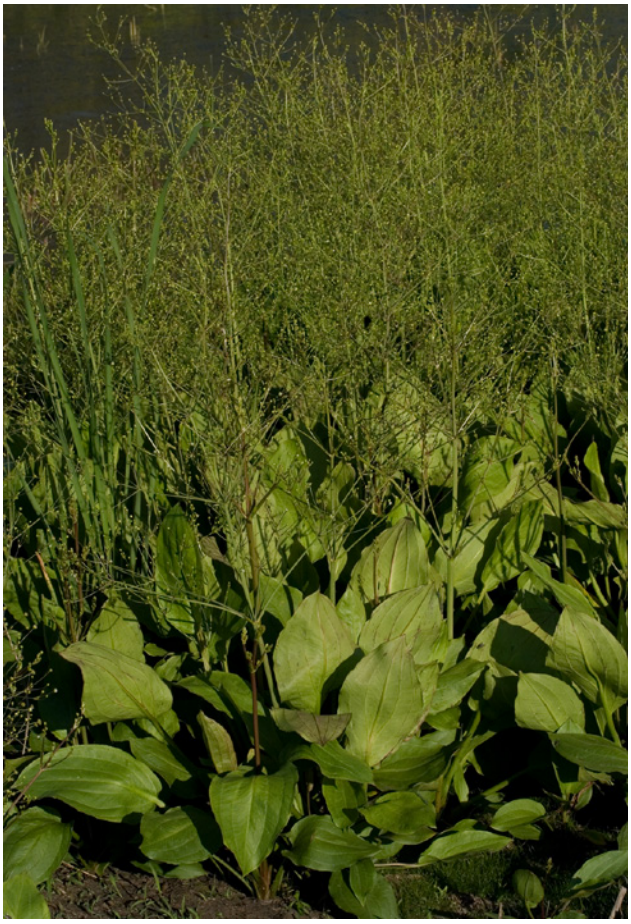
WATER PLANTAIN FAMILY (Alismataceae) **IND. STATUS:** OBL

C of C: Native (8 WI)(7 MN)

FIELD CHARACTERISTICS: A highly variable perennial herb that is erect and emersed, or lax and submersed. The naked stem is 10-80 cm. high. Leaves are lanceolate and entire, or shortly sagittate with narrow basal lobes, 4-15 cm. long and up to 7 cm. wide. Inflorescence has 2-8 whorls of flowers in heads to 1.5 cm. wide. Flowers are unisexual and consist of 3 green sepals and 3 white petals (rarely pink). Petals are 1-3 cm. long. Pistillate flower heads, when mature, are sessile on the stem. Staminate flowers have 15-many stamens. Nutlets are 2-4 mm. long with an ascending beak 1-1.5 mm. in length. In flower June-September.

ECOLOGICAL NOTES: Stiff arrowhead is a nonpersistent emergent found in shallow water and on saturated soils of shallow and deep marshes as well as stream and lake margins.

SOURCE: Fassett (1957); Gleason and Cronquist (1991); and Chadde (2002).



WATER PLANTAIN

(*Alisma triviale* Pursh)

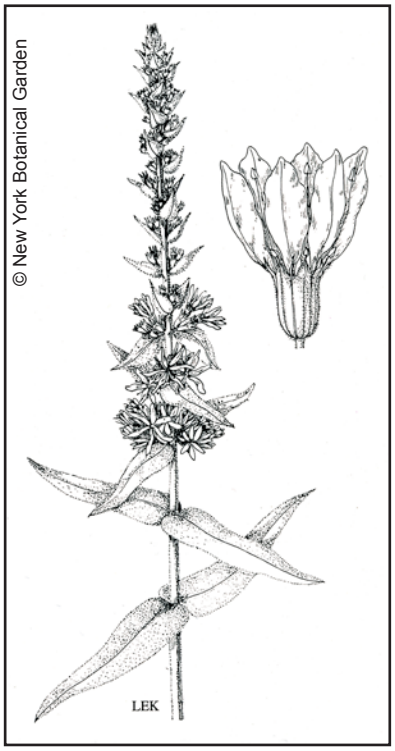
WATER PLANTAIN FAMILY (Alismataceae) **C of C:** Native (4) **IND. STATUS:** OBL

SYNONYM: *Alisma plantago-aquatica* L. var. *americanum* J.A. Schultes

FIELD CHARACTERISTICS: A perennial herb, usually emergent and 10-100 cm. high. Leaves have broad, flat blades that may be rounded or tapered at the base; however, submerged forms with only ribbon-like leaves are also produced. The inflorescence is highly branched. Flowers are perfect with 3 sepals and 3 white or pinkish petals. Petals are 2x the length of the sepals. Pistils are in a single whorl on a small, flat receptacle. Fruit is a group of minute, flat-sided nutlets borne in a whorl. Nutlets are 2.5-3 mm. long. In flower May-September.

ECOLOGICAL NOTES: Water plantain is found in shallow water and on saturated soils of marshes, shrub swamps, wooded swamps, and margins of lakes and streams. It rapidly invades exposed mudflats and is an abundant colonizer of farmed wetlands.

SOURCE: Gleason and Cronquist (1991); Fernald (1970); and Voss (1972).



PURPLE LOOSESTRIFE

(*Lythrum salicaria* L.)

LOOSESTRIFE FAMILY (Lythraceae) **IND. STATUS:** OBL

C of C: Introduced, a state-designated invasive and/or noxious weed in MN and WI (0)

FIELD CHARACTERISTICS: A stout, perennial herb with woody-like square stems growing to a height of 60-200 cm. Plants may be smooth or hairy. Leaves are 3-10 cm. long, lanceolate, opposite or whorled in 3's, entire, sessile and sometimes clasping the stem. Spikes are elongate (10-40 cm.) and packed with red-purple flowers composed of 6 petals. In flower June-September.

ECOLOGICAL NOTES: Purple loosestrife is a persistent emergent found in deep and shallow marshes, inland fresh meadows, and shores of lakes and streams. It is often associated with wetlands that have been disturbed by agricultural use, drainage, pasturing, siltation, or water level fluctuations.

Introduced from Eurasia, this aggressive invader poses a serious threat to North American wetlands because it can outcompete native wetland plants and take over wetland habitats. Deceptively colorful, the extensive monotypes formed by purple loosestrife result in a loss of plant and animal diversity. Biocontrol using loosestrife beetles has been successful to a degree. However, the best control method is to remove by hand the first individual plants that appear. Treatment using an herbicide approved for aquatic use is another option.

SOURCE: Fernald (1970); Gleason and Cronquist (1991); and Voss (1972).

The beginning of a purple loosestrife (*Lythrum salicaria*) invasion of a deep/ shallow marsh dominated by river bulrush (*Schoenoplectus fluviatilis*).

COMMON REED

(*Phragmites australis* (Cav.) Trin. ex Steud.)

GRASS FAMILY (Gramineae or Poaceae) **IND. STATUS:** FACW

SYNONYM: *Phragmites communis* Trin.

C of C: Both native and introduced genotypes. The native genotype has a C of C: 1. Introduced genotypes are highly invasive and have a C of C: 0.

FIELD CHARACTERISTICS: A tall (2-4 m.), robust, cane-like perennial grass that forms large colonies by rhizomes or stolons. Leaves are flat, pennant-shaped and 1-5 cm. wide. Inflorescence is a large panicle 20-40 cm. long that has a feathery appearance because the spikelets have long, silky hairs. Spikelets are 10-15 mm. long with 3-7 florets. In flower July-September.

Common reed can be distinguished from wild rice (*Zizania* spp.) by the following:

Annual, easy to pull up stem and roots as a unit; spikelets unisexual . . . . . *Zizania* spp.

Perennial, difficult to pull up because of stout rhizomes; spikelets perfect . . . . . *Phragmites australis*

ECOLOGICAL NOTES: Common reed is found in deep and shallow marshes, fresh (wet) meadows, sedge meadows, calcareous fens, bogs, road ditches, and along lake margins, sometimes in standing water up to 6 feet in depth. Common reed may be the most widely occurring plant of freshwater wetlands worldwide.

The tall, dense, cane-like stands of this persistent emergent provide excellent winter habitat for species such as white-tailed deer, ring-necked pheasant and eastern cottontail. However, invasive genotypes form large monotypic stands that displace diverse wetland communities. For example, in the lower Minnesota River Valley of the Twin Cities metropolitan area, common reed is invading high quality sedge meadow and calcareous fen communities.

SOURCE: Fassett (1957); Fernald (1970); Gleason and Cronquist (1991); and Voss (1972).

Autumn colors

Common Reed
(*Phragmites australis*)

Illustration from Hitchcock (1950)

Common Reed
(*Phragmites australis*)

Illustration from Hitchcock (1950)

RICE CUT-GRASS

(*Leersia oryzoides* (L.) Sw.)

GRASS FAMILY (Gramineae or Poaceae) **C of C:** Native (3) **IND. STATUS:** OBL

FIELD CHARACTERISTICS: A perennial grass spreading by long rhizomes. Stems are 1-1.5 m. long, weak and sometimes sprawling. Leaves and stems are highly scabrous (rough, easily cutting skin). Leaves are flat, 20-30 cm. long and 5-10 mm. wide. The ligule is flat-topped and 1 mm. long. Inflorescence is an open panicle 10-20 cm. long. Spikelets are 1-flowered, oval, 5 mm. long and 1-2 mm. wide. Glumes are absent and lemmas have bristly hairs. In flower July-September.

ECOLOGICAL NOTES: Rice cut-grass is a common species of shallow marshes and inland fresh meadows as well as shores and streambanks. Large patches or colonies are sometimes formed.

SOURCE: Gleason and Cronquist (1991); Chadde (2002); and Voss (1972).

NORTHERN WILD RICE

(*Zizania palustris* L.)

GRASS FAMILY (Gramineae or Poaceae) **C of C:** Native (8) **IND. STATUS:** OBL

FIELD CHARACTERISTICS: A robust, annual grass generally 2-3 m. in height. Inflorescence is a large panicle 10-60 cm. high. Spikelets have one flower and are unisexual. Pistillate spikelets are located in the upper portion of the inflorescence, while staminate spikelets are located in the lower portion. Pistillate spikelets have a lemma with a long, bristle-like awn. Staminate spikelets are red or yellow. Leaves are 1-5 cm. wide and go through a floating stage prior to emergence. In flower June-July.

ECOLOGICAL NOTES: Northern wild rice is a non-persistent emergent found in deep and shallow marshes, lakes, ponds and streams. Optimum water depth is 1.5 to 3.9 feet, although it can be found in deeper waters. It grows best in clear, shallow water with a slight current over a silty to mucky bottom. Wild rice is of great cultural and spiritual importance to Native Americans. It is an excellent waterfowl food and is often sown to grow stands for the benefit of wildlife. Wild rice has been widely planted both within and outside its natural range. Ownbey and Morley (1991) apply *Z. palustris* L., with two varieties, for the wild rice native to Minnesota. Southern wild rice (*Z. aquatica*) also occurs in both Minnesota and Wisconsin.

SOURCE: Fassett (1957); Gleason and Cronquist (1991); Ownbey and Morley (1991); and Voss (1972).

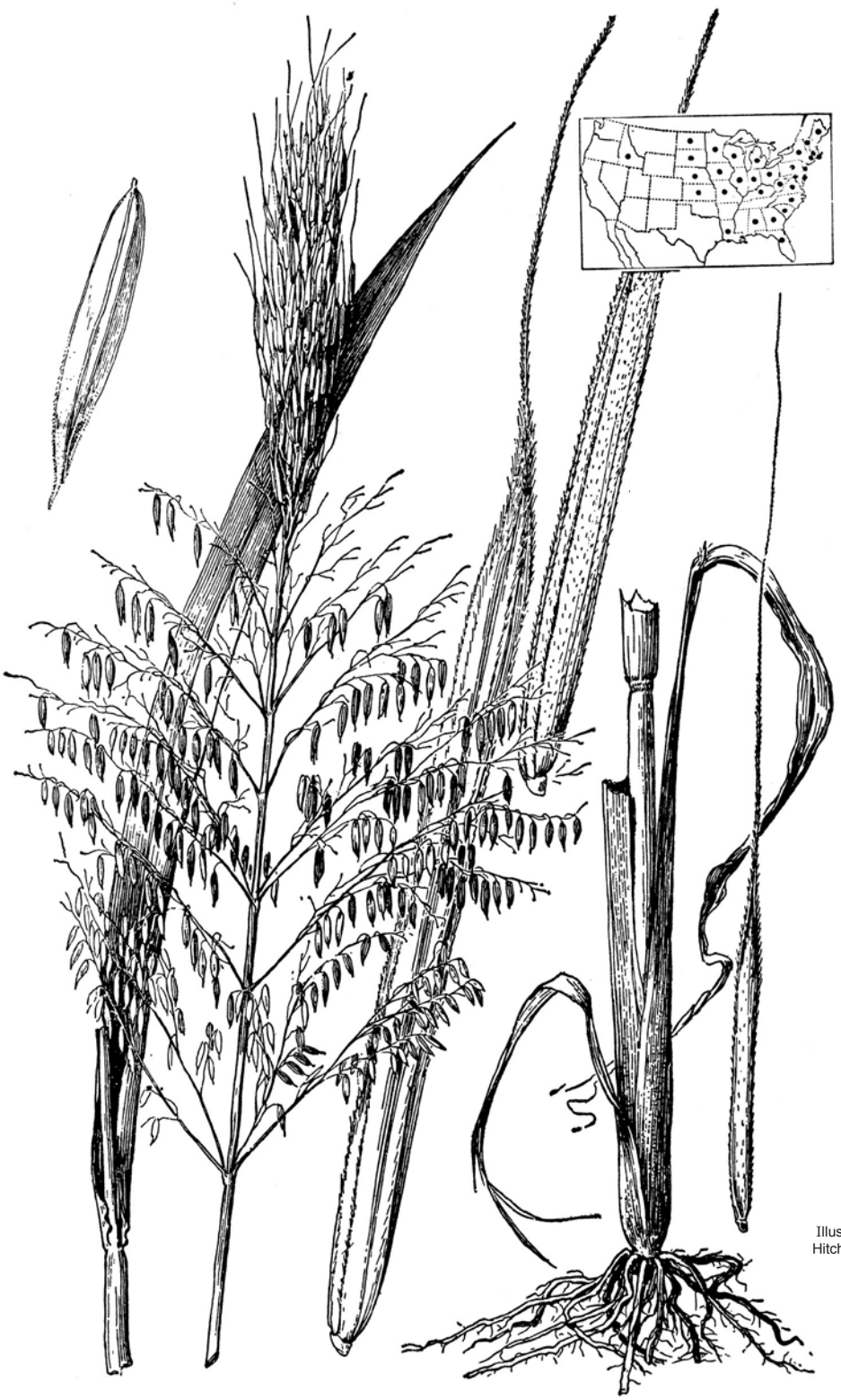
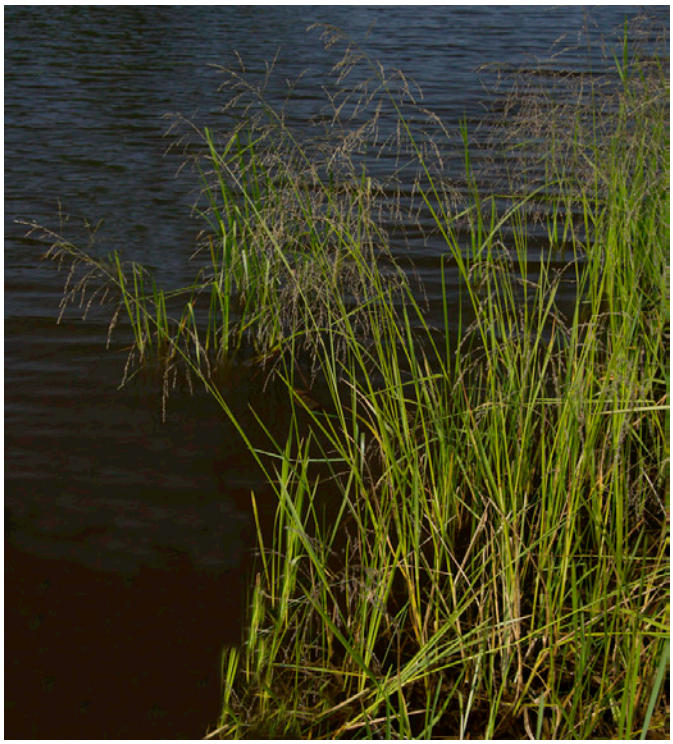


Illustration from
Hitchcock (1950)

Wild Rice
(*Zizania* spp.)



GIANT MANNA GRASS

(*Glyceria grandis* S. Wats.)

GRASS FAMILY (Gramineae or Poaceae) **C of C:** Native (6) **IND. STATUS:** OBL

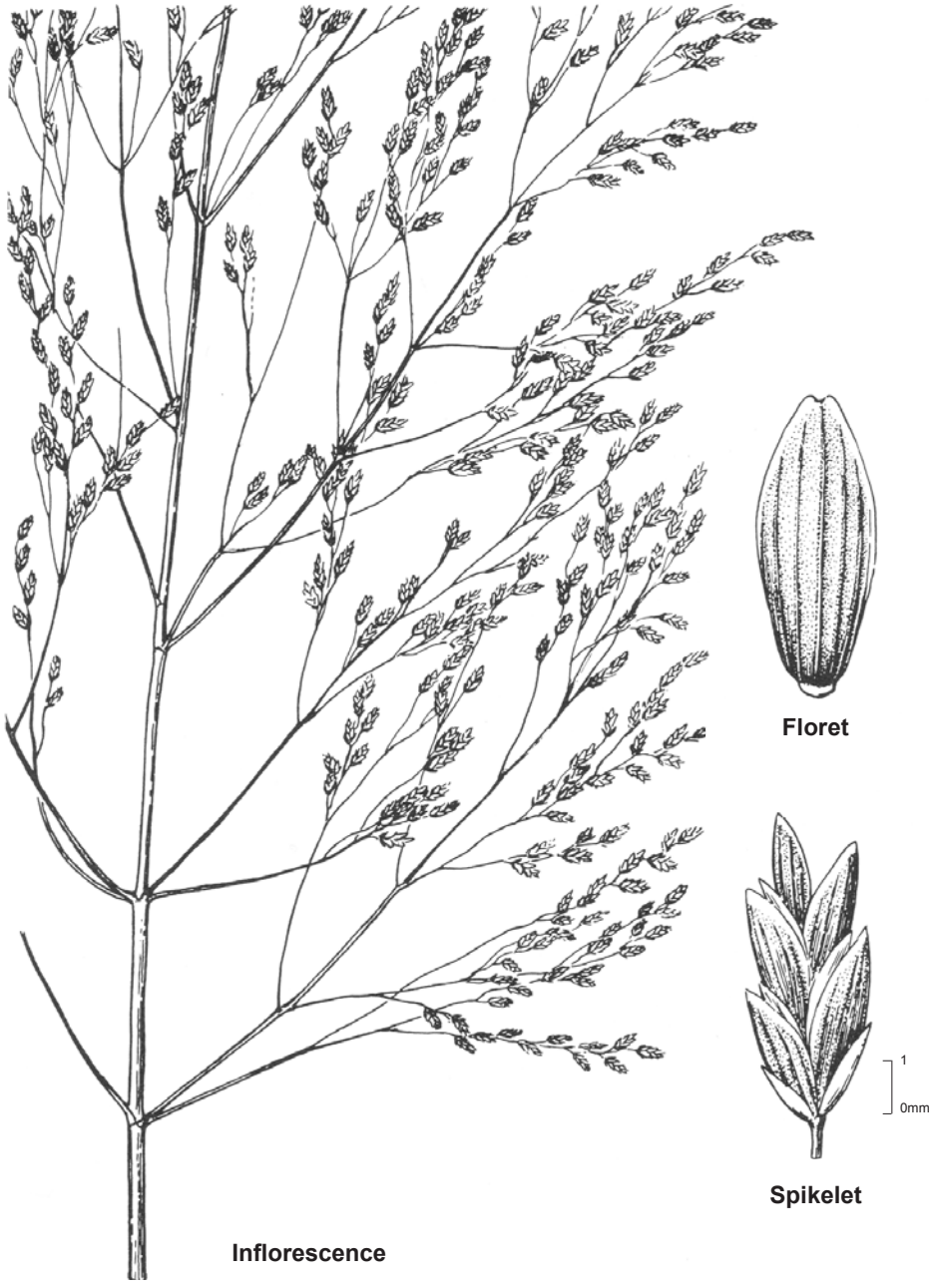
FIELD CHARACTERISTICS: A perennial grass with stems growing to a height of 1.5 m. Inflorescence is a large panicle 20-40 cm. long. Leaves are 8-12 mm. wide. Spikelets each have 5-9 florets. Lemmas are distinctly 7-ribbed and are usually purple. In flower June-August.

Giant manna grass can be easily distinguished from rattlesnake manna grass (*Glyceria canadensis*). Rattlesnake manna grass has lemmas with less conspicuous nerves unlike the strongly nerved or ribbed lemmas of giant manna grass. Additionally, spikelets of rattlesnake manna grass are 3-5 mm. wide at maturity compared to the less than 2.5 mm. wide spikelets of giant manna grass.

Good field characteristics that aid in distinguishing the manna grasses (*Glyceria* spp.) in general from other grasses are the parallel ribs on the lemmas (use 10-15x magnification) and their frequently closed leaf sheaths.

ECOLOGICAL NOTES: Giant manna grass is found in shallow and deep marshes, fresh (wet) meadows, bogs and ditches; commonly in shallow water.

SOURCE: Gleason and Cronquist (1991); and Voss (1972).



Giant Manna Grass
(*Glyceria grandis*)

Illustrations by Elsie Froeschner (Pohl 1966)

RATTLESNAKE MANNA GRASS

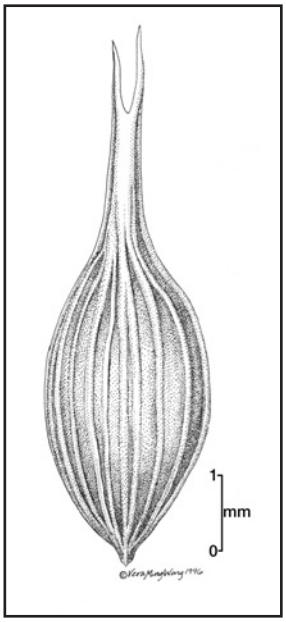
(*Glyceria canadensis* (Michx.) Trin.)

GRASS FAMILY (Gramineae or Poaceae) **C of C:** Native (7) **IND. STATUS:** OBL

FIELD CHARACTERISTICS: A perennial grass with usually solitary erect stems growing to a height of about 1 m. Leaf blades are 3-8 mm. wide. Inflorescence is a diffuse panicle of drooping branches 10-30 cm. long. Spikelets are ovate and 3-5(8) mm. long, have 3-8(10) flowers and become 3-5 mm. broad at maturity. Lemmas are pointed and exceed the palea by about 0.5-1.0 mm. Nerves on the lemmas are conspicuous, but not raised significantly. Glume margins are entire.

ECOLOGICAL NOTES: Rattlesnake manna grass is found in a variety of wet habitats such as deep and shallow marshes, bogs, wooded swamps and lakeshores. It is more commonly found north of the vegetation tension zone. Southward, it prefers bogs.

SOURCE: Fassett (1951); Gleason and Cronquist (1991); Swink and Wilhelm (1994); and Voss (1972).



Perigynium

© Steve D. Eggers

PORCUPINE SEDGE

(*Carex hystericina* Muhl. ex Willd.)

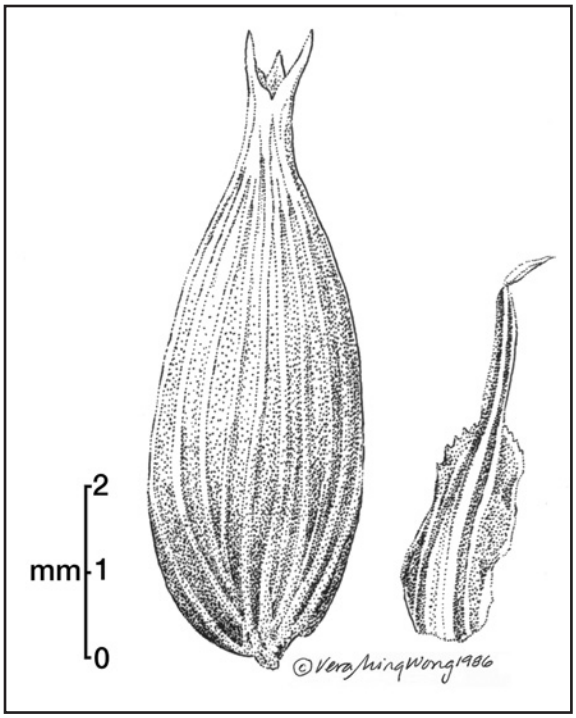
SEDGE FAMILY (Cyperaceae) **C of C:** Native (3 WI)(4 MN) **IND. STATUS:** OBL

FIELD CHARACTERISTICS: A slender, clustered, perennial sedge with triangular stems about 30-100 cm. tall. Leaves are 3-9 mm. wide, M-shaped and are not septate. Bracts of the lowest pistillate spikes are generally longer than the inflorescence. The several pistillate spikelets are 1.5-4 cm. in length and on slender stalks, the lower spikelets drooping. The numerous perigynia are 5-7 mm. long, 15-20 nerved and densely clustered. The slender beak of the perigynium is conspicuous and has short, straight teeth to about 0.7 mm. long.

ECOLOGICAL NOTES: Porcupine sedge is very similar to bottlebrush sedge (*Carex comosa*)[page 118] but close inspection of mature perigynia (see figures) will distinguish the two. It is a common sedge of marshes, fens and ditches.

SOURCE: Gleason and Cronquist (1991); and Swink and Wilhelm (1994).

Pinnate fibers



Perigynium and scale

LAKE SEDGE

(*Carex lacustris* Willd.)

SEDGE FAMILY (Cyperaceae) **C of C:** Native (6 WI)(5 MN) **IND. STATUS:** OBL

FIELD CHARACTERISTICS: A stout, perennial sedge with triangular stems 50-120 cm. in height. Leaves are coarse, M-shaped, bluish-green, 1 m. or more long and 8-15 mm. wide. Basal sheaths are reddened and have open, feather-like (pinnate) fibers. Pistillate spikelets number 2-4, are 2-10 cm. long, and sessile or on short stalks. Staminate spikelets number 2-4. Perigynium is 5.5-7.3 mm. long, without hairs, distinctly ribbed, and gradually tapers into a beak. Nutlets are three-angled.

ECOLOGICAL NOTES: Lake sedge is a common to dominant sedge found in shallow marshes, shrub-carrs, alder thickets, wooded swamps, sedge meadows and borders of lakes and streams. This persistent emergent forms scattered clones or beds.

SOURCE: Fernald (1970); Gleason and Cronquist (1991); and Voss (1972).

Lake Sedge
(*Carex lacustris*)

© Photos by Steve D. Eggers

COMMON YELLOW LAKE SEDGE

(*Carex utriculata* Boott)

SEDGE FAMILY (Cyperaceae) **C of C:** Native (7) **IND. STATUS:** OBL

FIELD CHARACTERISTICS: A robust, perennial, colonial sedge with blunt, three-sided stems 50-120 cm. tall. Stems and leaf sheaths are spongy at the base. Leaves are flat, tend to be yellow-green in color, and have knobby ridged partitions. The large leaf blades are 5-12 mm. wide. Upper spikelets are staminate. Lower pistillate spikelets are cylindric and 2-10 cm. long with densely crowded, shiny perigynia. Perigynia are inflated, 3-8 mm. long and 2-4 mm. wide, strongly 7-9 nerved and contracted to a toothed beak that is 1-2 mm. long. Pistillate scales are narrower and shorter than the perigynia. Triangular nutlets (achenes) are yellowish and 1.3-2 mm. long.

Some authors treat this species as a variety of *Carex rostrata*. However, *Carex rostrata* has very distinctive U-shaped leaves that are narrower (1.5-4 mm. wide).

ECOLOGICAL NOTES: Common yellow lake sedge is a common to dominant species of marshes and near shore shallows, especially north of the vegetation tension zone. It seems to prefer cool, soft waters. Gleason and Cronquist (1991) note that it may form a dense sod.

SOURCE: Gleason and Cronquist (1991); and Swink and Wilhelm (1994).

AQUATIC/WATER SEDGE

(*Carex aquatilis* Wahlenb.)

SEDGE FAMILY (Cyperaceae) **C of C:** Native (7) **IND. STATUS:** OBL

FIELD CHARACERISTICS: A clump-forming, perennial sedge (although does not form tussocks) with stems about 50–100 cm. tall. Stems do not usually exceed the height of the leaves. Mature leaves are slender (3-8 mm. wide), coarse, glaucous, and retain a blue-green tint through the autumn. Flowering stems arise from the center of the plant. Basal sheaths lack the pinnate fibers seen in hummock sedge (*Carex stricta*). The somewhat flattened perigynia are 2-3 mm. long, beakless, lack nerves and are widest above the middle section of the body. Nutlets (achenes) are lens-shaped.

See the discussion of *Carex stricta* [page 138] for further remarks on the dissimilarities of these two species.

ECOLOGICAL NOTES: Aquatic sedge tends to prefer wetter sites than those supporting *Carex stricta,* although the two species often occur together. Aquatic sedge is found in fresh (wet) meadows, shallow marshes, and along the margins of lakes, ponds and streams.

SOURCE: Gleason and Cronquist (1991); Swink and Wilhelm (1994); and Voss (1972).

RETRORSE SEDGE

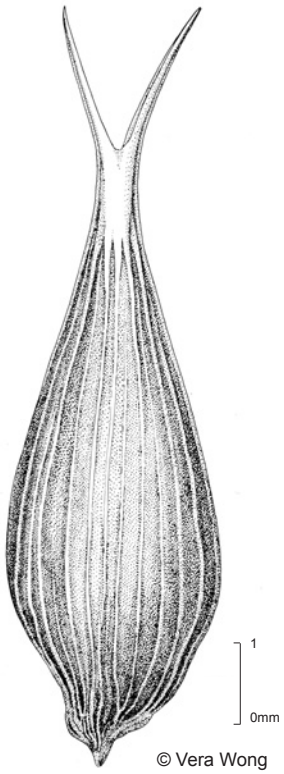
(*Carex retrorsa* Schwein.)

SEDGE FAMILY (Cyperaceae) **C of C:** Native (6 WI)(5 MN) **IND. STATUS:** OBL

FIELD CHARACTERISTICS: A stout, perennial sedge with triangular stems 50-120 cm. in height. Leaves are coarse, M-shaped, bluish-green, 1 m. or more long and 8-15 mm. wide. Basal sheaths are reddened and have open, feather-like (pinnate) fibers. Pistillate spikelets number 2-4, are 2-10 cm. long, and are sessile or on short stalks. Lower perigynia are downward or backward facing (retrorse). Staminate spikelets number 2-4. Perigynia are 5.5-7.3 mm. long, lack hairs, are distinctly ribbed and gradually tapered into a beak. The nutlet (achene) is three-angled.

ECOLOGICAL NOTES: Retrorse sedge is a very common sedge in shallow marshes, shrub-carrs, alder thickets, floodplain forests, wooded swamps, sedge meadows and borders of lakes and streams.

SOURCE: Fernald (1970); Gleason and Cronquist (1991); and Voss (1972).



Perigynium

© Photos by Steve D. Eggers

Pubescent leaf sheath

SLOUGH SEDGE

(*Carex atherodes* Spreng.)

SEDGE FAMILY (Cyperaceae) **C of C:** Native (8 WI)(5 MN) **IND. STATUS:** OBL

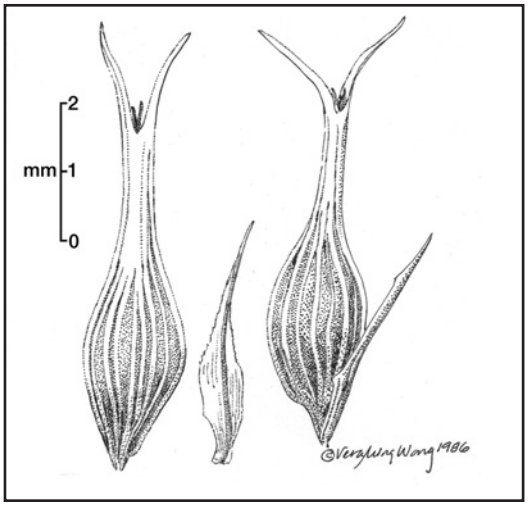
FIELD CHARACTERISTICS: A perennial sedge from long, coarse rhizomes. Triangular stems are stout, 30-150 cm. in height, growing singly or a few together. Leaf sheaths are densely covered with fuzzy hairs (see photograph). Leaf blades are 4-10 mm. wide. Spikes number several with pistillate spikes 2-10 cm. long and 1 cm. wide. Staminate spikes are 2-6 cm. long. Perigynia are strongly ribbed, ribs numbering 12-29. Perigynia are 7-10 mm. long with divergent teeth 1.5-2.5(3) mm. long. Nutlet (achene) is more or less triangular in shape.

Slough sedge resembles lake sedge (*C. lacustris*)[page 112]; however, lake sedge leaf sheaths are smooth, not covered with fuzzy hairs, and the perigynia of lake sedge have two short teeth instead of the long, widely-spread teeth of slough sedge.

ECOLOGICAL NOTES: Slough sedge is common in sedge meadows, shallow marshes and lake shores, often found in shallow water. It is one of the most frequently encountered sedges of prairie potholes in southern and western Minnesota.

SOURCE: Voss (1972); and Gleason and Cronquist (1991).

© Photos by Steve D. Eggers



Perigynia and scale

BOTTLEBRUSH SEDGE

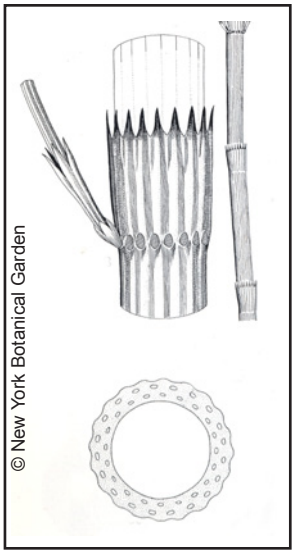
(*Carex comosa* Boott)

SEDGE FAMILY (Cyperaceae) **C of C:** Native (4 MN)(5 WI) **IND. STATUS:** OBL

FIELD CHARACTERISTICS: A stout, clump-forming, perennial sedge with sharply triangular stems growing to a height of 50-150 cm. Leaves are 6-15 mm. wide, M-shaped, septate and rough-margined. Pistillate spikelets number 3-6, are 3-7 cm. in length, and are on short stalks, the lower spikelets drooping. The perigynium is 5.5-7 mm. long, strongly ribbed, and has widely spreading, reflexed teeth (1)1.2-2.2 mm. long. Nutlets (achenes) are three-angled and 1.7-2 mm. long with a persistent style.

ECOLOGICAL NOTES: Bottlebrush sedge is found in shallow marshes, bogs and shores of lakes and streams.

SOURCE: Fernald (1970); Gleason and Cronquist (1991); and Voss (1972).



Stem: sheath, teeth, and cross section

WATER HORSETAIL

(*Equisetum fluviatile* L.)

HORSETAIL FAMILY (Equisetaceae) **C of C:** Native (7) **IND. STATUS:** OBL

FIELD CHARACTERISTICS: A horsetail with annual stems that are all alike and grow to a height of 1 m. or more from smooth, shiny rhizomes. The central cavity of the stem is about 80 percent of the stem's diameter. Stem sheaths are green and 6-10 mm. long. Teeth of the sheath number 12-24 and are narrow, black (sometimes with white margins) and 1.5-3 mm. long. Branches can be none to numerous and whorled, 4-6 angled and simple. Cones are 1-2 cm. long, terminal, deciduous and mature in summer.

ECOLOGICAL NOTES: Water horsetail is typically found in shallow, standing water of marshes, bogs, lakes and ditches.

SOURCE: Gleason and Cronquist (1991); and Chadde (2002).

SOFT RUSH

(*Juncus effusus* L.)

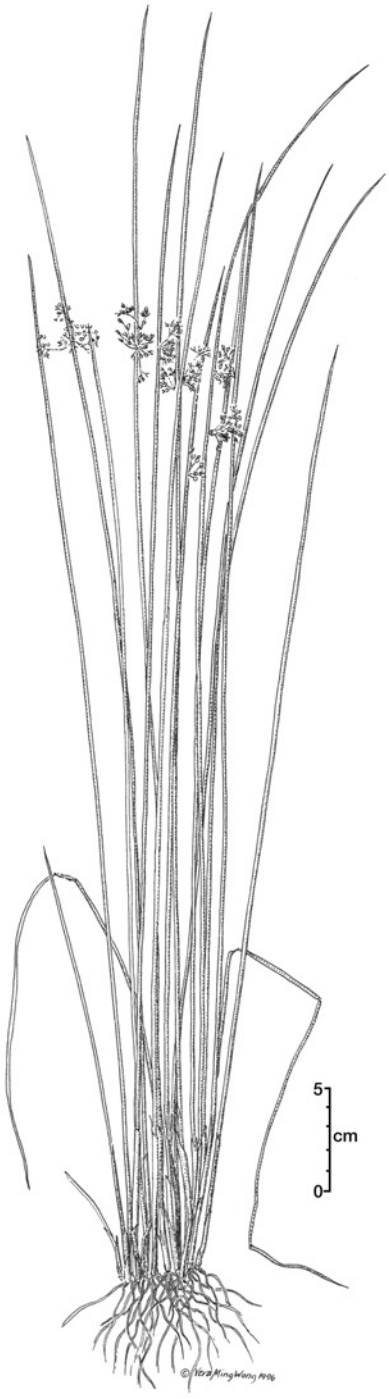
RUSH FAMILY (Juncaceae) **C of C:** Native (4) **IND. STATUS:** OBL

FIELD CHARACTERISTICS: A densely cespitose (tufted), perennial rush with stout rhizomes and soft stems 20-120 cm. in height. Leaves lack a leaf blade and auricles, only a sheath is present. An involucral leaf (10)15-25(35) cm. long appears to be a continuation of the stem. The many-flowered inflorescence appears to "erupt" from the side of the stem. Flowers consist of 6 tepals (3 sepals + 3 petals that are similar in color and size (2-2.5(3) mm. long)) surrounding a capsule. Capsule is many-seeded. Seeds are minute (0.2-0.3 mm. long).

A major division in keys to *Juncus* species involves whether the inflorescence is terminal or lateral. Soft rush has a lateral inflorescence that appears to erupt from the side of the stem. Dudley's rush (*J. dudleyi*) exhibits a terminal inflorescence (page 188).

ECOLOGICAL NOTES: Soft rush occurs in shallow marshes, inland fresh meadows, borders of bogs and along shores.

SOURCE: Voss (1972); Gleason and Cronquist (1991); Great Plains Flora Association (1991); and Swink and Wilhelm (1994).



Soft Rush
(*Juncus effusus*)

FALSE LOOSESTRIFE

(*Ludwigia polycarpa* Short & Peter)

EVENING PRIMROSE FAMILY (Onagraceae) **C of C:** Native (6) **IND. STATUS:** OBL

FIELD CHARACTERISTICS: A perennial herb from leafy stolons produced in the fall. Stems are erect to 10-90 cm., smooth and usually 4-angled. Leaves are alternate and lanceolate with entire margins, 3-12 cm. long by 5-15 mm. wide. Single flowers are sessile in leaf axils and 2-4 mm. long. Flower parts are in 4s with green petals that are minute or absent. Fruit is short cylindric to widened above, 4-7 mm. by 3-5 mm., glabrous and roundly 4-sided or shallowly grooved. In flower July-September.

ECOLOGICAL NOTES: False loosestrife primarly occurs in shallow marshes and inland fresh meadows.

SOURCE: Chadde (2002); and Gleason and Cronquist (1991).

Undersides of fertile pinnae

MARSH FERN

(*Thelypteris palustris* Schott)

MAIDEN FERN FAMILY (Thelypteridaceae) **C of C:** Native (7) **IND. STATUS:** FACW(NC/NE) OBL (MW, GP)

SYNONYM: *Dryopteris thelypteris* (L.) Sw.

FIELD CHARACTERISTICS: A perennial fern with fronds emerging singly from slender, long-running, blackish rhizomes. Pinnate-pinnatifid fronds are usually 20-60 cm. high, occasionally to 75 cm., light green to yellow-green, narrowly lanceolate, about 15 cm. wide, and deciduous. Petioles are black at the base, smooth (hairless) and scaleless. Lowest pinnae are less than 5 cm. long. Sterile fronds have up to 40 pairs of pinnae while fertile fronds have up to 25 pairs. Pinnae are lanceolate with rounded to blunt tipped lobes and the margins are not toothed. Veins of the subpinnae are forked. Fertile (spore-bearing) fronds tend to be more erect on longer stalks. Sori are inter-marginal on the bottom of the pinnae, each being borne on a vein.

ECOLOGICAL NOTES: Marsh fern occurs in more wetland community types than any other fern in our area. It is particularly common in marshes, inland fresh meadows and bog mats. To a lesser extent it occurs in shrub-carrs, alder thickets, coniferous swamps, hardwood swamps and calcareous fens.

SOURCE: Crow and Hellquist (2000); Gleason and Cronquist (1991); and Swink and Wilhelm (1994).

SPOTTED WATER HEMLOCK

(*Cicuta maculata* L.)

CARROT FAMILY (Umbelliferae or Apiaceae) **IND. STATUS:** OBL

C of C: Native (5 MN)(6 WI)

FIELD CHARACTERISTICS: An erect perennial herb up to 2 m. tall. The stout stems are branched, smooth, hollow and often purple spotted. This herb has highly poisonous tuber-like roots. Aternate leaves are 2-3 times pinnately compound. Leaflets are lanceolate, sharply toothed, and 5-25 mm. wide, excluding the teeth. Leaf veins end in sinuses rather than teeth. Lacks the axillary vegetative bulblets seen in *Cicuta bulbifera*. Supports several compound umbels, up to 12 cm wide. Petals are white. Fruit is small, 3-4(5) mm. long and slightly flattened. In flower June-September. **CAUTION:** All parts of this herb are highly poisonous.

ECOLOGICAL NOTES: Spotted water hemlock is an herb primarily of shallow marshes and wet prairies. It also occurs in sedge meadows, shrub-carrs, swales, ditches and along streambanks.

SOURCE: Gleason and Cronquist (1991); Swink and Wilhelm (1994); and Voss (1985).

BULBLET-BEARING WATER HEMLOCK

(*Cicuta bulbifera* L.)

CARROT FAMILY (Umbelliferae or Apiaceae) **C of C:** Native (7) **IND. STATUS:** OBL

FIELD CHARACTERISTICS: An erect perennial herb 30-100 cm. tall. The smooth, slender stems are hollow. Leaves are all alternately arranged along the stem. They are pinnately-divided into linear leaflets with sparsely toothed margins. Leaflets are usually about 3(5) mm. wide, excluding the coarse teeth. Leaf veins end in sinuses rather than teeth. Vegetative bulblets form in upper leaf axils. Inflorescences occur as a few compound umbels up to 5 cm. wide but often no inflorescence is present. Petals are white. In bloom August-September.

CAUTION: All parts of this herb are highly poisonous.

ECOLOGICAL NOTES: Bulblet-bearing water hemlock occurs in shallow marshes and along wet streambanks and pond margins. It also occurs in sedge meadows and along the edges of laggs (border between a bog and uplands).

SOURCE: Gleason and Cronquist (1991); Swink and Wilhelm (1994); and Voss (1985).

WATER PARSNIP

(*Sium suave* Walt.)

CARROT FAMILY (Umbelliferae or Apiaceae) **C of C:** Native (5) **IND. STATUS:** OBL

FIELD CHARACTERISTICS: A perennial herb up to 2 m. tall with fibrous roots (lacks a stolon). The solitary stems are stout, glabrous, corrugated and hollow. Stems have a slight zigzag form and may be inflated when submersed. Alternate leaves are one-pinnate (feather-like) compound, with (5)7-17 flat, elongated leaflets 5-10 cm. long. Lateral leaflets are opposite, sessile, and linear to lanceolate with numerous fine teeth (serrate) along the full length of the margins. Submerged leaves are often dimorphic (occur in two forms): lower leaves when submerged may be bipinnately dissected. Twice compound umbels are 3-12 cm. wide and support 5-petaled, white flowers. The ovoid fruits are flattened with prominent ribs. This herb has a sweet fennel odor. In bloom July-September.

Very similar to cowbane (*Oxypolis rigidior)*, but cowbane has irregularly-toothed leaves.

ECOLOGICAL NOTES: Water parsnip is often found in shallow marshes, ponds, wet meadows and swales. It is very characteristic of vernal pools.

SOURCE: Crow and Hellquist (2000); Gleason and Cronquist (1991); Swink and Wilhelm (1994); and Voss (1972).

TUFTED LOOSESTRIFE

(*Lysimachia thyrsiflora* L.)

PRIMROSE FAMILY (Primulaceae) **C of C:** Native (6 MN)(7 WI) **IND. STATUS:** OBL

FIELD CHARACTERISTICS: A perennial herb with stems 30-70 cm. in height. Leaves are narrowly lanceolate to linear, 5-12 cm. long and punctate. Inflorescence consists of a few, short racemes 1-3 cm. long on spreading stalks from axils of leaves in the middle of the stem. Flowers are yellow with corolla lobes 4-5 mm. long and marked with black. In flower May-July.

ECOLOGICAL NOTES: Tufted, or swamp, loosestrife is found in shallow marshes, bogs and along shores.

SOURCE: Gleason and Cronquist (1991); and Swink and Wilhelm (1994).

MARSH BELLFLOWER

(*Campanula aparinoides* Pursh)

BELLFLOWER FAMILY (Campanulaceae) **C of C:** Native (5 MN)(7 WI) **IND. STATUS:** OBL

FIELD CHARACTERISTICS: A low perennial herb with slender, weak, tangling stems. Three-angled stems are covered with short, stiff, hooking hairs or bristles. Alternate leaves are linear to narrowly lanceolate, with the lower leaves 9 cm. by 7(8) mm. Each funnel-shaped corolla is white to pale blue, 4-13 mm. long, and supported by a long, slender, nodding pedicel. Fruit is a capsule. In flower July-September.

ECOLOGICAL NOTES: Marsh bellflower is often unnoticed unless in flower. It is frequent in shallow marshes and fresh (wet) meadows and also occurs in shrub-carrs, calcareous fens, and along lake shores, pond margins and streambanks.

SOURCE: Crow and Hellquist (2000); Gleason and Cronquist (1991); Swink and Wilhelm (1994); and Voss (1996).

Terrestrial Form

Floating-leaved Form

WATER SMARTWEED

(*Persicaria amphibia* (L.) S.F. Gray)

SMARTWEED FAMILY (Polygonaceae) **C of C:** Native (5 WI)(4 MN) **IND. STATUS:** OBL

SYNONYM: *Polygonum amphibium* L.

FIELD CHARACTERISTICS: A highly variable, rhizomatous, perennial herb with prostrate or erect stems to a length of 1-2 m. Several lance-shaped leaves occur along the elongate stems. This species is divided into two forms: an aquatic form with submergent, glabrous floating leaves 2-15 cm. by 1-2 cm. (formerly known as *Polygonum natans*) and a terrestrial form with erect, densely hairy leaves usually less than 4.5 cm. wide (formerly known as *Polygonum coccineum*). Inflorescence is a usually solitary terminal spike, but sometimes two spikes, consisting of densely crowded, pink flowers. Swollen stem joints of at least the aquatic form exhibit a green flange at its summit. In flower June-September.

ECOLOGICAL NOTES: Water smartweed is a common species of marshes, prairie potholes, lakes, permanent and ephemeral ponds, quiet backwater areas and river edges. The terrestrial form typically occurs in marshes and on shores.

SOURCE: Gleason and Cronquist (1991); Swink and Wilhelm (1994); and Voss (1985).

ARROW-LEAF TEARTHUMB

(*Persicaria sagittata* (L.) Gross.)

SMARTWEED FAMILY (Polygonaceae) **C of C:** Native (4 MN)(6 WI) **IND. STATUS:** OBL

SYNONYM: *Polygonum sagittatum* L.

FIELD CHARACTERISTICS: A slender, annual, vine-like herb growing to 1-2 m. Often climbing or reclining on and/or tangling with other plants. Stems are 4-angled and armed with prickly recurved barbs, thus the common name. Arrowhead-shaped leaves are up to 10 cm. long and about 2.5 cm. wide, have basal lobes that are directed downward (sagittate), and a barbed midvein along the lower surface. Inflorescence is a raceme, usually less than 1 cm. long, with flowers in globular clusters at the end of a long, glabrous stalk (peduncle). Flowers are pink to white, sometimes green. Nutlet is 3-sided and 2.2-3 mm. long. In flower July-September.

ECOLOGICAL NOTES: Arrow-leaf tearthumb occurs in shallow marshes, sedge meadows and fresh (wet) meadows. In bogs it may form a thick distinctive zone, especially if the bog has been burned. It also occurs in wooded swamps where it is often a pioneering species following a burn.

SOURCE: Crow and Hellquist (2000); Gleason and Cronquist (1991); Swink and Wilhelm (1994); and Voss (1985).

SECTION 3

Inland Fresh Meadows

III. Inland Fresh Meadows

Inland fresh meadows are essentially closed wetland communities (nearly 100 percent vegetative cover) composed of perennial forb, grass and sedge mixtures growing on saturated soils. Woody plants are not dominant and standing water is usually only present during floods and snowmelt. Inland fresh meadows often form a transition zone between aquatic communities and uplands. Peat/muck soils indicate nearly permanent saturation and anaerobic conditions while communities occurring on hydric mineral soils are frequently saturated for long duration resulting in at least periodic anaerobic conditions.

Plants occurring in inland fresh meadows include species found in other communities such as the annuals of seasonally flooded basins, emergent aquatics of marshes, and invading shrubs or trees, which are present as scattered, small individuals. The forbs, grasses and sedges of inland fresh meadows can tolerate inundation to a greater degree than most woody species, but many species of inland fresh meadows are stressed if inundation during the growing season lasts for more than one or two consecutive weeks (reed canary grass is an exception). Because these wetlands lack standing water during most of the growing season, they are often called "dry marshes."

Inland fresh meadows are particularly important for their water quality functions including trapping sediments and assimilating nutrients. Inland fresh meadows are also important for stormwater and floodwater retention. Wildlife habitat is provided for many species including sandhill crane, ring-necked pheasant, common snipe, sedge wren, small mammals and white-tailed deer. The abundance of small mammals supports mink, fox and raptors such as the northern harrier. The composites found in these meadows are an important autumn and winter food source for songbirds. Inland fresh meadows are often used for pasture or cut for "marsh hay."

Inland fresh meadows include two of the rarest wetland plant communities in our area – calcareous fens and wet/wet-mesic prairies – both of which support a disproportionate number of rare, threatened and endangered species.

© Steve D. Eggers

Inland fresh meadows provide habitat for many species of wildlife, including sandhill cranes.

III.A. Sedge Meadows

Sedge meadows are dominated by the sedges (Cyperaceae) growing on saturated soils. Most of the sedges present are in the genus *Carex*, but also present are those of the genera *Eleocharis* (spike-rushes), *Scirpus* (bulrushes) and *Cyperus* (nut-grasses). Grasses (Gramineae), especially Canada blue-joint grass (*Calamagrostis canadensis*), and true rushes (*Juncus* spp.), can also be important components. Forb species can be sparse to diverse.

Soils are usually composed of peat or muck, but can also be composed of shallow muck over mineral soils, or entirely mineral soils. Some sedges, especially *Carex stricta*, form hummocks—also called tussocks—that are accentuated by grazing and frost action. Hummocks are composed of undecayed fibrous roots and rhizomes. Sedge meadows often grade into shallow marshes, calcareous fens, wet prairies and bogs.

Sedges of the genus *Carex* are mostly long-lived and competitive grass-like plants that have three-ranked leaves and triangular, solid stems. These traits are also shared with some species of bulrushes (e.g., *Schoenoplectus*) and other genera of the sedge family. This is opposed to the two-ranked leaves and cylindrical, hollow stems of grasses, or the apparently "leafless," cylindrical, solid stems of rushes (*Juncus*). The diagnostic character of *Carex* that distinguishes them from all other plants is the **perigynium**, a papery flask- or sac-like structure that encloses the pistil, which at maturity develops into a nutlet. Mature perigynia are usually required for positive identification of the species.

There are over 150 species of *Carex* in Minnesota and Wisconsin, many of which are found in wetland habitats. Because they have specific habitat requirements, *Carex* species are good indicators of environmental conditions such as soil and water chemistry, water levels, shading, silt deposition and floating mats.

The fertile organic soils associated with sedge meadows have traditionally been used for muck farming. Lowering of water tables through artificial drainage is suspected of causing shrub invasion in some of our remaining sedge meadows.

Curtis (1971) described floristic differences between sedge meadows located north of the tension zone compared to those south of the tension zone. He refers to these communities as northern sedge meadows and southern sedge meadows, respectively. See pages 580-583 in Curtis for a comparison of species.

In this third edition, we have added "sedge mats" to the key to wetland plant communities. This was in response to field practitioners who asked where floating mats composed of sedges (e.g., *Carex lasiocarpa*, *C. oligosperma*) would best fit given the plant communities of this guide.

Sedge Meadows

VEGETATION: The opposing page illustrates two seasonal views of the same sedge meadow community. Hummock sedge (*Carex stricta*) is dominant while Canada blue-joint grass (*Calamagrostis canadensis*) and lake sedge (*Carex lacustris*) are sub-dominant. Non-dominant species include fowl bluegrass (*Poa palustris*), fringed brome grass (*Bromus ciliatus*), woolly sedge (*Carex pellita*), marsh fern (*Thelypteris palustris*), joe-pye weed (*Eutrochium maculatum*), boneset (*Eupatorium perfoliatum*), sawtooth sunflower (*Helianthus grosseserratus*), swamp thistle (*Cirsium muticum*), giant goldenrod (*Solidago gigantea*), flat-top aster (*Doellingeria umbellata*), swamp aster (*Symphyotrichum firmum*), New England aster (*Symphyotrichum novae-angliae)*, ironweed (*Vernonia fasciculata*), Michigan lily (*Lilium michiganense*), swamp milkweed (*Asclepias incarnata*), blue vervain (*Verbena hastata*), turtlehead (*Chelone glabra*), cowbane (*Oxypolis rigidior*), angelica (*Angelica atropurpurea*), wild mint (*Mentha arvensis*), common bugleweed (*Lycopus americanus*), northern bugleweed (*Lycopus uniflorus*), hairy hedge-nettle (*Stachys pilosa*), marsh skullcap (*Scutellaria galericulata*), jewelweed (*Impatiens capensis*), marsh marigold (*Caltha palustris*), tall meadowrue (*Thalictrum dasycarpum*) and broad-leaf cattail (*Typha latifolia*). Small, scattered individuals of beaked willow (*Salix bebbiana*) and red-osier dogwood (*Cornus alba*) are present.

SOILS: Seelyeville muck (Typic Haplosaprists) with a muck layer greater than 51 inches in thickness. Seelyeville soils are typically saturated to the surface. Landscape position is the toe of the bluff of the Minnesota River Valley.

HYDROLOGY: Groundwater seepages. Seelyeville muck soils are saturated at or near the surface throughout the growing season.

LOCATION: Fort Snelling State Park, Dakota County, Minnesota.

May

August

Sedge Meadows

© Steve D. Eggers

VEGETATION: This sedge meadow is dominated by common yellow lake sedge (*Carex utriculata*). Also present are tussock sedge (*Carex stricta*), Buxbaum's sedge (*Carex buxbaumii*), marsh fern (*Thelypteris palustris*), crested shield-fern (*Dryopteris cristata*), sensitive fern (*Onoclea sensibilis*), cinnamon fern (*Osmundastrum cinnamomeum*), joe-pye weed (*Eutrochium maculatum*), boneset (*Eupatorium perfoliatum*), arrow-leaf tearthumb (*Persicaria sagittata*), linear-leaf willow-herb (*Epilobium leptophyllum*), green bulrush (*Scirpus atrovirens*), bulblet-bearing water hemlock (*Cicuta bulbifera*), Canada blue-joint grass (*Calamagrostis canadensis*), rattlesnake manna grass (*Glyceria canadensis*), steeplebush (*Spiraea tomentosa*), meadowsweet (*Spiraea alba*), Kalm's St. John's wort (*Hypericum kalmianum*), swamp candles (*Lysimachia terrestris*), grass-leaf goldenrod (*Euthamia graminifolia*), giant goldenrod (*Solidago gigantea*), northern bugleweed (*Lycopus uniflorus*), marsh St. John's wort (*Triadenum fraseri*) and slender willow (*Salix petiolaris*).

SOILS: Dawsil mucky peat (Terric Haplosaprists), very-poorly drained soils with 16 to 51 inches of mucky peat over sand.

HYDROLOGY: Dawsil soils have a seasonal high water table at the surface to 12 inches below the surface during September to June of most years.

LOCATION: Black River State Forest, South Unit, Jackson County, Wisconsin.

VEGETATION: This sedge meadow is dominated by hummock sedge (*Carex stricta*). Other species include lake sedge (*Carex lacustris*), Canada blue-joint grass (*Calamagrostis canadensis*), fowl blue-grass (*Poa palustris*), redtop (*Agrostis gigantea*), woolgrass (*Scirpus cyperinus*), marsh milkweed (*Asclepias incarnata*), arrow-leaf tearthumb *(Persicaria sagittata*), water pepper (*Persicaria hydropiper*), common bugleweed (*Lycopus americanus*), blue vervain (*Verbena hastata*), redstem aster (*Symphyotrichum puniceum*), sawtooth sunflower (*Helianthus grosseserratus*), giant goldenrod (*Solidago gigantea*), boneset (*Eupatorium perfoliatum*), beggarticks (*Bidens* sp.) and joe-pye weed (*Eutrochium maculatum*).

SOILS: Clyde silty clay loam (Typic Endoaquolls*)*, a poorly-drained mineral soil found in shallow depressions and drainageways on till plains. Landscape position is a depressional area in a gently rolling till plain.

HYDROLOGY: This sedge meadow is supported by groundwater and surface water runoff. Clyde soils are frequently saturated at the soil surface to 12 inches below the surface during the wettest part of the growing season.

LOCATION: Cartney Wildlife Management Area, Mower County, Minnesota.

HUMMOCK SEDGE

(*Carex stricta* Lam.)

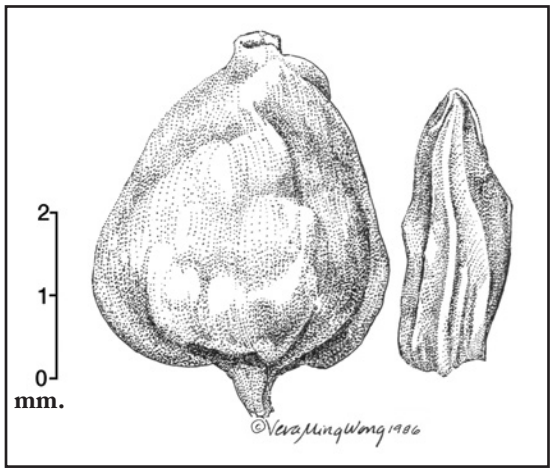
SEDGE FAMILY (Cyperaceae) **C of C:** Native (5 MN)(7 WI) **IND. STATUS:** OBL

FIELD CHARACTERISTICS: A perennial, clonal sedge with triangular stems about 40-100 cm. tall and which usually exceed the leaves. Mature leaves are 2-6 mm. wide, slender, green and M-shaped. Leaves and stems are extremely rough on the edges. Forms large tufts or hummocks to 30 cm. tall and as wide, although the authors have seen hummocks as tall as 75 cm. Flowering stems arise laterally. Lowest leaves are reduced to bladeless sheaths. Basal sheaths disintegrate into two rows of fibers on each side of a central fiber (pinnate)[see photo on page 112] and tend to be reddish-brown in color. The beakless perigynia are 2-3 mm. long, flat to flattened-convex, widest below the middle section of the body, and taper to the tip. Two stigmas are present and nutlets are lens-shaped. Pincushion-like young shoots erupt in late summer, persist through the winter and grow quickly in early spring into a tuft of bright green leaves.

Aquatic sedge (*Carex aquatilis*)[page 115] is very similar to hummock sedge. However, *C. aquatilis* lacks basal sheaths with two rows of fibers on each side of a central fiber; the flowering stems arise centrally; lowest leaves have blades; mature leaves tend to be blue-green; and stems do not form pincushion-like young shoots that persist through the winter.

ECOLOGICAL NOTES: Hummock, or tussock, sedge is the characteristic sedge of Minnesota and Wisconsin sedge meadows. It is also common in shrub-carrs and calcareous fens. The hummocks may persist for decades even when pastured. Stands of hummock sedge provide excellent habitat for rails and snipe.

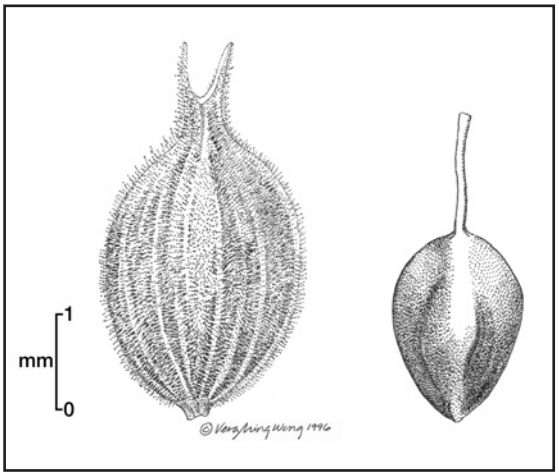
SOURCE: Gleason and Cronquist (1991); and Swink and Wilhelm (1994).



Perigynium and scale

Hummock Sedge
(*Carex stricta*)

© Steve D. Eggers



Perigynium and nutlet

© Steve D. Eggers

WOOLLY SEDGE

(*Carex pellita* Muhl. ex Willd.)

SEDGE FAMILY (Cyperaceae) **C of C:** Native (4) **IND. STATUS:** OBL

SYNONYM: *Carex lanuginosa* Michx.

FIELD CHARACTERISTICS: A perennial, mat-forming (colonial) sedge with triangular stems about 50-100 cm. tall. Leaves are glabrous and folded along the midrib. Leaf blades have revolute margins and are 2.5-4.5 mm. wide. Perigynia are 2.8-4.3 mm. long and densely pubescent. Beak of the perigynia is less than half of the body length with bidentate teeth up to 0.5(0.7) mm. long.

Woolly sedge resembles wiregrass sedge (*C. lasiocarpa*)[page 257], but the latter has inrolled, wire-like leaves that are less than 2 mm. wide.

ECOLOGICAL NOTES: Woolly sedge is characteristic of minerotrophic sedge meadows, sandy to marly flats, and shorelines. It also occurs in disturbed sites including abandoned agricultural lands and wetland restoration sites.

SOURCE: Gleason and Cronquist (1991); Swink and Wilhelm (1994); and Voss (1972).

BEBB'S SEDGE

(*Carex bebbii* Olney ex Fern.)

SEDGE FAMILY (Cyperaceae) **C of C:** Native (5 MN)(4 WI) **IND. STATUS:** OBL

FIELD CHARACTERISTICS: A loose to densely clumped, perennial sedge with stems up to about 70 cm. tall. Triangular stems usually exceed the leaf blades in height. Mature leaves are up to about 4 mm. wide. Ascending to slightly spreading, tan perigynia are crowded into stiff and dense spikelets. Oval, scale-like perigynia are less than 3.6 mm. long and under 2 mm. wide. They are lightly convex and nerveless (except at the base) on one side, thin winged, and taper to a shallow, toothed beak.

ECOLOGICAL NOTES: Bebb's sedge is a common sedge that prefers the wet, calcareous soils of all types of inland fresh meadows as well as kettle hole marsh edges.

SOURCE: Gleason and Cronquist (1991); Swink and Wilhelm (1994); and Voss (1972).

CANADA BLUE-JOINT GRASS

(*Calamagrostis canadensis* (Michx.) Beauv.)

GRASS FAMILY (Gramineae or Poaceae) **C of C:** Native (4 MN)(5 WI) **IND. STATUS:** OBL (NC/NE, MW);FACW(GP)

FIELD CHARACTERISTICS: A perennial grass 50-150 cm. high. Many very slender stems arise from small rhizomes. Sheaths are usually hairless. Slender leaves (4-8 mm. wide) tend to be flat. A distinct, thin, dry, papery structure extends beyond the summit of the sheath (the ligule). Nodes often have a blue to reddish-purple color. Inflorescence is somewhat nodding, open or fairly dense, and branched with stalked spikelets. Branches are often bent in one direction giving the inflorescence a flag-like appearance. Membrane-like lemmas range from three-quarters to as long as the glumes. A single, short, delicate and straight awn arises from or near the middle of the lemma. Also, a tuft of hair (use a 10-15x lens) is present at the base of each lemma, making the spikelets look slightly fuzzy (see drawing on following page).

ECOLOGICAL NOTES: Canada blue-joint grass is the most common native, wetland grass in Minnesota and Wisconsin. Often a sub-dominant in sedge meadows, it is the most frequent grass associate of the sedges. It can be dominant in wet to wet-mesic prairies and fresh (wet) meadows and occurs in shallow marshes as well. In and north of the vegetation tension zone, Canada blue-joint grass is a characteristic dominant in the groundlayer of hardwood swamps and alder thickets. This grass stands up well in winter making it important for wildlife habitat.

SOURCE: Gleason and Cronquist (1991); and Swink and Wilhelm (1994).

Canada Blue-Joint Grass

(*Calamagrostis canadensis*)

Illustration from Hitchcock (1950)

FRINGED BROME GRASS
(*Bromus ciliatus* L.)

GRASS FAMILY (Gramineae or Poaceae) **IND. STATUS:** FACW(NC/NE, MW); FAC(GP)

C of C: Native (6 MN)(7 WI)

FIELD CHARACTERISTICS: A perennial grass 60-120 cm. high. Stems are solitary or few, smooth (lack hairs), although the nodes may be hairy. Yellowish-green leaf blades are 4-10 mm. wide. Ligules are 0.3-1.0 mm. long, slightly shorter than the similar *Bromus kalmii* (0.5-2.0 mm. long). Inflorescence is an open panicle 10-20 cm. long with drooping or spreading branches generally to one side of the stem. Several spikelets arise from compound branches. Glumes are smooth and hairless. The first glume is single nerved (3-nerved in *B. kalmii*). Lemmas are 10-13 mm. long and short-awned with a dense, long-hairy "fringe" near the margin, especially toward the base. Remainder of the lemma is smooth and hairless or nearly so. The slightly shorter lemmas (8-10 mm. long) of the similar *B. kalmii* have silky hairs up to 1 mm. or more covering the entire surface.

ECOLOGICAL NOTES: Fringed brome grass is frequently seen in sedge meadows and calcareous fens, but the authors have not observed this grass as a major dominant species. It also occurs in wet prairies, along the edges of bogs, on wet shores, and openings in hardwood swamps.

SOURCE: Crow and Hellquist (2000); Fassett (1951); Gleason and Cronquist (1991); Swink and Wilhelm (1994); and Voss (1972).

WOOLGRASS

(*Scirpus cyperinus* (L.) Kunth)

SEDGE FAMILY (Cyperaceae) **C of C:** Native (3 MN)(4 WI) **IND. STATUS:** OBL

FIELD CHARACTERISTICS: A perennial, densely tufted sedge with stems up to 2 m. high. Sturdy stems are smooth and more or less round with about 10 stem leaves above a fountain of large, slender, basal leaves. Sheaths are brownish or green and not tinged with red. The terminal inflorescence is subtended by two or more unequally spreading, modified leaves. Several to many rays of the inflorescence ascend from a fountain-like base and contain one to many tiny spikelets in small, compact clusters at the apex of the stem. Spikelets are ovate, 3-8 mm. long and 2-3 mm. wide. Many brown, woolly bristles surround the nutlets, giving the cluster of spikelets a woolly appearance. Nutlets are a flattened three-angled shape and 0.5-1 mm. long with a short beak.

ECOLOGICAL NOTES: Woolgrass is actually a member of the sedge family and is common in sedge meadows, particularly in and north of the vegetation tension zone where it can be a dominant species. It is also frequent in bogs, alder thickets, shallow marshes and roadside ditches.

SOURCE: Gleason and Cronquist (1991); and Swink and Wilhelm (1994).

GREEN BULRUSH

(*Scirpus atrovirens* Willd.)

SEDGE FAMILY (Cyperaceae) **C of C:** Native (4 MN)(3 WI) **IND. STATUS:** OBL

FIELD CHARACTERISTICS: A perennial sedge with stems up to 1.5 m. high. The sturdy stems are roundly triangular with up to 10 stem leaves. Leaves are broad (1-2 cm.), green and M-shaped. Sheaths are brownish or green and not tinged with red. A terminal inflorescence is subtended by two or more conspicuous, spreading, modified leaves with flat blades. Inflorescence contains numerous spikelets crowded into a dense, nearly spherical head on rays that angle out in different directions. Spikelets are 2-8 mm. long and 1-3 mm. wide. Nutlets are a compressed three-angled shape and 1 mm. long with a short beak of 0.2 mm.

ECOLOGICAL NOTES: Green bulrush is a common, short-lived pioneer typically found in sedge meadows, but is also present in shrub-carrs, alder thickets and fresh (wet) meadows. It seems to increase with disturbance to peat/muck soils and often invades dredged material sites. It is a frequent colonizer of wetland restoration sites. Seeds have been known to remain viable for at least 40 years.

SOURCE: Gleason and Cronquist (1991); and Swink and Wilhelm (1994).

MARSH MILKWEED

(*Asclepias incarnata* L.)

MILKWEED FAMILY (Asclepiadaceae) **C of C:** Native (4 MN)(5 WI) **IND. STATUS:** OBL (NC/NE, MW);FACW(GP)

FIELD CHARACTERISTICS: A perennial herb usually up to 1.4 m. high. Stems are erect and have opposite, lance-shaped to linear to oblong leaves on short leaf stalks. Leaves are 6-15 cm. long and 1-5 cm. wide. Base of the leaf abruptly narrows to a pointed, rounded, or nearly heart-shaped base. Cut stems and leaves exude a milky juice. Inflorescence occurs as several flat umbels 2-3 cm. in diameter with rose-pink to purple-red flowers that are 4-6 mm. long. Fruit is a long, narrow, smooth pod. In flower June-August.

ECOLOGICAL NOTES: Marsh or swamp milkweed is common in several wetland communities in addition to sedge meadows, including shallow marshes. Curtis (1971) notes a higher presence in southern sedge meadows than in northern sedge meadows. Many birds use the fibers from old stems for nest building. Monarch butterfly larvae feed on the leaves.

SOURCE: Gleason and Cronquist (1991); and Swink and Wilhelm (1994).

JOE-PYE WEED

(*Eutrochium maculatum* (L.) E. Lamont)

ASTER FAMILY (Compositae or Asteraceae) **C of C:** Native (4) **IND. STATUS:** OBL

SNYNONYM: *Eupatorium maculatum* L.

FIELD CHARACTERISTICS: A tall, perennial herb 60-200 cm. high with one to several stems. Leaves are in whorls of 4's and 5's around a purple-spotted stem. Lance-shaped leaves are 5-20 cm. long and 2-7 cm. wide, narrowed to the leaf stalk, serrate and seldom triple-nerved. Stems usually lack a white waxy bloom. The flattish inflorescence consists solely of disc flowers (lacks ray flowers). Between 9-22 pink to purple flowers occur in each head. Fruit is a black achene 2-4 mm. long with long bristles (pappus). In bloom July-September.

ECOLOGICAL NOTES: Joe-pye weed is a very common composite of sedge meadows and shrub-carrs, particularly on calcareous soils. It is also present in fresh (wet) meadows, calcareous fens and shallow marshes. Joe-pye weed often occurs with an equally common species, boneset (*Eupatorium perfoliatum*), which has white flowers and opposite leaves joined around the stem.

SOURCE: Gleason and Cronquist (1991); and Swink and Wilhelm (1994).

Stem appears to pierce the leaves (perfoliate).

BONESET

(*Eupatorium perfoliatum* L.)

ASTER FAMILY (Compositae or Asteraceae)

IND. STATUS: FACW(NC/NE, GP);OBL(MW)

C of C: Native (4 MN)(6 WI)

FIELD CHARACTERISTICS: A perennial herb 40-150 cm. high. Stem leaves are opposite and grown together around the stem. Stems and leaves are coarsely hairy. Leaves are broadly lance-like and 6-20 cm. long by 1.5-5 cm. wide. The flattish inflorescence consists solely of disc flowers (lacks ray flowers). Between 9-23 white flowers occur in each head. Fruit is a black nutlet 1-2 mm. long with slender bristles (pappus). In bloom July-September.

ECOLOGICAL NOTES: Boneset occurs in sedge meadows, fresh (wet) meadows, calcareous fens and marshes. It is often associated with groundwater seepages and tends to be a pioneer species.

SOURCE: Gleason and Cronquist (1991); and Swink and Wilhelm (1994).

WILD MINT

(*Mentha arvensis* L.)

MINT FAMILY (Labiatae or Lamiaceae) **C of C:** Native (3) **IND. STATUS:** FACW

FIELD CHARACTERISTICS: A rhizome-producing, perennial, clonal, strongly aromatic (minty fragrance), herb usually 29-89 cm. high. Square stems are erect or ascending with opposite leaves. Leaves are 2-7 cm. long and 0.5-3 cm. wide, serrate, on short stalks (but greater than 2 mm.) and taper to a slender tip. Both the stems and leaves are variably hairy or fuzzy. Flowers occur in dense, axillary clusters. Petals are white to light purple or pink. Flowers have four stamens and are in bloom from July through September. Calyx is completely hairy; calyx lobes are broadly triangular to awl shaped. Mints (*Mentha* spp.) in general are strongly aromatic.

ECOLOGICAL NOTES: This common mint occurs in sedge meadows, calcareous fens, shrub-carrs, alder thickets, shallow marshes, and along streams and shores.

SOURCE: Fassett (1957); Gleason and Cronquist (1991); and Swink and Wilhelm (1994).

COMMON BUGLEWEED

(*Lycopus americanus* Muhl. ex W. Bart.)

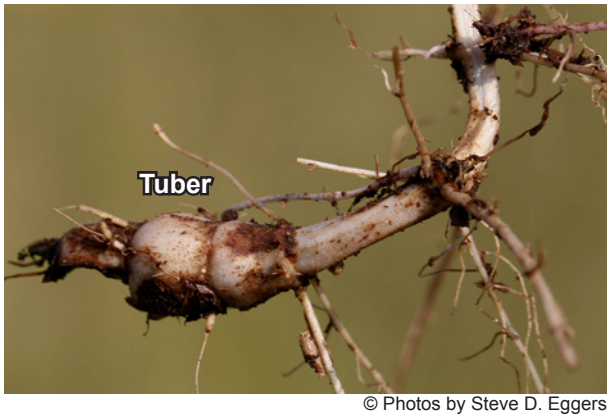
MINT FAMILY (Labiatae or Lamiaceae) **C of C:** Native (4) **IND. STATUS:** OBL

FIELD CHARACTERISTICS: A rhizome-producing, perennial herb, usually only 5-15 cm. high (rarely to 80 cm.). Square stems are erect with opposite leaves. Leaves are 3-8 cm. long and 1-4 cm. wide, stalked or nearly so and are hairless above; at least the lower leaves are pinnately toothed at least halfway to the midrib. The small, white flowers form dense clusters in leaf axils. Flowers lack stalks, have two stamens, and are in bloom from July through September. Petals extend beyond the calyx-lobes. Calyx-lobes are at least 1-2 mm. long and extend beyond the nutlets at maturity; are narrowly triangular with the width at the base less than half the length; and have a prominent midvein. Bugleweeds (*Lycopus* spp.) are not strongly aromatic.

L. americanus is similar to *L. uniflorus* and *L. virginicus,* both of which have blunt, triangular calyx-lobes that lack a prominent midvein. The calyx-lobes of the latter two species are equal to or shorter than the nutlets at maturity. *L. uniflorus* also produces a conspicuous tuber. All three species can occur together.

ECOLOGICAL NOTES: Common bugleweed is one of our most common wetland herbs. In addition to sedge meadows, it occurs in marshes, calcareous fens, fresh (wet) meadows, wet to wet-mesic prairies, floodplains, poorly-drained fields and ditches. It is also called cut-leaf water horehound.

SOURCE: Fassett (1957); Gleason and Cronquist (1991); and Swink and Wilhelm (1994).



NORTHERN BUGLEWEED

(*Lycopus uniflorus* Michx.)

MINT FAMILY (Labiatae or Lamiaceae) **C of C:** Native (5 MN)(4 WI) **IND. STATUS:** OBL

FIELD CHARACTERISTICS: A stolon-producing, perennial herb, up to about 1 m. tall. Stolons end in a shallow tuber from which a single stem will arise. The square stems are erect with opposite leaves. Mature leaves are long and narrow, usually less than 3 cm. wide, with a few shallow teeth along the margins. Leaf blades taper to a short stalk. Small, white flowers form dense clusters in the leaf axils. Calyx-lobes are less than 1 mm. long and are shorter than the nutlets at maturity, are bluntly triangular, and lack a prominent midvein. Bugleweeds (*Lycopus* spp.) are not strongly aromatic.

L. uniflorus may be confused with *L. virginicus.* But, *L. uniflorus* has a 5-lobed calyx and corolla while *L. virginicus* is only 4-lobed.

ECOLOGICAL NOTES: Northern bugleweed, also called northern water horehound, is frequently found growing in sedge meadows, wet prairies, calcareous fens, bog laggs, and at marsh edges. It also occurs in openings of wooded swamps.

SOURCE: Crow and Hellquist (2000); Gleason and Cronquist (1991); Swink and Wilhelm (1994); and Voss (1996).

Stipule

MARSH PEA

(*Lathyrus palustris* L.)

BEAN FAMILY (Fabaceae or Leguminosae) **IND. STATUS:** FACW

C of C: Native (6 MN)(5 WI)

FIELD CHARACTERISTICS: A perennial herbaceous (non-woody) vine growing to about 1 m. in length. Stems are frequently winged at the angles with 4-8(10) alternate, pinnately compound leaves. Leaves are terminated by tendrils. The 2-4(6) pairs of opposite leaflets are elliptic to lance-ovate. Stipules are less than 5(7) mm. wide and semi-sagittate (inset photo). Inflorescence is a 2-8 flowered raceme. Calyxes are usually smooth, but may be sparsely pubescent. Flowers are violet-purple (white), 12-20 mm. long, and loosely arranged on slender pedicels 3-6 mm. long. Flowers from June through late August.

ECOLOGICAL NOTES: Curtis (1971) notes that marsh pea reaches its highest presence in southern sedge meadows. It also occurs in marshes, wet prairies and calcareous fens.

SOURCE: Crow and Hellquist (2000); Fassett (1976); Gleason and Cronquist (1991); Swink and Wilhelm (1994); and Voss (1972).

MARSH SKULLCAP

(*Scutellaria galericulata* L.)

MINT FAMILY (Labiatae or Lamiaceae) **C of C:** Native (5) **IND. STATUS:** OBL

SYNONYM: *Scutellaria epilobiifolia* A. Hamilton

FIELD CHARACTERISTICS: A rhizome-producing, perennial herb 20-80 cm. high. Square stems are weak but erect, with opposite, simple leaves. Leaves have stalks and are 2-4 times longer than wide. Leaves lack aroma and have a bitter after-taste. Flowers are solitary and occur in the leaf axils. Calyx is 2-lipped with a distinct, shield-like crest or projection on the upper side. Petals are arching and 1.5-2 cm. long. Flowers are 15-20 mm. long, blue, marked with white, and in bloom June-September.

ECOLOGICAL NOTES: Marsh skullcap is a common wetland species occurring primarily on the peat/muck soils of sedge meadows, shrub-carrs and bogs, as well as marshes that have essentially stable water levels.

SOURCE: Fassett (1978); Gleason and Cronquist (1991); and Swink and Wilhelm (1994).

SIDE-FLOWERED SKULLCAP

(*Scutellaria lateriflora* L.)

MINT FAMILY (Labiatae or Lamiaceae) **C of C:** Native (5) **IND. STATUS:** OBL (NC/NE, MW);FACW(GP)

FIELD CHARACTERISTICS: A perennial herb 20-60 cm. high. Square stems are usually branched. Leaves are simple, opposite, coarsely-toothed, ovate to lanceolate, 3-8 cm. long and 1.5-5 cm. wide. Blue flowers marked with white are two-lipped, to 8 mm. long, in elongate racemes from leaf axils. Fruit is a nutlet. In bloom July-September.

Side-flowered skullcap is very similar to marsh skullcap (*S. galericulata*) which has solitary flowers in leaf axils whereas side-flowered skullcap has multiple flowered branches (racemes) from leaf axils. Also, the flowers are larger in marsh skullcap (15-20 mm. long) compared to side-flowered skullcap (to 8 mm.).

ECOLOGICAL NOTES: Side-flowered skullcap is a common species occurring primarily on the peat/muck soils of sedge meadows, shrub-carrs and marshes.

SOURCE: Chadde (2002); Fassett (1978); Gleason and Cronquist (1991); and Swink and Wilhelm (1994).

ANGELICA

(*Angelica atropurpurea* L.)

CARROT FAMILY (Umbelliferae or Apiaceae) **C of C:** Native (6) **IND. STATUS:** OBL

FIELD CHARACTERISTICS: A very coarse, tall, perennial herb, usually up to 3 m. high. The stout, round stems are purplish, aromatic and hollow. Basal leaves are pinnately more than once divided, and upper leaves are progressively reduced with broadly sheathing leaf stalks and serrate, pointed leaflets. Inflorescence is a large (10-20 cm. wide), spherical compound umbel with 20-45 rays. Flowers are white or greenish-white and in bloom around the first week in June. Thin, flat lateral wings occur on the hairless fruit, which fall by mid-summer.

ECOLOGICAL NOTES: Angelica is common in sedge meadows and calcareous fens and is a good indicator of groundwater springs and seepages. It also occurs in forested wetlands, and along streambanks and shores.

SOURCE: Gleason and Cronquist (1991); Swink and Wilhelm (1994); and Voss (1985).

BLUE FLAG IRIS

(*Iris versicolor* L.)

IRIS FAMILY (Iridaceae) **C of C:** Native (4 MN)(5 WI) **IND. STATUS:** OBL

FIELD CHARACTERISTICS: A perennial herb usually 10-80 cm. high. This iris tends to form large clumps from thick, creeping rhizomes. The unwinged, erect stems generally have basal leaves that are more than 1 cm. wide. Leaves are folded on the midribs so that they form an overlapping flat fan. The well developed flower petals and sepals spread out nearly flat and have two forms. Longer sepals are hairless and have a greenish-yellow blotch at their base. The inferior ovary is bluntly angled. Flowers are usually light to deep blue and in bloom May-July. Fruit is a 3-celled, bluntly angled capsule. The large seeds can be observed floating in the fall.

A similar species, *I. virginica*, can be distinguished by its cauline (stem) leaves that often exceed the inflorescence whereas the cauline leaves of *I. versicolor* are usually shorter than or equal to the height of the inflorescence.

ECOLOGICAL NOTES: Blue flag iris is common in sedge meadows, marshes, and along streambanks and shores. *Iris versicolor* tends to be more northern in its regional distribution, while *I. virginica* is more southern. There is some debate concerning the taxonomic status of *I. versicolor.* See Swink and Wilhelm (1994) for a brief discussion.

SOURCE: Gleason and Cronquist (1991); Swink and Wilhelm (1994); and Voss (1972).

TURTLEHEAD

(*Chelone glabra* L.)

FIGWORT FAMILY (Scrophulariaceae) **C of C:** Native (7) **IND. STATUS:** OBL

FIELD CHARACTERISTICS: A perennial herb with stems 50-100 cm. tall that are 4-angled but rounded on the corners. Leaves are opposite, lanceolate, to 15 cm. long and 1-3 cm. wide, with margins of sharp teeth. Flowers are in dense spikes 3-8 cm. long at the end of stems. Flowers are white or light pink and 2.5-3.5 long. Fruit is an ovate capsule. In flower August-September.

ECOLOGICAL NOTES: Turtlehead primarily occurs in sedge meadows and calcareous fens, typically in those that have not been degraded by disturbances. It also occurs in openings of wooded swamps and along streambanks and shores.

SOURCE: Gleason and Cronquist (1991); Chadde (2002); Voss (1996); and Black and Judziewicz (2009).

GRASS-LEAF GOLDENROD

(*Euthamia graminifolia* (L.) Nutt.)

ASTER FAMILY (Compositae or Asteraceae) **C of C:** Native (4) **IND. STATUS:** FACW (MW, GP);FAC(NC/NE)

SYNONYM: *Solidago graminifolia* (L.) Salisb.

FIELD CHARACTERISTICS: A perennial herb 50-150 cm. in height. Stems are smooth or hairy, and much branched towards the top of the plant. Leaves are alternate, linear to narrowly lanceolate, 3-15 cm. long and 3-10 mm. wide, with 3 veins. Leaf margins are entire. Inflorescence consists of small, flat-topped clusters at the end of stems. Disc and ray flowers are yellow. Ray flowers are small, only to 1 mm. long. The involucre is 3-5 mm. long. Fruit is a hairy nutlet (achene) 1 mm. long with a pappus of many white bristles. In flower August-September. See Appendix A for a key to wetland goldenrods.

ECOLOGICAL NOTES: Grass-leaf goldenrod is a frequent wildflower of wet meadows, sedge meadows, wet prairies and calcareous fens.

SOURCE: Gleason and Cronquist (1991); and Swink and Wilhelm (1994).

GREAT BLUE LOBELIA

(*Lobelia siphilitica* L.)

BELLFLOWER FAMILY (Campanulaceae) **C of C:** Native (5) **IND. STATUS:** OBL (GP, MW);FACW(NC/NE)

FIELD CHARACTERISTICS: A short-lived, perennial herb 50-150 cm. high. Stem leaves are alternate, simple, elliptic to lanceolate, 8-12 cm. long, and narrow to a sessile base. Flowers are blue (rarely white), 15-33 mm. long and arranged on a terminal raceme. The two-lipped corolla has a split on each side near its base. Seed capsules are two-celled with many seeds and have ear-like lobes (auriculate) at the base. In flower August-September.

ECOLOGICAL NOTES: Great blue lobelia occurs in sedge meadows, fresh (wet) meadows, swamps, and the borders ponds and streams, and occasionally in calcareous fens.

SOURCE: Crow and Hellquist (2000); Gleason and Cronquist (1991); Swink and Wilhelm (1994); and Voss (1996).

MICHIGAN LILY

(*Lilium michiganense* Farw.)

LILY FAMILY (Liliaceae) **C of C:** Native (7 MN)(6 WI) **IND. STATUS:** FACW

FIELD CHARACTERISTICS: A perennial herb 1-2 m. in height. Leaves are lanceolate and rough at the edges and veins. Main leaves are whorled while upper leaves are alternate. Largest leaves are 8-15 cm. by 8-20 mm. Orange flowers, marked with purple spots, are nodding from long pedicels and measure 5-8 cm. wide. The petal-like sepals are bent backwards (like a Turk's cap). Fruit is an elongated, 3-parted capsule. In flower June-August.

ECOLOGICAL NOTES: Michigan lily occurs in sedge meadows, along streams, and in floodplain forests.

SOURCE: Gleason and Cronquist (1991); Chadde (2002); and Black and Judziewicz (2009).

KALM'S ST. JOHN'S-WORT

(*Hypericum kalmianum* L.)

ST. JOHN'S-WORT FAMILY (Clusiaceae) **C of C:** Native (9 WI) **IND. STATUS:** FACW

FIELD CHARACTERISTICS: A small, branching shrub growing to 1 m. in height. Branches are 4-angled. Leaves are firm, often revolute, linear to oblong, 2-4 cm. long by 3-8 mm. wide. Leaves are often waxy on the underside. Yellow flowers are 2-3.5 cm. wide and located in small cymes of 3-7 at the tips of branches. Stamens are many while styles number 5. Fruit is a narrowly ovoid, 7-10 mm. long pod with a slender beak. In flower June-August.

ECOLOGICAL NOTES: Curtis (1971) notes that Kalm's St. John's-wort reaches its highest presence in northern sedge meadows. In Wisconsin, it is found in the central and northeastern portions of the state, while in Minnesota it has only been recorded in one northeastern county.

SOURCE: Curtis (1971); Gleason and Cronquist (1991); and Chadde (2002).

III.B. Fresh (Wet) Meadows

Fresh (wet) meadows are dominated by grasses, such as redtop grass and reed canary grass, and by forbs such as giant goldenrod, growing on saturated soils. The grass family (Gramineae) and aster family (Compositae) are well represented in fresh (wet) meadows. The forbs and grasses of these meadows tend to be less competitive, more nutrient demanding, and often shorter-lived species than the sedges of the sedge meadow community. Therefore, fresh (wet) meadows may represent younger communities that indicate recent disturbances of other inland fresh meadows by drainage, siltation, cultivation, pasturing, peat fires and/or temporary flooding. Once established, the forbs and grasses of the fresh (wet) meadow community may persist for extended periods of time.

Many fresh (wet) meadows in Minnesota and Wisconsin are dominated by reed canary grass (*Phalaris arundinacea*), a very aggressive, invasive species that can form near monotypes persisting for decades. Disturbances such as artificial drainage, plowing, mechanized land-clearing, road construction, and excessive sediment and/or nutrient inputs, allow reed canary grass to outcompete the diverse, native plant assemblages of sedge meadows, wet prairies, calcareous fens, etc.

A fresh (wet) meadow dominated by reed canary grass (*Phalaris arundinacea*).

Not all fresh (wet) meadows in Minnesota and Wisconsin are dominated by non-native and/or invasive species. For example, the native Canada blue-joint grass (*Calamagrostis canadensis*) can dominate fresh (wet) meadow communities that may include a diversity of native forbs.

VEGETATION: The dominants of this fresh (wet) meadow are reed canary grass (*Phalaris arundinacea*), cup-plant (*Silphium perfoliatum*), giant goldenrod (*Solidago gigantea*) and Canada goldenrod (*Solidago canadensis*). Other species include sawtooth sunflower (*Helianthus grosseserratus*), giant sunflower (*Helianthus giganteus*), cut-leaf coneflower (*Rudbeckia laciniata*), hairy hedge-nettle (*Stachys pilosa*), redstem aster (*Symphyotrichum puniceum*), marsh aster (*S. lanceolatum*), tall meadowrue (*Thalictrum dasycarpum*), Indian hemp (*Apocynum cannabinum*), redtop (*Agrostis gigantea*) and muhly grass (*Muhlenbergia mexicana*). Canada thistle (*Cirsium arvense*), an introduced, invasive species, has become established as well.

SOILS: Faxon silty clay loam (Typic Endoaquolls), a poorly-drained to very poorly-drained soil on terraces of floodplains. These soils are formed in silty to clayey alluvium underlain by dolomite bedrock. Landscape position is a terrace within the broad valley of the Minnesota River.

HYDROLOGY: Faxon soils have a seasonal high water table at the surface to 12 inches below the surface during November through May of most years.

LOCATION: Black Dog Preserve, Minnesota Valley National Wildlife Refuge, Dakota County, Minnesota.

REED CANARY GRASS

(*Phalaris arundinacea* L.)

GRASS FAMILY (Gramineae or Poaceae) **IND. STATUS:** FACW

C of C: A native genotype has been essentially assimilated by European genotypes. The highly invasive, robust stands currently observed are indicative of the introduced genotypes. (0)

FIELD CHARACTERISTICS: A colonial, perennial grass with stout, branched stems 1-2 m. in height. The ligule is large (3-8 mm. long), dry and papery. Leaves are flat and usually 1-2 cm. wide. Panicles are branched or lobed and 5-25 cm. long, initially purple-tinged then becoming straw colored with age. Spikelets are 1-flowered, 4-6 mm. long, with one fertile floret and two reduced, appressed, sterile lemmas. Lemmas are awnless and shorter than the glumes. Lance-like glumes are compressed and wingless.

ECOLOGICAL NOTES: Reed canary grass is an extremely aggressive species that often forms persistent, near monotypic stands on sites disturbed by agricultural use, drainage, filling, siltation and other factors. It is found in a variety of disturbed wetlands including inland fresh meadows, shrub swamps, wooded swamps and floodplain forests. Although typically associated with disturbed wetlands, this species can occasionally colonize disturbed upland sites. Reed canary grass has been planted for erosion control on upland and wetland sites, and for lowland pasture.

SOURCE: Fassett (1951); and Gleason and Cronquist (1991).

Reed Canary Grass
(*Phalaris arundinacea*)

REDTOP

(*Agrostis gigantea* Roth)

GRASS FAMILY (Gramineae or Poaceae) **C of C:** Introduced (0) **IND. STATUS:** FACW

SYNONYM: *Agrostis stolonifera* var. *major* (Gaudin) Farw.

FIELD CHARACTERISTICS: A perennial, sod-forming grass from rhizomes, not stoloniferous. Culms (stems) can be straight or curved at the very base; otherwise, plants are erect and straight to 30-100 cm. or more in height. Larger leaf blades are mostly 3-7(10) mm. wide. Larger ligules are 2.5-6 mm. long. Panicles are 10-20 cm. long with widely spreading, unequal branches. Panicles usually tinged with purple-red, although plants growing in shade may be more greenish. Spikelets are one-flowered and 2-3.5 mm. long.

ECOLOGICAL NOTES: A common grass that occurs in a wide variety of moist to saturated soils of inland fresh meadows, pastures, abandoned agricultural lands, vacant urban lands and wetland restoration sites. It is often encountered in the wetland/upland transition zone. A native of Europe, redtop has become so well established in our flora as to appear indigenous.

SOURCE: Voss (1972); and Gleason and Cronquist (1991).

Redtop (*Agrostis gigantea*)

The conspicuous red patches in this wetland hay meadow consist of redtop.

Illustration from Hitchcock (1950)

Spikelets

Redtop
(*Agrostis gigantea*)

KENTUCKY BLUEGRASS

(*Poa pratensis* L.)

GRASS FAMILY (Gramineae or Poaceae)

IND. STATUS: FACU(NC/NE, GP)
FAC(MW)

C of C: Predominately introduced (0)

FIELD CHARACTERISTICS: A perennial, sod-forming grass 10-100 cm. in height. Its characteristic of forming many rhizomes (i.e., sod-forming) helps distinguish it from some other grass species. Stems are erect and nearly round or slightly flattened. Leaf blades are flat to folded, 1-15 cm. long, 2-5 mm. wide, ending in a boat-shaped tip. Ligules are shorter than wide and less than 2 mm. in length. Inflorescence is a panicle that is open to somewhat contracted. Spikelets are 2-5 flowered and laterally compressed (flattened). Lemmas have abundant cottony hairs at the base easily visible with a hand lens. Lemmas are 5-nerved, the keel hairy on about the basal two-thirds, and only scabrous to smooth on the upper third.

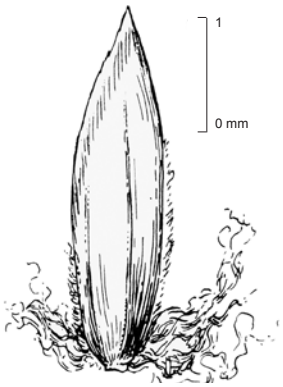
Fowl bluegrass (*Poa palustris*)[pages 172-173] is similar, and can be distinguished from Kentucky bluegrass by its lack of rhizomes, more open/loose panicle, and conspicuous ligules 2.5-5 mm. in length.

ECOLOGICAL NOTES: Kentucky bluegrass is ubiquitous in all but the wettest habitats (Voss 1972). Vacant urban lands, pastured areas and abandoned agricultural lands are prime habitats for this species. In urban and agricultural regions of Minnesota and Wisconsin, Kentucky bluegrass is one of the most common species encountered in the wetland/upland transition zone.

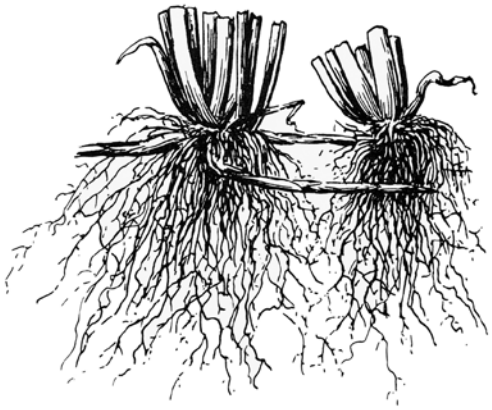
SOURCE: Voss (1972); Gleason and Cronquist (1991); Great Plains Flora Association (1991); and Swink and Wilhelm (1994).

Inflorescence

Spikelet



Floret



Rhizomes

Kentucky Bluegrass
(*Poa pratensis*)

Illustrations by Elsie Froeschner (Pohl 1966)

Ligule (fleshy white structure)

FOWL BLUEGRASS

(*Poa palustris* L.)

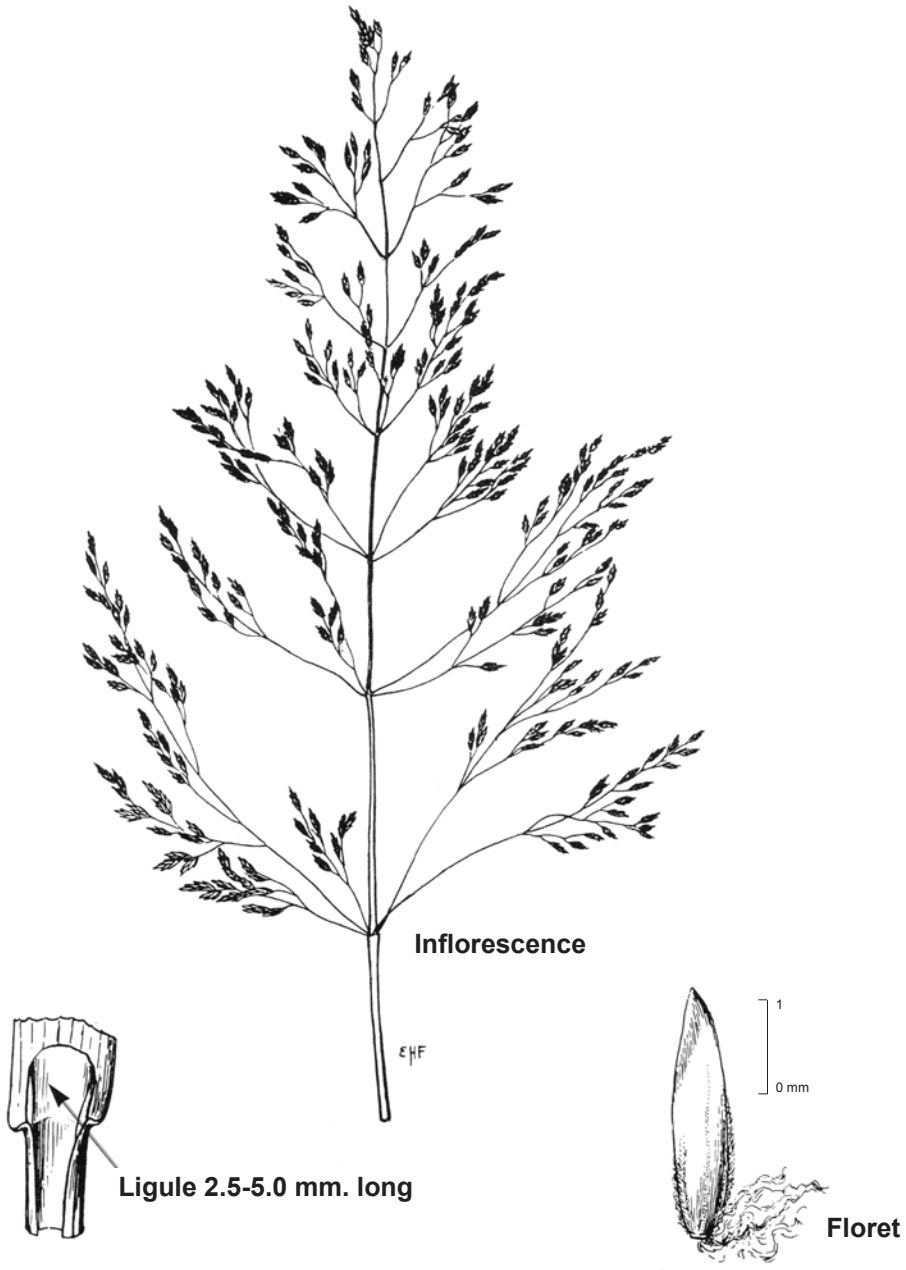
GRASS FAMILY (Gramineae or Poaceae) **C of C:** Native (5) **IND. STATUS:** FACW

FIELD CHARACTERISTICS: A perennial, tufted grass 60-120 cm. in height. Unlike its relative *P. pratensis*, it lacks rhizomes and is not a sod-forming grass. Stems are round, weak and wiry, often leaning on adjacent vegetation. Often seen rooting from stem nodes in contact with the ground. Leaf blades are flat to folded, 1-3.1(3.8) mm. wide, ending in a boat-shaped tip. Ligules are a conspicuous 2.5-5 mm. in length. Inflorescence is an open/loose panicle with 3-5 branches per cluster (fascicle). Spikelets have 2-4 narrow florets, often with golden tips. Lemmas are 3-nerved and have abundant cottony hairs at the base easily visible with a hand lens.

A similar, ubiquitous grass species, Kentucky bluegrass (*Poa pratensis* L.), can be distinguished from fowl bluegrass by its sod-forming rhizomes, more contracted panicle, and shorter ligules (less than 2 mm. in length).

ECOLOGICAL NOTES: Fowl bluegrass, also called marsh bluegrass, is an often misidentified but common grass of fresh (wet) meadows, sedge meadows and openings in wooded swamps as well as along shores, ponds and streambanks. It frequently occurs in prairie marshes and is used in wet meadow seed mixes.

SOURCE: Crow and Hellquist (2000); Fassett (1951); Gleason and Cronquist (1991); Great Plains Flora Association (1991); Swink and Wilhelm (1994); and Voss (1972).



Fowl Bluegrass

(*Poa palustris*)

Illustrations by Elsie Froeschner (Pohl 1966)

QUACK GRASS

(*Elymus repens* (L.) Gould)

GRASS FAMILY (Gramineae or Poaceae) **C of C:** Introduced (0) **IND. STATUS:** FACU

SYNONYMS: *Agropyron repens* (L.) P. Beauv.; *Elytrigia repens* (L.) Desv. ex B.D. Jacks.

FIELD CHARACTERISTICS: A strongly rhizomatous, perennial grass 50-110 cm. tall. The erect to reclining hollow, green to glaucous stems are smooth. Stems may arise from buds located along the rhizome nodes. Rhizome tips tend to be pale yellow and sharp pointed. Lower stem sheaths are hairy, while the upper such sheaths tend to be smooth. Leaf blades are broad and flat, 3-10+ mm. wide with conspicuous, claw-like auricles clasping the stem (upper right photo). Ligules are short: 0.1-0.8 mm. in length. Inflorescence is a solitary bilateral spike 4-19 cm. long with two long rows of persistent spikelets laying flat wise to the stem. Glumes and lemmas are glabrous, acute, and may end with short awns. Lemmas are 7-10 mm. long.

ECOLOGICAL NOTES: An abundant, introduced, weedy grass invasive in fields, clearings and roadsides, often spreading onto shores, ditch banks, lake dunes and seasonally wet agricultural soils.

SOURCE: Fassett (1951); Gleason and Cronquist (1991); Swink and Wilhelm (1994); and Voss (1972).

Illustrations from Hitchcock (1950)

Quack Grass
(*Elymus repens*)

MEADOW FOXTAIL

(*Alopecurus pratensis* L.)

GRASS FAMILY (Gramineae or Poaceae) **C of C:** Introduced (0) **IND. STATUS:** FAC(NC/NE) FACW(MW, GP)

FIELD CHARACTERISTICS: A perennial grass with stems 40-80 cm. long, erect or decumbent at base. Spikelets are 1-flowered and 4-6.5 mm. long excluding the awn. Awns mostly extended 3.5-6 mm. beyond the glumes. Glumes with conspicuous hairs. Inflorescence is very long and narrow – 2-8 cm. by 5-10 mm. – similar to timothy (*Phleum pratense*). However, the glumes are acute (football-shaped) as opposed to the U-shaped tip of the glumes of timothy (see photograph on next page).

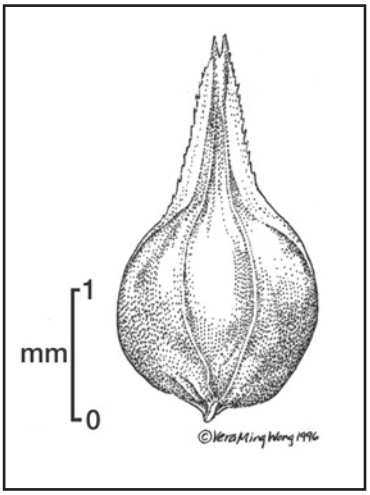
ECOLOGICAL NOTES: Meadow foxtail is a native of Eurasia that has become naturalized in our wet meadows, especially those used for pasture or hay. Roadside ditches are another common habitat.

SOURCE: Gleason and Cronquist (1991); and Voss (1972).

Illustration by Elsie Froeschner (Pohl 1966)

Meadow Foxtail
(*Alopecurus pratensis* L.)

Comparison of the inflorescence of meadow foxtail (*Alopecurus pratensis*) [right] and timothy (*Phleum pratense*) [left]. The glumes of timothy have U-shaped tips as opposed to the football-shaped glumes of meadow foxtail.



Perigynium

FOX SEDGE

(*Carex vulpinoidea* Michx.)

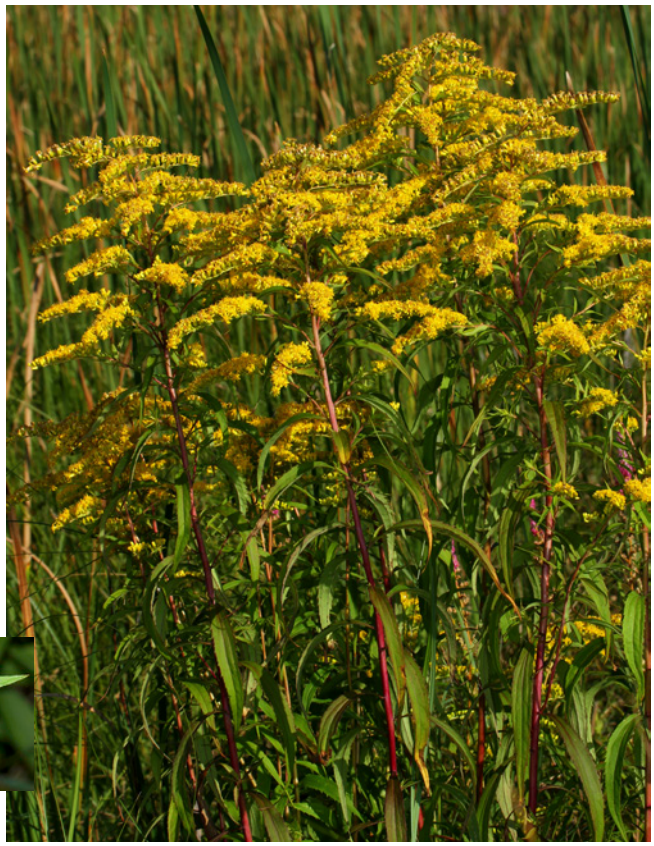
SEDGE FAMILY (Cyperaceae) **C of C:** Native (3 MN)(2 WI) **IND. STATUS:** OBL(NC/NE) FACW(MW, GP)

FIELD CHARACTERISTICS: A perennial, clump-forming sedge with stems about 30-100 cm. tall. Leaves are generally longer than the stem. The lowest leaves on the stem, however, are reduced to scales (aphyllopodic). Stems are slender and firm with whitish, thin sheaths that are conspicuously cross-wrinkled (see photograph). Perigynia are 2-3 mm. long and 1-2 mm. wide, ovate and abruptly taper into a beak, which is usually more than 0.7 mm. long. Each spikelet is typically subtended by a long, linear bract.

Fox sedge can be confused with *Carex annectens* which has leaves that are generally shorter than the stems and the perigynia tend to be yellowish with red-tinged scales.

ECOLOGICAL NOTES: One of our most common sedges, fox sedge is a pioneer species tending to colonize wet, sunny sites soon after disturbance. Fox sedge is an excellent colonizer of wetland restoration sites.

SOURCE: Fassett (1976); Gleason and Cronquist (1991); and Swink and Wilhelm (1994).



GIANT GOLDENROD

(*Solidago gigantea* Ait.)

ASTER FAMILY (Compositae or Asteraceae) **C of C:** Native (3) **IND. STATUS:** FAC(GP) FACW(NC/NE, MW)

FIELD CHARACTERISTICS: A clonal, perennial herb 25-200 cm. high. Leaves of the lower and upper stem tend to be similar, triple-nerved and not rough. Stems are perfectly smooth below the inflorescence, often glaucous, and reddish (may be green in shaded habitats). Stem is not angled. Inflorescence is usually a one-sided, arching panicle. Flowers are yellow. In flower August-October. This species hybridizes with Canada goldenrod (*Solidago canadensis*), a FACU species. These hybrids are often sparsely hairy on the stem below the inflorescence. Refer to Appendix A for a key to wetland goldenrods.

ECOLOGICAL NOTES: Giant goldenrod is our most common goldenrod in fresh (wet) meadows and sedge meadows and is one of the most common forbs encountered in the wetland/upland transition zone. It also occurs in shaded floodplains, shrub-carrs, wet to wet-mesic prairies, calcareous fens and abandoned agricultural lands. In winter, goldenrods are noteworthy for their conspicuous round insect galls on the stem.

SOURCE: Gleason and Cronquist (1991); and Swink and Wilhelm (1994).

Comparison of Goldenrod Stems

Left is giant goldenrod (*Solidago gigantea*) collected from a sunny habitat; center is giant goldenrod collected from a shaded habitat; and right is Canada goldenrod (*Solidago canadensis*). Giant goldenrod stems are always perfectly smooth, sometimes with a white, waxy bloom. In contrast, Canada goldenrod stems are densely hairy.

SWAMP ASTER

(*Symphyotrichum firmum* (Nees) Nesom)

ASTER FAMILY (Compositae or Asteraceae) **C of C:** Native (6) **IND. STATUS:** [FACW]

SYNONYMS: *Aster firmus* Nees, *Aster lucidulus* (Gray) Wieg., or lumped entirely with *Symphyotrichum puniceum* (L.) A. & D. Love

FIELD CHARACTERISTICS: A colonial, perennial herb 40-260 cm. high that can form dense, monotypic stands. Stem leaves are lobed-clasping at their bases and are conspicuously crowded, particularly towards the inflorescence. Stems are green with mahogany marks at the nodes, or streaked. In addition, the stems are smooth, to sparingly covered with stiff, straight hairs along the angles (see photograph above). Inflorescence is hairy or smooth, but does not have glands. Ray flowers are usually white to pale blue or lavender. Nutlets are hairy. In flower August-October. Refer to Appendix B for a key to wetland asters.

ECOLOGICAL NOTES: Swamp aster, also called shining aster, is one of the more common wetland asters, primarily of inland fresh meadows. This species seems to increase in response to disturbances such as grazing and drainage.

SOURCE: Gleason and Cronquist (1991); Swink and Wilhelm (1994); Great Plains Flora Association (1991); and Ownbey and Morley (1991).

Leaves 10x as long as wide and taper to a narrow base. Scale is in inches.

MARSH ASTER

(*Symphyotrichum lanceolatum* (Willd.) Nesom)

ASTER FAMILY (Compositae/Asteraceae) **C of C:** Native (5 MN)(4 WI) **IND. STATUS:** FACW (NC/NE, GP); FAC(MW)

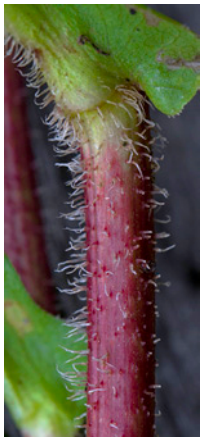
SYNONYMS: *Aster simplex* Willd.; *Aster lanceolatus* Willd.

FIELD CHARACTERISTICS: A perennial herb 60-150 cm. high that can form dense, monotypic clones. Leaf undersides are smooth except for occasional small hairs located along the margins. Leaves are mostly serrate, but can be entire, the larger leaves usually about 10 times as long as wide and taper to a narrow base (see photo), or may be slightly clasping. Axial branching is distinct. Inflorescence is leafy and forms a panicle. Ray flowers are always white and smaller than those of the redstem and swamp asters (*S. puniceum* and *S. firmum*). In flower July-November. Refer to Appendix B for a key to wetland asters.

ECOLOGICAL NOTES: Marsh aster is one of our more common wetland asters. It occurs in fresh (wet) meadows, sedge meadows, wet to wet-mesic prairies, calcareous fens and old fields.

SOURCE: Gleason and Cronquist (1991); Swink and Wilhelm (1994); Great Plains Flora Association (1991); and Ownbey and Morley (1991).

Stems are red with coarse, stiff, white hairs. Leaves clasp the stem.



REDSTEM ASTER

(*Symphyotrichum puniceum* (L.) A. & D. Love)

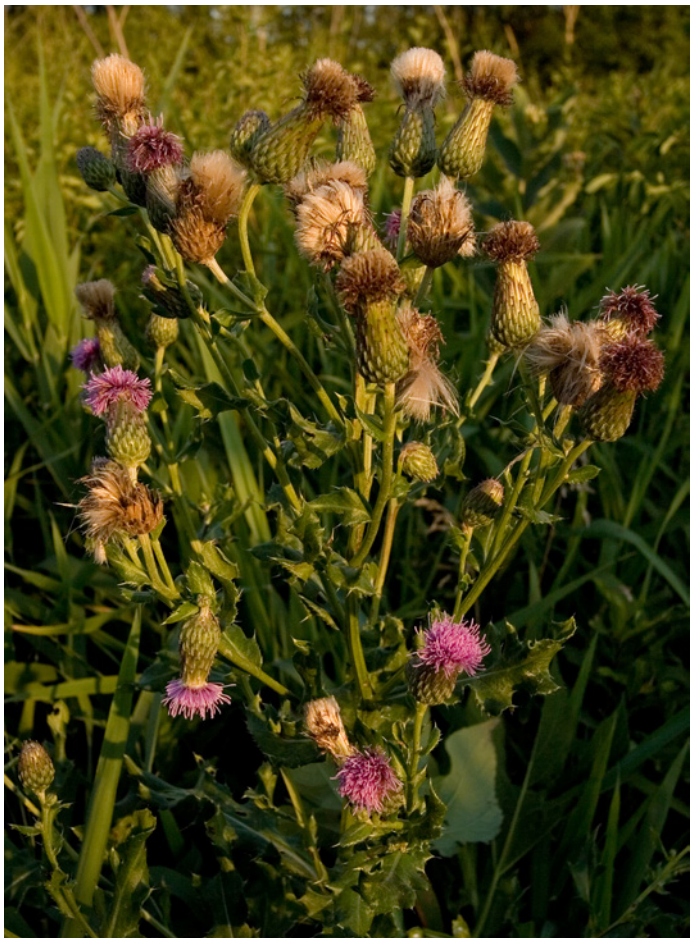
ASTER FAMILY (Compositae or Asteraceae) **IND. STATUS:** OBL

SYNONYM: *Aster puniceus* L. **C of C:** Native (6 MN)(5 WI)

FIELD CHARACTERISTICS: A perennial herb 40-150 cm. high. Stem leaves are lobed-clasping at their bases and are not conspicuously crowded. Stems are reddish with coarse, stiff, white hairs. The inflorescence is hairy or smooth, but does not have glands. Ray flowers are usually pale blue to deep lavender or violet. Disc flowers are yellow and nutlets are smooth. In flower August-October. Refer to Appendix B for a key to wetland asters.

ECOLOGICAL NOTES: Redstem aster is a frequently encountered species of fresh (wet) meadows, sedge meadows, shrub-carrs, alder thickets, hardwood swamps, calcareous fens and on shores. It typically occurs as widely spaced individuals.

SOURCE: Gleason and Cronquist (1991); and Swink and Wilhelm (1994).



CANADA THISTLE

(*Cirsium arvense* (L.) Scop.)

ASTER FAMILY (Compositae or Asteraceae) **IND. STATUS:** FACU

C of C: Introduced, a state-designated invasive and/or noxious weed in MN and WI (0)

FIELD CHARACTERISTICS: A colonial, perennial herb 30-150(200) cm. in height. Leaves are pinnately divided, white beneath, with spiny margins. Flower heads are numerous in an often flat-topped inflorescence. Flower heads are nearly unisexual, the involucre 1-2 cm. tall. Flowers are pink-purple and nutlets (achenes) are 2.5-4 mm. long. In flower June-October.

ECOLOGICAL NOTES: Canada thistle is a native of Eurasia that has become widely established in disturbed habitats in our area, including sedge meadows and wet prairies where disturbance has been limited to grazing. The FACU status is accurate but note that Canada thistle occasionally occurs in habitats as wet as the edges of shallow marshes.

SOURCE: Gleason and Cronquist (1991).

BLUE VERVAIN

(*Verbena hastata* L.)

VERVAIN FAMILY (Verbenaceae) **C of C:** Native (6 MN)(3 WI) **IND. STATUS:** FACW

FIELD CHARACTERISTICS: A perennial herb 40-120 cm. tall. Leaves are opposite, lance-shaped to narrowly ovate, and coarsely serrated. Leaves are 4-12 cm. long and 1-5 cm. wide. Bright blue to purple flowers are overlapped and packed into a number of dense spikes that form a panicle at the end of the 4-sided, erect stem. Flowers are 5-lobed, trumpet-shaped and 2-4 mm. wide. In bloom July-August.

ECOLOGICAL NOTES: Blue vervain is common in sedge meadows, wet to wet-mesic prairies and fresh (wet) meadows. It is a colonizer of exposed, moist to saturated soils.

SOURCE: Gleason and Cronquist (1991); and Swink and Wilhelm (1994).

MARSH HEDGE-NETTLE

(*Stachys palustris* L.)

MINT FAMILY (Labiatae or Lamiaceae) **C of C:** Native (5) **IND. STATUS:** OBL

FIELD CHARACTERISTICS: A rhizome-producing, perennial herb usually 30-100 cm. high. Square stems are erect with opposite leaves and are hairy on the sides as well as the angles. Leaves are sessile to short-petioled (less than 5 mm. long), lanceolate to narrowly ovate, toothed and hairy. The axillary flowers are borne in whorls of six forming a terminal spike. Lower flower whorls are usually subtended by foliage leaves. But, the leaves are progressively reduced to bracts up the spike. The hooded, two-lipped corolla is pink to purplish with white dots, 5-parted, the lower lip having 3 lobes. The calyx is a bell-shaped tube with 4-5 acute, deltoid teeth (lobes). Fruit is a single seeded nutlet. In flower July-August.

ECOLOGICAL NOTES: Marsh hedge-nettle frequently occurs in fresh (wet) meadows, wet prairies, along open wet shorelines and marsh edges and, to a lesser extent, openings in hardwood swamps.

SOURCE: Crow and Hellquist (2000); Gleason and Cronquist (1991); Swink and Wilhelm (1994); and Voss (1996).

TALL MEADOWRUE

(*Thalictrum dasycarpum* Fisch. & Ave-Lall.)

BUTTERCUP FAMILY (Ranunculaceae) **C of C:** Native (4) **IND. STATUS:** FACW(NC/NE, MW) FAC(GP)

FIELD CHARACTERISTICS: A robust, perennial herb from a short rhizome. Stems are purple-tinged and grow to 1-2 m. in height. Leaves are divided into 3-4 groups of leaflets. Each leaflet is 15 mm. or more long and most have a three-lobed tip. Leaflets are distinctly hairy beneath but not glandular. Flowers are in large panicles. Flowers are unisexual with male and female flowers occurring on separate plants. Sepals are 3-5 mm. long. Green to white flowers are 4- to 5-parted with petal-like sepals falling early leaving fringe-like filaments. Fruit is a ribbed nutlet 4-6 mm. long. In flower June-July.

ECOLOGICAL NOTES: Tall meadowrue is common in sedge meadows, fresh (wet) meadows, wet to wet-mesic prairies, openings in shrub swamps, and along streambanks.

SOURCE: Chadde (2002); Black and Judziewicz (2009); and Gleason and Cronquist (1991).

DUDLEY'S RUSH

(*Juncus dudleyi* Wieg.)

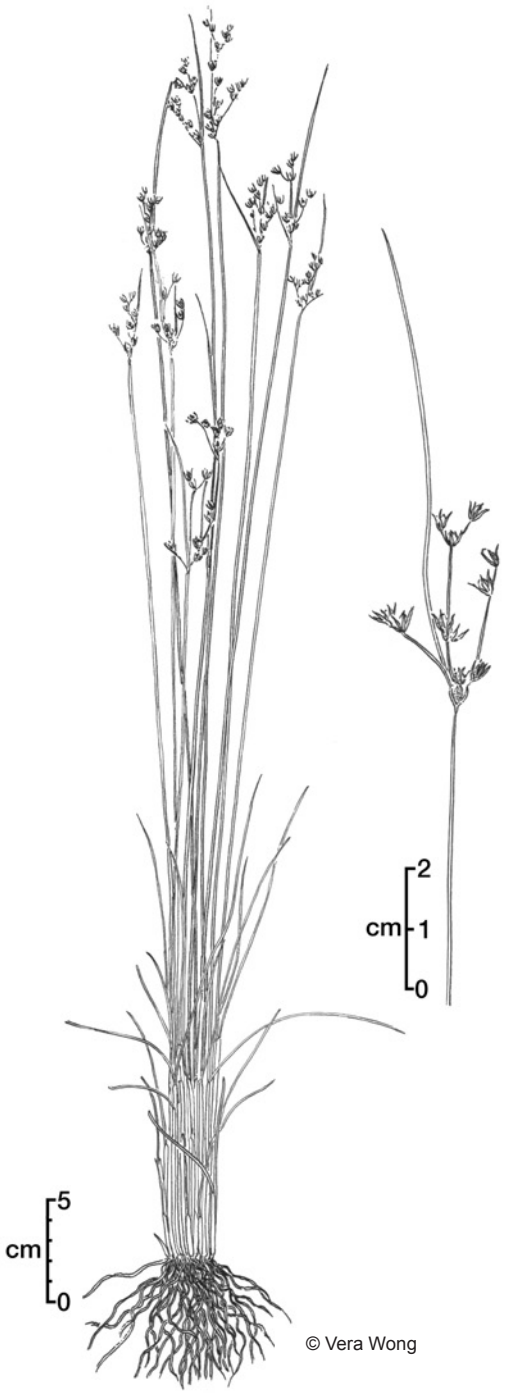
RUSH FAMILY (Juncaceae) **C of C:** Native (3 MN)(4 WI) **IND. STATUS:** FACW

SYNONYM: *Juncus tenuis* var. *dudleyi* (Wieg.) F. J. Herm.

FIELD CHARACTERISTICS: A perennial rush with stems more or less cespitose and 30-80 cm. in height. Leaves are all basal, 10-30 cm. long, flat and 1-1.5 mm. wide, becoming involute or merely narrowly channeled on the upper side. Leaves are a third to half the height of the stems. Leaf sheaths terminate in 0.5-1 mm. long, rounded lobes (auricles) that are leathery and usually yellow or brown when dry. Inflorescence is terminal, with modified leaves 5-10 cm. long subtending and often surpassing the inflorescence, but not appearing as a continuation of the stem. Flowers are composed of a star-like pattern of 6 tepals (3.4-5.4 mm. long) surrounding an ovoid capsule 2.9-4.2 mm. long. Capsule is many-seeded with tiny seeds 0.3-0.5 mm. long.

ECOLOGICAL NOTES: A very common rush of inland fresh meadows and all sorts of exposed moist soils including farmed wetlands and wetland restoration sites. Gleason and Cronquist (1991) lump *J. dudleyi* and *J. interior* Wieg. under *J. tenuis* Willd.

SOURCE: Gleason and Cronquist (1963, 1991); Swink and Wilhelm (1994); Voss (1972); and Great Plains Flora Association (1991).



Dudley's Rush
(*Juncus dudleyi*)

CANADA RUSH

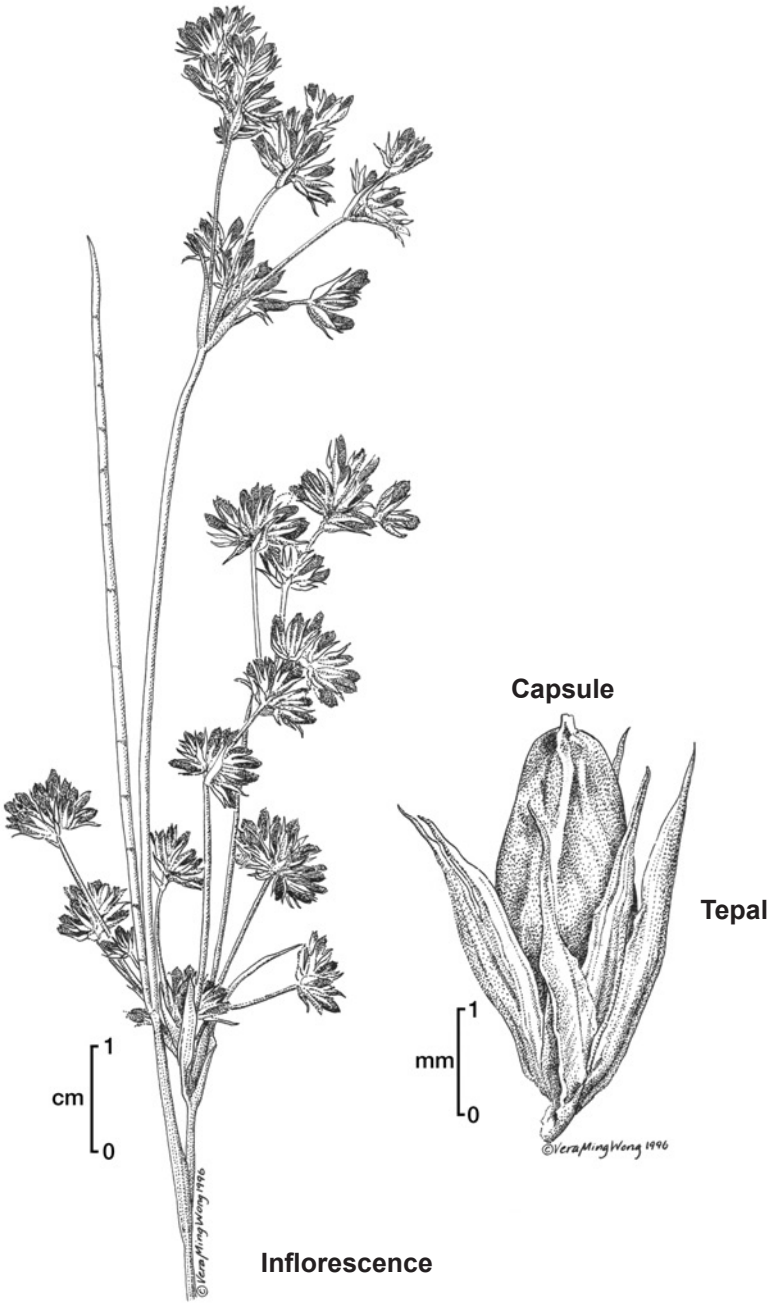
(*Juncus canadensis* J. Gay ex Laharpe)

RUSH FAMILY (Juncaceae) **C of C:** Native (7) **IND. STATUS:** OBL

FIELD CHARACTERISTICS: A perennial, cespitose (tufted) rush with stout, rigid stems 40-100 cm. in height. Leaves number 2-4 and are round in cross section with hard cross partitions (visible on accompanying ink drawing). Leaves are 1.5-2.5 mm. thick. Heads are hemispherical and 5-10 flowered to spherical and 40-(or more) flowered. The 6 tepals (term used for *Juncus* because sepals and petals are similar) are 2.7-3.8 mm. long. Fruit is a capsule 3.3-4.5 mm. long. Capsules with a multitude of elongate seeds 1.2-1.9 mm. long with a tail on each end that accounts for more than half the length of the seed.

ECOLOGICAL NOTES: Canada rush is a common species of shallow marshes, inland fresh meadows, lakeshores and a variety of sandy, wet soils.

SOURCE: Gleason and Cronquist (1991); Voss (1972); Great Plains Flora Association (1991); Swink and Wilhelm (1994); and Britton and Brown (1970).



Canada Rush
(*Juncus canadensis*)

JOINTED RUSH

(*Juncus nodosus* L.)

RUSH FAMILY (Juncaceae) **C of C:** Native (5 MN)(6 WI) **IND. STATUS:** OBL

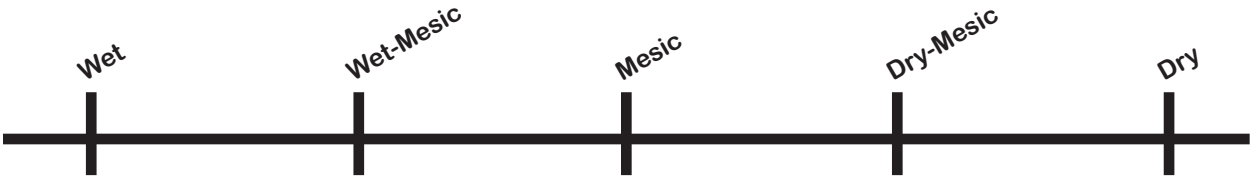
FIELD CHARACTERISTICS: A perennial rush with erect, slender stems 15-40 cm. in height. The singular stems arise from nodes along a slender rhizome. Stem leaves number 2-3 and are round in cross section with hard cross partitions. Leaves are 0.7-1.5 mm. thick. Membranous sheaths are yellowish and terminate in 0.5-1 mm. long lobes (auricles). Inflorescence is composed of 2-15 spherical heads each with up to 25 reddish brown flowers radiating in all directions. Each flower has 6 stamens. The 6 tepals are 2.5-3.5 mm. long and shorter than the capsule. Fruit is a slender capsule 3.5-4.5 mm. long containing seeds about 0.5 mm. long.

ECOLOGICAL NOTES: Jointed rush is a common species of wet sandy to marly shores, marshes and calcareous fens. Occasionally it can be found growing along the edges of bog laggs.

SOURCE: Crow and Hellquist (2000); Gleason and Cronquist (1991); Swink and Wilhelm (1994); and Voss (1972).

III.C. Wet to Wet-Mesic Prairies

Prairies are open, herbaceous plant communities dominated by native grass and grass-like species; at least half of the vegetative cover is made up of true grasses (Curtis 1971). Prairie communities occur along a moisture gradient as shown below. The wet end of the gradient, wet and wet-mesic prairies, meet the criteria for wetlands. These communities are similar to fresh (wet) meadows, but are dominated by native grasses and forbs associated with prairies such as prairie cord-grass, big bluestem, switchgrass, narrow reedgrass, mat muhly grass, gayfeather, New England aster, culver's root, prairie dock and sawtooth sunflower. Wet to wet-mesic prairie communities predominately occur south of the vegetation tension zone; however, some prairie communities are found in sandy barrens and wet swales north of the tension zone.



Moisture Gradient of Prairies

Prior to European settlement, vast expanses of prairie existed in southern Wisconsin and western and southern Minnesota. Minnesota alone had approximately 18 million acres of prairie. Prairies evolved with fire and fire is essential to maintenance of prairies. Without periodic burns, prairies become subject to invasion by woody vegetation. In the pre-European settlement landscape, huge wildfires roared across the prairies of Minnesota and Wisconsin. European settlement brought the plow and fire suppression. Once the prairie sod was broken, and the wet prairies were drained, the deep, black soils proved to be among the most productive farmland in the world. More than 99 percent of prairies in Minnesota and Wisconsin were destroyed by the conversion to agricultural use. Prairies that were not plowed under were hayed or intensively grazed for decades resulting in degradation and changes in species composition. Remaining remnant prairies often suffer because of fire suppression and may be lost without intensive management. Given this nearly total loss of prairie, it is not surprising that many prairie species once common in Minnesota and Wisconsin are now threatened or endangered. Two prairie orchids, the western prairie fringed orchid and white lady's-slipper, are prime examples.

Some large tracts of unbroken (never plowed) or otherwise high quality prairie still exist on publicly-owned preserves or those purchased and managed by private conservation groups. Notable examples are the Chiwaukee Prairie in Kenosha County, Wisconsin, the Scuppernong River Habitat Area in Waukesha County, Wisconsin, and the preserves within the Interbeach Area of Glacial Lake Agassiz in northwestern Minnesota.

VEGETATION: This example of a wet to wet-mesic prairie includes gayfeather (*Liatris pycnostachya*), prairie cord-grass (*Spartina pectinata*), giant manna grass (*Glyceria grandis*), big bluestem (*Andropogon gerardii*), hummock sedge (*Carex stricta*), flattened spike-rush (*Eleocharis compressa*), green bulrush (*Scirpus atrovirens*), sawtooth sunflower (*Helianthus grosseserratus*), Riddell's goldenrod (*Solidago riddellii*), grass-leaf goldenrod (*Euthamia graminifolia*), New England aster (*Symphyotrichum novae-angliae*), sneezeweed (*Helenium autumnale*), prairie loosestrife (*Lysimachia quadriflora*), water hemlock (*Cicuta maculata*), mountain mint (*Pycnanthemum virginianum*), Dudley's rush (*Juncus dudleyi*), redtop (*Agrostis gigantea*), winged loosestrife (*Lythrum alatum*) and shrubby cinquefoil (*Dasiphora fruticosa*).

SOILS: Colwood silt loam (Typic Endoaquolls), a poorly-drained mineral soil underlain by stratified lacustrine silt and very fine sand. Landscape position is a swale connecting morainal hills with an extensive wetland complex on muck soils.

HYDROLOGY: High groundwater table and, to a lesser extent, surface runoff from morainal hills. Colwood soils have a seasonal high water table at the surface to 12 inches below the surface during October through May of most years.

LOCATION: Scuppernong River Habitat Area, Kettle Moraine State Forest, Waukesha County, Wisconsin.

VEGETATION: This wet to wet-mesic prairie includes prairie cord-grass (*Spartina pectinata*), gayfeather (*Liatris pycnostachya*), big bluestem (*Andropogon gerardii*), switchgrass (*Panicum virgatum*), Canada wild-rye (*Elymus canadensis*), narrow reedgrass (*Calamagrostis stricta*), fowl bluegrass (*Poa palustris*), mountain mint (*Pycnanthemum virginianum*), woolly sedge (*Carex pellita*), Sartwelli sedge (*Carex sartwellii*), flattened spike-rush (*Eleocharis compressa*), Riddell's goldenrod (*Solidago riddellii*), prairie loosestrife (*Lysimachia quadriflora*), culver's root (*Veronicastrum virginicum*), cowbane (*Oxypolis rigidior*), sneezeweed (*Helenium autumnale*), marsh pea (*Lathyrus palustris*), bottle gentian (*Gentiana andrewsii*), jointed rush (*Juncus nodosus*), northern bedstraw (*Galium boreale*), New England aster (*Symphyotrichum novae-angliae*), sawtooth sunflower (*Helianthus grosseserratus*), giant goldenrod (*Solidago gigantea*) and compass plant (*Silphium laciniatum*). Widely scattered willows (*Salix discolor, S. petiolaris, S. bebbiana*) are present. State-listed threatened species include tuberous Indian plantain (*Arnoglossum plantagineum*) and common valerian (*Valeriana edulis* var. *ciliata*). The large, deeply cut leaves are those of compass plant, a species typically found in uplands but in this case is part of a hydrophytic plant community, although it is stunted and not flowering. Active management, including prescribed burns, is employed to maintain this prairie.

SOILS: Tripoli silty clay (Typic Endoaquolls), poorly drained soils that formed on nearly level or slightly concave positions on dissected till plains of low relief on the Iowan Erosion Surface.

HYDROLOGY: Tripoli soils are frequently saturated at the soil surface to a depth of 12 inches during the wettest portions of the growing season. Both perched and apparent saturation can occur depending upon precipitation frequency and intensity during a given time period.

LOCATION: Iron Horse Prairie Scientific and Natural Area, Dodge County, Minnesota.

PRAIRIE CORD-GRASS

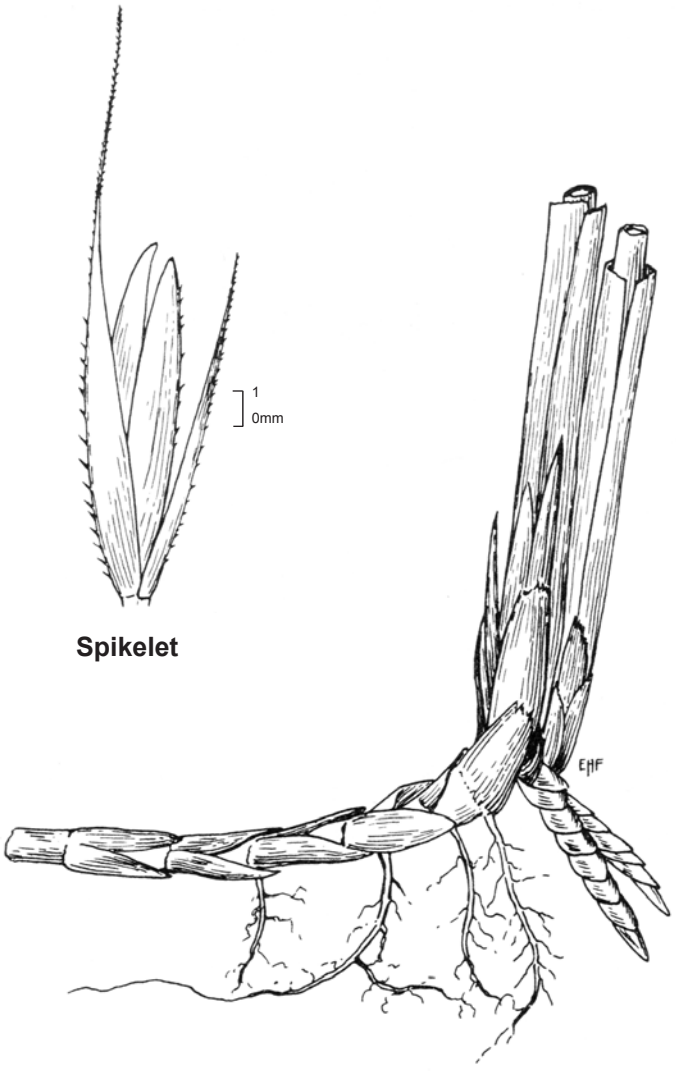
(*Spartina pectinata* Bosc ex Link)

GRASS FAMILY (Gramineae or Poaceae) **C of C:** Native (5) **IND. STATUS:** FACW

FIELD CHARACTERISTICS: A coarse, densely clonal, perennial grass 1-2 m. high. Stout, smooth, erect stems have short ligules. A dense mass of stout, scaly rhizomes can form monotypic clones 1-10 m. across. The main leaf blades are shiny, long, and flat, between 5-10 mm. wide, and up to 1 m. long. Leaves may be inrolled, but only when dry. Margins of the leaf blades are strongly roughened. Arching leaves turn red to light straw yellow in fall. Inflorescence is a panicle with numerous, distinct, one-sided spikes 5-12 cm. long. Spikelets are one-flowered, 8-11 mm. long, overlay, and ascending or lying flat, resembling a comb. They are also articulated below the glumes. Glumes are unequal in size with the first glume three-fourths as long as, to equal to, the length of the lemma. The second glume is awned.

ECOLOGICAL NOTES: Prairie cord-grass is the characteristic, dominant grass of wet prairies. It occasionally occurs in mesic prairies, but usually in low spots. It is also found on wet shores and in shallow marshes and road ditches.

SOURCE: Fassett (1951); Gleason and Cronquist (1991); and Swink and Wilhelm (1994).



Prairie Cord-Grass
(*Spartina pectinata*)

Illustrations by Elsie Froeschner (Pohl 1966)

BIG BLUESTEM

(*Andropogon gerardii* Vitman)

GRASS FAMILY (Gramineae or Poaceae) **C of C:** Native (4) **IND. STATUS:** FACU(NC/NE, GP) FAC(MW)

FIELD CHARACTERISTICS: A perennial, sod-forming grass 1-3 m. high with stout stems. Leaf blades are 5-10 mm. wide. Inflorescence contains 2-10 finger-like racemes with two types of spikelets: perfect, stalkless spikelets and staminate, stalked spikelets. Both types of spikelets resemble each other in size and shape, and occur in pairs at the joints of the principal axis. The twisted, fertile spikelet awn is 8-15 mm. long. The principal axis and flower stalk joints are equal. Leaves and stems turn bright yellow, red, orange or purple in the fall, and some color persists inside the stem leaf sheaths into the spring.

ECOLOGICAL NOTES: Big bluestem occurs across the moisture gradient of dry-mesic to wet prairies reaching its optimum presence in mesic prairies where it is a dominant grass. Big bluestem also occurs in calcareous fens, although it is typically stunted in such wet habitats. Turkey foot is another common name given the outline of the inflorescence (see ink drawing).

SOURCE: Fassett (1951); Gleason and Cronquist (1991); and Swink and Wilhelm (1994).

Big Bluestem
(*Andropogon gerardii*)

Illustration from Hitchcock (1950)

SWITCH GRASS

(*Panicum virgatum* L.)

GRASS FAMILY (Gramineae or Poaceae) **C of C:** Native (4 WI)(2 MN) **IND. STATUS:** FAC

FIELD CHARACTERISTICS: A stout, perennial, sod-forming grass up to 2 m. tall from scaly rhizomes. The firmly erect, hollow stems are essentially smooth, but pubescent at the nodes. Leaf blades are flat to somewhat inrolled along the margins and up to 15 mm. wide. Ligules are a dense fringe of hairs 2-4 mm. in length. A patch of white hairs occur in the angles between the stem and leaf (axils) near the ligule. Inflorescence is a terminal, open, spreading panicle 2-3 times as long as wide. One-flowered spikelets are ovoid and set on long pedicels that are smooth and 3-6 mm. long.

ECOLOGICAL NOTES: A common, distinctive grass of wet to mesic prairies. It also occurs in interdunal swales and flats on moist to seasonally wet sands and sandy loams.

SOURCE: Fassett (1951); Gleason and Cronquist (1991); Swink and Wilhelm (1994); and Voss (1972).

Switch Grass
(*Panicum virgatum*)
Illustration from Hitchcock (1950)

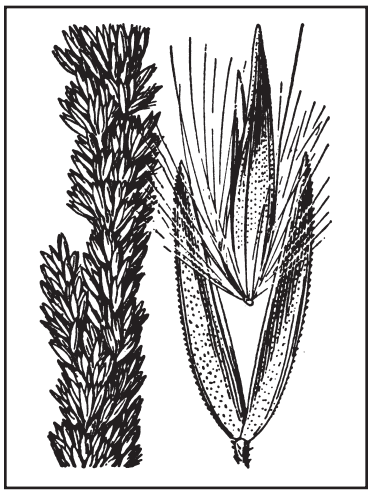


Illustration from Hitchcock (1950)

NARROW REEDGRASS

(*Calamagrostis stricta* (Timm) Koel.)

GRASS FAMILY (Gramineae or Poaceae) **IND. STATUS:** FACW

SYNONYM: *Calamagrostis inexpansa* A. Gray **C of C:** Native (7), listed as special concern in WI

FIELD CHARACTERISTICS: A perennial grass 50-100 cm. high. Slender, erect stems are hollow and arise from rhizomes. Mature, slender leaf (less than 4 mm. wide) margins tend to be rolled inward. A distinct, thin, membranous structure (the ligule) extends beyond the summit of the sheath. The ligule of the uppermost leaf is between 2.5-8 mm. long (usually about 4 mm.). Inflorescence is an erect, spike-like panicle of ascending branches that are obscured by the crowded spikelets; the panicle is referred to as strict (compact and narrow) hence its scientific name. A single, short, delicate, and straight to twisted awn arises from the base of the lemma. A slightly more robust plant than Canada blue-joint grass (*C. canadensis*).

ECOLOGICAL NOTES: Narrow reedgrass is a common species of wet prairies and calcareous fens in Minnesota and westward. In Wisconsin, *C. stricta* is an infrequent grass of moist to wet peaty, sandy or marly soils of lake shores, marshes, bogs, interdunal flats and swales, and inland fresh meadows. It tends to occur in slightly drier habitats than Canada blue-joint grass. Two subspecies, *inexpansa* and *stricta*, occur in Minnesota and Wisconsin.

SOURCE: Crow and Hellquist (2000); Fassett (1951); Gleason and Cronquist (1991); Swink and Wilhelm (1994); and Voss (1972).

Narrow Reedgrass
(*Calamagrostis stricta*)

BUXBAUM'S SEDGE

(*Carex buxbaumii* Wahlenb.)

SEDGE FAMILY (Cyperaceae) **C of C:** Native (8) **IND. STATUS:** OBL

FIELD CHARACTERISTICS: A very distinctive perennial sedge with stems arising singly, or a few together, from long rhizomes. Stems are 30-100 cm. tall. Sheaths and leaf blades are glabrous. Basal sheaths break down into filamentous, pinnate fibers with age. Purple dots may be observed with a hand lens toward the base of the basal sheaths. Leaves are 2-4 mm. wide and have a bluish tinge in the spring. Erect spikelets, 2-5, are short stalked. The terminal spikelet is 1-3 cm. long and supports both staminate and pistillate flowers. Lateral spikelets are all pistillate. The bract subtending the lowest spikelet is sheathless. Perigynia are subtended by lance-shaped scales that are brown to purplish-black along the margins with a paler mid-rib. The 0.5-3 mm. scales surpass the perigynia tapering to an awn. Oval perigynia are 2.7-4.3 mm. long by 1.5-2 mm. wide, glabrous, and gray-green to whitish. The beak is very short or lacking.

ECOLOGICAL NOTES: Buxbaum's sedge prefers calcareous soils. It is often found in minerotrophic shrub/wooded swamps, shallow marl beds, shores, calcareous fens and wet prairies.

SOURCE: Gleason and Cronquist (1991); McGregor *et al.* (1991); Swink and Wilhelm (1994); and Voss (1972).

COMMON STIFF SEDGE

(*Carex tetanica* Schkuhr)

SEDGE FAMILY (Cyperaceae) **C of C:** Native (7 MN)(9 WI) **IND. STATUS:** FACW

FIELD CHARACTERISTICS: A perennial sedge forming small clumps with stems 20-60 cm. tall. The blue-green leaf blades are flat, (1.5)2-4.5(5) mm. wide with lower leaf sheath brownish to occasionally reddish to purplish tinged. Leaf blades are typically shorter than the stems. The terminal spikelet is staminate and on an elongated peduncle that greatly exceeds the pistillate spikelets (see photograph and ink drawing). Pistillate spikelets (1-3) are erect on slender peduncles and are 7-40 mm. long. The distinctive pistillate scales are brown to purple-tinged with green centers and hyaline margins. The essentially beakless perigynia are 2.5-3.5 mm. long, ascending, and have minute nipple-like projections on the surface. The nutlets are light to dark brown and less than 1.7 mm. wide.

Very similar to *Carex meadii* of upland prairies, whose mature nutlets are 1.8-2.2 mm. wide and have perigynia more than 3.5 mm. long.

ECOLOGICAL NOTES: Common stiff sedge prefers wet prairies and calcareous fens (in the eastern U.S. it is known as fen sedge), and also occurs in other inland fresh meadow types.

SOURCE: Fassett (1976); Gleason and Cronquist (1991); Swink and Wilhelm (1994); and Voss (1972).

GAYFEATHER

(*Liatris pycnostachya* Michx.)

ASTER FAMILY (Compositae or Asteraceae) **C of C:** Native (7) **IND. STATUS:** FAC

FIELD CHARACTERISTICS: A perennial herb 60-150 cm. high. Stems are hairy with numerous, essentially linear leaves. Leaves are gradually reduced upwards on the stem. The sessile, disc-like flower heads are crowded (usually more than 29 heads) on a spike. Each head usually contains 5-7 perfect tubular flowers. Ray flowers are absent. The modified leaves (involucral bracts) subtending the flowers taper to a long point and are bent back or spreading. Flowers are pink-purple, occasionally white, and in bloom from July to mid-September.

ECOLOGICAL NOTES: Gayfeather, also known as prairie blazing star, is largely restricted to wet and wet-mesic prairie remnants in Minnesota and Wisconsin, and some calcareous fens. It is similar to marsh blazing star (*Liatris spicata*), which has smooth stems and appressed involucral bracts.

SOURCE: Gleason and Cronquist (1991); and Swink and Wilhelm (1994).

© Photos by Steve D. Eggers

NEW ENGLAND ASTER

(*Symphyotrichum novae-angliae* (L.) Nesom)

ASTER FAMILY (Compositae or Asteraceae) **C of C:** Native (3) **IND. STATUS:** FACW

SYNONYM: *Aster novae-angliae* L.

FIELD CHARACTERISTICS: A perennial herb with clustered stems 30-200 cm. high. The plant is often covered with glandular hairs (use a 10-15x lens). Lance-shaped leaves are entire, have no stalks, and are conspicuously lobed-clasping. Lower and upper leaves are similar but the lower leaves tend to be deciduous. The leafy inflorescence consists of several flowering heads. Flower stalks, and modified leaves subtending the flowers, have hairy glands. Both ray and disc flowers are present. Numerous, slender ray flowers are amethyst to rosy, rarely blue or white in color, while the distinctive disc flowers are yellow to yellow-orange. Nutlets are densely covered with stiff, appressed to silky, hairs. In flower from the end of July through October. Refer to Appendix B for a key to wetland asters.

ECOLOGICAL NOTES: New England aster is a common aster of wet to wet-mesic prairies. It also occurs in other inland fresh meadows, as well as upland sites such as old fields and moist, open woods. Slight disturbances often benefit this aster.

SOURCE: Gleason and Cronquist (1991); and Swink and Wilhelm (1994).

SAWTOOTH SUNFLOWER

(*Helianthus grosseserratus* Martens)

ASTER FAMILY (Compositae or Asteraceae) **IND. STATUS:** FACW

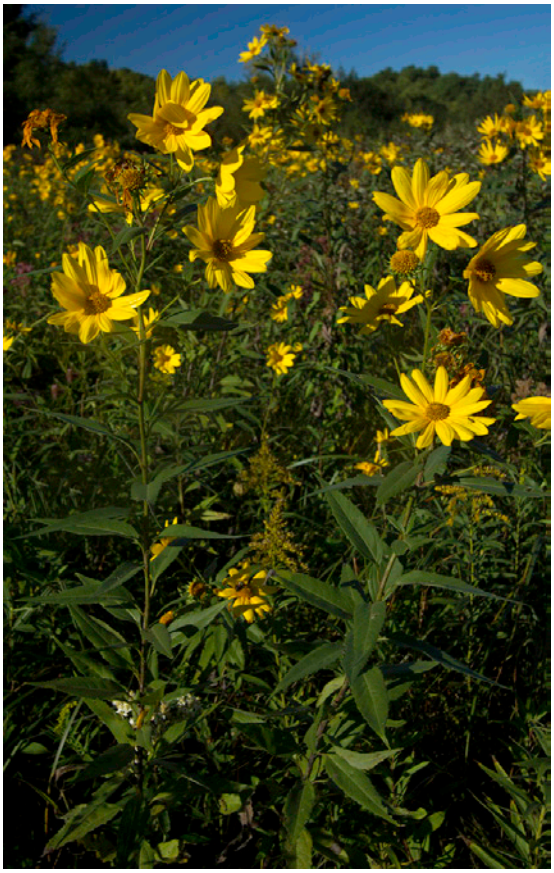
C of C: Native (3 MN)(2 WI)

FIELD CHARACTERISTICS: A perennial herb 1-4 m. high. Coarse, woody, tuberous roots are in a tight cluster up to 5 cm. long and 1 cm. or more thick, with elongate rhizomes. Stems are essentially without hairs below the inflorescence, often with a white, waxy bloom (glaucous) as shown in the photograph above. Basal leaves are absent or inconspicuous. Well-developed alternate, stem leaves occur on the middle to upper stem. The sharply toothed, lanceolate leaves are densely hairy below and are often supported by winged leaf stalks. Both ray and disc flowers are present. The conspicuous, yellow ray flowers are deciduous and sterile. Disc flowers are perfect, fertile, and have yellow petals. In flower July-October.

Only two of the native, perennial sunflowers of Minnesota and Wisconsin have alternate leaves: this one and giant sunflower (*H. giganteus*).

ECOLOGICAL NOTES: Sawtooth sunflower is a common sunflower of wet to wet-mesic prairies and other inland fresh meadows. It also occurs along disturbed streambanks and in old fence rows.

SOURCE: Gleason and Cronquist (1993); and Swink and Wilhelm (1994).



GIANT SUNFLOWER

(*Helianthus giganteus* L.)

SUNFLOWER FAMILY (Compositae or Asteraceae) **C of C:** Native (4) **IND. STATUS:** FAC(GP) FACW(NC/NE, MW)

FIELD CHARACTERISTICS: A perennial, rhizomatous herb 1-3 m. high with thickened, fleshy roots. The often purplish stems have spreading hairs below the inflorescence, which sometimes may be scattered. Lower leaves tend to be opposite becoming alternate on the upper stem. Lanceolate leaves are usually less than 3.5 cm. wide, range from strongly toothed to subentire, and taper to short petioles. Upper leaf surfaces are rough, while the lower leaf surfaces have long hairs (1 mm. or more). Both ray and disc flowers are present. The conspicuous yellow ray flowers (12-20) are deciduous and sterile. Disc flowers are perfect, fertile, and have yellow lobes. In flower July-October. This sunflower is a very variable species, often confused with *Helianthus grosseserratus*, with which it hybridizes.

ECOLOGICAL NOTES: Giant sunflower is characteristic of wet prairies and also occurs in a variety of other wet, sunny sites. It occasionally occurs in shaded floodplain forests and swamps. This sunflower seems to prefer calcareous soils.

SOURCE: Gleason and Cronquist (1991); Swink and Wilhelm (1994); and Voss (1996).

RIDDELL'S GOLDENROD

(*Solidago riddellii* Frank)

ASTER FAMILY (Compositae or Asteraceae) **C of C:** Native (8 MN)(7 WI) **IND. STATUS:** OBL

SYNONYM: *Oligoneuron riddellii* (Frank ex Riddell) Rydb.

FIELD CHARACTERISTICS: A perennial herb 40-100 cm. high. Leaves of the lower and upper stem are dissimilar, the lower or basal leaves being better developed and usually persistent. Leaves are sickle-shaped, folded, triple nerved, and not dotted with glands. Leaves are persistent up to flowering time. Inflorescence is a flat-topped, hairy corymb with yellow flowers. In flower from September to early November. Riddell's goldenrod can be confused with Ohio goldenrod (*Solidago ohioensis*)[page 239], which occurs in similar habitats in Wisconsin. Ohio goldenrod leaves are flat and not triple-nerved and its inflorescence is hairless. Refer to Appendix A for a key to wetland goldenrods.

ECOLOGICAL NOTES: Riddell's goldenrod is characteristic of wet to wet-mesic prairies supported by groundwater seepages. In Minnesota, it frequently occurs in calcareous fens as well.

SOURCE: Gleason and Cronquist (1991); and Swink and Wilhelm (1994).

SNEEZEWEED

(*Helenium autumnale* L.)

ASTER FAMILY (Compositae or Asteraceae) **C of C:** Native (4) **IND. STATUS:** FACW

FIELD CHARACTERISTICS: A perennial herb 30-150 cm. high. Stems are usually winged with well-developed, alternate, flat, stem leaves. A leafy inflorescence contains several heads of both ray and disc flowers. Yellow disc flowers are perfect and yellow. The yellow, "squared-off" ray flowers tend to be sterile and are generally 3-toothed. The diagnostic features of sneezeweed are its winged stems and bent back ray flowers with 3 teeth. In flower August-October.

ECOLOGICAL NOTES: Sneezeweed is common in wet to wet-mesic prairies and other inland fresh meadows. It is often seen along streambanks.

SOURCE: Gleason and Cronquist (1991); and Swink and Wilhelm (1994).

CUP-PLANT

(*Silphium perfoliatum* L.)

ASTER FAMILY (Compositae or Asteraceae) **C of C:** Native (4) **IND. STATUS:** FAC(GP) FACW(NC/NE, MW)

FIELD CHARACTERISTICS: A large, stout, robust, perennial herb 1-2.5 m. tall with square stems. Leaves are opposite, perfoliate (stem appears to pierce the leaves), coarsely-toothed, 8-30 cm. long by 4-15 cm. wide. Flower heads with a disk 1.5-2.5 cm. wide and ray flowers numbering 16-35. Rays are yellow and 1.5-2 cm. long. In flower July-September.

ECOLOGICAL NOTES: Cup-plant is an easy to identify, common forb of wet to wet-mesic prairies, fresh (wet) meadows, calcareous fens and streambanks.

SOURCE: Gleason and Cronquist (1991); Chadde (2011); and Black and Judziewicz (2009).

PRAIRIE DOCK

(*Silphium terebinthinaceum* Jacq.)

ASTER FAMILY (Compositae or Asteraceae) **C of C:** Native (7) **IND. STATUS:** FAC

FIELD CHARACTERISTICS: A coarse, tap-rooted, perennial herb 50-300 cm. high. The essentially hairless stems support reduced stem leaves. The huge principal leaves (7-30 cm. x 10-50 cm.) are essentially basal, rough, sharply toothed, heart-shaped to oblong, and supported by long leaf stems. Leaves are often oriented edgewise to the south or southwest. Inflorescence is open and resembles a corymb with both ray and disc flowers present. The conspicuous, yellow ray flowers have pistils and are fertile, while the disc flowers are sterile. Ray flower nutlets are flattened and winged along their margins. In flower from the end of June through September.

ECOLOGICAL NOTES: Prairie dock occurs in wet-mesic to dry-mesic prairies and infrequently in dry prairies and oak openings in Wisconsin. Its range does not include Minnesota.

SOURCE: Gleason and Cronquist (1991); and Swink and Wilhelm (1994).

IRONWEED

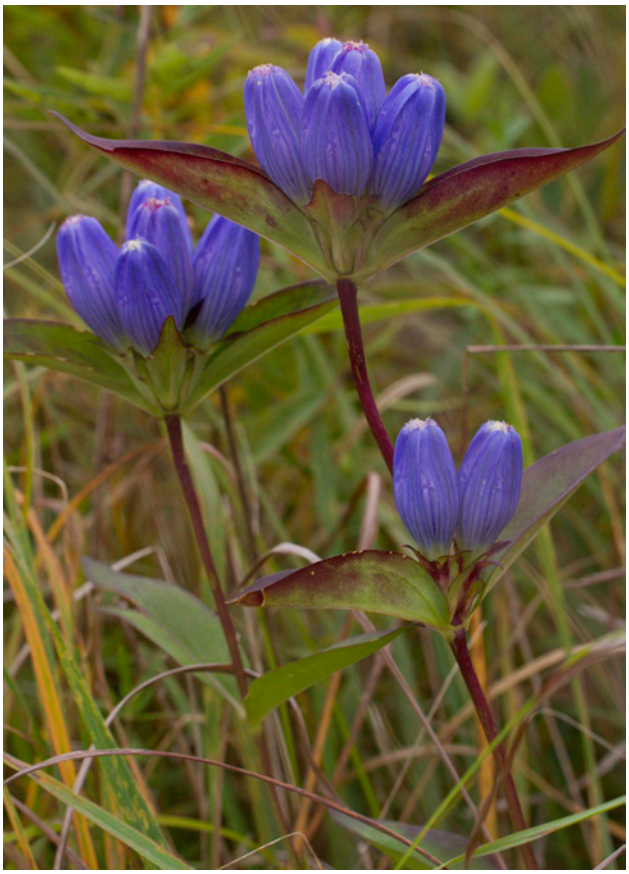
(*Vernonia fasciculata* Michx.)

ASTER FAMILY (Compositae or Asteraceae) **C of C:** Native (5) **IND. STATUS:** FAC(GP) FACW(NC/NE, MW)

FIELD CHARACTERISTICS: A perennial herb with often red or purple stems 30-140 cm. in height. Leaves are 7-17 cm. long, alternate, sharply dentate, glabrous, and conspicuously punctate beneath. Inflorescence is usually flat-topped, dense and 4-10 cm. wide. Flowers consist of disc flowers that are purple with 10-26 per head, with an involucre 5-9 mm. long. In flower July-September.

ECOLOGICAL NOTES: Ironweed occurs primarily in wet to wet-mesic prairies.

SOURCE: Gleason and Cronquist (1991); and Black and Judziewicz (2009).



BOTTLE GENTIAN

(*Gentiana andrewsii* Griseb.)

GENTIAN FAMILY (Gentianaceae) **C of C:** Native (6) **IND. STATUS:** FACW(NC/NE, MW) FAC(GP)

FIELD CHARACTERISTICS: A perennial herb with unbranched, smooth stems 20-80 cm. in height. Leaves are simple, opposite, lanceolate and 4-12 cm. long by 1-3 cm. wide. Blue (sometimes white) flowers 3-5 cm. long are in terminal clusters and sessile in upper leaf axils. Sepals form a tube around the petals. Flowers usually remain closed. Petals, sepals and leaves have a fringe of tiny hairs (use 10x lens). Fruit is a capsule. In flower August-September.

ECOLOGICAL NOTES: Bottle gentian is most frequently encountered in wet to wet-mesic prairies, but also occurs in wet meadows and openings in hardwood swamps.

SOURCE: Gleason and Cronquist (1991); and Black and Judziewicz (2009).

WESTERN PRAIRIE FRINGED ORCHID

(*Platanthera praeclara* Shev. & Bowles)

ORCHID FAMILY (Orchidaceae) **IND. STATUS:** FACW(NC/NE, MW); OBL(GP)

C of C: Native (10); Federally threatened and listed as endangered by the State of Minnesota

SYNONYM: *Habenaria leucophaea* (Nutt.) A. Gray var. *praeclara* (Shev. & Bowles) Cronq.

FIELD CHARACTERISTICS: A perennial herb 40-100 cm. tall. Lower leaves are lance-like to broadly linear and 10-20 cm. long. Upper leaves are much reduced. Spike is cylindric, 8-20 cm. tall and 5-7 cm. wide. Sepals oval to obovate, 7-13 mm. Petals toothed, slightly longer than sepals. Lip 14-27 mm., deeply 3-lobed, long-fringed. Spur is 25-60 mm. long. In bloom late June to early July.

The very similar eastern prairie fringed orchid, *P. leucophaea*, has been segregated from *P. praeclara* by flower size and morphology, and largely occurs east of the Mississippi River.

Ragged fringed orchid (*P. lacera*) is also similar, but is not as tall and has a smaller lip (no more than 15 mm. long) and shorter spur (less than 20 mm. long).

ECOLOGICAL NOTES: Western prairie fringed orchid is found in sedge meadows and wet to wet-mesic prairies, especially those that are calcareous or subsaline. The nearly total loss of its habitat has resulted in listing western prairie fringed orchid as a threatened species under the Endangered Species Act (ESA), and endangered under Minnesota state law. The eastern prairie fringed orchid occurs in Wisconsin and is similarly listed as threatened by the ESA and endangered by the State of Wisconsin. Report any sightings to the U.S. Fish and Wildlife Service or state department of natural resources. Do not disturb!

SOURCE: Gleason and Cronquist (1991); Smith (1993); Coffin and Pfannmuller (1988); and Great Plains Flora Association (1991).

Western Prairie Fringed Orchid
(*Platanthera praeclara*)

COMMON MOUNTAIN MINT

(*Pycnanthemum virginianum* (L.) T. Dur. & B.D. Jackson ex B.L. Robins. & Fern.)

MINT FAMILY (Labiatae or Lamiaceae) **C of C:** Native (6) **IND. STATUS:** FACW(NC/NE, MW) FAC(GP)

FIELD CHARACTERISTICS: A perennial, aromatic (minty fragrance) herb 20-40 cm. high with square stems and opposite leaves. Stems are hairy along the angles. Leaves are lance-linear, entire, smooth above, and usually average less than 6 mm. wide. The outermost modified leaves of the inflorescence are leafy and essentially hairless above. The midvein of modified leaves of the inflorescence is not prominent. Triangular-shaped calyx lobes are less than 1 mm. long, and thus are shorter than the calyx tube. Inflorescence contains four or more flowers in dense, button-like cymes that terminate the stems and branches. Each white flower contains four stamens. In flower from the end of June to the beginning of October.

ECOLOGICAL NOTES: This mint is common in wet to wet-mesic prairies and calcareous fens. It occasionally occurs in dry prairies and open, upland forests. Common mountain mint may persist when other prairie species are eliminated by grazing.

SOURCE: Gleason and Cronquist (1991); and Swink and Wilhelm (1994).

CULVER'S ROOT

(*Veronicastrum virginicum* (L.) Farw.)

FIGWORT FAMILY (Scrophulariaceae) **C of C:** Native (6) **IND. STATUS:** FAC

FIELD CHARACTERISTICS: An erect, perennial herb 80-200 cm. high. Narrow, finely serrated leaves occur in whorls of 3-7 around the stem. Both stem and basal leaves are present. The showy inflorescence is erect with slender, terminal, spike-like racemes. Conspicuous stamens are crowded and protrude in a brush-like fashion perpendicular to the raceme. Corollas are white and usually not much over 2 mm. in length. In flower from mid-June through August.

ECOLOGICAL NOTES: Culver's root is a frequent herb of wet to wet-mesic prairies. It is occasionally found on upland sites such as sand prairies and openings in mesic forests.

SOURCE: Gleason and Cronquist (1991); and Swink and Wilhelm (1994).

PRAIRIE LOOSESTRIFE

(*Lysimachia quadriflora* Sims)

PRIMROSE FAMILY (Primulaceae) **C of C:** Native (8 MN)(9 WI) **IND. STATUS:** FACW(GP) OBL(NC/NE, MW)

FIELD CHARACTERISTICS: A perennial herb with stems 30-100 cm. in height. Leaves are linear, 3-8 cm. by 2-7 mm., the margins smooth, revolute, tapering to a sessile base. Flowers are in terminal clusters on the stem and branches. Corolla lobes are 7-12 mm. by 5-9 mm. In flower July-August.

ECOLOGICAL NOTES: Prairie loosestrife primarily occurs in wet to wet-mesic prairies.

SOURCE: Gleason and Cronquist (1991); and Black and Judziewicz (2009).

Fruit is an elongate pod (10-15 cm.).

INDIAN HEMP

(*Apocynum cannabinum* L.)

DOGBANE FAMILY (Apocynaceae) **C of C:** Native (3) **IND. STATUS:** FAC

SYNONYM: *Apocynum sibiricum* Jacq.

FIELD CHARACTERISTICS: A perennial herb erect to 0.5-1.5 m. or can be drooping. Leaves are opposite, oval, sessile, cordate, broadly clasping at the base. Leaves and stem have a milky juice. Corolla is greenish-white or pale yellow, cylindric, 3-6 mm. long. Fruit is a long, narrow pod 10-15 cm. long. In flower May-September.

ECOLOGICAL NOTES: Indian hemp primarily occurs in wet to wet-mesic prairies.

SOURCE: Gleason and Cronquist (1991); and Black and Judziewicz (2009).

Steve D. Eggers

WINGED LOOSESTRIFE

(*Lythrum alatum* Pursh)

LOOSESTRIFE FAMILY (Lythraceae) **C of C:** Native (6) **IND. STATUS:** OBL

FIELD CHARACTERISTICS: A perennial herb 40-80 cm. tall with 4-angled stems. Leaves are sessile with bases rounded to subcordate, overall leaf shape linear-oblong to lance-ovate, usually only the lowest leaves are opposite. Leaves below the branches are up to 4 cm. long while leaves of the branches are smaller and narrower. Flowers are solitary in leaf axils with purple, obovate petals 2-6 mm. long. In contrast, the flowers of purple loosestrife (*L. salicaria*) are packed into dense spikes 10-40 cm. in length. The fruit of winged loosestrife is a capsule enclosed by the sepals. In flower June-August.

ECOLOGICAL NOTES: Winged loosestrife occurs in wet to wet-mesic prairies, calcareous fens, marshes and along lakeshores.

SOURCE: Gleason and Cronquist (1991); Chadde (2002); and Black and Judziewicz (2009).

III.D. Calcareous Fens

Calcareous fens are the rarest wetland plant community in Minnesota and Wisconsin, and probably one of the rarest in North America. These are plant communities of saturated, seepage sites that have an internal flow of groundwater rich in calcium and magnesium bicarbonates, and sometimes calcium and magnesium sulfates as well (Curtis 1971). The calcium and magnesium bicarbonates and sulfates precipitate out at the surface creating a harsh, alkaline soil condition. Only a select group of calcium-tolerant plants, referred to as **calciphiles**, can tolerate these conditions. Healthy (unaltered) calcareous fens are sedge-dominated by *Carex* species (e.g., sterile sedge (*C. sterilis*), prairie sedge (*C. prairea*), common stiff sedge (*C. tetanica*), Buxbaum's sedge (*C. buxbaumii*)) as well as beaked spike-rush (*Eleocharis rostellata*), twig-rush (*Cladium mariscoides*) and hair beak-rush (*Rhynchospora capillacea*). Characteristic grasses and forbs include wild timothy, Ohio goldenrod, Grass-of-Parnassus, common valerian, brook lobelia and lesser fringed gentian. Shrubby cinquefoil and sage willow are characteristic shrubs. Included are species disjunct from the tundra, alpine meadows and salt marshes. Therefore, calcareous fens are described as a hybrid community by Curtis (1971).

Calcareous fen communities in general have a disproportionate number of rare, threatened and endangered plant species compared to other plant communities in the Great Lakes Region.

Trout streams are often associated with calcareous fens because of the cold, pure water provided by the springs and seepages.

Steve D. Eggers

Active springs are frequently associated with calcareous fens. The example shown by the photograph is within Nicols Meadow Fen in Dakota County, Minnesota. The aquatic plant is water cress (*Rorippa nasturtium-aquaticum*).

Two Eurasian shrubs, glossy buckthorn (*Frangula alnus*) and common buckthorn (*Rhamnus cathartica*), have become established within many fen complexes in Minnesota and Wisconsin. Without control measures, buckthorns can form dense thickets that shade out calcareous fen species including the rare taxa.

VEGETATION: The calcareous fen community shown on the following page supports five species listed as threatened (T) by the State of Minnesota as well as two species listed as special concern (SC): sterile sedge (*Carex sterilis*) (T); beaked spike-rush (*Eleocharis rostellata*) (T); hair beak-rush (*Rhynchospora capillacea*) (T); whorled nut-rush (*Scleria verticillata*) (T); common valerian (*Valeriana edulis* var. *ciliata*) (T); twig-rush (*Cladium mariscoides*) (SC) and white lady's-slipper (*Cypripedium candidum*) (SC). Additional species present include Buxbaum's sedge (*Carex buxbaumii*), limestone meadow sedge (*Carex granularis*), common stiff sedge (*Carex tetanica*), prairie sedge (*Carex prairea*), hummock sedge (*Carex stricta*), Sartwell's sedge (*Carex sartwellii*), hardstem bulrush (*Schoenoplectus acutus*), Grass-of-Parnassus (*Parnassia glauca*), lesser fringed gentian (*Gentianopsis virgata*), brook lobelia (*Lobelia kalmii*), wild timothy (*Muhlenbergia glomerata*), mat muhly grass (*Muhlenbergia richardsonis*), swamp thistle (*Cirsium muticum*), blazing star (*Liatris ligulistylis*), Riddell's goldenrod (*Solidago riddellii*), great blue lobelia (*Lobelia siphilitica*), mountain mint (*Pycnanthemum virginianum*), northern bedstraw (*Galium boreale*), northern bog aster (*Symphyotrichum boreale*), giant goldenrod (*Solidago gigantea*), shrubby cinquefoil (*Dasiphora fruticosa*), sage willow (*Salix candida*), beaked willow (*Salix bebbiana*) and red-osier dogwood (*Cornus alba*). Invasive species present include glossy buckthorn (*Frangula alnus*), common buckthorn (*Rhamnus cathartica*) and an invasive genotype of common reed (*Phragmites australis*).

SOILS: Houghton muck (Typic Borosaprists), sloping, calcareous. Muck "domes" created by upwelling groundwater pressure and muck accumulation are present within the sloping, organic muck deposit that is up to 25 feet (7.5 m.) in depth overlaying dolomite bedrock. Radiocarbon dating of muck deposits in calcareous fens in southern Minnesota revealed them to be 4,700 to 11,000 years old (Almendinger and Leete 1998).

HYDROLOGY: Upwelling, calcareous, groundwater discharge. Small, calcareous streams originate within the fen complex due to groundwater discharges. Houghton soils (sloping) are typically saturated at or near the surface throughout the growing season.

LOCATION: Savage Fen Scientific and Natural Area, Scott County, Minnesota.

The photograph above was taken from the lower edge of a muck "dome" looking towards the center high spot. This dome is approximately 2 acres in extent.

The photograph to the right illustrates a typical assemblage of sedges and forbs.

STERILE SEDGE

(*Carex sterilis* Willd.)

SEDGE FAMILY (Cyperaceae) **IND. STATUS:** OBL

C of C: Native (10); a threatened species in Minnesota

FIELD CHARACTERISTICS: A perennial, dioecious sedge with stems forming tufts 20-70 cm. high (Figure a on the opposing page). The many slender leaves (1-2 mm. wide) are 30 cm. or more long. Spikelets (Figure b) usually number four and are stalkless (sessile). The perigynium (Figure c) is egg-shaped, 2-4 mm. long and up to 2 mm. wide, with a double-toothed beak 0.6-1.6 mm. long. At maturity, perigynia are dark brown and often spreading or bent backward. Nutlet is shown by Figure d. In the central photograph above, the stem labeled [Fertile] has pistillate (seed-producing) spikelets, while the stem labeled [Sterile] has only staminate spikelets (pollen producing but not seed producing). Some of the tufts are all staminate giving them the appearance of being sterile.

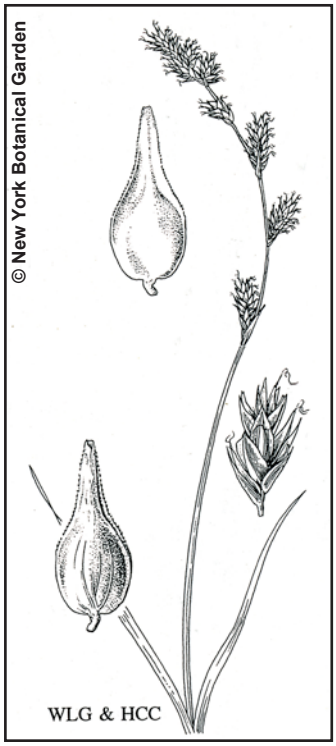
Interior sedge (*Carex interior*)[page 384] is similar but usually has only 3 spikelets per stem and the terminal spikelet has a club-shaped mass of staminate flowers at its base. Interior sedge also occurs in a wider range of habitats including bogs and calcareous inland fresh meadows, particularly those with fluctuating water levels.

ECOLOGICAL NOTES: Sterile sedge is a characteristic sedge of calcareous fens and other inland fresh meadows supported by stable, calcareous groundwater seepages. The authors have observed that, in Minnesota and Wisconsin, sterile sedge is essentially an obligate calcareous fen species; however, it occasionally occurs on wet dolomite pavements and other calcareous seepages.

SOURCE: Fassett (1976); Gleason and Cronquist (1991); and Swink and Wilhelm (1994).

Sterile Sedge
(*Carex sterilis*)

Copper colored leaf sheath



PRAIRIE SEDGE

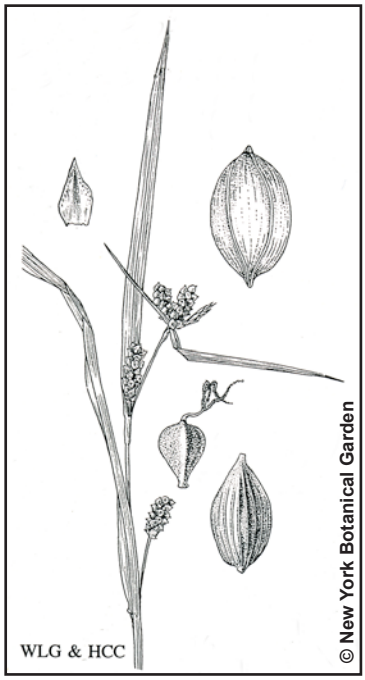
(*Carex prairea* Dewey ex Wood)

SEDGE FAMILY (Cyperaceae) **C of C:** Native (10 WI)(8 MN) **IND. STATUS:** FACW(NC/NE) OBL(MW, GP)

FIELD CHARACTERISTICS: A perennial sedge forming dense clusters (tussocks) of stems 50-100 cm. tall, exceeding the leaves. Leaf sheaths are prolonged 2-3 mm. beyond the leaf base and are tinged a coppery brown color on the ventral (inner) side toward the sheath summit (see photo). Numerous, small sessile spikes in a short, but loose, panicle-like arrangement are present. Reddish-brown scales conceal the perigynia. The pale brown perigynia are lance-shaped, 2.5-3 mm. long, appressed, and taper to a pale beak. Two stigmas are present and the nutlets are lens-shaped.

ECOLOGICAL NOTES: Prairie sedge primarily occurs in wet prairies and calcareous fens. It is most frequently seen in and south of the vegetation tension zone.

SOURCE: Fassett (1976); Gleason and Cronquist (1991); Swink and Wilhelm (1994); and Voss (1972).



LIMESTONE MEADOW SEDGE

(*Carex granularis* Muhl. ex Willd.)

SEDGE FAMILY (Cyperaceae) **C of C:** Native (3) **IND. STATUS:** FACW(NC/NE, MW) OBL(GP)

FIELD CHARACTERISTICS: A clump-forming, perennial sedge with very short rhizomes and stems about 30-80 cm. tall. Stems and leaves are glaucous with a bluish green tint. Mature leaves are 4-10(13) mm. wide and typically surpass the stems in height. Staminate and pistillate flowers occur in separate spikelets. Terminal spikelets are sessile, or very short-stalked, and staminate. Lateral pistillate spikelets are 1-3 cm. long. A subtending bract usually exceeds its spikelet. Tightly clustered, erect perigynia are elliptical to oval in shape, 2.2-4 mm. long, conspicuously nerved, and abruptly contracted to a short beak.

ECOLOGICAL NOTES: Limestone meadow sedge chiefly occurs in sunny calcareous areas, such as wet meadows and swales, calcareous fens and seepages, but also occurs in wooded swamps.

SOURCE: Gleason and Cronquist (1991); Swink and Wilhelm (1994); and Voss (1972).

Fertile stem (spikelet)

Vegetative stem rooting at the tip

BEAKED SPIKE-RUSH

(*Eleocharis rostellata* (Torr.) Torr.)

SEDGE FAMILY (Cyperaceae) **IND. STATUS:** OBL

C of C: Native (10); a threatened species in both Minnesota and Wisconsin

FIELD CHARACTERISTICS: A perennial sedge 40-100 cm. high (Figure a on opposing page). Stems are leafless and stout, but conspicuously narrower than the spikelets (Figure b). Two stem types are present: fertile and vegetative (labeled in the photograph above). Vegetative stems are characteristically long and arching, and root at the tip. No other spike-rush (*Eleocharis* sp.) found in Minnesota and Wisconsin has this trait. The nutlet (Figure c) is 1.9-2.8 mm. long and three-sided to planoconvex.

ECOLOGICAL NOTES: This rare spike-rush is restricted to calcareous fens, spring fens in northern peatlands, and calcareous shores. It can form dense stands.

SOURCE: Gleason and Cronquist (1991); Swink and Wilhelm (1994); and Voss (1972).

Beaked Spike-Rush
(*Eleocharis rostellata*)

NARROW-LEAF COTTONGRASS

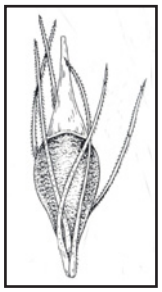
(*Eriophorum angustifolium* Honckeny)

SEDGE FAMILY (Cyperaceae) **C of C:** Native (8 MN)(9 WI) **IND. STATUS:** OBL

FIELD CHARACTERISTICS: A colonial, perennial sedge with stems growing to a height of 20-60 cm. Stem leaf blades are generally flat for most of their length and up to 4 mm. or more wide. The 2 or 3 involucral bracts are leaf-like and often exceed the inflorescence. The summit of the leaf sheaths, as well as the base of the involucral bracts, are tinged with a dark red color. Scales are single (mid-) nerved. Nutlets are blackish in color, 2-3 mm. long and surrounded by long, silky white bristles. In flower, and thus conspicuous, in late April to mid-May.

ECOLOGICAL NOTES: Narrow-leaf cottongrass is common in calcareous fens and also occurs in bogs and openings in coniferous swamps. It is a circumboreal species.

SOURCE: Gleason and Cronquist (1991); Swink and Wilhelm (1994); and Voss (1972).



Nutlet

HAIR BEAK-RUSH

(*Rhynchospora capillacea* Torr.)

SEDGE FAMILY (Cyperaceae) **IND. STATUS:** OBL

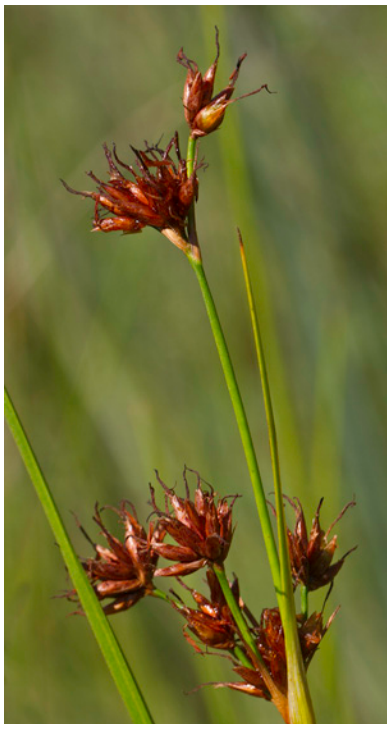
C of C: Native (10), a threatened species in Minnesota

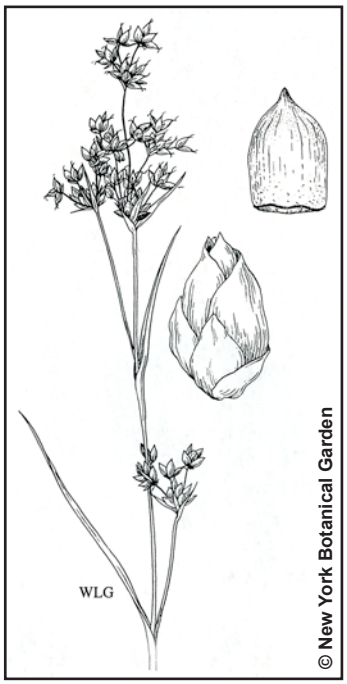
FIELD CHARACTERISTICS: A perennial, tufted sedge 10-40 cm. tall. The wiry stems are erect or curved, hair-like, and leafy. Leaves are ascending, outwardly curved, and hair-like. Leaf blades are 0.2-0.4 mm. wide with inwardly rolled margins. Inflorescence consists of 1-4 spikelets in narrow, ascending clusters. Each cluster is subtended by an ascending green, scale-like leaf (involucral bract). Spikelets are pale reddish brown to brown, spindle-shaped and 6-7 mm. long. Each spikelet is usually 1-2 flowered. Nutlets are pale brown, usually 1-4 per spikelet, and surrounded by 6 bristles (perianth bristles). Nutlet body surfaces have small longitudinally marked fine lines. Each nutlet terminates with a distinct, 5 mm. or less, beak-like tubercle.

Two similar *Rhynchospora* species also occur in fens: the usually taller *R. capitellata* with wider (to 3 mm.) flat leaves and slightly shorter spikelets (3.5-4 mm. long) and *R. alba* with its distinct tan to white spikelets and 9-12 perianth bristles.

ECOLOGICAL NOTES: Hair beak-rush characteristically occurs in calcareous fens and open, marly, sedge flats. It also occurs on seepages over dolomite pavements and on calcareous sands of interdunal swales. The similar *Rhynchospora alba* is usually found on open bog mats.

SOURCE: Crow and Hellquist (2000); Gleason and Cronquist (1991); Swink and Wilhelm (1994); and Voss (1972).





TWIG-RUSH

(*Cladium mariscoides* (Muhl.) Torr.)

SEDGE FAMILY (Cyperaceae) **IND. STATUS:** OBL

C of C: Native (10), a species of special concern in Minnesota

FIELD CHARACTERISTICS: A solitary to sparsely colonial perennial sedge with stiff, slender stems growing to about 1 m. The 1-3 mm. wide stem leaf blades are folded or inrolled inward lengthwise. The compound inflorescence is much branched, each bearing a cluster of 1-2 flowered spikelets. A perianth (floral envelope) is absent. The flattish scales are in a shingle-like spiral arrangement forming a lance- to oval-shaped spikelet. Nutlets are ovoid, pointed at the summit, and whitish to pale green in color. In flower June-August.

ECOLOGICAL NOTES: Twig-rush prefers calcareous fens and calcareous watertracks of northern peatlands. In addition, it is found on floating mats, sandy seepage areas, and in interdunal swales.

SOURCE: Crow and Hellquist (2000); Gleason and Cronquist (1991); and Swink and Wilhelm (1994); and Voss (1972).

Illustration from Hitchcock (1950)

WILD TIMOTHY

(*Muhlenbergia glomerata* (Willd.) Trin.)

GRASS FAMILY (Gramineae or Poaceae) **C of C:** Native (8 MN)(9 WI)

IND. STATUS: FACW(MW, GP);OBL(NC/NE)

FIELD CHARACTERISTICS: A perennial grass 50-120 cm. high. Stems usually do not branch above the base. Ligules are 0.25-0.5 mm. long. Inflorescence is a terminal, stout, condensed head of compact spikelets. Glumes are longer than the lemmas, which taper to a slender point.

ECOLOGICAL NOTES: Wild timothy is a characteristic grass of calcareous fens and is occasionally found growing on calcareous soils of wet to wet-mesic prairies and sedge meadows supported by groundwater seepages.

SOURCE: Fassett (1951); Gleason and Cronquist (1991); and Swink and Wilhelm (1994).

SPRING-CRESS

(*Cardamine bulbosa* (Schreb. ex Muhl.) B.S.P.)

MUSTARD FAMILY (Brassicaceae or Cruciferae) **C of C:** Native (6) **IND. STATUS:** OBL

FIELD CHARACTERISTICS: A perennial herb 20-45 cm. high and up to 60 cm. high when in flower. The erect stems are borne singly, or a few together, from a bulbous, tuber-like rhizome. Unbranched stems support 4-8 simple, rounded leaves. Basal leaves are rotund to heart shaped. Lower leaves are supported by petioles, while upper leaves are tapered to their bases. The upper part of the stem and inflorescence is glabrous. The showy flowers have 4 white petals 7-16 mm. long. Sepals are bright green turning yellow with age. Seed pod is a silique with a single row of seeds. In flower from late April through June.

ECOLOGICAL NOTES: Spring-cress is typically found in calcareous fens and other sunny, springs or seepages. It also occurs in openings of hardwood swamps.

SOURCE: Crow and Hellquist (2000); Fassett (1976); Gleason and Cronquist (1991); Swink and Wilhelm (1994); and Voss (1985).

GRASS-OF-PARNASSUS

(*Parnassia glauca* Raf.)

SAXIFRAGE FAMILY (Saxifragaceae) **C of C:** Native (9 MN)(8 WI) **IND. STATUS:** OBL

FIELD CHARACTERISTICS: A perennial herb 15-30 cm. high. The stalked basal leaves are entire, smooth, rounded, 2-7 cm. long x 1-5 cm. wide, forming a basal rosette. The stem leaf, if present, is stalkless and located at or below the middle of the stem. Flowers are white with five star-like, green-striped petals 1-2 cm. long, and solitary at the end of a single stem. Fruit is a conspicuous, terminal capsule. In flower August-October.

ECOLOGICAL NOTES: Grass-of-Parnassus is a characteristic species of calcareous fens. It also occurs along calcareous shores and on wet lake dune flats if groundwater seepages are present.

SOURCE: Gleason and Cronquist (1991).

COMMON VALERIAN

(*Valeriana edulis* var. *ciliata* Nutt. ex Torr. & Gray)

VALERIAN FAMILY (Valerianaceae) **IND. STATUS:** FACW(NC/NE, MW); FAC(GP)

SYNONYM: *Valeriana edulis* Nutt. ex Torr. & Gray

C of C: Native (10); a threatened species in Minnesota

FIELD CHARACTERISTICS: A perennial herb 10-50 cm. tall, occasionally to 120 cm. Leaves are generally parallel-veined with a margin of dense white hairs (ciliated). Basal leaves are linear to oblanceolate, entire or with 1-2 divisions toward the base. Stem leaves are pinnately parted. Inflorescence is an elongate panicle with creamy white flowers. In flower April-June.

ECOLOGICAL NOTES: Common valerian is characteristic of calcareous fens and calcium-rich wet to wet-mesic prairies. It is one of the first herbs to flower during the spring in these habitats. In Minnesota, railroad rights-of-way are one of the few remaining habitats where this species occurs.

SOURCE: Fassett (1976); Gleason and Cronquist (1991); and Swink and Wilhelm (1994).

OHIO GOLDENROD

(*Solidago ohioensis* Riddell)

ASTER FAMILY (Compositae or Asteraceae) **IND. STATUS:** OBL

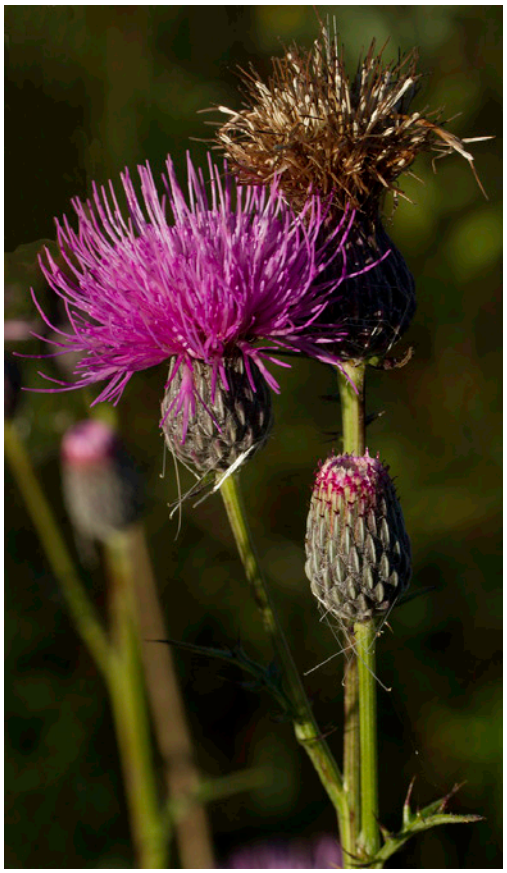
SYNONYM: *Oligoneuron ohioense* (Riddell) G.N. Jones

C of C: Native (9 WI); a species of special concern in Wisconsin

FIELD CHARACTERISTICS: A perennial herb 40-90 cm. high. Leaves of the lower and upper stem are dissimilar; the lower or basal leaves are better developed than the upper, and are usually persistent. Leaves are flat, not triple-nerved, and are not dotted with glands. Inflorescence is a flat-topped corymb that is without hairs. Flowers are yellow. In flower June-October. This species is similar to Riddell's goldenrod (*Solidago riddellii*)[page 210], which occurs in similar Wisconsin habitats. However, the leaves of *S. riddellii* are sickle-shaped, folded and triple-nerved, and its inflorescence is hairy. Refer to Appendix A for a key to wetland goldenrods.

ECOLOGICAL NOTES: In Wisconsin, Ohio goldenrod is characteristic of calcareous fens and also occurs in wet to wet-mesic prairies supported by groundwater seepages. Eastern Wisconsin is the western extent of its range. This goldenrod has not been recorded in Minnesota.

SOURCE: Gleason and Cronquist (1991); and Swink and Wilhelm (1994).



SWAMP THISTLE

(*Cirsium muticum* Michx.)

ASTER FAMILY (Compositae or Asteraceae) **IND. STATUS:** FACW(GP); OBL(NC/NE, MW)

C of C: Native (6 MN)(8 WI)

FIELD CHARACTERISTICS: A biennial herb 50-200 cm. high. Leaves are pinnatifid, green beneath and have weak spines. A basal rosette is formed the first year, and an unwinged flowering stalk the second year. Flower heads do not have stiff spines as in most other thistles, but instead are weakly spined and sticky because of a gummy resin. Flowers are pink to purple. In flower July-October.

ECOLOGICAL NOTES: Swamp thistle, or fen thistle, is characteristic of calcareous fens and also occurs in wet to wet-mesic prairies and sedge meadows supported by groundwater seepages.

SOURCE: Gleason and Cronquist (1991); and Swink and Wilhelm (1994).

GOLDEN RAGWORT

(*Packera aurea* (L.) A. & D. Love)

ASTER FAMILY (Compositae or Asteraceae) **C of C:** Native (6) **IND. STATUS:** FACW

SYNONYM: *Senecio aureus* L.

FIELD CHARACTERISTICS: A perennial herb to 30-80 cm. in height. Basal leaves are heart-shaped, 5-10 cm. long and as wide, on long petioles with rounded teeth. Stem leaves are much smaller and pinnately-lobed becoming sessile. Flower heads number several to many, the disc is 5-10 mm. wide. Rays are golden yellow and 6-13 mm. long. The involucre is 5-8 mm. tall, the tips often purple. Fruit is a smooth nutlet (achene). In flower May-June.

ECOLOGICAL NOTES: Golden ragwort occurs primarily in wet to wet-mesic prairies and calcareous fens.

SOURCE: Gleason and Cronquist (1991); Chadde (2002); and Black and Judziewicz (2009).

SWAMP LOUSEWORT

(*Pedicularis lanceolata* Michx.)

FIGWORT FAMILY (Scrophulariaceae) **C of C:** Native (8) **IND. STATUS:** FACW(NC/NE) OBL(MW, GP)

FIELD CHARACTERISTICS: A perennial herb with stems 30-80 cm. tall. Leaves are opposite, or in part alternate, lanceolate, 4-9 cm. long and 1-2 cm. wide, pinnately-lobed with margins of rounded teeth. Flowers are in spikes 2-10 cm. long at the end of branches from the upper leaf axils. Flowers are pale yellow, two-lipped and about 2 cm. long. Fruit is a capsule. In flower July-August.

ECOLOGICAL NOTES: Swamp lousewort primarily occurs in calcareous fens and wet to wet-mesic prairies.

SOURCE: Gleason and Cronquist (1991); Chadde (2002); and Black and Judziewicz (2009).

BROOK LOBELIA

(*Lobelia kalmii* L.)

BELLFLOWER FAMILY (Campanulaceae) **C of C:** Native (9) **IND. STATUS:** OBL

FIELD CHARACTERISTICS: A perennial herb 10-40 cm. high. Basal leaves are spatula-shaped and may be deciduous. Stem leaves are linear. Inflorescence is a loose raceme with small (7-13 mm. long) flowers that are blue with a white "eye." Flowers consist of an erect, upper, 2-lobed lip and spreading, lower, 3-lobed lip. In flower July-October.

ECOLOGICAL NOTES: Brook lobelia is characteristic of calcareous fens and shores. It also occurs on calcareous soils of wet to wet-mesic prairies and wet lake dune flats if groundwater seepages are present.

SOURCE: Gleason and Cronquist (1991).

FEN TWAYBLADE

(*Liparis loeselii* (L.) L.C. Rich.)

ORCHID FAMILY (Orchidaceae) **C of C:** Native (6 MN)(7 WI) **IND. STATUS:** OBL(GP) FACW(NC/NE, MW)

FIELD CHARACTERISTICS: A perennial herb 10-25 cm. tall from a bulb-like base. Two shiny leaves, lanceolate to oval and 4-15 cm. long by 1-4 cm. wide, arise from the base of the plant. Flowers number 2-15 and are arranged in an open raceme 2-10 cm. long and 1-2 cm. wide. Flowers are yellow-green with lanceolate sepals 4-6 mm. long and linear petals 3-5 mm. long. The lip is obovate, 4-5 mm. long and 2-3 mm. wide. Fruit is a capsule that is short-cylindric and 8-12 mm. long. In flower June-August.

ECOLOGICAL NOTES: Fen twayblade primarily occurs in calcareous fens but also in coniferous swamps.

SOURCE: Gleason and Cronquist (1991); Chadde (2002); and Black and Judziewicz (2009).

WHITE LADY'S-SLIPPER

(*Cypripedium candidum* Muhl. ex Willd.)

ORCHID FAMILY (Orchidaceae) **IND. STATUS:** OBL

C of C: Native (10); a threatened species in Wisconsin and a species of special concern in Minnesota

FIELD CHARACTERISTICS: A perennial herb 15-40 cm. high. Stems range in number from 1-30 per plant. Leaves on the stem number 3-5 and are curved and strongly ribbed or pleated. Leaves tend to form an erect cluster near the ground, sheathing the stem. Flowers are distinctive and solitary with a white lip (1.5-2.5 cm. long) streaked with violet. Sepals and lateral petals are 2-4 cm. long, green-yellow and streaked with purple. Lateral petals are often spirally twisted. In flower from mid-May to early June, only for a few days in hot weather.

ECOLOGICAL NOTES: White lady's-slipper is a rare orchid that occurs on calcareous, wet soils of calcareous fens and wet to wet-mesic prairies. The flowers and flower buds are eaten by white-tailed deer and eastern cottontail.

SOURCE: Gleason and Cronquist (1991); and Swink and Wilhelm (1994).

NODDING LADIES' TRESSES ORCHID

(*Spiranthes cernua* (L.) L.C. Rich.)

ORCHID FAMILY (Orchidaceae) **C of C:** Native (5) **IND. STATUS:** FACW

FIELD CHARACTERISTICS: A perennial herb seldom over 20 cm. high. Stem leaves are usually persistent at flowering time. Several white flowers, with lips 7-12 mm. long, form a 3-ranked, spirally twisted spike. Caliosites at the base of the lip are conspicuous, projecting, and rounded. Flowers are sometimes fragrant. In flower August-October.

ECOLOGICAL NOTES: Nodding ladies' tresses is a frequent orchid of inland fresh meadows, particularly calcareous fens and wet to wet-mesic prairies that have been slightly disturbed.

SOURCE: Gleason and Cronquist (1991); and Swink and Wilhelm (1991).

NORTHERN BOG VIOLET

(*Viola nephrophylla* Greene)

VIOLET FAMILY (Violaceae) **C of C:** Native (8 MN)(9 WI) **IND. STATUS:** FACW

FIELD CHARACTERISTICS: A low perennial herb 10-15 cm. in height and spreading by rhizomes. Leaves are all basal, smooth, heart-shaped to kidney-shaped, 1-4 cm. long and 2-6 cm. wide, and rounded at the tip. Leaves arise from long petioles that are 2-16 cm. long. Leaf margins have rounded tips. Flowers are violet, single, nodding on slender stalks and held above the leaves. The spurred petal is densely hairy within. Fruit is a capsule 5-10 mm. long. In flower in May, but sometimes flowering again in August or September.

ECOLOGICAL NOTES: Northern bog violet prefers cold, groundwater-fed, calcareous habitats such as calcareous fens and some interdunal swales.

SOURCE: Gleason and Cronquist (1991); Chadde (2002); and Black and Judziewicz (2009).

LESSER FRINGED GENTIAN

(*Gentianopsis virgata* (Raf.) Holub)

GENTIAN FAMILY (Gentianaceae) **IND. STATUS:** OBL

SYNONYM: *Gentianopsis procera* (Holm) Ma **C of C:** Native (8); special concern in Wisconsin

FIELD CHARACTERISTICS: A biennial herb up to 80 cm. tall. Leaves are opposite, without stalks, linear to lance-shaped, and less than 1 cm. (8 mm.) wide. Flowers are blue with four fringed corolla lobes, and are solitary to numerous at the end of branches. In bloom September-October.

Greater fringed gentian (*Gentianopsis crinita*) is similar, but occurs in less calcareous habitats. *G. crinita* leaves are greater than 1 cm. wide and the flowers are more box-shaped. These two species may hybridize.

ECOLOGICAL NOTES: Lesser fringed gentian is characteristic in calcareous fens, and also occurs on calcareous soils of wet to wet-mesic prairies and along shores, particularly if groundwater seepages are present.

SOURCE: Gleason and Cronquist (1991); and Swink and Wilhelm (1994).

SHRUBBY CINQUEFOIL

(*Dasiphora fruticosa* (L.) Rydb.)

ROSE FAMILY (Rosaceae) **C of C:** Native (7 MN)(9 WI) **IND. STATUS:** FACW

SYNONYMS: *Potentilla fruticosa* L. , *Pentaphylloides floribunda* (Pursh) A. Love

FIELD CHARACTERISTICS: A low, bushy, deciduous shrub with woody stems usually 20-50 cm. tall, but can be up to 1 m. high. Leaves are pinnately compound with 5-7 fuzzy leaflets that are gray-green and about 1-2 cm. long. The five-petaled flowers are yellow, 2-3 cm. wide, and solitary to few at the ends of branches. In flower May-October.

ECOLOGICAL NOTES: Shrubby cinquefoil occurs on calcareous soils, particularly in calcareous fens. Occasionally, it is found in wet to wet-mesic prairies, bogs and along shores. It tends to increase aggressively with declining water levels. A horticultural variety of this species is used for landscaping.

SOURCE: Fassett (1976); Gleason and Cronquist (1991); and Swink and Wilhelm (1994).

Pistillate catkins

SAGE WILLOW

(*Salix candida* Fluegge ex Willd.)

WILLOW FAMILY (Salicaceae) **C of C:** Native (9 MN)(10 WI) **IND. STATUS:** OBL

FIELD CHARACTERISTICS: A low deciduous shrub usually up to 1 m. high. Leaves are entire with inrolled margins, have dense white-matted hairs on the undersides, and are 4-8 cm. long by 0.7-2 cm. wide (between 5-10 times as long as wide). Twigs are also covered by dense white-matted hairs, but tend to become somewhat hairless with age. Capsules are woolly and pink-white in color (see photograph). In flower April-May.

ECOLOGICAL NOTES: In addition to calcareous fens, this small willow is found in wet to wet-mesic prairies, coniferous swamps and bogs. It usually is found growing solitary and scattered.

SOURCE: Gleason and Cronquist (1991); and Swink and Wilhelm (1994).

SECTION 3

Bogs

IV. Bogs

Bogs are a specialized wetland community with saturated, acidic, peat soils that have low concentrations of minerals (e.g., calcium, magnesium) and essential nutrients (phosphorus, nitrogen). They support a unique assemblage of trees, low shrubs, sedges and forbs growing on a mat of *Sphagnum* mosses (Curtis 1971). In Minnesota and Wisconsin, most bogs are found north of the vegetation tension zone.

Bogs are one stage in succession from open water lake to climax mesic hardwood forest (Curtis 1971). The bog originates on a floating mat of sedges that becomes colonized by *Sphagnum* mosses. As the mat gradually thickens and becomes more stable it is invaded by the evergreen shrubs of the heath family (Ericaceae). Eventually, tamarack and black spruce can be supported by the mat. The final stage of succession is, theoretically, climax mesic hardwood forest. Note that succession is rarely without interruption. It is typically a series of advancements and setbacks primarily due to fire and/or changes in water levels. These changes may be a cyclic, rather than a linear, type of vegetation development (Niering 1994). Also note that there are similar successional patterns for other wetland plant communities.

In addition to providing habitat for a unique assemblage of flora, including many orchid species, bogs are an important habitat for northern wildlife species such as gray wolf, moose, shrews, voles, snowshoe hare, red squirrel, amphibians, reptiles, spruce grouse, great gray owl, northern goshawk and numerous species of songbirds. Uses of bogs include harvesting of *Sphagnum* moss, Christmas trees, and commercial production of cranberries and wild rice.

IV.A. Open Bogs

Open bogs are composed of a carpet of living *Sphagnum* mosses growing over a layer of saturated, acidic peat. Sedges, forbs and/or the low shrubs of the heath family (Ericaceae) colonize the *Sphagnum* moss mat. Scattered, usually stunted trees of black spruce and/or tamarack may be present. Lack of forest is probably due to: conditions too wet for the tree species; *Sphagnum* moss mat too thin to support trees; recurrent fires; summer frosts; and/or lack of a seed source for the tree species.

VEGETATION: This floating bog mat supports a carpet of sphagnum mosses (*Sphagnum magellanicum* and *Sphagnum* spp.), bog sedge (*Carex oligosperma*), poor sedge (*Carex magellanica*), tawny cottongrass (*Eriophorum virginicum*), three-way sedge (*Dulichium arundinaceum*), steeplebush (*Spiraea tomentosa*), leatherleaf (*Chamaedaphne calyculata*), bog rosemary (*Andromeda polifolia*), labrador tea (*Rhododendron groenlandicum*), small cranberry (*Vaccinium oxycoccos*), large cranberry (*Vaccinium macrocarpon*), bog buckbean (*Menyanthes trifoliata*), poison sumac (*Toxicodendron vernix*), broad-leaf cattail (*Typha latifolia*) and scattered tamarack (*Larix laricina*). Three species of insectivorous plants occur in this bog community: flat-leaf bladderwort (*Utricularia intermedia*), pitcher plant (*Sarracenia purpurea)* and sundew (*Drosera rotundifolia*).

SOILS: Fibric peat (Histosols), acid. Along the perimeter of the lake basin, the peat mat is thick enough to support tree-size tamarack and black spruce. The mat becomes progressively thinner moving out towards the center of the lake basin until it only consists of a thin mat of sedge roots/rhizomes and layer of *Sphagnum* moss.

HYDROLOGY: A floating mat covering part of Beckman Lake. Fibric peat soils are saturated to the surface.

LOCATION: Beckman Lake Bog, Cedar Creek Ecosystem Science Reserve, Isanti County, Minnesota.

SPHAGNUM MOSSES

(*Sphagnum* spp.)

SPHAGNUM MOSS FAMILY (Sphagnaceae)

Sphagnum mosses are the characteristic species of bogs. They play an important role in keeping the bog environment acidic by their production of organic acids. Sphagnum mosses are commonly known as peat moss. No indicator status or C of C values have been assigned to the *Sphagnum* mosses that occur in Minnesota and Wisconsin. It is presumed that the five species shown herein are OBL.

Sphagnum moss has been used for many purposes including fuel, mulch, packing, bedding and insulation. In the First World War, it was used for surgical dressings in lieu of cotton. Commercial peat mining is done in both Minnesota and Wisconsin. Harvested peat moss is primarily used for horticultural purposes.

Sphagnum magellanicum is a robust, hummock-forming moss that is usually reddish or purplish in color, but may be pale green in the shade. It is one of the most frequent species in our bogs and prefers the most acidic and nutrient-poor habitats.

© Keith Bowman

Sphagnum squarrosum is a less common and more minerotrophic species compared to *S. magellanicum*.

Sphagnum fuscum is a common species of open and coniferous bogs.

© Keith Bowman

Sphagnum Mosses

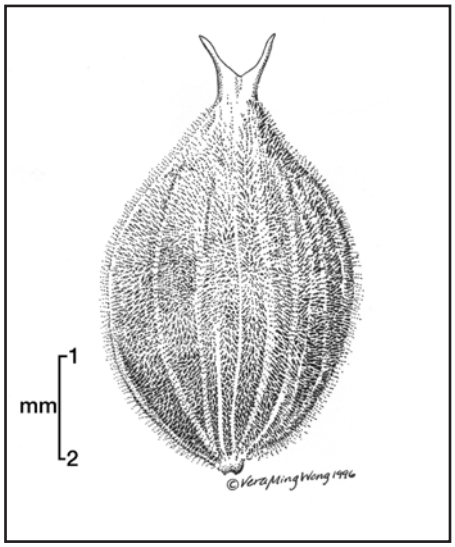
(*Sphagnum* spp.)

Sphagnum teres is a frequent species preferring slightly more minerotrophic habitats than *Sphagnum magellanicum*.

Sphagnum capillifolium is one of the most common moss species of open and coniferous bogs in our area.

Sphagnum Mosses

(*Sphagnum* spp.)



Perigynium

WIREGRASS SEDGE

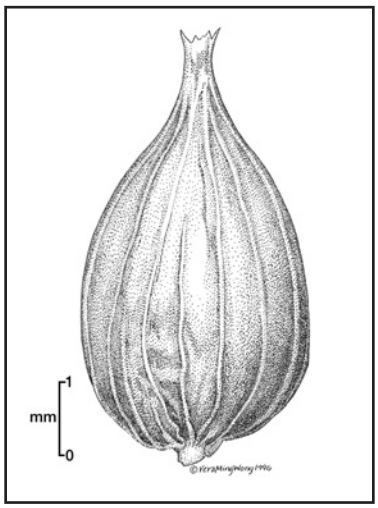
(*Carex lasiocarpa* Ehrh.)

SEDGE FAMILY (Cyperaceae) **C of C:** Native (7 MN)(9 WI) **IND. STATUS:** OBL

FIELD CHARACTERISTICS: A clone-forming, smooth, perennial sedge with triangular stems growing to 1 m. in height. Leaves are very slender (not over 2 mm. wide), wiry, characteristically C-shaped in cross section or inrolled, and taper to very slender tips. Pistillate spikelets number 1-3, are sessile or nearly so, and 1-3 cm. long. The 1-3 staminate spikelets are 2-6 cm. long. Perigynia are 3-4.5 mm. long and densely fuzzy with an oblong-oval shape and sharp teeth not over 0.5(0.7) mm. long.

ECOLOGICAL NOTES: Wiregrass sedge is a common to dominant sedge of bogs, calcareous fens, shrub-carrs, sedge meadows and shallow marshes; frequently in shallow water. The well developed, air-filled root and rhizome system produced by this sedge makes it one of the floating mat-forming species that create the first stage in bog succession.

SOURCE: Fernald (1970); Gleason and Cronquist (1991); and Voss (1972).



Perigynium

BOG SEDGE

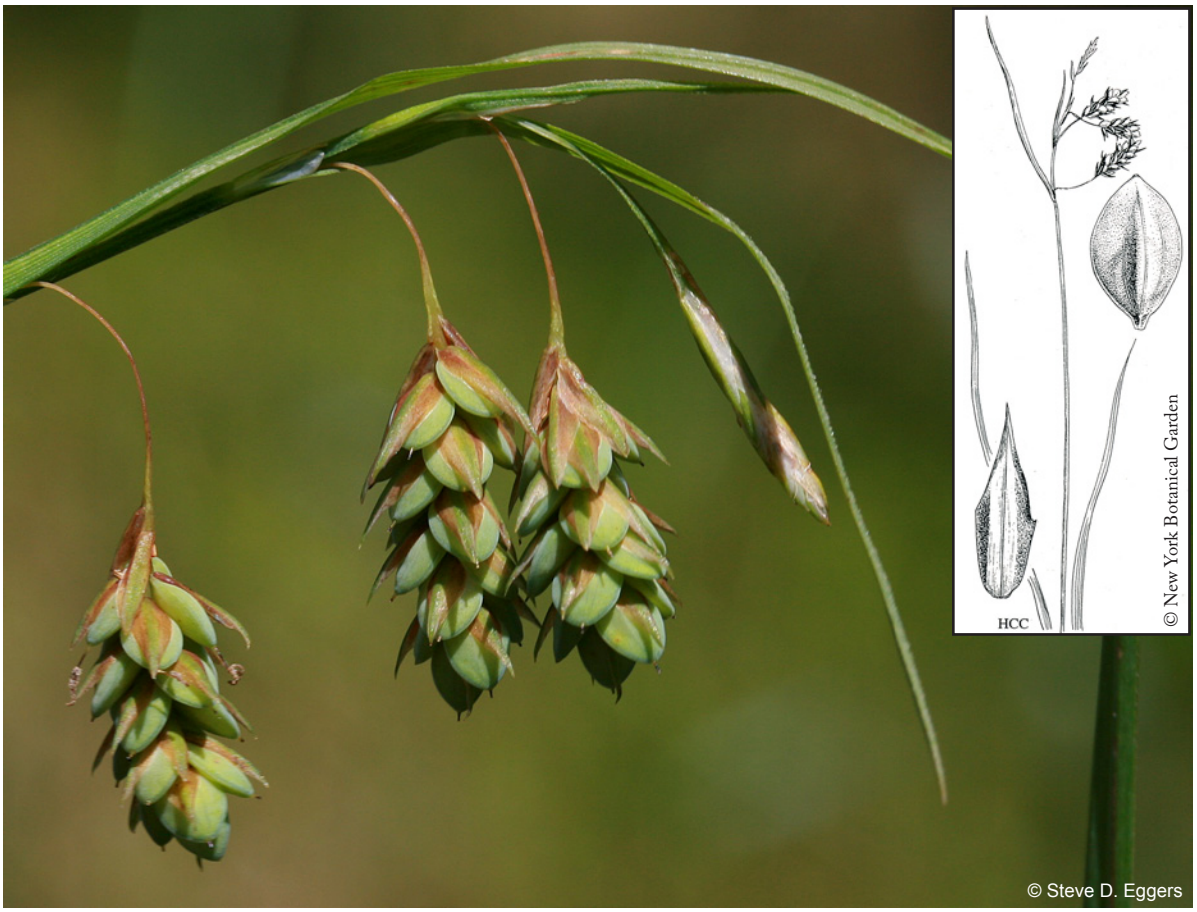
(*Carex oligosperma* Michx.)

SEDGE FAMILY (Cyperaceae) **C of C:** Native (8 MN)(10 WI) **IND. STATUS:** OBL

FIELD CHARACTERISTICS: A perennial sedge forming rhizomatous mats (may form a turf) with stems 40-100 cm. tall. Pale green, wiry leaf blades are inrolled (involute) and less than 3 mm. wide. Stems are glabrous and reddish at the base. Usually only a solitary staminate spikelet is present while pistillate spikelets number 1-3. Ascending perigynia number 3-15 (less than 18), are ovoid, and over 2 mm. wide with a 1-2 mm. beak. Sterile plants of this sedge may be confused with woolly sedge (*Carex pellita*), but leaf blades of woolly sedge are revolute and 2.5-4.5 mm. wide.

ECOLOGICAL NOTES: Bog sedge is characteristic of open bogs and coniferous bogs.

SOURCE: Gleason and Cronquist (1991); Swink and Wilhelm (1994); and Voss (1972).



POOR SEDGE

(*Carex magellanica* Lam.)

SEDGE FAMILY (Cyperaceae) **C of C:** Native (8 MN)(10 WI) **IND. STATUS:** OBL

SYNONYM: *Carex paupercula* Michx.

FIELD CHARACTERISTICS: A perennial sedge with loosely clustered stems growing 20-70 cm. in height, the remains of last year's leaves commonly persisting at the base. Leaves are flat and 1-3 mm. wide. The terminal spikelet is staminate and 0.7-1.5 cm. in length. Pistillate spikelets number 1-4, nodding on long peduncles, often with a few staminate flowers at the base. Pistillate scales are light to dark brown, generally longer and narrower than the perigynia, and have a green midstripe (visible in photo). Perigynia are elliptic to ovate, 2-ribbed, beakless or with a minute beak, and 2.3-4.2 mm. in length. Nutlets (achenes) are 3-sided.

ECOLOGICAL NOTES: Poor sedge is a common species of open and coniferous bogs preferring the acidic, low nutrient and low mineral (poor) conditions of these habitats.

SOURCE: Gleason and Cronquist (1991).

FEW-FLOWERED BOG SEDGE

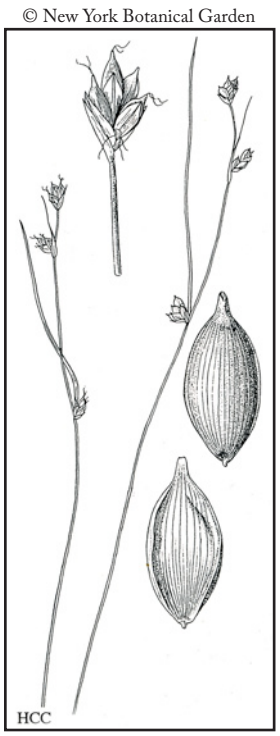
(*Carex pauciflora* Lightf.)

SEDGE FAMILY (Cyperaceae) **C of C:** Native (9 MN)(10 WI) **IND. STATUS:** OBL

FIELD CHARACTERISTICS: A perennial sedge with a single to few stems occurring in loose tufts. Each stem has 1-2(3) leaves that are 1-2 mm. wide. Stems are up to 40 cm. tall and typically longer than the leaves. There is only one spikelet per stem consisting of 1-6 perigynia. The very distinctive linear-lance shaped perigynia are slender, 7-9 mm. long, divergent to reflexed along the stem, and nearly rounded in cross section. They are initially light green, becoming straw to pale brown in color. Nutlets are bluntly three-angled.

ECOLOGICAL NOTES: Few-flowered bog sedge is essentially restricted to the acidic, low nutrient conditions of *Sphagnum* bogs, usually on the open mat.

SOURCE: Fassett (1976); Gleason and Cronquist (1991); Swink and Wilhelm (1994); and Voss (1972).



THREE-SEEDED SEDGE

(*Carex trisperma* Dewey)

SEDGE FAMILY (Cyperaceae) **C of C:** Native (9 WI)(7 MN) **IND. STATUS:** OBL

FIELD CHARACTERISTICS: A loosely clumped perennial sedge with weak, slender, arching stems to 20-70 cm. in height. Leaves are 1-2 mm. wide. Bracts are threadlike and typically as long as the inflorescence. The widely separated spikelets are arranged in a zigzag pattern along the stem, sessile, number 2-3(4), and support fewer than 5 perigynia, usually 3. Staminate spikelets are basally located in the inflorescence. Ovoid perigynia are 2.7–3.8(4) mm. long and slightly beaked. Scales are ovate and shorter than the perigynia and hyaline with green centers. Nutlets are flat on one side and convex on the other.

This sedge can be confused with *Carex disperma* whose nutlets tend to be round in cross section.

ECOLOGICAL NOTES: Three-seeded sedge is characteristic of the shaded portion of *Sphagnum* bogs under spruce and tamaracks.

SOURCE: Fassett (1976); Gleason and Cronquist (1991); Swink and Wilhelm (1994); and Voss (1972).

TAWNY COTTONGRASS

(*Eriophorum virginicum* L.)

SEDGE FAMILY (Cyperaceae) **C of C:** Native (10 WI)(8 MN) **IND. STATUS:** OBL

FIELD CHARACTERISTICS: A colonial, perennial sedge with stems growing to a height of 1 m. Stem leaf blades are flat and up to 4 mm. or more wide. Two or three involucral bracts are leaf-like and often exceed the inflorescence. Summit of leaf sheaths are not tinged with a dark red color, as seen in *Eriophorum angustifolium*. Scales are thick, brownish to reddish and the mid-nerve is inconspicuous. Spikelets are several and form a dense cluster. Nutlets are 3-3.5 mm. long and surrounded by brown to coppery (tawny) silky bristles. In flower mid-July through August, which is notably later than other *Eriophorum* species in Minnesota and Wisconsin.

ECOLOGICAL NOTES: Tawny cottongrass occurs in coniferous swamps and bogs as well as open bogs.

SOURCE: Crow and Hellquist (2000); Gleason and Cronquist (1991); Swink and Wilhelm (1994); and Voss (1972).

TUSSOCK COTTONGRASS

(*Eriophorum vaginatum* L.)

SEDGE FAMILY (Cyperaceae) **C of C:** Native (10 WI)(9 MN) **IND. STATUS:** OBL

SYNONYM: *Eriophorum spissum* Fern.

FIELD CHARACTERISTICS: A clump-forming, perennial sedge with stems to a height of 20-70 cm. Leaves are thread-like and 1 mm. wide. Spikelets are solitary with several sterile, basal scales. Nutlets are 2.5-3.5 mm. long and are surrounded by long, silky, bright white bristles. In flower, and thus conspicuous, in May and June. Tussock cottongrass is the only *Eriophorum* in Minnesota and Wisconsin that is both densely cespitose (clump-forming) and has a single spikelet per stem.

ECOLOGICAL NOTES: Tussock cottongrass is generally restricted to bogs. Its name is derived from the fact that the flowering head resembles a ball of cotton.

SOURCE: Gleason and Cronquist (1991); and Voss (1972).

DARK-SCALE COTTONGRASS

(*Eriophorum viridicarinatum* (Engelm.) Fern.)

SEDGE FAMILY (Cyperaceae) **C of C:** Native (9 MN)(10 WI) **IND. STATUS:** OBL

FIELD CHARACTERISTICS: A colonial, perennial sedge from spreading rhizomes. Stems are more or less round in cross section and grow to 30-70 cm. in height. Uppermost leaves are 10-15 cm. long with green sheaths that lack a dark band at the tip (differentiates this species from *E. angustifolium*). Spikelets are terminal on the stem, typically number 20-30, with short to long pedicels. Involucral bracts number 2-4. Scales are narrowly ovate and blackish-green with a pale midrib that extends to the very tip of the scale. Nutlets are brown, 3-4 mm. long, and surrounded by bright white, silky bristles. In flower May-June.

ECOLOGICAL NOTES: Dark-scale cottongrass is generally restricted to open bogs and openings in coniferous bogs.

SOURCE: Gleason and Cronquist (1991); and Chadde (2002).

LEATHERLEAF

(*Chamaedaphne calyculata* (L.) Moench)

HEATH FAMILY (Ericaceae) **C of C:** Native (9 WI)(8 MN) **IND. STATUS:** OBL

FIELD CHARACTERISTICS: A low, evergreen shrub usually 30-40 cm. tall occasionally growing to 1.5 m. in height. Leaves are alternate, oblong to elliptic, 1.5-5 cm. long, leathery, and minutely scaled beneath. Leaves assume a characteristic russet color in winter (inset photo). Flowers are white, tubular, 6-7 mm. long and arranged in 1-sided, leafy racemes. In flower April-June.

ECOLOGICAL NOTES: Leatherleaf is restricted to bogs. It often forms colonies covering many acres.

SOURCE: Fernald (1970); and Gleason and Cronquist (1991).

Fruit is a linear capsule 5-6 mm. long.

LABRADOR-TEA

(*Rhododendron groenlandicum* (Oeder) K.A. Kron & Judd)

HEATH FAMILY (Ericaceae) **C of C:** Native (8) **IND. STATUS:** OBL(NC/NE, MW);FACW(GP)

SYNONYM: *Ledum groenlandicum* Oeder

FIELD CHARACTERISTICS: A low, evergreen shrub growing to a height of 1 m. Leaves are alternate, lanceolate to elliptic, 2-5 cm. long and entire. Leaves have strongly enrolled margins and are dark green above and orange-woolly beneath (younger leaves may be white-woolly beneath). Flowers are white, 1 cm. wide, composed of 5 petals, and arranged in terminal clusters. Fruit is a lance-shaped capsule 5-6 mm. long. In flower May-June.

ECOLOGICAL NOTES: Labrador-tea is restricted to bogs north of the vegetation tension zone.

SOURCE: Courtenay and Zimmerman (1972); Fernald (1970); Gleason and Cronquist (1991); and Chadde (2011).

BOG ROSEMARY

(*Andromeda polifolia* L.)

HEATH FAMILY (Ericaceae) **C of C:** Native (10 WI)(9 MN) **IND. STATUS:** OBL

SYNONYM: *Andromeda glaucophylla* Link

FIELD CHARACTERISTICS: A low, evergreen shrub growing to 50 cm. in height. Leaves are alternate, narrowly linear, 2-5 cm. long, sessile, entire, leathery and strongly inrolled. Leaves are blue-green above and whitened below. The corolla is urn-shaped, pink (sometimes white), 5-6 mm. long and arranged on terminal, drooping, umbel-like racemes with stalks to 8 mm. Fruit is a rounded capsule to 5 mm. wide that becomes erect when mature (upper left photograph). In flower May-June.

ECOLOGICAL NOTES: Bog rosemary is restricted to bogs.

SOURCE: Gleason and Cronquist (1991); and Chadde (2011).

SMALL CRANBERRY

(*Vaccinium oxycoccos* L.)

HEATH FAMILY (Ericaceae) **C of C:** Native (9 WI)(8 MN) **IND. STATUS:** OBL

SYNONYM: *Oxycoccus quadripetalus* Gilib.

FIELD CHARACTERISTICS: A very small, weak, creeping, evergreen, vine-like shrub 50 cm. or more long. Leaves are alternate, ovate to elliptical, pointed, 7-10 mm. long and 2.5-5 mm. wide, leathery, and have flat to strongly inrolled margins. Pink flowers are 1 cm. wide, 5-6 mm. long and shaped like those of a shooting star with petals turned back, away from the stigma and stamens. Flowers are solitary on stalks with 2 red bracts. Fruit is a red berry 7-12 mm. in diameter. In flower from early June to mid-July.

ECOLOGICAL NOTES: Small cranberry is restricted to bogs where it is abundantly common on the *Sphagnum* mat.

SOURCE: Gleason and Cronquist (1991); Smith (2008); and Chadde (2002).

LARGE CRANBERRY

(*Vaccinium macrocarpon* Ait.)

HEATH FAMILY (Ericaceae) **C of C:** Native (9) **IND. STATUS:** OBL

SYNONYM: *Oxycoccus macrocarpus* (Ait.) Pers.

FIELD CHARACTERISTICS: A very small, weak, creeping, evergreen, vine-like shrub to 1.5 m. in length. Leaves are alternate, elliptical to obovate, rounded to blunt at the apex, 9-16 mm. long by 3-7 mm. wide, leathery, and have flat to strongly inrolled margins. Pink flowers are 6-9 mm. long and shaped like those of a shooting star with petals turned back, away from the stigma and stamens. Flowers are solitary on stalks with 2 ovate, green, leaf-like bracts. Fruit is a red berry 10-16 mm. in diameter. In flower from mid-June to July.

ECOLOGICAL NOTES: Large cranberry is restricted to bogs. Cranberries are an important commercial crop in Wisconsin. Commercial varieties of cranberries were developed using cuttings taken directly from the native or "wild" strain of *V. macrocarpon*.

SOURCE: Gleason and Cronquist (1991); Smith (2008); and Chadde (2002).

PITCHER PLANT

(*Sarracenia purpurea* L.)

PITCHER PLANT FAMILY (Sarraceniaceae) **IND. STATUS:** OBL

C of C: Native (10 WI)(9 MN)

FIELD CHARACTERISTICS: A perennial herb that usually grows in a clump-like fashion. Leaves are hollow, pitcher-shaped, broadly winged, growing to a height of 10-20 cm. and a width of 1-5 cm. Leaves are green to red to yellowish and heavily veined. Interior lips of the leaves have stiff, downfacing hairs that trap insects and other organisms. Flowers are borne on a long, leafless stalk (30-50 cm. tall) and are mostly dark red to purple. In flower May-August.

ECOLOGICAL NOTES: Pitcher plant is found in bogs and some calcareous fens. It prefers sunny habitats, but does survive more shaded conditions as succession advances. The pitcher-shaped leaves of this insectivorous species collect water, and the stiff, downfacing hairs make it easier for an insect or other organism to travel downward rather than upward. The hairs abruptly stop at the "pitcher" where the plant tissue becomes very slippery. Once inside, the organism may not be able to crawl back up the "pitcher" wall and slips into the water. "Digestion" of the organism provides needed nutrients for the plant.

SOURCE: Gleason and Cronquist (1991); and Voss (1985).

Pitcher Plant

(*Sarracenia purpurea*)

Flower

An assortment of insects trapped within the pitcher.

SUNDEW

(*Drosera rotundifolia* L.)

SUNDEW FAMILY (Droseraceae) **C of C:** Native (7 WI)(8 MN) **IND. STATUS:** OBL

FIELD CHARACTERISTICS: A tiny, perennial herb forming a small rosette (half dollar size or smaller) near the ground. Leaf blades are round and covered with reddish, glandular hairs. Flowers are white (rarely pink) and 4-7 mm. wide. The leafless stalk is 7-30 cm. high with 3-15 flowers. In flower July-August. Other species of sundew (*Drosera* spp.) are found in Minnesota and Wisconsin, but have narrower leaves.

ECOLOGICAL NOTES: Sundew is found in bogs, coniferous swamps, and wet, sunny, acidic, sandy habitats. This insectivorous species has reddish, glandular hairs that secrete dew-like drops of a sticky fluid that traps minute animal life. The captured prey is then "digested" thereby providing needed nutrients to the plant.

SOURCE: Courtenay and Zimmerman (1972); Gleason and Cronquist (1991); and Voss (1985).

FLAT-LEAF BLADDERWORT

(*Utricularia intermedia* Hayne)

BLADDERWORT FAMILY (Lentibulariaceae) **IND. STATUS:** OBL

C of C: Native (8 MN)(9 WI)

FIELD CHARACTERISTICS: An annual, aquatic, herb free-floating or with creeping stems along the substrate in shallow water. Stems are weak and 7.5-25 cm. long. Leaves are numerous, 0.5-2 cm. long, primarily 3-parted near the base, then again divided 1-3 times, the segments flat and linear. Bladders are 2-4 mm. wide on branches separate from the leaves. Yellow flowers number 2-4 on an emergent stalk 5-20 cm. long. The lower lip of the flower is 8-12 mm. long, twice the length of the upper lip. The spur is nearly as long as the lower lip. In flower July-August. See Appendix C for a key to bladderworts.

ECOLOGICAL NOTES: Flat-leaf bladderwort is found in open bogs, marshes, fens, interdunal swales, ponds and rivers. Swink and Wilhelm (1994) note that this bladderwort occurs in acidic habitats (e.g., *Carex lasiocarpa* mats) as well as calcareous habitats.

SOURCE: Courtenay and Zimmerman (1972); Gleason and Cronquist (1991); Swink and Wilhelm (1994); and Voss (1972).

WATER ARUM

(*Calla palustris* L.)

ARUM FAMILY (Araceae) **C of C:** Native (9 WI)(8 MN) **IND. STATUS:** OBL

FIELD CHARACTERISTICS: A perennial herb from rhizomes creeping in peat, mud, or floating. The spathe is broad, white, and 3-5 cm. long with a tip 5-10 mm. long. Spadix is golden, ovate to elliptic, fleshy, 1.5-2.5 cm. long and packed with flowers. Leaves are ovate to subrotund, heart-shaped at the base and 5-10 cm. long on petioles 10-20 cm. long. Fruit is a cluster of berries turning from green to red when mature. In flower during June.

ECOLOGICAL NOTES: Water arum is found in bogs and shallow, acidic waters.

SOURCE: Courtenay and Zimmerman (1972); Gleason and Cronquist (1991); and Voss (1972).

SHOWY LADY'S-SLIPPER

(*Cypripedium reginae* Walt.)

ORCHID FAMILY (Orchidaceae) **IND. STATUS:** FACW

C of C: Native (9 WI)(8 MN), a species of special concern in Wisconsin

FIELD CHARACTERISTICS: A hairy, perennial herb with flowers composed of white sepals and petals, and a large inflated lip (pouch) 3-5.5 cm. long. The lip is white with purple to rose to pink streaks. Flowers number 1-2 (rarely 3 or 4) per stem. Stems are leafy, hairy and 20-100 cm. in height. Leaves are elliptic-oval to ovate, 10-20 cm. long, strongly ribbed, hairy and clasp the stem. In flower during June.

ECOLOGICAL NOTES: Showy lady's-slipper, Minnesota's state flower, is found in bogs, wooded swamps, calcareous fens, and along calcareous ridges and dunes in both shaded and open (sunny) habitats. It is occasional to common in its preferred habitats in Minnesota, but is much less common in Wisconsin. The hairs on the stem and leaves are irritating to some people producing a rash similar to that caused by poison ivy.

SOURCE: Fernald (1970); Gleason and Cronquist (1991); Voss (1972); and Smith (1993).

ROSE POGONIA

(*Pogonia ophioglossoides* (L.) Ker-Gawl.)

ORCHID FAMILY (Orchidaceae) **C of C:** Native (9) **IND. STATUS:** OBL

FIELD CHARACTERISTICS: A perennial herb with a stem 15-45 cm. in height. Usually a single leaf is produced about midway up on the stem. The leaf is elliptical, sessile and veiny, 3-12 cm. long and 0.6-2 cm. wide. One pink to purple flower is produced per stem, typically. Sepals are elliptical and 1.3-2.4 cm. long and 2-6 mm. wide. Petals are broadly elliptical and 1.3-2.3 cm. long by 0.7-1.2 cm. wide. Lip is pinkish with purple veins, 1.4-2.1 cm. long by 5-10 mm. wide, conspicuously bearded with a crest of bristles. In bloom mid-June to late July.

ECOLOGICAL NOTES: Rose pogonia occurs in open bogs, coniferous bogs and coniferous swamps particularly on *Sphagnum* mosses under a partial canopy of northern white cedar, tamarack or spruce. It also occurs on floating mats and in sedge meadows with acidic, peat soils.

SOURCE: Gleason and Cronquist (1991); and Smith (1993).

GRASS PINK

(*Calopogon tuberosus* (L.) B.S.P.)

ORCHID FAMILY (Orchidaceae) **C of C:** Native (9 MN)(8 WI) **IND. STATUS:** OBL

FIELD CHARACTERISTICS: A perennial herb with a glabrous stem 19-55 cm. in height. A single, essentially basal leaf is linear and grasslike, 10-35 cm. long by 0.2-1.6 cm. wide. Inflorescence is a terminal raceme with 2-12 pink to purple (or rarely white) flowers. Sepals are ovate to elliptical and 1.2-2.4 cm. long by 5-11 mm. wide. Petals are oblong or oblong-elliptical 1.3-2.4 cm. long by 5-8.5 mm. wide. Lip is the uppermost part of the flower, broadly winged and 1.1-2 cm. wide by 6.5-14 mm. wide. The ventral surface of the lip is bearded with yellow-tipped bristles. In flower mid-June to early August.

ECOLOGICAL NOTES: Grass pink occurs in coniferous swamps and bogs, usually under a sparse canopy of northern white cedar, tamarack or spruce. It also occurs on floating mats dominated by sedges or *Sphagnum* mosses.

SOURCE: Gleason and Cronquist (1991); and Smith (1993).

Photos by Steve D. Eggers

MARSH CINQUEFOIL

(*Comarum palustre* L.)

ROSE FAMILY (Rosaceae) **C of C:** Native (7 MN)(8 WI) **IND. STATUS:** OBL

SYNONYM: *Potentilla palustris* (L.) Scop.

FIELD CHARACTERISTICS: A perennial herb with somewhat woody, reddish-brown stems that are trailing or erect to 20-60 cm. in length. Leaves are long-petioled and pinnately compound. Leaflets number 5-7 and are narrowly oblong to elliptic, 5-10 cm. by 1-3 cm., sharply toothed and glaucous beneath. Inflorescence consists of several red-purple flowers that are 2 cm. wide. Nutlets are smooth and attached to the enlarged, spongy receptacle. In flower June-August.

ECOLOGICAL NOTES: Marsh cinquefoil is a common forb of bogs, especially in the "lagg" around the border of the bog and uplands.

SOURCE: Gleason and Cronquist (1991); and Fernald (1970).

BOG ARROW-GRASS

(*Scheuchzeria palustris* L.)

SCHEUCHZERIA FAMILY (Scheuchzeriaceae) **IND. STATUS:** OBL

C of C: Native (9 MN)(10 WI)

FIELD CHARACTERISTICS: A perennial herb with one to several stems that are 10-40 cm. long. Leaves are alternate and wiry with several arising from the base as well as along the erect stem. Leaves are 10-30 cm. long and only 1-3 mm. wide. Flowers consist of 6 tepals 2-3 mm. long that are green-white and arranged into several-flowered racemes 3-10 cm. long. Fruit consists of follicles 5-10 mm. long each with 2 seeds that are 4-5 mm. long. In flower May-June.

ECOLOGICAL NOTES: Bog arrow-grass, or Scheuchzeria, prefers the acidic habitat of bogs, typically growing on *Sphagnum* mosses or floating mats.

SOURCE: Gleason and Cronquist (1991); and Chadde (2002).

IV.B. Coniferous Bogs

Coniferous bogs are similar to open bogs in plant community composition except that mature trees of black spruce and/or tamarack are the dominant canopy species growing on the *Sphagnum* moss mat. Trees may be stunted due to the wet, nutrient- and mineral-poor conditions. *Sphagnum* moss is the dominant groundlayer species. Sedges, orchids and pitcher plants that have endured the shaded conditions are typically present, along with the heath family (Ericaceae) shrubs.

Black spruce and the heath family shrubs are characteristic only of acidic peats such as those associated with *Sphagnum* moss mats, whereas tamarack can grow in minerotrophic peats as well.

VEGETATION: This coniferous bog is dominated by tamarack (*Larix laricina*), black spruce (*Picea mariana*), leatherleaf (*Chamaedaphne calyculata*), tussock cottongrass (*Eriophorum vaginatum*) and a carpet of sphagnum moss (*Sphagnum magellanicum*). Other species present include small cranberry (*Vaccinium oxycoccos*), bog rosemary (*Andromeda polifolia*), bog laurel (*Kalmia polifolia*), bog sedge (*Carex oligosperma*), tawny cottongrass (*Eriophorum virginicum*), sphagnum mosses (*Sphagnum* spp.) and woolgrass (*Scirpus cyperinus*). This photograph was taken in October when the tamarack had turned golden yellow in the process of shedding its needles.

SOILS: Loxley mucky peat (Typic Haplosaprists), very poorly-drained, acidic soils with an organic layer greater than 51 inches in depth. Landscape position is a kettle bog (ice block depression) located in rolling, glacial till.

HYDROLOGY: Direct precipitation (rainfall and snowmelt). Loxley soils are typically saturated at or near the surface throughout the growing season.

LOCATION: Washburn County, Wisconsin.

BLACK SPRUCE

(*Picea mariana* (P. Mill.) B.S.P.)

PINE FAMILY (Pinaceae) **C of C:** Native (8 WI)(7 MN) **IND. STATUS:** FACW

FIELD CHARACTERISTICS: An evergreen conifer growing to a height of 10(25) m. and 48 cm. dbh; frequently stunted and scrubby. Like those of all spruces, the twigs have woody pegs for the quadrangular (4-sided) needles. Needles are 6-18 mm. long, blue-green and covered with a pale, waxy coating. Twigs and buds are hairy (see photograph). The cones are 1.5-3.5 cm. long (which is shorter than other spruces), dark purple when young, later turning gray-brown. Cones usually remain on the tree for several years.

ECOLOGICAL NOTES: In Minnesota and Wisconsin, black spruce is typically found in coniferous bogs and scattered in open bogs north of the vegetation tension zone. It often grows with tamarack (*Larix laricina*). Black spruce is parasitized by dwarf mistletoe (*Arceuthobium pusillum*) that causes the twigs to form dense clusters called "witches' brooms." Like tamarack, the shallow root system of black spruce frequently results in "wind throw." Fire hastens opening of the cones. Given a mixed stand of black spruce and tamarack, fires would gradually promote dominance by black spruce while eliminating tamarack, which is very susceptible to fire.

SOURCE: Curtis (1971); Gleason and Cronquist (1991); Smith (2008); and Voss (1972).

TAMARACK

(*Larix laricina* (Du Roi) K. Koch)

PINE FAMILY (Pinaceae) **C of C:** Native (8 WI)(7 MN) **IND. STATUS:** FACW

FIELD CHARACTERISTICS: A deciduous conifer growing to a height of 26 m. and 84 cm. dbh; frequently stunted and scrubby. It has a cone-shaped growth pattern like the spruces (*Picea* spp.). Dwarf, spur-like branches are produced that support clusters of soft, slender, needle-like leaves. Leaves are typically less than 2.5 cm. long. Young cones are purple; mature cones are pale brown with less than 20 scales and are 1-2 cm. long.

ECOLOGICAL NOTES: Tamarack is the dominant or codominant tree in many coniferous swamps and bogs. Both north and south of the vegetation tension zone, it occurs on circumneutral to alkaline soils (*Sphagnum* moss mat is lacking). North of the vegetation tension zone, it is also frequently associated with black spruce (*Picea mariana*) and sphagnum mosses (*Sphagnum* spp.) growing on acidic, peat soils. It is the only native deciduous conifer of Minnesota and Wisconsin; the needles turn golden yellow and are shed from late September to early November [see photograph on page 280].

SOURCE: Gleason and Cronquist (1991); Smith (2008); and Swink and Wilhelm (1994).

BOG BIRCH

(*Betula pumila* L.)

BIRCH FAMILY (Betulaceae) **C of C:** Native (7) **IND. STATUS:** OBL

SYNONYM: *B. pumila* L. var. *glandulifera* Regel

FIELD CHARACTERISTICS: A deciduous shrub 1-4 m. in height. The alternate leaves are simple, coarsely toothed and ovate. New leaves are pubescent, but lose their hairs as they age. Leaves have 3-6 pairs of lateral veins and are 2-3 cm. long. Twigs have woody, cone-like pistillate catkins, supported by a short, 5-10 mm. long peduncle. Pistillate catkins are conspicuous over the winter. Fruit is a small (ca 2 x 3 mm.), winged nutlet.

ECOLOGICAL NOTES: Bog birch is a distinctive shrub of bogs, the edges of conifer swamps and occasionally calcareous fens, sometimes forming large colonies. The birches readily form hybrids and bog birch is no exception. The hybrid *B. glandulifera* x *sandbergii* is common in our bogs.

SOURCE: Gleason and Cronquist (1991); Swink and Wilhelm (1994); Smith (2008); and Fassett (1976).

Leaves and pistillate catkin

BOG WILLOW

(*Salix pedicellaris* Pursh)

WILLOW FAMILY (Salicaceae) **C of C:** Native (8) **IND. STATUS:** OBL

FIELD CHARACTERISTICS: A small, erect, deciduous shrub usually 1-2 m. high. Branches are few to none. Leaves are oblong, elliptical-oblong or obovate, 2-6 cm. long by 0.6-2 cm. wide with an acute to rounded apex. Margins of the leaves are entire, sometimes revolute. Upper leaf surfaces are dark green and net-veined while lower surfaces are pale green or gray-green. Male catkins are 0.5-2 cm. long; female catkins are 1.3-3 cm. long. In flower May to early June.

ECOLOGICAL NOTES: Bog willow is found in moderately to weakly acidic peatlands including coniferous bogs, coniferous swamps, shrub swamps and sedge meadows. It does not tolerate shading or crowding by larger woody plants and tends to occur under openings in the canopy.

SOURCE: Gleason and Cronquist (1991); and Smith (2008).

DRAGON'S-MOUTH

(*Arethusa bulbosa* L.)

ORCHID FAMILY (Orchidaceae) **IND. STATUS:** OBL

C of C: Native (10); a species of special concern in Wisconsin

FIELD CHARACTERISTICS: A perennial herb with a stem 7-36 cm. in height. The single leaf is linear-lanceolate and up to 18 cm. long and 3-8 mm. wide. A single flower is produced with rose-purple sepals that are linear oblong to narrowly elliptical and 2.5-4.5 cm. long by 4.5-8 mm. wide. Petals are similar but are shorter and wider. Lip is pink with rose-purple markings and a crest of yellow bristles. The lip is oblong, curves downward, and 2.6-3.8 cm. long. In flower late May-July.

ECOLOGICAL NOTES: Dragon's-mouth typically occurs in northern coniferous swamps and bogs particularly where there are gaps in the canopy. It also occurs on floating mats and in sedge meadows with acidic peat soils.

SOURCE: Gleason and Cronquist (1991); Chadde (2002); Voss (1972); and Smith (1993).

PINK LADY'S-SLIPPER

(*Cypripedium acaule* Ait.)

ORCHID FAMILY (Orchidaceae) **C of C:** Native (8 MN)(7 WI) **IND. STATUS:** FACW

FIELD CHARACTERISTICS: A perennial herb 14-44 cm. in height. Two basal leaves per stem are produced. Leaves are elliptical to obovate, 9-23 cm. long and 2.5-9 cm. wide. Flowers are solitary with sepals 2.5-4 cm. long and greenish to brown to purple in color. Petals are 2.8-4.5 cm. long and similar in color to the sepals. A large, inflated lip (pouch) is 3.3-6 cm. long and pink to purple in color. In flower late May to mid-July.

ECOLOGICAL NOTES: Pink, or stemless, lady's-slipper prefers shaded, acidic and nutrient-poor habitats. It is found in a wide variety of northern plant communities including bogs as well as upland forests of mixed oak, pine and aspen.

SOURCE: Gleason and Cronquist (1991); Voss (1972); and Smith (1993).

SECTION 3

Shrub Swamps

V. Shrub Swamps

Shrub swamps are wetland plant communities dominated by woody vegetation less than 20 feet in height and with a dbh of less than 6 inches. Shrub swamps in Minnesota and Wisconsin are categorized as shrub-carrs or alder thickets depending upon the dominant shrub species. Both occur on organic soils (peats/mucks) as well as on hydric mineral soils.

Shrub swamps are an important habitat for many songbirds, ruffed grouse, American woodcock and small mammals, and are particularly important winter habitat for ring-necked pheasant, eastern cottontail and white-tailed deer.

V.A. Shrub-Carrs

Shrub-carrs are plant communities composed of tall, deciduous shrubs growing on saturated to seasonally flooded soils. Dominant shrubs are typically willows, red-osier dogwood, silky dogwood, gray dogwood and/or *Spiraea*. Groundlayer species include some of the ferns, forbs, grasses and sedges of sedge meadow and fresh (wet) meadow communities. The diversity of groundlayer species is dependent upon the degree of shrub canopy cover, degree of disturbance, water source and other factors. For example, disturbed shrub-carrs may have a groundlayer dominated by reed canary grass, an invasive species. Relatively undisturbed shrub-carrs can have a high diversity of groundlayer species.

Shrub-carrs are common both north and south of the vegetative tension zone. Artificial drainage and fire suppression are two factors that promote succession of inland fresh meadow communities to shrub-carr communities.

A shrub-carr dominated by red-osier dogwood (*Cornus alba*) **in Trempealeau County, Wisconsin.**

VEGETATION: This shrub-carr is dominated by slender willow (*Salix petiolaris*), Canada blue-joint grass (*Calamagrostis canadensis*) and marsh fern (*Thelypteris palustris*). Additional shrub species include beaked willow (*Salix bebbiana*), pussy willow (*Salix discolor*), sandbar willow (*Salix interior*) and meadowsweet (*Spiraea alba*). Non-dominant herbaceous species include lake sedge (*Carex lacustris*), common yellow lake sedge (*Carex utriculata*), hummock sedge (*Carex stricta*), fowl bluegrass (*Poa palustris*), blue flag iris (*Iris versicolor*), tall meadowrue (*Thalictrum dasycarpum*), giant goldenrod (*Solidago gigantea*), redstem aster (*Symphyotrichum puniceum*), joe-pye weed (*Eutrochium maculatum*), marsh skullcap (*Scutellaria galericulata*), marsh milkweed (*Asclepias incarnata*) and water hemlock (*Cicuta maculata*).

SOILS: Seelyeville muck (Typic Haplosaprists), very poorly-drained soils with an organic layer greater than 51 inches in depth. Landscape position is a glacial lake plain.

HYDROLOGY: Seelyeville soils are typically saturated at or near the surface throughout the growing season and may be inundated by up to 1 foot of water.

LOCATION: Willowsippi Wildlife Management Area, Aitkin County, Minnesota.

SLENDER WILLOW

(*Salix petiolaris* Sm.)

WILLOW FAMILY (Salicaceae) **C of C:** Native (5 MN)(6 WI) **IND. STATUS:** FACW(NC/NE) OBL(MW, GP)

SYNONYM: *Salix gracilis* Anderss.

FIELD CHARACTERISTICS: A tall shrub to 4 m. height with many branches. Bark is gray, smooth or slightly rough. Leaves are linear to lanceolate to narrowly elliptical and 3.8-11 cm. by 0.6-1.9 cm. Leaf margins are serrate to subentire, upper surfaces are dark green while lower surfaces are pale green to grayish (glaucous). Immature leaves have long silky hairs. Flowers are in unisexual catkins that appear with the leaves or slightly before. Pistillate catkins are 1-3.5 cm. long while male catkins are 1-3 cm. long. Capsules are hairy and 4-8 mm. long. In flower April to late May.

ECOLOGICAL NOTES: Slender willow is probably the most common and abundant willow in Minnesota, often dominating or codominating large wetland complexes (Smith 2008). It is similarly common in Wisconsin. In addition to shrub-carrs, slender willow occurs in sedge meadows, shallow marshes, prairie swales and along riverbanks. It is apparently intolerant of strongly acidic soils (e.g., bogs) and flood-borne sediments (e.g., floodplain forests) that smother its roots.

SOURCE: Gleason and Cronquist (1991); and Smith (2008).

Leaves are dark green above and grayish (glaucous) below.

Leaves and pistillate catkins. Capsules have split open and released their seeds.

Pistillate catkins are short and wide.

Slender Willow

(*Salix petiolaris*)

PUSSY WILLOW

(*Salix discolor* Muhl.)

WILLOW FAMILY (Salicaceae) **C of C:** Native (2 WI)(3 MN) **IND. STATUS:** FACW

FIELD CHARACTERISTICS: An erect, deciduous shrub usually 2-5 m. high. The alternate leaves are generally elliptic, entire to slightly toothed, dark green above, whitened beneath, and are without hairs (may have sparse hairs beneath); usually less than 5.5 times as long as wide. Large, roundish stipules are deciduous. Twigs are stout, reddish to dark brown, and lack hairs (although new twigs may be hairy). Plants are unisexual. Pistillate catkins are 3-12(14) cm. long with black scales, while staminate catkins are 1.5-5 cm. long. Fruit is a densely hairy capsule. In flower late March-May.

ECOLOGICAL NOTES: Pussy willow is common in shrub-carrs, inland fresh meadows, the edges of wooded swamps, and along shores. It is usually the first willow to flower in spring. Twigs are browsed by white-tailed deer, moose and eastern cottontail. Various willows (*Salix* spp.) can be recognized in winter by insect galls that may be shaped like pine cones. Willows (*Salix* spp.) in general hybridize, sometimes making identification difficult.

SOURCE: Gleason and Cronquist (1991); and Swink and Wilhelm (1994).


A female plant in full bloom - May 10.

Pussy Willow

(*Salix discolor*)

Pistillate catkin

Leaves and pistillate catkins

Leaf and staminate catkin

BEAKED WILLOW

(*Salix bebbiana* Sarg.)

WILLOW FAMILY (Salicaceae) **C of C:** Native (7 WI)(6 MN) **IND. STATUS:** FACW

FIELD CHARACTERISTICS: An erect, deciduous shrub or small tree, usually 2-6 m. high, with one to a few stems. The alternate leaves are elliptic to obovate, subentire to crenate, and conspicuously rugose-reticulate veined. An abruptly acute leaf apex (beak) is present. Leaf blades are usually less than 2.8 times as long as wide and may be pubescent above, but glaucous underneath. Small, less than 2 mm. long, deciduous stipules may be present. Twigs are slender and brownish in color. Pistillate catkins are 2-7 cm. long while the staminate catkins are small and subsessile. Fruit is a pubescent capsule. In flower from late March to early June.

ECOLOGICAL NOTES: Beaked willow, or Bebb's willow, occurs in a wide variety of wetland habitats, but it is most often seen in sedge meadows, shrub-carrs, fresh (wet) meadows, calcareous fens and along wet forest edges. Swink and Wilhelm (1994) state that this willow is frequent in shrub zones "... where there has been disturbance." The authors have also observed it in some fairly pristine sites.

SOURCE: Fassett (1976); Gleason and Cronquist (1991); and Swink and Wilhelm (1994).

Leaves and pistillate catkins

Leaves and staminate catkins

SANDBAR WILLOW

(*Salix interior* Rowlee)

WILLOW FAMILY (Salicaceae) **C of C:** Native (2) **IND. STATUS:** FACW

SYNONYM: *Salix exigua* ssp. *interior* (Rowlee) Cronq.

FIELD CHARACTERISTICS: An erect, deciduous shrub 2-5 m. high. A distinctive characteristic of this willow is its long, linear leaves (usually 10 times longer than wide) that are irregularly toothed. Mature leaves are without hairs. Leaf stalks lack glands and no stipules are present. It often has many stems that are slender, reddish-brown, lack hairs, and are leafy. Pistillate catkins are 3-6(8) cm. long and appear with the leaves or later. Fruit is a capsule that is hairless to thinly silky. In flower April-June.

ECOLOGICAL NOTES: Sandbar willow frequently forms large, dense, circular colonies (clones) that can be an acre or two in extent. In addition to shrub-carrs, this willow is common on sandbars, mudflats, beaches, and other alluvial mineral soils. It responds positively to water level changes and is often found colonizing dredged material sites.

SOURCE: Gleason and Cronquist (1991); Swink and Wilhelm (1994); and Voss (1985).

HEART-LEAF WILLOW

(*Salix eriocephala* Michx.)

WILLOW FAMILY (Salicaceae) **C of C:** Native (4) **IND. STATUS:** FACW

SYNONYMS: *Salix cordata* Muhl.; *S. rigida* Muhl.

FIELD CHARACTERISTICS: A many-stemmed, deciduous shrub to 7 m. in height. Leaves are alternate, narrowly oblong to narrowly elliptical or lance-elliptical, the larger leaves 6-12 cm. long by 1-3 cm. wide. Leaf bases are acute to blunt or rarely subcordate. Leaf blades are dark green above and pale green below with a serrulate (finely-toothed) margin. Stipules are prominent, leafy and persistent. Staminate catkins are 1.5-4.5 cm. long while pistillate catkins are 2-6 cm. long, both appearing with or slightly before the leaves. Capsules are glabrous and 3-7 mm. long. In flower mid-April to late May.

ECOLOGICAL NOTES: Heart-leaf willow is a common species of shrub-carrs, inland fresh meadows, shallow marshes, streambanks and ditches. Despite its common name, the leaves are rarely heart-shaped. Leaf shape is highly variable and can resemble slender willow (*S. petiolaris*) and black willow (*S. nigra*); however, the leafy, persistent stipules (see photos) distinguish heart-leaf willow.

SOURCE: Fassett (1976); Gleason and Cronquist (1991); and Swink and Wilhelm (1994).

Note the persistent, leafy stipules and serrulate leaf margins.

Pistillate catkins

Heart-Leaf Willow

(*Salix eriocephala*)

AUTUMN WILLOW

(*Salix serissima* (Bailey) Fern.)

WILLOW FAMILY (Salicaceae) **C of C:** Native (8 WI)(7 MN) **IND. STATUS:** OBL

FIELD CHARACTERISTICS: A deciduous shrub 1-4 m. in height. First year branchlets are yellowish and glabrous while second year branchlets are yellowish to red, shiny and glabrous. Leaves are alternate, elliptical to oval to lance-shaped, and 4-10 cm. long by 1-3 cm. wide. Leaf blades are glossy, dark green above and white-waxy below. Leaf margins are finely-toothed (serrulate). Petioles have glands near the summit and stipules are usually absent. Staminate catkins are 1.5-3(4) cm. long while pistillate catkins are 2-4 cm. long, both appearing with or after the leaves in spring (mid-May to mid-June). Capsules are glabrous and 7-10 mm. long. Seeds are not released until late summer or autumn. Capsules are often seen retaining seeds after the leaves are shed in autumn, sometimes after snow falls (Smith 2008).

ECOLOGICAL NOTES: Autumn willow is intolerant of shade but is tolerant of a wide range of pH conditions from weakly acidic to strongly calcareous. It occurs on shallow peats, or less frequently hydric mineral soils, as widely scattered individuals or small, sparse populations. This includes shrub-carrs, coniferous swamps, calcareous fens, shallow marshes and floating sedge mats.

SOURCE: Gleason and Cronquist (1991); Smith (2008); and Chadde (2011).

SILKY DOGWOOD

(*Cornus obliqua* Raf.)

DOGWOOD FAMILY (Cornaceae) **C of C:** Native (4) **IND. STATUS:** FACW

SYNONYM: *Cornus amomum* P. Mill.

FIELD CHARACTERISTICS: An erect, deciduous shrub usually 1-3 m. high. Leaves are opposite, ovate to elliptic, and 6-12 cm. long with 4-6 pairs of lateral veins. Twigs and branches are magenta with fine hairs and brown pith. Inflorescence is an open cyme with white flowers. Mature fruit is a dark blue berry while immature fruit is white to bluish-white. In flower May-July.

ECOLOGICAL NOTES: Silky dogwood is not as common as red-osier dogwood (*Cornus alba*) in shrub-carrs. It is primarily seen along streambanks and in shrubby thickets adjacent to wooded swamps. Silky dogwood is frequently planted for wildlife cover and foodplots.

SOURCE: Gleason and Cronquist (1991); and Swink and Wilhelm (1994).

RED-OSIER DOGWOOD

(*Cornus alba* L.)

DOGWOOD FAMILY (Cornaceae) **C of C:** Native (3) **IND. STATUS:** FACW

SYNONYMS: *Cornus stolonifera* Michx., *Cornus sericea* L.

FIELD CHARACTERISTICS: An erect, deciduous shrub usually 1-3 m. high. Leaves are opposite, lanceolate to ovate, 5-10 cm. long with 5-7 pairs of lateral veins. Twigs and branches are greenish to yellowish in summer turning to red in autumn/winter. Inflorescence is an open cyme with white flowers. Mature fruit is a white berry. In flower May to mid-August. *C. alba* is the only dogwood in our range with both white berries and white pith. It can be easily distinguished from silky dogwood (*Cornus obliqua*), which has dark blue berries and brown pith.

ECOLOGICAL NOTES: Red-osier dogwood is a characteristic species of shrub-carrs and can form dense thickets. This common shrub can invade sedge meadows, wet to wet-mesic prairies and calcareous fens in response to water level changes and/or lack of fire. Red-osier dogwood is also common in wooded swamps and along streambanks. The berries are eaten by songbirds and ruffed grouse; white-tailed deer and eastern cottontail browse the twigs and buds.

SOURCE: Gleason and Cronquist (1991); and Swink and Wilhelm (1994).

Red-Osier Dogwood
(*Cornus alba*)

GRAY DOGWOOD

(*Cornus racemosa* Lam.)

DOGWOOD FAMILY (Cornaceae) **C of C:** Native (2) **IND. STATUS:** FAC

SYNONYM: *Cornus foemina* P. Mill.

FIELD CHARACTERISTICS: An erect, deciduous shrub usually 1-3 m. high. Leaves are opposite, ovate to elliptic, and 6-12 cm. long with 4-6 pairs of lateral veins. Twigs and braches are gray with brown pith. Inflorescence is a conical-shaped, open cyme with bright red pedicels, white flowers and white berries. In flower early June to early July.

ECOLOGICAL NOTES: Gray dogwood is a common shrub that is particularly adept at colonizing abandoned agricultural lands, areas disturbed by logging, and forest edges. It is an excellent wildlife food plant. This shrub is especially conspicuous in winter with its dull gray twigs and bright red pedicels.

SOURCE: Gleason and Cronquist (1991); Swink and Wilhelm (1994); and Smith (2008).

Comparison of Dogwood Twigs

Red-osier dogwood (*Cornus alba*) with red twigs and white pith is on the left. Gray dogwood (*C. racemosa*) with gray twigs and brown pith is in the center. On the right is silky dogwood (*C. obliqua*) with brownish-magenta twigs and brown pith.

COMMON BUCKTHORN

(*Rhamnus cathartica* L.)

BUCKTHORN FAMILY (Rhamnaceae) **C of C:** Introduced, invasive (0) **IND. STATUS:** FACU (GP);FAC(NC/NE, MW)

FIELD CHARACTERISTICS: A shrub or small tree growing to 6 m. in height. Some branches end in short thorns. Leaves are mostly opposite or subopposite, with some alternate. Leaves are broadly elliptic, oblong, or elliptic-oblong, 3-6 cm. long, with a margin of fine teeth (serrulate). Lateral leaf veins (2)3(4) on each side are strongly upcurved. Plants are dioecious (unisexual) with female plants producing black fruit, 5-6 mm. in diameter, commonly with 4 stones (hard seeds). Flowers appear with the leaves and have parts in 4s.

ECOLOGICAL NOTES: Introduced from Eurasia and planted as an ornamental, common buckthorn is an aggressive invader of both upland and wetland habitats becoming a serious weed. Birds eat the fruit and spread the seeds such that even scientific and natural area quality fens, prairies and woodlands now have infestations of buckthorn. Common buckthorn can form dense thickets that shade out species of sedge meadows, calcareous fens and the spring ephemerals of woodlands. It is especially prolific in drained peatlands and upland oak forests. Also see comments under glossy buckthorn (*Frangula alnus*).

SOURCE: Gleason and Cronquist (1991); Swink and Wilhelm (1994); and Smith (2008).

Leaves and pistillate flowers

Staminate flowers

Common Buckthorn

(*Rhamnus cathartica*)

GLOSSY BUCKTHORN

(*Frangula alnus* P. Mill.)

BUCKTHORN FAMILY (Rhamnaceae) **C of C:** Introduced, invasive (0) **IND. STATUS:** FAC (NC/NE, GP);FACW(MW)

SYNONYM: *Rhamnus frangula* L.

FIELD CHARACTERISTICS: A shrub or small tree growing to 7 m. in height. Leaves are all or mostly alternate, oblong to obovate-oblong, 5-8 cm. long, and acute to short-acuminate. Leaf margins are entire and may be wavy (see photograph), but are easily distinguished from the fine-toothed leaf margins of common buckthorn (*Rhamnus cathartica*). Leaves are also shiny compared to the leaves of common buckthorn and branches do not end in thorns. Flowers are perfect with parts in 5s. Fruits are red turning to black, with 2-3 stones. In flower May-August.

ECOLOGICAL NOTES: Introduced from Eurasia and planted as an ornamental, glossy buckthorn is an aggressive invader and serious weed of wooded swamps, shrub swamps, bogs and inland fresh meadows, especially calcareous fens. It is not as widespread in Minnesota and Wisconsin as common buckthorn and prefers wetter habitats. Glossy buckthorn often occurs in association with disturbance (power lines, ditches), but also has infested scientific and natural area quality wetlands, such as Cedarburg Bog in southeastern Wisconsin and calcareous fens in the lower Minnesota River Valley, due to seed dispersal by birds.

SOURCE: Voss (1985); Gleason and Cronquist (1991); and Swink and Wilhelm (1994).

MEADOWSWEET

(*Spiraea alba* Du Roi)

ROSE FAMILY (Rosaceae) **C of C:** Native (5 MN)(4 WI) **IND. STATUS:** FACW

FIELD CHARACTERISTICS: A low, deciduous shrub, usually up to 2 m. high. Leaves are alternate, simple, unlobed, finely serrate, without hairs, oblanceolate, and 3-5 cm. long. The unarmed twigs are slender, ascending, and generally a dull brown. Inflorescence is a terminal, finely hairy, elongate panicle 5-25 cm. in height. Five-petaled flowers are white, 6-8 mm. wide and fuzzy. Fruit is a follicle. In flower June-August. A similar species, steeplebush (*S. tomentosa*)[page 308], can be easily distinguished from *S. alba* because of its pink flowers and woolly twigs and leaf undersides.

ECOLOGICAL NOTES: Meadowsweet occurs in sedge meadows, wet to wet-mesic prairies, alder thickets and shrub-carrs. It can form relatively tall, dense thickets on disturbed sites and tends to increase with declining water levels.

SOURCE: Gleason and Cronquist (1991); and Swink and Wilhelm (1994).

STEEPLEBUSH

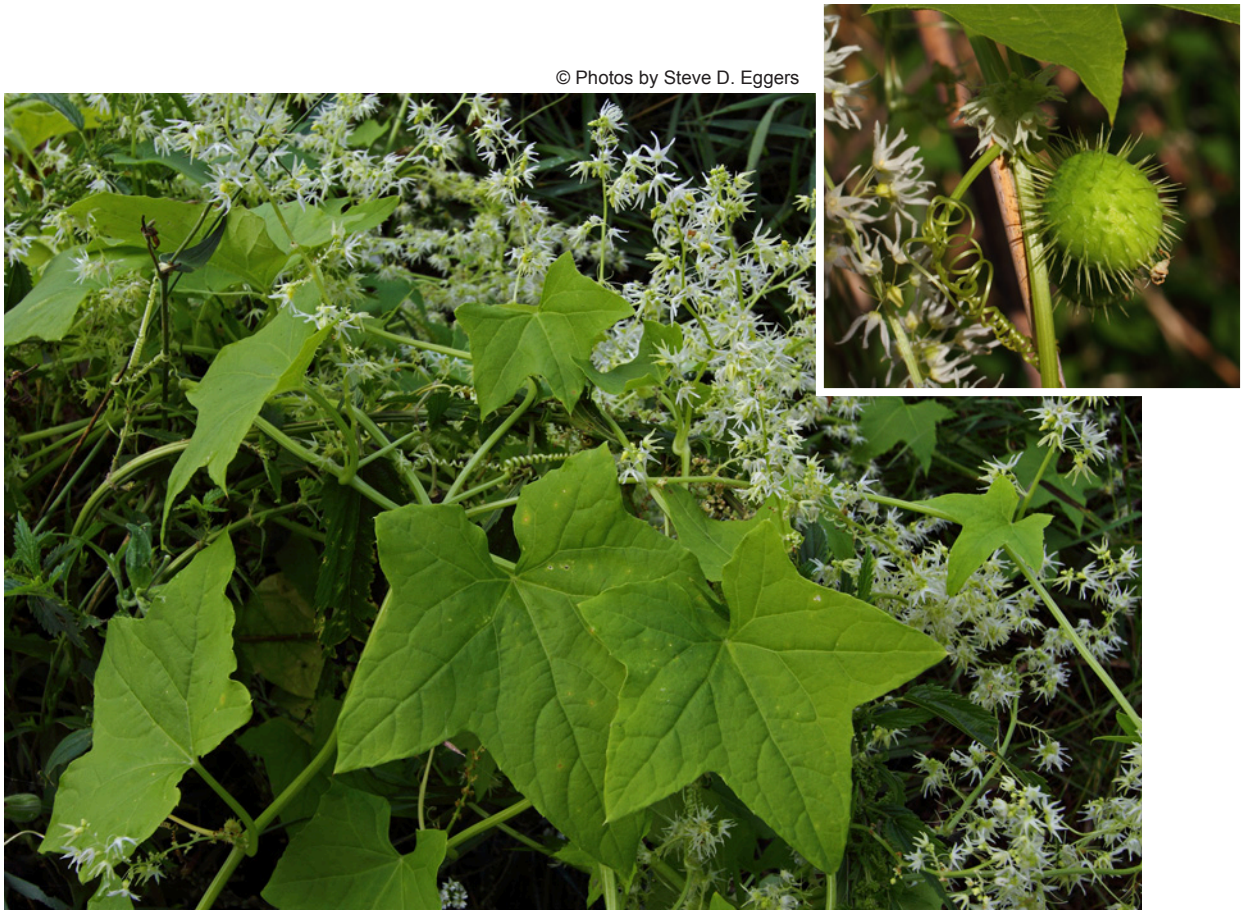
(*Spiraea tomentosa* L.)

ROSE FAMILY (Rosaceae) **C of C:** Native (6 WI)(7 MN) **IND. STATUS:** FACW

FIELD CHARACTERISTICS: A low, deciduous shrub, usually up to 2 m. high. Leaves are alternate, simple, unlobed, finely serrate, oblanceolate, 3-5 cm. long, dark green above and white woolly beneath. The unarmed twigs are slender, ascending, and generally a dull brown. Both twigs and the undersides of leaves are densely covered with hairs. Inflorescence is a terminal, finely hairy, elongate panicle 5-15 cm. long. Five-petaled flowers are rose-pink, 3-4 mm. wide, and fuzzy. Fruit is a follicle. In flower June-August.

ECOLOGICAL NOTES: Steeplebush occurs in northern sedge meadows, shrub swamps and open bogs.

SOURCE: Gleason and Cronquist (1991); and Swink and Wilhelm (1994).



WILD CUCUMBER

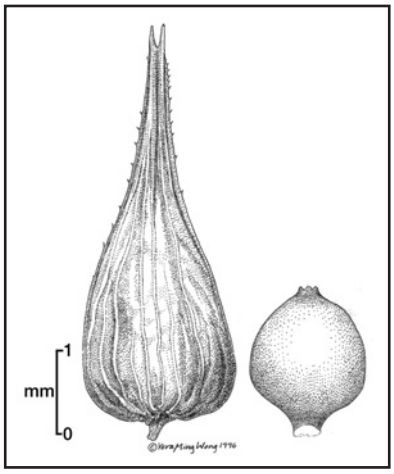
(*Echinocystis lobata* (Michx.) Torr. & Gray)

GOURD FAMILY (Curcurbitaceae) **C of C:** Native (2) **IND. STATUS:** FACW(NC/NE, MW) FAC(GP)

FIELD CHARACTERISTICS: An annual, vining herb to 5 m. or more in length. Leaves usually have 5 sharp, triangular lobes (some leaves may have 3 or 7 sharp lobes). Flowers are white and unisexual. Staminate flowers are 8-10 mm. wide with lance-like lobes and are arranged in long, upright racemes. Pistillate flowers are one to several on short stalks from leaf axils. Fruit is ovate, inflated, 3-5 cm. long, and covered with soft prickles. In flower August-September.

ECOLOGICAL NOTES: Wild cucumber is an abundantly common species of shrub and wooded swamps, floodplain forests, inland fresh meadows, streambanks and road ditches, often seen sprawling over other vegetation or fences.

SOURCE: Chadde (2011).



Perigynium and nutlet

Cespitose growth habit

STALK-GRAIN SEDGE

(*Carex stipata* Muhl. ex Willd.)

SEDGE FAMILY (Cyperaceae) **C of C:** Native (2 WI)(3 MN) **IND. STATUS:** OBL

FIELD CHARACTERISTICS: A somewhat stout, perennial sedge with clustered, sharply triangular stems 30-100 cm. in height. Leaves are coarse, M-shaped, green, and usually shorter than the stem. Whitish, thin sheaths extend beyond the leaf base and are conspicuously cross-wrinkled (see photo on page 178). Each spikelet is typically subtended by a long, linear bract. The lance-triangular shaped perigynia are 4-7 mm. long, sessile, and densely aggregated. The conspicuous beak of the perigynia is less than twice as long as the body and gives the inflorescence a prickly appearance. Similar to fox sedge (*Carex vulpinoidea*)[page 178] but larger with flaccid stems.

ECOLOGICAL NOTES: A common sedge of wooded swamps and shrub swamps, but also occurring in ditches and other sunny, wet habitats.

SOURCE: Gleason and Cronquist (1991); Swink and Wilhelm (1994); and Voss (1972).

V.B. Alder Thickets

Alder thickets are a tall, deciduous shrub community similar to shrub-carrs except that speckled alder (*Alnus incana* ssp. *rugosa*) is dominant. Speckled alder can pioneer exposed peat or alluvial soils because of its tiny seeds and ability to fix nitrogen. Alder thickets are generally found in and north of the vegetation tension zone.

Speckled alder may occur as a monotype in the canopy layer, but alder thicket communities can have a diversity of shrubs including American high-bush cranberry (*Viburnum opulus* var. *americanum*), sweet gale (*Myrica gale*) and common winterberry (*Ilex verticillata*).

The groundlayer typically includes some of the ferns, sedges, grasses and forbs of sedge meadows and fresh (wet) meadows. The diversity of species in the groundlayer is often dependent on degree of shrub canopy cover, degree of disturbance, and water source (e.g., groundwater versus surface runoff from urban or agricultural lands). Stands with 100 percent shrub canopy cover may have a depauperate groundlayer. The example of an alder thicket shown by the photograph is groundwater fed and minimally disturbed resulting in a rich diversity of species in the groundlayer.

Alder thickets provide high quality habitat for ruffed grouse and American woodcock as well as white-tailed deer. Rare, threatened and endangered species use alder thickets including golden-winged warblers, a globally threatened species. Alder thicket communities on the Lake Superior red clay plain of northwestern Wisconsin can include state-listed threatened or special concern species such as sweet coltsfoot (*Petasites sagittatus*) and small yellow water crowfoot (*Ranunculus gmelinii* var. *hookeri*).

Alder thickets provide important habitat for the most popular upland gamebird in Minnesota and Wisconsin - ruffed grouse.

Alder Thickets

© Steve D. Eggers

VEGETATION: As shown by the photograph, "thicket" is an accurate description of this community dominated by speckled alder (*Alnus incana* ssp. *rugosa*). Non-dominant shrubs include common winterberry (*Ilex verticillata*), common elderberry (*Sambucus nigra*), meadowsweet (*Spiraea alba*) and steeplebush (*Spiraea tomentosa*). Skunk cabbage (*Symplocarpus foetidus*), jewelweed (*Impatiens capensis*) and cinnamon fern (*Osmundastrum cinnamomeum*) dominate the groundlayer which also includes Canada blue-joint grass (*Calamagrostis canadensis*), rattlesnake manna grass (*Glyceria canadensis*), silvery sedge (*Carex canescens*), hummock sedge (*Carex stricta*), stalk-grain sedge (*Carex stipata*), sensitive fern (*Onoclea sensibilis*), crested shield fern (*Dryopteris cristata)*, marsh marigold (*Caltha palustris*), arrow-leaf tearthumb (*Persicaria sagittata*), swamp dewberry (*Rubus hispidus*), marsh blue violet (*Viola cucullata*), northern white violet (*Viola macloskeyi*) and small patches of sphagnum moss (*Sphagnum* sp.). Bog bluegrass (*Poa paludigena*), a species listed as threatened by the State of Wisconsin, occurs in this habitat.

SOILS: Dawson peat (Terric Haplosaprists), a very poorly-drained soil on floodplains or lake basins with an organic layer between 16 and 51 inches in depth underlain by acidic, sandy material. Dawson soils are typically saturated to the surface and may have as much as 6 inches of standing water after spring snowmelt and heavy rainfall events.

HYDROLOGY: Groundwater discharge (seepages). A small, groundwater fed, perennial stream flows through this alder thicket.

LOCATION: Fort McCoy Military Reservation, Monroe County, Wisconsin.

SPECKLED ALDER

(*Alnus incana* ssp. *rugosa* (L.) Moench)

BIRCH FAMILY (Betulaceae) **C of C:** Native (4 WI)(3 MN) **IND. STATUS:** FACW

SYNONYM: *Alnus rugosa* (Du Roi) Sprengel

FIELD CHARACTERISTICS: A deciduous shrub or small tree occasionally reaching 10 m. in height. Leaves are alternate, simple, serrate to doubly serrate, and ovate to oval. Undersides of leaves are pale green or have a thin, waxy coating. Leaves are often hairy above with hairy veins beneath. Main leaves have 9-12 pairs of lateral veins. Twigs have sessile, woody, cone-like, pistillate catkins. Staminate catkins are pendulous and usually clustered. Over winter, both types of catkins are conspicuous: last growing season's pistillate catkins and the new staminate catkins that will flower in spring.

ECOLOGICAL NOTES: Speckled alder, or tag alder, is the dominant in alder thickets of Minnesota and Wisconsin, and also is common in bogs and coniferous swamps on acidic soils. It occurs primarily in and north of the vegetation tension zone. Speckled alder is an important wildlife food plant, especially for beaver and white-tailed deer.

SOURCE: Gleason and Cronquist (1991), Swink and Wilhelm (1994); and Voss (1985).

COMMON ELDERBERRY

(*Sambucus nigra* L.)

HONEYSUCKLE FAMILY (Caprifoliaceae) **C of C:** Native (3) **IND. STATUS:** FAC(GP) FACW(NC/NE, MW)

SYNONYM: *Sambucus canadensis* L.

FIELD CHARACTERISTICS: An erect, coarse, deciduous shrub, usually up to 3 m. high. The light brown or gray stems are stout, but very weak and brittle because of a large pith, which is white. Opposite, pinnately compound leaves have 5-7 lanceolate to ovate leaflets with serrate margins. Inflorescence is 5-rayed from the base, umbel-like, flat-topped, and wider than long. Flowers are white. The 3-seeded fruit is a small, purple-black berry. In flower June-August. Red elderberry (*S. racemosa*) is similar but has brown pith, a panicle-like inflorescence and red berries (**warning**: berries may be toxic to humans if consumed without adequate preparation [source: USDA Plant Fact Sheet]).

ECOLOGICAL NOTES: Common elderberry is frequent in shrub swamps, wooded swamps and roadside ditches. It may form dense thickets. Berries are eaten by songbirds and ruffed grouse and can be used to make wine or jam.

SOURCE: Gleason and Cronquist (1991); and Swink and Wilhelm (1994).

DWARF RED RASPBERRY

(*Rubus pubescens* Raf.)

ROSE FAMILY (Rosaceae) **C of C:** Native (7 WI)(6 MN) **IND. STATUS:** FACW

FIELD CHARACTERISTICS: A low growing shrub with annual or partially biennial stems that are hairy but lack bristles, spines or glands. Sterile stems are trailing, rooting at the nodes and tips, and grow to 2.8 m. long. Fertile stems grow erect to 30 cm. tall. Leaves consist of 3 leaflets. The central leaflet has a short petiole and is 3-8 cm. long and 2-5 cm. wide. Flowers are borne singly or in a loose cluster of 2-4. Petals are whitish to pinkish and 4-8 mm. long. In flower mid-May to June. Fruit is an aggregate of red to dark red drupelets 5-12 mm. in diameter that matures in late June to early August.

ECOLOGICAL NOTES: Dwarf red raspberry is frequently encountered in a variety of habitats including coniferous swamps, coniferous bogs, hardwood swamps, shrub swamps, sedge meadows and even calcareous fens. To a lesser extent it also occurs in upland forests.

SOURCE: Gleason and Cronquist (1991); Chadde (2002); and Smith (2008).

AMERICAN RED RASPBERRY

(*Rubus idaeus* L. var. *strigosus* (Michx.) Maxim.)

ROSE FAMILY (Rosaceae) **C of C:** Native (3) **IND. STATUS:** FAC(NC/NE); FACU(MW, GP)

SYNONYM: *Rubus strigosus* Michx.

FIELD CHARACTERISTICS: A low-growing shrub with stems up to 2 m., erect, arching (sometimes prostrate), sparsely to densely covered with slender-based prickles and stiff bristles. Flower stalks and leaf stalks of younger foliage have gland-tipped bristles (use a 10x lens, these look like a stalk with a ball on the end). Leaves are compound with 3-5 leaflets, green above and strongly whitened beneath. Flowers are white to greenish white, blooming in May. Mature fruit is red and about 1 cm. wide.

The European red raspberry (*Rubus idaeus* L. var. *idaeus*) is similar, but glandless. It sometimes escapes from gardens, but typically does not persist in the wild (Swink and Wilhelm 1994).

Black raspberry (*Rubus occidentalis* L.) also has strongly-whitened leaf undersides, but has glandless, broad-based prickles or thorns, glaucous stems, and the mature fruit is purple-black.

ECOLOGICAL NOTES: American red raspberry is frequent along the edges of wooded and shrub swamps, as well as bogs. It is especially common following logging, burning or other disturbances.

SOURCE: Gleason and Cronquist (1991); Swink and Wilhelm (1994); and Voss (1985).

Note the gland-tipped bristles on the pedicel and petioles.

American Red Raspberry

(*Rubus idaeus* L. var. *strigosus*)

SENSITIVE FERN

(*Onoclea sensibilis* L.)

WOOD FERN FAMILY (Dryopteridaceae) **C of C:** Native (4 MN)(5 WI) **IND. STATUS:** FACW

FIELD CHARACTERISTICS: This colonial fern produces very dissimilar sterile and fertile fronds. Sterile fronds (leaves) are up to about 60 cm. tall, deciduous (very sensitive to frost), 18-40 cm. x 15-35 cm., leathery, light to medium green in color, and simple. The deeply pinnatifid leaflets occur as 8-12 paired segments, 1.5-5 cm. wide, with characteristic net venation. The upper side of the leaflet is smooth and the bottom side has scattered white hairs, usually on the veins. The rachis is broadly winged as are the upper leaflets. Fertile fronds are produced beginning in midsummer, turn dark brown at maturity and persist through winter. They grow to about 30 cm. tall and are upright with many short leaflets that form small, inrolled bead-like divisions (pinnules). These divisions contain the spore cases. A mass of pale red fiddle-heads forms in spring.

ECOLOGICAL NOTES: Sensitive fern primarily occurs in wooded swamps, alder thickets and shrub-carrs, particularly near their borders. It also occurs in marshes and along edges of shaded ponds.

SOURCE: Gleason and Cronquist (1991); and Tryon (1980).

INTERRUPTED FERN

(*Osmunda claytoniana* L.)

ROYAL FERN FAMILY (Osmundaceae) **C of C:** Native (6) **IND. STATUS:** FAC

FIELD CHARACTERISTICS: A clumped, perennial fern to 1 m. or more in height. Blades are 40-100 cm. long and 15-30 cm. wide. The stipe is covered with woolly hairs when young, becoming glabrous with age. Fertile fronds are "interrupted" in that the upper and lower portions of the blade are sterile (green) while the middle portion is fertile (brownish due to fertile pinnae). Fertile pinnae soon whither and are less conspicuous during the latter half of the growing season.

ECOLOGICAL NOTES: Interrupted fern is frequent in hardwood swamps, alder thickets, edges of sedge meadows, and upland forests. It occurs in drier habitats more often than the related cinnamon fern (*Osmundastrum cinnamomeum* - FACW) and royal fern (*Osmunda spectabilis* - OBL).

SOURCE: Gleason and Cronquist (1991); and Chadde (2002).

NORTHERN WHITE VIOLET

(*Viola macloskeyi* Lloyd)

VIOLET FAMILY (Violaceae) **C of C:** Native (7) **IND. STATUS**: OBL(NC/NE, MW) FACW(GP)

FIELD CHARACTERISTICS: A small, perennial herb spreading by rhizomes or stolons. Leaves all arise from the base and are heart-shaped to kidney-shaped, 1-3 cm. wide at flowering, later growing to 8 cm. wide. White flowers are on upright petioles equal to or longer than the leaves. The lower 3 petals are purple veined near the base. The upper 2 petals are only slightly (or not at all) recurved, not twisted. Lateral petals are beardless or with sparse hairs. Fruit is a green capsule 4-6 mm. long. In flower April-June.

ECOLOGICAL NOTES: Northern white violet occurs in alder thickets, coniferous swamps and sedge meadows, particularly where groundwater discharges (e.g., springs, seeps) occur. Voss (1985) notes that it also occurs in bogs on *Sphagnum* hummocks.

SOURCE: Gleason and Cronquist (1991); Chadde (2002); and Voss (1985).

ROUGH BEDSTRAW

(*Galium asprellum* Michx.)

MADDER FAMILY (Rubiaceae) **C of C:** Native (6 MN)(7 WI) **IND. STATUS:** OBL

FIELD CHARACTERISTICS: A perennial herb spreading or reclining on other plants and much branched to 2 m. long. Stems are 4-angled and rough on the angles with downward-pointing (retrorse) barbs that cling to clothing. Leaves are 6-whorled on the stem and 4-5 whorled on the branches. The narrowly oval leaves are widest above the middle, 1-2 cm. long and 4-6 mm. wide, with a sharp tip. The underside midvein and leaf margins are lined with barbs. Inflorescence consists of loosely arranged, few-flowered clusters that are both terminal and axillary. Flowers have 4 white petals that are 3 mm. long. Fruit is round and smooth. In flower May-August.

ECOLOGICAL NOTES: Rough bedstraw reaches it highest presence in alder thickets (Curtis 1971) and is also a common species of marshes, hardwood swamps, inland fresh meadows and streambanks.

SOURCE: Curtis (1971); Gleason and Cronquist (1991); Chadde (2002); and Black and Judziewicz (2009).

This page intentionally left blank.

SECTION 3

Wooded Swamps

VI. Wooded Swamps

Wooded swamps are forested wetlands dominated by mature conifers and/or lowland hardwoods. They are usually associated with ancient lake basins and retired riverine oxbows. Wooded swamps include the northern wet-mesic forest and the southern wet and wet-mesic forest associations described by Curtis (1971).

Wooded swamps provide a multitude of important functions. Multiple strata (tree, sapling, shrub, vine, herbaceous) provide a high diversity of habitats for a wide range of wildlife species including white-tailed deer, furbearers, songbirds, ruffed grouse, barred owl and amphibians. The flora is also diverse and reflects the water regime, soil/water chemistry and microtopography present. Habitat for threatened or endangered species is provided by some wooded swamps. Water quality and floodwater storage functions are provided as well. Large, relatively intact wooded swamps still remain in northern Minnesota and Wisconsin. They often exist within complexes of other wetland types and forested uplands that provide these functions on a watershed scale.

Wooded swamps of Minnesota and Wisconsin are divided into two types depending on whether the dominant trees are conifers or hardwoods.

VI.A. Hardwood Swamps

Hardwood swamps are dominated by deciduous hardwood trees with soils that are saturated during much of the growing season, and may be temporarily inundated by as much as a foot of standing water, which usually occurs in microdepressions (Shaw and Fredine 1971). Hummocky microtopography is a frequent trait. Dominant trees include black ash, red maple, yellow birch, balsam poplar, quaking aspen and, south of the vegetation tension zone, silver maple. Northern white cedar can be a sub-dominant species in stands within and north of the vegetation tension zone. American elm is still an important component of this community, although its numbers have been drastically reduced by Dutch elm disease. Soils are often peats or mucks, but also include hydric mineral soils. The key for this Third Edition was revised to include a "vernal pool subtype" of hardwood swamps. These consist of depressions within upland forests that are ponded early in the growing season, and then dry down for the majority of the growing season. The herb layer may be sparse to absent given the alternating periods of ponding and drawdown.

The shrub layer of hardwood swamps is often composed of shrub-sized individuals of the dominant tree species, as well as the dogwoods, willows, viburnums and alder species of shrub swamps. Groundlayer species include some of the ferns, sedges, grasses and forbs of sedge meadows and fresh (wet) meadows.

VEGETATION: This hardwood swamp is dominated by black ash (*Fraxinus nigra*). Scattered tree size yellow birch (*Betula alleghaniensis*) and red maple (*Acer rubrum*) are present. The shrub layer is sparse and consists of the aforementioned tree species as well as speckled alder (*Alnus incana* ssp. *rugosa*) and American black currant (*Ribes americanum*). Groundlayer species include common hop sedge (*Carex lupulina*), Tuckerman's sedge (*Carex tuckermanii*), stalk-grain sedge (*Carex stipata*), lake sedge (*Carex lacustris*), drooping wood-reed (*Cinna latifolia*), fowl manna grass (*Glyceria striata*), sensitive fern (*Onoclea sensibilis*), cinnamon fern (*Osmundastrum cinnamomeum*), jack-in-the-pulpit (*Arisaema triphyllum*), giant goldenrod (*Solidago gigantea*), redstem aster (*Symphyotrichum puniceum*), water parsnip (*Sium suave*), bristly buttercup (*Ranunculus pensylvanicus*) and jewelweed (*Impatiens capensis*).

SOILS: Seelyeville and Palms mucks (Typic Haplosaprists and Terric Haplosaprists, respectively), very poorly-drained mucks with an organic layer 16 to 51 inches in depth (Palms) or greater than 51 inches in depth (Seelyeville) over mineral soils.

HYDROLOGY: Seelyeville and Palms mucks are typically saturated to the surface and may have up to 12 inches of standing water. Microtopography in the form of hummocks and depressions (visible in the photograph) is typical of many black ash swamps. During dry years, and the late growing season of normal years, standing water in the microdepressions is usually absent. The above photograph was taken in early August after a period of wetter than normal precipitation. Microdepressional areas had water depths up to 12 inches.

LOCATION: Mille Lacs Kathio State Park, Aitkin County, Minnesota.

BLACK ASH

(*Fraxinus nigra* Marsh.)

OLIVE FAMILY (Oleaceae) **C of C:** Native (8 WI)(6 MN) **IND. STATUS:** FACW

FIELD CHARACTERISTICS: A deciduous tree growing to 33 m. in height and 84 cm. dbh. Leaves are opposite and compound. Leaflets number 7-11 and are 5-5.4 cm. long, toothed and sessile. Leaf scars are nearly circular. Branches are circular, or nearly so, and smooth. The bark is furrowed to scaly. Fruit is a flat samara, winged to the base and blunt on both ends. In flower during May.

The circular (or nearly so) branches distinguish *F. nigra* from the 4-sided branches of blue ash (*F. quadrangulata*). The nearly circular leaf scars, sessile leaflets, and flat samaras winged to the base of *F. nigra* distinguish it from the half circle leaf scars, slightly petioled leaflets, and wedge-shaped samaras with a flat wing, of green ash (*F. pennsylvanica*).

ECOLOGICAL NOTES: Black ash is a dominant species of hardwood swamps and also occurs as a non-dominant in coniferous swamps.

SOURCE: Gleason and Cronquist (1991); Smith (2008); and Swink and Wilhelm (1994).

RED MAPLE

(*Acer rubrum* L.)

MAPLE FAMILY (Aceraceae) **C of C:** Native (3) **IND. STATUS:** FAC

FIELD CHARACTERISTICS: A deciduous tree growing to 29 m. in height and 64 cm. dbh. Leaves are opposite and shallowly 3-(to 5-) lobed with the lobes cut less than halfway to the base of the blade. Leaves are 0.8-3.2 cm. broad, green above and whitened below, turning bright red to yellow in autumn. Petioles are usually red, at least on one side. Bark is smooth and gray in young trees, becoming broken and darker with age. Twigs and buds are reddish, and flowers and young samaras are bright red. The fruit is a winged samara 1.5-2.5 cm. long. In flower April-May.

Red maple (*Acer rubrum*) can be distinguished from silver maple (*A. saccharinum*) by its shallowly lobed leaves, wide base of the leaves, and smoother bark, versus the deeply lobed leaves with narrow leaf bases and flaking bark of *A. saccharinum*.

ECOLOGICAL NOTES: Red maple is commonly found in wooded swamps and can be a dominant in logged or burned swamps. However, it is a facultative species found growing on poor soils of both upland and wetland habitats.

SOURCE: Fernald (1970); Smith (2008); and Swink and Wilhelm (1994).

YELLOW BIRCH

(*Betula alleghaniensis* Britt.)

BIRCH FAMILY (Betulaceae) **C of C:** Native (7) **IND. STATUS:** FAC(NC/NE, MW); FACU(GP)

SYNONYM: *B. lutea* Michx.

FIELD CHARACTERISTICS: A deciduous tree growing to 28 m. in height and 120 cm. dbh. Mature trees have peeling bark that ranges from yellow to dark brown to black. The crushed bark of young twigs has a characteristic odor and flavor of wintergreen. Leaves are alternate, serrate, 6-10 cm. long, and range from lance-ovate to somewhat obovate. Leaves have 6-12 pairs of lateral veins and are rounded or somewhat heart-shaped at the base. Catkins are 2-3 cm. long. Pistillate catkins are cone-like and disintegrate when ripe. Staminate catkins form in summer and open the following spring. In flower during April and May.

This birch can be distinguished from river birch (*B. nigra*) [page 401] because the latter lacks the wintergreen flavor, and has leaves that are paler beneath and are both doubly serrate and shallowly lobed.

ECOLOGICAL NOTES: Yellow birch is found in wooded swamps, as well as upland forests, primarily north of the vegetation tension zone.

SOURCE: Gleason and Cronquist (1991); Smith (2008); and Voss (1985).


Pistillate catkins


© Photos by Steve D. Eggers

BALSAM POPLAR

(*Populus balsamifera* L.)

WILLOW FAMILY (Salicaceae) **C of C:** Native (4) **IND. STATUS:** FACW

FIELD CHARACTERISTICS: A deciduous tree growing to 25 m. in height and 64 cm. dbh. Young bark is smooth then becomes dark gray and furrowed with age. Leaves are ovate, 8-13 cm. long and 4-7 cm. wide, tapering to a long tip while rounded to heart-shaped at the base. Leaf color is dark green above and white-green below with many brownish resin stains. Leaf buds have a fragrant balsam scent and are extremely sticky due to resin. Catkins appear in April-May. Pistillate catkins are 10-13 cm. long. Mature capsules are 6-8 mm. long.

ECOLOGICAL NOTES: Balsam poplar is common in hardwood swamps and shrub-carrs, particularly north of the vegetation tension zone. It occasionally occurs in mesic (upland) forests.

SOURCE: Gleason and Cronquist (1991); Smith (2008); Swink and Wilhelm (1994); Chadde (2002); and Voss (1996).

QUAKING ASPEN

(*Populus tremuloides* Michx.)

WILLOW FAMILY (Salicaceae) **C of C:** Native (2) **IND. STATUS:** FAC

FIELD CHARACTERISTICS: A deciduous tree growing to a height of 32 m. and 67 cm. dbh. The ovate to nearly cordate leaves are alternate, simple, darker green above and paler below with small regular teeth. Leaves are attached by a long (2.5-6.0 cm.) flattened petiole. Bark is smooth and whitish-gray to greenish-white becoming darker and furrowed with age. Sexes are separate. Pistillate catkins are up to 10 cm. long.

ECOLOGICAL NOTES: Quaking aspen, also known as popple, has the widest distribution of any tree in North America. It prefers wet to moist, calcareous soils where it can form large colonies from an extensive rhizome system. Quaking aspen is a fast growing, pioneering species of sites disturbed by logging, fire or drainage and often invades abandoned agricultural lands and vacant urban lands. It is a critical food source for beaver and ruffed grouse.

SOURCE: Gleason and Cronquist (1991); Fassett (1976); and Elias (1980).

Quaking aspen is a facultative species that can thrive in wet to dry habitats. Here quaking aspen is growing in the very wet conditions of a hardwood swamp following logging of black ash trees.

A comparison of the terminal buds of quaking aspen (left) and balsam poplar (right).

NANNYBERRY

(*Viburnum lentago* L.)

HONEYSUCKLE FAMILY (Caprifoliaceae) **C of C:** Native (4) **IND. STATUS:** FACU (GP) FAC(NC/NE, MW)

FIELD CHARACTERISTICS: A tall, deciduous shrub with erect stems to 10 m. Leaves are opposite, unlobed, oval to oblong and 5-10 cm. long by 3.5-6 cm. wide. The upper leaf surface is dark green and glabrous, while the lower surface is a pale green. Leaves taper to a long slender tip and the margins are finely serrated. Petioles are 1-3 cm. long, with irregularly winged margins. The many flowers are arranged in sessile cymes 5-10 cm. wide. Flowers are typically white. Berry-like fruits (drupes) are blue-black and hang in clusters. The stone is flat. In flower in June.

ECOLOGICAL NOTES: Nannyberry is common in shrub-carrs and hardwood swamps, floodplains, streambanks and pond margins. It also occurs in mesic (upland) deciduous forests.

SOURCE: Gleason and Cronquist (1991); Smith (2008); Swink and Wilhelm (1994); and Voss (1996).

Fruit matures in late August to late September, often persisting through winter.

Characteristic elongated terminal bud

Nannyberry

(*Viburnum lentago*)

COMMON WINTERBERRY

(*Ilex verticillata* (L.) Gray)

HOLLY FAMILY (Aquifoliaceae) **C of C:** Native (6 MN)(7 WI) **IND. STATUS:** FACW

FIELD CHARACTERISTICS: An erect shrub with multiple stems to 5 m. The thin, deciduous leaves are alternate; broadly egg-shaped, with an abrupt, acute point; and 5-10 cm. long by 2-4.5 cm. wide. Upper leaf surface are dull, dark green with sunken veins while lower leaf surfaces are pale green with protruding veins giving it a quilted appearance. Flowers occur in axillary (angle where the leaf joins the stem) clusters and have pale, whitish petals that are united at their base. Pedicels are 1- 2 mm. long. The conspicuous bright red berries (actually drupes) are persistent, 5-8 mm. in diameter, and have thick, bony nutlets that are smooth on their backs. In flower mid-June to early July.

ECOLOGICAL NOTES: Common winterberry is typically found in hardwood swamps, coniferous swamps and coniferous bogs. It is also found growing along the margins of marshes and ponds, and on lakeshores.

SOURCE: Crow and Hellquist (2000); Gleason and Cronquist (1991); Smith (2008); Swink and Wilhelm (1994); and Voss (1985).

AMERICAN BLACK CURRANT

(*Ribes americanum* P. Mill.)

GOOSEBERRY FAMILY (Grossulariaceae) **C of C:** Native (4) **IND. STATUS:** FACW

FIELD CHARACTERISTICS: An erect shrub with unarmed stems to 2.5 m. in length. Leaves are palmately 3-5 lobed, alternate, and 2.5-5 cm. long with conspicuous yellow, dot-like glands. Leaf bottoms are sparsely pubescent with minute hairs. Leaf margins are sharply serrated. Flowers are many and arranged in drooping racemes. Sepals are greenish and petals are white to yellowish. The bracts (a specialized leaf subtending the flower at the base of each flower) are longer than their pedicels. Fruits are a black, glabrous (not prickly) berry 6-10 mm. in diameter, maturing by early July to late August. In flower in early May to mid-June.

ECOLOGICAL NOTES: American black currant is a common species of hardwood swamps and also occurs in floodplain forests, cedar swamps and calcareous, springy sites. It is the most common and widespread currant in Minnesota.

SOURCE: Fassett (1976); Gleason and Cronquist (1991); Smith (2008); Swink and Wilhelm (1994); and Voss (1985).

MOUNTAIN MAPLE

(*Acer spicatum* Lam.)

MAPLE FAMILY (Aceraceae) **C of C:** Native (5 MN)(6 WI) **IND. STATUS:** FACU

FIELD CHARACTERISTICS: A tall, deciduous shrub or clumped small tree growing to a height of 7 m. and a dbh of 8 cm. Leaves are opposite with essentially three shallow lobes, 8-12 cm. long, yellowish-green above and paler with soft hairs below. Leaf margins are coarsely and irregularly serrated. Petioles are 3-11 cm. long and have minute hairs. Distinctive five-parted flowers occur in slender upright clusters of 2-4. Flowers are long-stalked panicles, 3-8 cm. long. Petals are greenish to pale yellow. Seeds are dry, winged, conspicuously veined in a net-like pattern, and 1.2-2.8 cm. long.

Mountain maple retains its hanging seeds into late summer or autumn.

ECOLOGICAL NOTES: Mountain maple is a northern species of cool habitats, often growing in shade. It is occasionally found in conifer swamps and hardwood swamps and is common in mesic upland forests and shrub communities.

SOURCE: Gleason and Cronquist (1991); Smith (2008); and Voss (1985).

AMERICAN HIGH-BUSH CRANBERRY

(*Viburnum opulus* L. var. *americanum* Ait.)

HONEYSUCKLE FAMILY (Caprifoliaceae) **IND. STATUS:** FACW(NC/NE);FAC(MW, GP)

C of C: Native (5 MN)(6 WI)

SYNONYM: *Viburnum trilobum* Marsh.

FIELD CHARACTERISTICS: A tall, deciduous shrub with erect stems to 5 m. Leaves are opposite, palmately three-lobed and 5-12 cm. long by 5-11 cm. wide. Upper leaf surfaces are distinctly hairy with coarsely toothed margins. Leaf petioles are 1-3.5 cm. long with prominent, large glands. These stalked glands are higher than wide and club-shaped with an essentially convex surface. Flowers are white and arranged in cymes 5-10 cm. wide. The larger, sterile flowers encircle a set of smaller, fertile flowers. The fruit is a red (orange) berry (drupe) with a flat stone. Blooms in June.

Our native variety is readily distinguished from the non-native European variety (*V. opulus* L. var. *opulus*) which has glands on the petioles that are wider than high, saucer-shaped (concave) structures. The upper leaf surfaces of the European variety are also glabrous.

ECOLOGICAL NOTES: American high-bush cranberry occurs in shrub-carrs, tamarack swamps, wet shores and streambanks. The fruits are sweeter than the more bitter European variety.

SOURCE: Gleason and Cronquist (1991); Smith (2008); Swink and Wilhelm (1994); and Voss (1996).

BLACK CHOKEBERRY

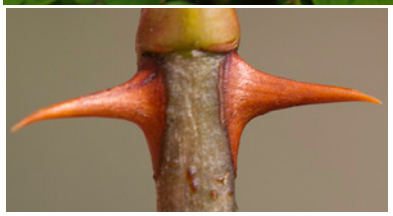
(*Aronia melanocarpa* (Michx.) Ell.)

ROSE FAMILY (Rosaceae) **C of C:** Native (7) **IND. STATUS:** FAC(NC/NE); FACW(MW); OBL(GP)

FIELD CHARACTERISTICS: A deciduous shrub 1-2.5 m. in height with twigs initially greenish but becoming brown to reddish brown after the first year. Leaves are alternate, oval or obovate, 3-8 cm. long and 1-4 cm. wide, the upper surface dark green and smooth with a row of dark glands along the midvein. Lower surface is paler, smooth or hairy. Leaf margins are serrate with black glands at the tip. White flowers are 5-10 mm. wide in clusters of 5-15. Fruit is a dark purple, berry-like pome 5-10 mm. wide. In flower May-June.

ECOLOGICAL NOTES: Black chokeberry prefers acidic peaty or sandy soils of hardwood swamps, tamarack swamps, shrub swamps and open bogs. Smith (2008) advises that if one is tempted to eat the berries, consider the common name.

SOURCE: Gleason and Cronquist (1991); Chadde (2002); and Smith (2008).



SWAMP ROSE

(*Rosa palustris* Marsh.)

ROSE FAMILY (Rosaceae) **C of C:** Native (7) **IND. STATUS:** OBL

FIELD CHARACTERISTICS: A much branched shrub to 2 m. in height with a pair of stout, curved prickles 3-6 mm. long located below each leaf node. Leaflets usually number 7 and are 2-6 cm. long and 1-2 cm. wide, finely serrate, the teeth typically less than 2 mm. wide. Flowers are pink, 2-3 cm. wide, solitary or in small corymbs. Pedicels and hypanthium have stalked glands (stipitate-glandular) (visible in photograph). Hips are red and 7-12 mm. thick with gland-tipped hairs. In flower June-July.

ECOLOGICAL NOTES: True to its name, swamp rose is found in hardwood swamps and conifer swamps as well as bogs, marshes and along streambanks. Its range includes Wisconsin east to the East Coast and south to Florida. It has not been recorded in Minnesota.

SOURCE: Gleason and Cronquist (1991); Chadde (2002); and Smith (2008).

JEWELWEED

(*Impatiens capensis* Meerb.)

TOUCH-ME-NOT FAMILY (Balsaminaceae) **C of C:** Native (2) **IND. STATUS:** FACW

SYNONYM: *Impatiens biflora* Willd.

FIELD CHARACTERISTICS: An annual herb with a succulent, smooth stem that grows to a height of 50-150 cm. Leaves are alternate, finely toothed, and 3-10 cm. long on petioles about 2.5 cm. in length. Flowers are pendent, conical, 2-3 cm. long, with a spur 8 mm. long and curved forward. Flowers are usually orange-yellow with brown or reddish spots. The mouth of the flower is half as wide as the flower is long. Fruit is a capsule that, when mature, pops open at the slightest touch (which gives this plant another common name, touch-me-not). In flower June-September.

ECOLOGICAL NOTES: Jewelweed is found in a wide variety of wetland habitats including floodplain forests, shrub-carrs, fresh (wet) meadows, wooded swamps, and along streambanks and springs. It occasionally occurs in upland woods. Crushing the stem and rubbing the juice on the skin is said to alleviate the symptoms of poison ivy (*Toxicodendron* spp.) and nettle (Urticaceae) stings.

SOURCE: Gleason and Cronquist (1991); Swink and Wilhelm (1994); and Voss (1985).

YELLOW TOUCH-ME-NOT

(*Impatiens pallida* Nutt.)

TOUCH-ME-NOT FAMILY (Balsaminaceae) **IND. STATUS:** FACW

C of C: Native (5 MN)(6 WI)

FIELD CHARACTERISTICS: An annual herb very similar to jewelweed (*I. capensis*) except larger with pale yellow flowers 2.5-4 cm. long with reddish-brown dots. The spur is curved at a right angle to the sac and is one-fourth the length of the sac. Stems are succulent and smooth. Leaves are alternate, up to 12 cm. long and 8 cm. wide., and more finely serrated than those of jewelweed. In flower July-September.

ECOLOGICAL NOTES: Yellow touch-me-not is not nearly as common as jewelweed. It is found in floodplain forests, shrub-carrs, wooded swamps, and along streambanks and springs.

SOURCE: Gleason and Cronquist (1991); and Chadde (2002).

MARSH MARIGOLD

(*Caltha palustris* L.)

BUTTERCUP FAMILY (Ranunculaceae) **C of C:** Native (6) **IND. STATUS:** OBL

FIELD CHARACTERISTICS: A perennial herb with hollow stems 20-60 cm. long. Flowers are 1.5-4 cm. wide, golden yellow, with 5-9 petal-like sepals, and 4 to many pistils surrounded by many stamens. Leaves are heart-shaped or kidney-shaped, entire or toothed, and 3-20 cm. in diameter. Fruit is a follicle 1-1.5 cm. long with a pronounced beak. In flower April-May.

ECOLOGICAL NOTES: Marsh marigold, also known as cowslip, is found in sedge meadows, fresh (wet) meadows, hardwood swamps, shrub swamps, shallow marshes and along streambanks, especially in areas of groundwater discharge (springy areas). It is one of our first wildflowers to bloom in spring.

SOURCE: Fernald (1970); and Gleason and Cronquist (1991).

SKUNK CABBAGE

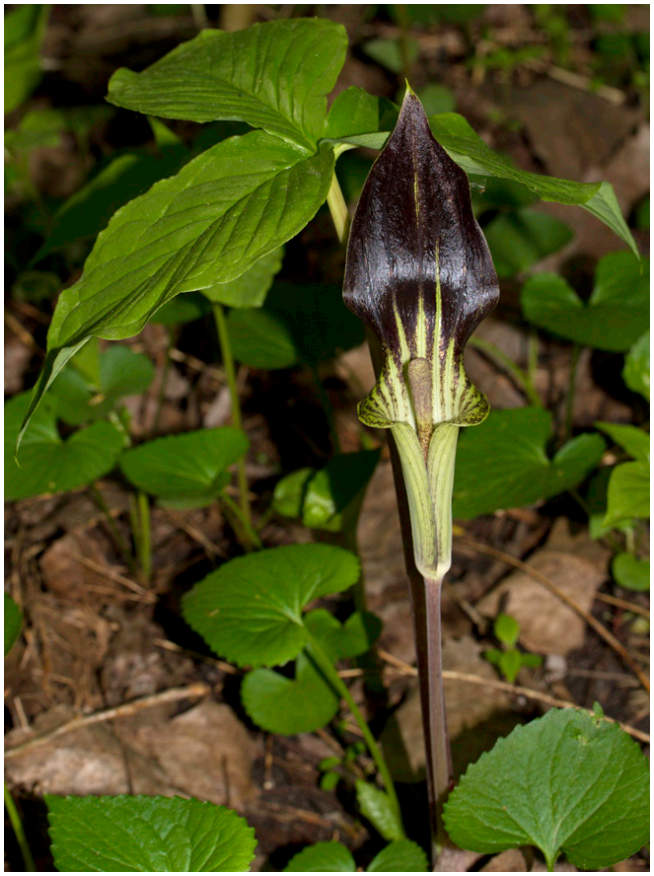
(*Symplocarpus foetidus* (L.) Salisb. ex Nutt.)

ARUM FAMILY (Araceae) **C of C:** Native (8) **IND. STATUS:** OBL

FIELD CHARACTERISTICS: A low, coarse, perennial herb with a thick rhizome. The spathe is 8-15 cm. high, sessile, egg-shaped, and mottled with purple and green. The spadix is spherical or football-shaped with many densely-packed flowers. Basal leaves are huge (to 30-60 cm.), ovate, and heart-shaped at the base, emerging after the spathe. In flower March-May.

ECOLOGICAL NOTES: Skunk cabbage is found in wooded swamps and shrub swamps and is good indicator of groundwater discharge (springy areas). As the name implies, skunk cabbage has a strong skunk- or garlic-like odor. It is our earliest herbaceous "wildflower" to bloom in spring, sometimes emerging through snow.

SOURCE: Fernald (1970); Gleason and Cronquist (1991); and Voss (1972).



JACK-IN-THE-PULPIT

(*Arisaema triphyllum* (L.) Schott)

ARUM FAMILY (Araceae) **C of C:** Native (4 MN)(5 WI) **IND. STATUS:** FACW(MW) FAC(NC/NE, GP)

FIELD CHARACTERISTICS: A perennial herb with stems 30-100 cm. in height. Usually 2 leaves are produced each divided into 3 leaflets, the terminal leaflet oval to ovate while lateral leaflets are often asymmetrical. Leaves are on long petioles that are 30-60 cm. long at flowering time, later to as much as 150 cm. in length. Flowers are unisexual and usually borne on separate plants on a peduncle 3-20 cm. long. Flowers are located at the base of a cylindric spadix subtended by a green, purple-striped spathe that arches over the spadix (spathe was folded back by photographer to show both spathe and spadix). Fruit is a cluster of bright red berries. In flower April-July.

ECOLOGICAL NOTES: Jack-in-the-pulpit is a common herb of floodplain forests, hardwood swamps, coniferous swamps, shrub-carrs and rich, mesic (upland) forests.

SOURCE: Gleason and Cronquist (1991); and Chadde (2002).

LAKE HURON GREEN ORCHID

(*Platanthera huronensis* (Nutt.) Lindl.)

ORCHID FAMILY (Orchidaceae) **C of C:** Native (5 MN)(7 WI) **IND. STATUS:** OBL(GP) FACW(NC/NE, MW)

SYNONYMS: *Habenaria hyperborea* (L.) R. Br.; *Platanthera hyperborea* (L.)

FIELD CHARACTERISTICS: A perennial herb 20-100 cm. in height. The 2-7 principal leaves are oblong to linear to narrowly elliptical, and are 5-30 cm. long and 1-7 cm. wide. Inflorescence is a raceme 4-25 cm. long consisting of tightly packed, whitish-greenish flowers. The lip is 5-12 mm. long x 2-4 mm. wide while the spur is 4-12 mm. long. In flower mid-June to mid-August.

ECOLOGICAL NOTES: Lake Huron green orchid is a common species found in a variety of habitats including coniferous bogs, coniferous swamps, hardwood swamps, shrub swamps, sedge meadows and fens.

SOURCE: Gleason and Cronquist (1991); Chadde (2002); and Smith (1993).

PURPLE-FRINGED ORCHIS

(*Platanthera psycodes* (L.) Lindl.)

ORCHID FAMILY (Orchidaceae) **C of C:** Native (7) **IND. STATUS:** FACW

SYNONYM: *Habenaria psycodes* (L.) Sprengel

FIELD CHARACTERISTICS: A perennial herb with stout stems 30-100 cm. high. Inflorescence is a cylindrical raceme 5-25 cm. long and 2.5-4.5 cm. thick with many small flowers. Flowers are rose-purple (rarely white) with a deeply three-parted, fringed lip 6-16 mm. broad. Leaves are oval to lanceolate, the largest 2-7 cm. broad. Upper leaves are reduced and narrow. In flower June-August.

ECOLOGICAL NOTES: Purple-fringed orchis occurs in wooded swamps, shrub-carrs, fresh (wet) meadows, sedge meadows and along streambanks. It tends to be more common north of the vegetation tension zone. It can be frequent to common and can even be spotted in road ditches when in bloom. There are similar orchids (*Platanthera* spp.) that have yellow, white, or green flowers.

SOURCE: Smith (1993); Ownbey and Morley (1991); Fernald (1970); Gleason and Cronquist (1991); and Voss (1972).

OSTRICH FERN

(*Matteuccia struthiopteris* (L.) Todaro)

WOOD FERN FAMILY (Dryopteridaceae) **C of C:** Native (5) **IND. STATUS:** FACW(MW, GP) FAC(NC/NE)

FIELD CHARACTERISTICS: A clonal, perennial fern with erect, coarse, stout, leafy crowns growing to a height of 0.5-2(3)m. from black rhizomes that are large and stoloniferous. Fronds are of two types. Sterile fronds are green and pinnate-pinnatifid with a fine pubescence along the rachis, particularly in spring. The alternate pinnae are gradually reduced toward the base of the frond. Fertile fronds are shorter than sterile fronds, brown at maturity, with inrolled pinnae enclosing the sporangia. Fertile fronds are produced between midsummer and early fall and persist through the winter.

ECOLOGICAL NOTES: Ostrich fern is a circumboreal species of hardwood swamps, floodplain forests, and mesic upland forests and thickets. It is often found growing on alluvial deposits. This species typically occurs north of the vegetation tension zone.

SOURCE: Gleason and Cronquist (1991) and Tryon (1980).

A portion of a fertile frond

CINNAMON FERN

(*Osmundastrum cinnamomeum* (L.) K. Presl)

ROYAL FERN FAMILY (Osmundaceae) **C of C:** Native (7) **IND. STATUS:** FACW

SYNONYM: *Osmunda cinnamomea* L.

FIELD CHARACTERISTICS: A clump-forming, perennial fern with a stout rhizome, growing to a height of 60-120(160) cm. Fronds are of two types. Sterile fronds are green, pinnate-pinnatifid, with a tuft of cinnamon-colored hair at the base of the pinnae, and a few hairs along the margins of the segments. Fertile (spore-bearing) fronds are cinnamon-colored and hairy.

Osmundastrum cinnamomeum can be distinguished from the related royal fern (*Osmunda spectabilis*) and interrupted fern (*Osmunda claytoniana*) by the following:

1.A. Fronds bipinnate, fertile portion of fronds, if present, located at the apex……*O. spectabilis*

1.B. Fronds pinnate-pinnatifid; fertile fronds entirely fertile or fertile portion located in the middle of the frond…… 2

2.A. Fertile fronds entirely fertile, soon disappearing; margins of the segments of sterile fronds with a few hairs……*O. cinnamomeum*

2.B. All fronds green and leafy; fertile brown portion, when present, confined to the middle of the frond, soon dropping off……*O. claytoniana*

ECOLOGICAL NOTES: Cinnamon fern is common in wooded swamps, shrub swamps, bogs and along streambanks. Fertile fronds die back by mid-summer and are not readily apparent.

SOURCE: Gleason and Cronquist (1991); and Tryon (1980).

Cinnamon Fern

(*Osmundastrum cinnamomeum*)

Undersides of pinnae illustrating the hook-shaped sori and indusia.

LADY FERN

(*Athyrium angustum* (Willd.) K. Presl)

WOOD FERN FAMILY (Dryopteridaceae) **C of C:** Native (4 MN)(5 WI) **IND. STATUS:** FAC

SYNONYM: *Athyrium filix-femina* (L.) Roth

FIELD CHARACTERISTICS: A perennial, clumped, rhizome-producing fern with mostly bipinnate or bipinnate-pinnatifid blades 40-100 cm. tall and 10-35 cm. wide. Pinnae consist of 20-30 pairs below the pinnatifid tip, the pinnules mostly serrate to deeply parted. Indusia and sori are dark brown and hooked in shape, or less often straight.

ECOLOGICAL NOTES: A very common fern preferring the shaded habitats of hardwood swamps, coniferous swamps, floodplain forests and mesic (upland) forests. For example, lady fern had 90 percent occurrence in "northern wet ash swamps" inventoried in Minnesota (MnDNR 2005).

SOURCE: Gleason and Cronquist (1991) and Tryon (1980).

WOOD HORSETAIL

(*Equisetum sylvaticum* L.)

HORSETAIL FAMILY (Equisetaceae) **C of C:** Native (6 MN)(7 WI) **IND. STATUS:** FACW

FIELD CHARACTERISTICS: Stems are annual and of two types. Fertile stems are initially unbranched and pale, later producing green branches. Sterile stems are 30-70 cm. tall and 1.5-3 mm. wide with a central cavity that is both larger than the outer ring and more than half the diameter of the stem. Stems are branched, the branches commonly branched themselves. Teeth of the sheaths of the main stem are reddish brown.

ECOLOGICAL NOTES: Wood horsetail is a common species typically preferring the shaded habitats of hardwood swamps and shrub swamps.

SOURCE: Gleason and Cronquist (1991); Chadde (2002); and Tryon (1980).

COMMON WOOD-REED

(*Cinna arundinacea* L.)

GRASS FAMILY (Gramineae or Poaceae) **C of C:** Native (5) **IND. STATUS:** FACW

FIELD CHARACTERISTICS: A perennial grass 60-150 cm. tall with weak rhizomes or none. Leaves are 4-12 mm. wide with scabrous margins and a red-brown ligule 3-10 mm. long. Inflorescence is a loose panicle 10-30 cm. long with panicle branches ascending, at least at the base. The one-flowered spikelets are 4.5-7 mm. long.

The very similar drooping wood-reed (*Cinna latifolia*) has shorter spikelets (2.5-4 mm. long) and a more open, spreading to drooping panicle.

ECOLOGICAL NOTES: Common wood-reed is frequent in hardwood swamps, usually scattered, not forming dense stands.

SOURCE: Gleason and Cronquist (1991); Swink and Wilhelm (1994); Chadde (2002); and Voss (1972).

Illustration from Hitchcock (1950)

Common Wood-Reed
(*Cinna arundinacea*)

FRINGED SEDGE

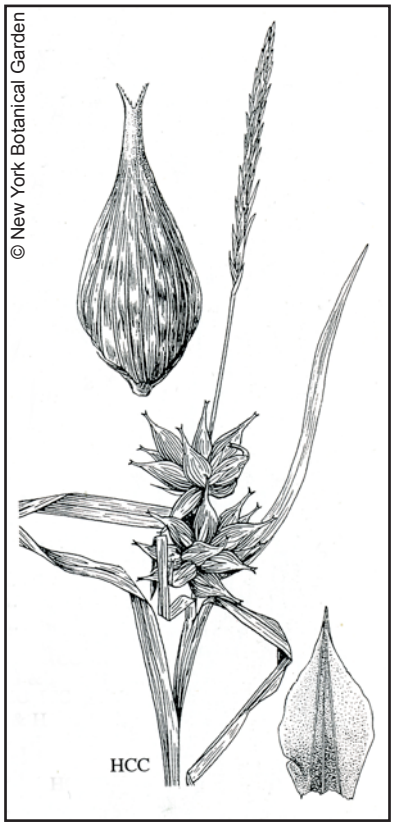
(*Carex crinita* Lam.)

SEDGE FAMILY (Cyperaceae) **C of C:** Native (6) **IND. STATUS:** OBL

FIELD CHARACTERISTICS: A perennial, cespitose (clumped) sedge growing to 40-120 cm. in height. Basal leaf sheaths are red and pinnate-fibrillose. Main leaves are 7-13 mm. wide with glabrous sheaths. Spikelets are loosely spreading to drooping on long peduncles. Staminate spikelets number 1-3 and are 4-9 cm. long while pistillate spikelets number 2-5 and are 4-11 cm. long. Pistillate spikelets are linear-cylindric. Pistillate scales have long awns to 10 mm. that greatly exceed the perigynia giving the spikelets a fringed or bristly appearance. Perigynia are 2-3.5 mm. long, strongly 2-ribbed, with a minute beak. The achene is 2-sided.

ECOLOGICAL NOTES: Fringed sedge is a common species of hardwood swamps, shrub-carrs, and vernal pools within mesic (upland) forests. The long-drooping pistillate spikelets with a bristly appearance make this species easy to recognize.

SOURCE: Gleason and Cronquist (1991); Voss (1972); and Hipp (2008).



SHINING BUR (BLADDER) SEDGE

(*Carex intumescens* Rudge)

SEDGE FAMILY (Cyperaceae) **C of C:** Native (5) **IND. STATUS:** FACW(NC/NE, MW) OBL(GP)

FIELD CHARACTERISTICS: A perennial sedge with stems arising singly or in small clumps 30-90 cm. tall. Sheaths are tinged reddish-purple toward the base. Bracts and evergreen leaves have flat blades more than 3 mm. wide. Staminate flowers are pedunculate and form in terminal spikes. Perigynia form 1-3 subglobose spikelets with 2-8(12) loosely spaced, inflated, ascending or spreading, ovoid perigynia about 9-17.5 mm. long and 4-5 mm. wide. Conspicuously veined perigynia are rounded at the base, glabrous, shiny, with beaks that are much shorter than the body. A persistent style is contorted at or just below the middle and arises from a 3-angled nutlet.

ECOLOGICAL NOTES: Shining bur sedge is characteristic of hardwood swamps. It occasionally occurs in coniferous swamps and northern sedge meadows.

SOURCE: Fassett (1976); Gleason and Cronquist (1991); Swink and Wilhelm (1994); and Voss (1972).

COMMON HOP SEDGE

(*Carex lupulina* Muhl. ex Willd.)

SEDGE FAMILY (Cyperaceae) **C of C:** Native (6) **IND. STATUS:** OBL

FIELD CHARACTERISTICS: A perennial sedge with stems 20-130 cm. in height arising singly or a few together from long, scaly rhizomes. Persistent basal sheaths are tinged reddish brown. Mature leaves are 4-15 mm. wide. Usually a single terminal staminate spikelet arises from a 0.5-6 cm. peduncle. Between 1-6 pistillate spikes with 8-80 ascending perigynia are present. Pistillate spikelets are longer than wide and often persist into the fall. Ovoid perigynia are inflated, strongly nerved, and 1 cm. or more long. They have a conical beak with bidentate teeth. Acute, slender scales subtend the perigynia. The rhomboid nutlets are longer than wide, 3-angled, and have a persistent style, which is contorted at or near the base.

Care must be taken not to confuse this sedge with the State of Wisconsin endangered *Carex lupuliformis*. The nutlets of *C. lupuliformis* are as long as wide and have conspicuous nipple-like knobs on the angle summits.

ECOLOGICAL NOTES: Common hop sedge is characteristic of hardwood swamps. It is often the dominant sedge along the edges of vernal pools.

SOURCE: Fassett (1976); Gleason and Cronquist (1991); Swink and Wilhelm (1994); and Voss (1972).

VI.B. Coniferous Swamps

Coniferous swamps are forested wetlands dominated by lowland conifers, primarily northern white cedar and tamarack, growing on soils that are saturated during much of the growing season, and that may be temporarily inundated by as much as a foot of standing water in microdepressions. Balsam fir is a component in some stands. Soils are usually organic (peat/muck) but not as acidic and nutrient-poor as those of coniferous bogs. Instead, soils vary from somewhat nutrient-poor and acidic, to mineral-rich and alkaline. Tamarack typically dominates on the former soils, and northern white cedar on the latter. A continuous *Sphagnum* moss mat is not present. Coniferous swamps occur primarily in and north of the vegetation tension zone. However, several large tamarack swamps occur south of the tension zone.

VEGETATION: The tree layer of this coniferous swamp is dominated by northern white cedar (*Thuja occidentalis*). Scattered, tree size black ash (*Fraxinus nigra*), yellow birch (*Betula alleghaniensis*) and white pine (*Pinus strobus*) are also present. The groundlayer is dominated by cinnamon fern (*Osmundastrum cinnamomeum*), marsh fern (*Thelypteris palustris*) and lady fern (*Athyrium angustum*). Other species include speckled alder (*Alnus incana* ssp. *rugosa*), poison sumac (*Toxicodendron vernix*), royal fern (*Osmunda spectabilis*), fowl manna grass (*Glyceria striata*), long-stalk sedge (*Carex pedunculata*), graceful sedge (*Carex gracillima*), northern white violet (*Viola macloskeyi*), wood anemone (*Anemone quinquefolia*), naked miterwort (*Mitella nuda*), starflower (*Trientalis borealis*), blue-bead lily (*Clintonia borealis*), dwarf red raspberry (*Rubus pubescens*), sensitive fern (*Onoclea sensibilis*), wild lily-of-the-valley (*Maianthemum canadense*), sweet-scented bedstraw (*Galium triflorum*), bunchberry (*Cornus canadensis*), wild sarsaparilla (*Aralia nudicaulis*), hog peanut (*Amphicarpaea bracteata*) and jack-in-the-pulpit (*Arisaema triphyllum*). Ram's-head lady's-slipper (*Cypripedium arietinum*), a species listed as threatened by the State of Minnesota, was recorded in this habitat.

SOILS: Lupton muck (Typic Haplosaprists), a very poorly-drained, calcareous soil with an organic layer greater than 51 inches in depth (and can be many feet in depth). Landscape position is an ancient lakebed in the nearly level, sandy outwash of the Anoka Sandplain.

HYDROLOGY: Lupton muck is typically saturated to the surface. During September through May, the seasonal high water table can vary from 12 inches of standing water to a water table 12 inches below the surface.

LOCATION: Cedar Bog Lake, Cedar Creek Ecosystem Science Reserve, Anoka County, Minnesota.

VEGETATION: The opposing page illustrates two views of a coniferous swamp dominated by tamarack (*Larix laricina*). In addition to tamarack, the shrub layer consists of scattered speckled alder (*Alnus incana* ssp. *rugosa*), meadowsweet (*Spiraea alba*), bog willow (*Salix pedicellaris*), meadow willow (*Salix petiolaris*), shining willow (*Salix lucida*), red-osier dogwood (*Cornus alba*) and balsam willow (*Salix pyrifolia*). Marsh fern (*Thelypteris palustris*) and Canada blue-joint grass (*Calamagrostis canadensis*) dominate the diverse groundlayer that also includes: tussock sedge (*Carex stricta*), stalk-grained sedge (*Carex stipata*), buxbaum's sedge (*Carex buxbaumii*), lake sedge (*Carex lacustris*), yellow lake sedge (*Carex utriculata*), interior sedge (*Carex interior*), wild timothy (*Muhlenbergia glomerata*), fringed brome grass (*Bromus ciliatus*), fowl mana grass (*Glyceria striata*), joe-pye weed (*Eutrochium maculatum*), marsh milkweed (*Asclepias incarnata*), northern bog goldenrod (*Solidago uliginosa*), turtlehead (*Chelone glabra*), flat-top aster (*Doellingeria umbellata*), giant goldenrod (*Solidago gigantea*), marsh cinquefoil (*Comarum palustre*), marsh bellflower (*Campanula aparinoides*) and crested shield fern (*Dryopteris cristata*).

SOILS: Markey muck (Terric Haplosaprists), very poorly-drained soils with up to 51 inches of organic materials overlying sandy materials.

HYDROLOGY: The seasonal high water table for Markey soils ranges from ponded to a water table within 6 inches of the surface during November to June of most years. This is a minerotrophic (mineral rich) peatland due to groundwater inflows.

LOCATION: Rice Lake National Wildlife Refuge, Aitkin County, Minnesota.

Coniferous Swamps

NORTHERN WHITE CEDAR

(*Thuja occidentalis* L.)

CYPRESS FAMILY (Cupressaceae) **C of C:** Native (9 WI)(7 MN) **IND. STATUS:** FACW

FIELD CHARACTERISTICS: An evergreen, conifer tree to 25 m. in height and 123 cm. dbh. Branches are spreading with flattened, leafy twigs. Scale-like, opposite leaves are 2-4 mm. long and overlap like shingles. The small, woody, oblong cones are paired, 8-15 mm. long, and yellowish brown in color.

ECOLOGICAL NOTES: Northern white cedar is a dominant tree in coniferous swamps along with tamarack (*Larix laricina*). It is also a subdominant in some hardwood swamps. Northern white cedar typically occurs north of the vegetation tension zone on neutral to alkaline, springy soils due to groundwater seepages. It is common near the Great Lakes on soils subtended by dolomite. During winter months, northern white cedar swamps provide both food and shelter for white-tailed deer. Another common name is arbor vitae.

SOURCE: Gleason and Cronquist (1991); Swink and Wilhelm (1994); Voss (1972); and Smith (2008).

BALSAM FIR

(*Abies balsamea* (L.) P. Mill.)

PINE FAMILY (Pinaceae) **C of C:** Native (5 WI)(4 MN) **IND. STATUS:** FAC(NC/NE, GP) FACW(MW)

FIELD CHARACTERISTICS: An evergreen, conifer tree to 26 m. height and 48 cm. dbh. Bark is smooth and gray but eventually becomes scaly. Young trunks are covered with raised resin-bearing pockets. Spreading branches have twigs with minute hairs. Leaves are flattened, 12-25 mm. in length, blunt or minutely notched, sessile, and tend to align in one plane. The narrow, cylinder-shaped cones are erect and 5-10 cm. long with broadly rounded scales. Papery bracts are generally hidden by the scales and may be spreading, but not reflexed.

ECOLOGICAL NOTES: Balsam fir is a shade tolerant conifer that is common in northern white cedar swamps, coniferous bogs, mixed hardwood/conifer swamps, and mesic (upland) forests.

SOURCE: Elias (1980); Gleason and Cronquist (1991); Smith (2008); and Voss (1972).

POISON SUMAC

(*Toxicodendron vernix* (L.) Kuntze)

CASHEW FAMILY (Anacardiaceae) **C of C:** Native (7) **IND. STATUS:** OBL

SYNONYM: *Rhus vernix* L.

FIELD CHARACTERISTICS: A tall, deciduous shrub 5(7) m. in height with a smooth to slightly rough bark. The bark is a patchy light gray, with numerous horizontally spreading lenticels. Branches are stout with thick, coarse twigs. Leaves are alternate and pinnately compound with 7 to 13 sessile, oval leaflets along a red rachis. Mature leaflets are dark green and shiny above with entire margins. Unisexual greenish flowers form on drooping raceme-like panicles. Fruits are a yellowish to grayish white berry-like drupe. The resin, called urushiol and which occurs throughout the plant, can cause a severe allergic contact dermatitis.

ECOLOGICAL NOTES: Poison sumac primarily occurs in coniferous swamps and bogs. It also occurs in ash-dominated hardwood swamps, alder thickets, bogs and fens. Seeds are dispersed by birds.

SOURCE: Crow and Hellquist (2000); Gleason and Cronquist (1991); Smith (2008); Swink and Wilhelm (1994); and Voss (1985).

Staminate catkins

Pistillate catkins and leaves

BALSAM WILLOW

(*Salix pyrifolia* Anderss.)

WILLOW FAMILY (Salicaceae) **C of C:** Native (8 MN)(7 WI) **IND. STATUS:** OBL(GP) FACW(NC/NE, MW)

FIELD CHARACTERISTICS: A tall, deciduous shrub to 5 m. in height. Twigs are glabrous, at first yellowish then becoming red and shining. Petioles are red. Leaves are reddish when unfolding then becoming dark green and glossy above while lower leaf surfaces are glaucous, glabrous and reticulate. Leaves are ovate to lanceolate or lanceloate-oblong, 4-10(13) cm. by 2-4(5) cm., with a tip that is acute to acuminate. Leaf margins often have glandular teeth. Leaves are rounded to cordate at the base and have the fragrance of balsam. Catkins 2-6(8) cm. long appear with or after the leaves. Capsules are glabrous and 4-8 mm. long. In flower May-June.

ECOLOGICAL NOTES: Balsam willow is most common in coniferous swamps and bogs with tamarack or black spruce. To a lesser extent, it occurs in shrub swamps, on floating sedge mats, and along lakeshores and riverbanks. Balsam willow is easy to identify with its bright red, shiny petioles and branches, as well as leaves that are glossy green above and gray beneath with cordate bases.

SOURCE: Gleason and Cronquist (1991); and Smith (2008).

SWAMP RED CURRANT

(*Ribes triste* Pallas)

GOOSEBERRY FAMILY (Grossulariaceae) **C of C:** Native (8 WI)(7 MN) **IND. STATUS:** OBL

FIELD CHARACTERISTICS: A small shrub 40-100 cm. tall with 1 or a few ascending, spreading or trailing stems. Stems lack the spines or bristles of some other *Ribes*. Young stems are hairy then become smooth by the second year. Leaves are 4-9 cm. long and 5-10 cm. wide with 3-5 broad lobes and no glandular dots (unlike some other *Ribes*, e.g., *R. americanum*). Flowers are green-purple, 4-5 mm. wide and arranged in long, drooping clusters of 5-12. Fruit is a smooth, red berry 6-9 mm. wide. In flower May-June.

ECOLOGICAL NOTES: Swamp red currant prefers coniferous swamps and bogs, especially those with tamarack, as well as hardwood swamps. This currant prefers soils that are moderately acidic and seems to be absent in the most highly acidic bogs. Of the *Ribes* in our range, swamp red currant is the only one with fruits that are both smooth and red.

SOURCE: Gleason and Cronquist (1991); Smith (2008); and Chadde (2002).

SKUNK CURRANT

(*Ribes glandulosum* Grauer)

GOOSEBERRY FAMILY (Grossulariaceae) **IND. STATUS:** OBL(GP);FACW(NC/NE, MW)

C of C: Native (6 MN)(7 WI)

FIELD CHARACTERISTICS: A small shrub with 1 or a few ascending, arching or trailing stems to 2 m. long. Spines or bristles are absent. First and second year branches are glabrous. Leaves are 2.5-5 cm. long and 3.5-7 cm. wide with 3-5 palmate lobes. Leaf bases are deeply cordate while leaf margins have pointed serrations. Upper leaf surfaces are dark green, glabrous and lack glands. Lower leaf surfaces are pale green, glabrous or with scattered hairs, and have stalked glands along the main veins. Ascending racemes 3-6 cm. long have 6-15 flowers with pinkish to purplish petals 0.8-1.2 mm. long. Pedicels and ovaries have red, gland-tipped hairs. Fruit is a translucent red berry, 6-10 mm. in diameter, with stiff, gland-tipped hairs. In flower early May to mid-June.

ECOLOGICAL NOTES: Skunk currant is common in a variety of habitats north of the vegetation tension zone. A favored habitat is coniferous swamps dominated by northern white cedar and/or tamarack. True to its name, the leaves and inner bark have a skunk-like odor when crushed.

SOURCE: Gleason and Cronquist (1991); Smith (2008); and Chadde (2002).

ALDER-LEAF BUCKTHORN

(*Rhamnus alnifolia* L'Her.)

BUCKTHORN FAMILY (Rhamnaceae) **IND. STATUS:** OBL(NC/NE, MW); FACW(GP)

C of C: Native (7 MN)(8 WI)

FIELD CHARACTERISTICS: A mid-size shrub with multiple upright or decumbent stems to 2.3 m. long (but usually only 1 m. in height). Leaves are alternate, lanceolate-oblong to lanceolate-ovate to elliptical, with a tip that is obtuse to acuminate. Petioles are 5-15 mm. long. Greenish flowers are in sessile umbels with 1-3 flowers each. Flowers are functionally unisexual, 5-merous with sepals 1.5-2 mm. long (petals are absent). In flower mid-May to mid-June. Fruit is a black drupe 6-8 mm. in diameter with 3 stones. Fruit matures in mid-July to late August.

ECOLOGICAL NOTES: Alder-leaf buckthorn is found in northern coniferous swamps, hardwood swamps, shrub swamps and sedge meadows, usually in shade but also full sunlight. It prefers peat or mineral soils that are weakly to moderately acidic.

SOURCE: Gleason and Cronquist (1991); Smith (2008); and Voss (1985).

BRISTLE-BERRY

(*Rubus wheeleri* (Bailey) Bailey)

ROSE FAMILY (Roseaceae) **C of C:** Native **IND. STATUS:** FAC

SYNONYMS: *Rubus setosus* Bigelow; *Rubus semisetosus* Blanch. var. *wheeleri* Bailey

FIELD CHARACTERISTICS: A perennial, mid-size shrub with erect or arching biennial canes to 1 m. long. Prickles are usually sparse and weak, 3-5 mm. long, and number 2.5-5 per cm. of cane. Primocane leaves are palmately compound with 5(3) leaflets. The central leaflet is elliptical to obovate, 7-10 cm. long by 4.5-7 cm. wide, the base tapered to subcordate or rounded, while the tip is short and abrupt. Petioles have sparse, non-glandular hairs and often a few weak prickles. Inflorescence is corymb or cyme with 4-12 white flowers. Pedicels and peduncle usually have stiff bristles or weak prickles. Flowers are bisexual, 5-merous, 2.3-3.8 cm. wide, sepals usually with gland-tipped hairs. In flower mid- to late June. Fruit is an aggregate of black drupelets, more or less round and 8-15 mm. in diameter.

ECOLOGICAL NOTES: Bristle-berry occurs at the edges of swamps and marshes, and in wet meadows and sedge meadows, as well as in uplands. Its range includes most of Wisconsin but only a small portion of central Minnesota where it is considred rare. No C of C for this species has been assigned by either state.

SOURCE: Gleason and Cronquist (1991); Smith (2008); and Voss (1985).

SWAMP FLY HONEYSUCKLE

(*Lonicera oblongifolia* (Goldie) Hook.)

HONEYSUCKLE FAMILY (Caprifoliaceae) **C of C:** Native (8 MN)(9 WI) **IND. STATUS:** OBL

FIELD CHARACTERISTICS: A mid-size to tall, deciduous shrub with single or multiple stems to 2 m. in height and 2 cm. basal diameter. Bark is gray or brown and exfoliating in flakes or strips. Leaves are opposite, elliptical to obovate to oblong, the larger ones 3.5-8.5 cm. long and 1.5-3 cm. wide. Leaf margins are entire and finely hairy but not ciliate. Upper leaf surfaces are green and moderately covered with fine hairs while lower leaf surfaces are pale green and densely covered with fine, woolly hairs. Flowers are bisexual, 5-merous and arranged in sessile pairs that are erect or ascending. Corolla is tubular, pale yellow to whitish, and 0.8-1.4 cm. long, the lobes longer than the tube and reflexed. In flower early June to early July. Fruit is a spherical, reddish berry 7-11 mm. in diameter, shiny, maturing in early July to early August.

ECOLOGICAL NOTES: Swamp fly honeysuckle is fairly common in coniferous swamps, shrub swamps and sedge meadows. Occasionally it can be found on lakeshores and streambanks. This species prefers openings or thin canopies of tamarack and northern white cedar. Moderately acidic peats are preferred, although it does occur on loamy soils as well. Flowers are pollinated by insects and hummingbirds.

SOURCE: Smith (2008).

GOLDTHREAD

(*Coptis trifolia* (L.) Salisb.)

BUTTERCUP FAMILY (Ranunculaceae) **C of C:** Native (8 WI)(7 MN) **IND. STATUS:** FACW

FIELD CHARACTERISTICS: A perennial herb from bright yellow, slender rhizomes, hence the common name. Evergreen leaves have 3 leaflets and arise from the base of the plant on long petioles. Margins of the leaves are shallowly lobed with rounded tips, with broadly rounded teeth. The one-flowered peduncle grows to a height of 5-15 cm. Flowers are white with petal-like sepals 10-15 mm. wide. Fruit is a beaked follicle 8-13 mm. long. In flower April-June.

ECOLOGICAL NOTES: Goldthread is a characteristic herb of cedar swamps often growing on moss hummocks.

SOURCE: Gleason and Cronquist (1991); Chadde (2002); and Voss (1985).

BLUE-BEAD LILY

(*Clintonia borealis* (Ait.) Raf.)

LILY FAMILY (Liliaceae) **C of C:** Native (7) **IND. STATUS:** FAC

FIELD CHARACTERISTICS: A perennial, rhizome producing herb to 40 cm. in height. The 2-5 glossy, green leaves are oblong to elliptic, up to 3 dm. in length, and have ciliate margins (becoming hairless with age). A scape (naked stem) produces 3-8 bright yellow, nodding flowers with 6 stamens and 6 tepals (15-18 mm. in length). Fruit is a bright blue berry 8 mm. in diameter. In flower May-June.

ECOLOGICAL NOTES: Blue-bead lily is a frequent herb of coniferous swamps and bogs in and north of the vegetation tension zone. It often grows on the tops of hummocks and around tree trunks with raised root systems, a drier microhabitat in these forested wetlands. It is equally common in mesic (upland) forested habitats.

SOURCE: Gleason and Cronquist (1991); and Voss (1972).

WILD LILY-OF-THE-VALLEY

(*Maianthemum canadense* Desf.)

LILY FAMILY (Liliaceae) **C of C:** Native (5) **IND. STATUS:** FAC(MW); FACU(NC/NE, GP)

FIELD CHARACTERISTICS: A perennial herb 5-20 cm. in height. Leaves number (1)2(3), are short-petioled to sessile, 3-10 cm. long and ovate-oblong. Inflorescence is a raceme 2-5 cm. long with flowers that are 4-6 mm. wide. Fruit is a pale red berry 3-4 mm. thick. In flower May-June.

ECOLOGICAL NOTES: Wild lily-of-the-valley is an abundant herb that occurs in a diversity of plant communities from wet to dry. In coniferous swamps and bogs, it frequently occurs on the drier microhabitat of raised hummocks.

SOURCE: Gleason and Cronquist (1991); Chadde (2002); and Voss (1972).

BUNCHBERRY

(*Cornus canadensis* L.)

DOGWOOD FAMILY (Cornaceae) **C of C:** Native (7 WI)(6 MN) **IND. STATUS:** FACU(GP) FAC(NC/NE, MW)

FIELD CHARACTERISTICS: A perennial herb with a woody rhizome. Stems are 10-20 cm. in height. Leaves are oval to obovate and 4-8 cm. long. Four to 6 leaves are apparently whorled at the summit. A single flower cluster arises on a peduncle 1-3 cm. high. Flowers are yellow-green or creamy-white surrounded by 4 white bracts 1-2 cm. long. Fruit is a cluster of round, bright red berry-like drupes 6-8 mm. wide. In flower June-July.

ECOLOGICAL NOTES: Bunchberry is a common herb of coniferous swamps and bogs frequently growing on raised hummocks. It is also common in upland forests consisting of mixed conifers/ hardwoods.

SOURCE: Gleason and Cronquist (1991); Smith (2008); Chadde (2002); and Voss (1985).

ONE-FLOWERED PYROLA

(*Moneses uniflora* (L.) Gray)

WINTERGREEN FAMILY (Pyrolaceae) **C of C:** Native (9 WI)(8 MN) **IND. STATUS:** FAC

FIELD CHARACTERISTICS: A perennial herb 3-10 cm. in height. Finely-toothed leaves are opposite or in whorls of 3, orbicular in shape, and 1-2 cm. wide. The single flower is white, nodding, and 1-2 cm. wide. Fruit is a round capsule. In flower July-August.

ECOLOGICAL NOTES: One-flowered pyrola occurs in cedar swamps as well as mixed conifer/hardwood swamps.

SOURCE: Gleason and Cronquist (1991); Chadde (2002); and Voss (1985).

ALPINE ENCHANTER'S NIGHTSHADE

(*Circaea alpina* L.)

EVENING PRIMROSE FAMILY (Onagraceae) **IND. STATUS:** FACW

C of C: Native (7 WI)(6 MN)

FIELD CHARACTERISTICS: A perennial herb with weak stems 10-30 cm. in height. Leaves are opposite, ovate, 2-5 cm. long and 1-3 cm. wide. White flowers, with sepals 1-2 mm. long and petals up to 2 mm. long, are in racemes of 10-15 flowers. Fruit is a 1-seeded capsule 2-3 mm. long. In flower June-August.

ECOLOGICAL NOTES: Alpine enchanter's nightshade is characteristic of cedar swamps where it is frequently found on rotting logs. Voss (1985) notes that this species also occurs in depressional areas of hardwood swamps.

SOURCE: Gleason and Cronquist (1991); Chadde (2002); and Voss (1985).

FLAT-TOP ASTER

(*Doellingeria umbellata* (P. Mill.) Nees)

ASTER FAMILY (Compositae or Asteraceae) **IND. STATUS:** OBL(GP); FACW(NC/NE, MW)

SYNONYM: *Aster umbellatus* P. Mill. **C of C:** Native (6 WI)(5 MN)

FIELD CHARACTERISTICS: A perennial herb with 1-10(20) ascending to erect stems, 10-200 cm. high. May be colonial at times from creeping rhizomes. Narrowly lance-elliptic, entire leaves, all from smooth to sparsely hairy stems, are 4-16 cm. long by (7)10-35 mm. wide and sessile to nearly so. The numerous (22-54) heads form a distinctive, generally flat-topped (corymbiform) inflorescence. The 7-14 ray flowers are white and 5-8 mm. long, with 16-40 yellowish-white disc flowers. In flower July-September.

ECOLOGICAL NOTES: Flat-top aster is frequently found in calcareous fens, open bogs and openings in conifer swamps. It occasionally occurs in wet prairies and sedge meadows.

SOURCE: Gleason and Cronquist (1991); Swink and Wilhelm (1994); and Voss (1996).

NORTHERN BOG ASTER

(*Symphyotrichum boreale* (Torr. & Gray) A. & D. Love)

ASTER FAMILY (Compositae or Asteraceae) **IND. STATUS:** OBL

SYNONYMS: *Aster junciformis* Rydb.; *Aster borealis* (Torr. & Gray) Prov.

C of C: Native (9 MN)(10 WI)

FIELD CHARACTERISTICS: A perennial herb 15-100 cm. high. Rhizomes and the slender stems are less than 2(2.2) mm. in diameter. Stems are often reddish, smooth below, but finely hairy in lines on the upper stem. Narrowly linear leaves are entire and 4-13 cm. long by 1.5-5 mm. wide. They are sessile and very slightly clasping along 1-3+ erect stems. The flowering heads are few—occasionally solitary—and terminal. The 20-50 white to pale lavender ray flowers are about 10 mm. (up to 15 mm.) long. In flower August-September. See Appendix B for a key to wetland asters.

ECOLOGICAL NOTES: Northern bog aster, also known as rush aster, primarily occurs in open conifer swamps, bogs and calcareous fens.

SOURCE: Gleason and Cronquist (1991); Swink and Wilhelm (1994); and Voss (1996).

NORTHERN BOG GOLDENROD

(*Solidago uliginosa* Nutt.)

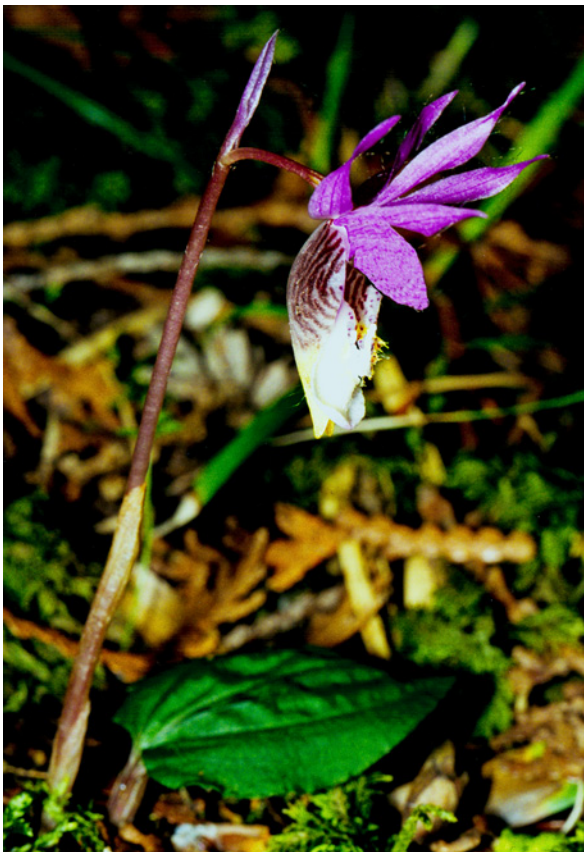
ASTER FAMILY (Compositae or Asteraceae) **IND. STATUS:** OBL

C of C: Native (8 WI)(9 MN)

FIELD CHARACTERISTICS: A perennial herb 50-150 cm. tall with smooth stems but finely hairy within the inflorescence. The alternate leaves are largest at the base of the plant, becoming smaller upward. Lower leaves taper to a long petiole while upper leaves are sessile. Larger leaves are 6-15 times as long as wide (6-35 cm. x 6-60 mm.). Flowers are clustered in an elongate, narrow raceme. Flowers are yellow with involucres 3-5 mm. long. In flower July-September. See Appendix A for a key to wetland goldenrods.

ECOLOGICAL NOTES: Northern bog goldenrod typically occurs in open bogs, coniferous bogs and coniferous swamps.

SOURCE: Gleason and Cronquist (1991); Swink and Wilhelm (1994); and Chadde (2002).



CALYPSO ORCHID

(*Calypso bulbosa* (L.) Oakes var. *americana* (R.Br.) Luer)

ORCHID FAMILY (Orchidaceae) **IND. STATUS:** FACW

C of C: Native (9 MN)(10 WI); a threatened species in Wisconsin

FIELD CHARACTERISTICS: A perennial herb with a stem 6-21 cm. in height. A single, ovate leaf 3-5 cm. long and 2-3 cm. wide is produced in fall and remains green through the winter. The single, nodding flower emerges in mid-May to June and has pale purple sepals and lateral petals 1-2 cm. long. The lip, 1.5-2.3 cm. long, is white to pink and streaked with purple.

ECOLOGICAL NOTES: The calypso orchid is a rare species associated with northern forests in relatively pristine condition (e.g., old growth forests, or forests with 80 or more years post logging). In particular, it is found in older growth cedar swamps near the base of the largest cedars. Smith (1993) states that calypso orchids also occur to a lesser extent in upland coniferous forests. He notes its short-lived and somewhat ephemeral nature making it an "…elusive orchid that cannot be found on demand."

SOURCE: Gleason and Cronquist (1991); Chadde (2002); Voss (1972); and Smith (1993).

RAM'S-HEAD LADY'S-SLIPPER

(*Cypripedium arietinum* R. Br.)

ORCHID FAMILY (Orchidaceae) **IND. STATUS:** FACW

C of C: Native (10 WI)(9 MN); a threatened species in both Minnesota and Wisconsin

FIELD CHARACTERISTICS: A perennial herb with a pubescent stem 15-32 cm. in height. Up to 12 stems can arise from a single rhizome. Leaves number 3-5 per stem and are elliptical, 5-10 cm. long and 1.4-3 cm. wide. Inflorescence consists of one, sometimes 2, flowers. Dorsal sepal is greenish to purplish and 1.2-2.6 cm. long. Lateral sepals are separate, greenish to purplish and 1.2-2.1 cm. long. Petals are similar to the lateral sepals. The lip is an inflated pouch 1-2 cm. long, whitish or pinkish with a conspicuous downward conical projection on the underside. In flower May-June.

ECOLOGICAL NOTES: Ram's-head lady's-slipper is the smallest and rarest of our lady's-slippers and with the distinct downward protruding lip, it cannot be confused with any other. Ram's-head lady's-slipper occurs in northern coniferous swamps under a canopy of northern white cedar, tamarack or spruce. Additionally, it has been found in upland habitats such as sandy, jack pine forests.

SOURCE: Smith (1993).

SMALL ROUND-LEAF ORCHIS

(*Platanthera rotundifolia* (Banks ex Pursh) Lindl.)

ORCHID FAMILY (Orchidaceae) **IND. STATUS:** OBL

SYNONYM: *Amerorchis rotundifolia* (Banks) Hulten **C of C:** Native (10); a threatened species in Wisconsin

FIELD CHARACTERISTICS: A perennial herb with a stem 15-36 cm. in height (including the inflorescence). The single, essentially basal leaf is elliptic to ovate to obovate, and 5-15 cm. long and 2-8.5 cm. wide. Inflorescence is a terminal raceme 3-13 cm. long with 4-18 flowers. Sepals are white to pale pink and 5-8 mm. long. Petals are whitish to pink or purplish and 4.5-7 mm. long. The lip is white with purple spots, 3-lobed, and 6.5-10 mm. long and 4-7.5 mm. wide. In flower June-July.

ECOLOGICAL NOTES: Small round-leaf orchis typically occurs in northern coniferous swamps under a canopy of northern white cedar, tamarack or spruce. While rare in portions of its range in Minnesota and Wisconsin, substantial populations still exist in the large peatlands of northwestern and north central Minnesota (Smith 1993).

SOURCE: Gleason and Cronquist (1991); Chadde (2002); Voss (1972); and Smith (1993).

RAGGED-FRINGED ORCHID

(*Platanthera lacera* (Michx.) G. Don)

ORCHID FAMILY (Orchidaceae) **C of C:** Native (7) **IND. STATUS:** FACW

SYNONYM: *Habenaria lacera* (Michx.) R. Br.

FIELD CHARACTERISTICS: A perennial herb with a stem 20-77 cm. in height (including inflorescence). Leaves number 3-7 per stem, lower ones lanceolate to elliptical, and 5-14 cm. long and 1-3.5 cm. wide. Upper leaves are greatly reduced in size becoming bract-like. Inflorescence is a terminal raceme 4-17 cm. long and 2-4.5 cm. wide with 15-60 white to greenish white flowers. Sepals are ovate to subobicular and 3-7 mm. long. Petals are linear-oblong and 2.8-6 mm. long. The lip is white, 0.5-1.9 cm. wide, and divided into three major segments. The lateral segments are deeply incised producing a fringe of thread-like divisions. Spur is curved and 1.1-1.7 cm. long. In flower in July.

ECOLOGICAL NOTES: Ragged-fringed orchid is usually found in full or partial sunlight, but sometimes in shade, on acidic peat or mineral soils. This includes open bogs, sedge meadows, coniferous bogs and coniferous swamps.

SOURCE: Gleason and Cronquist (1991); Chadde (2002); Voss (1972); and Smith (1993).

CRESTED SHIELD FERN

(*Dryopteris cristata* (L.) Gray)

WOOD FERN FAMILY (Dryopteridaceae) **C of C:** Native (7) **IND. STATUS:** OBL

FIELD CHARACTERISTICS: A perennial fern from short-creeping to somewhat ascending rhizomes. Fronds are once pinnate to nearly twice pinnate, narrow, primarily 35-80 cm. long and 7-15 cm. wide with about 10-25 pairs of pinnae. Fronds are somewhat dimorphic in that sterile fronds are half to three-fourths as long as fertile fronds. Sori are round and located midway between the midvein and the margin. The indusium is attached at the center of the sori and looks like a clear, plastic, miniature umbrella covering the sori (see photograph above).

ECOLOGICAL NOTES: Crested shield fern is a common species of bogs, coniferous swamps and alder thickets, typically on a moss substrate.

SOURCE: Gleason and Cronquist (1991); Swink and Wilhelm (1994); and Chadde (2002).

ROYAL FERN

(*Osmunda spectabilis* Willd.)

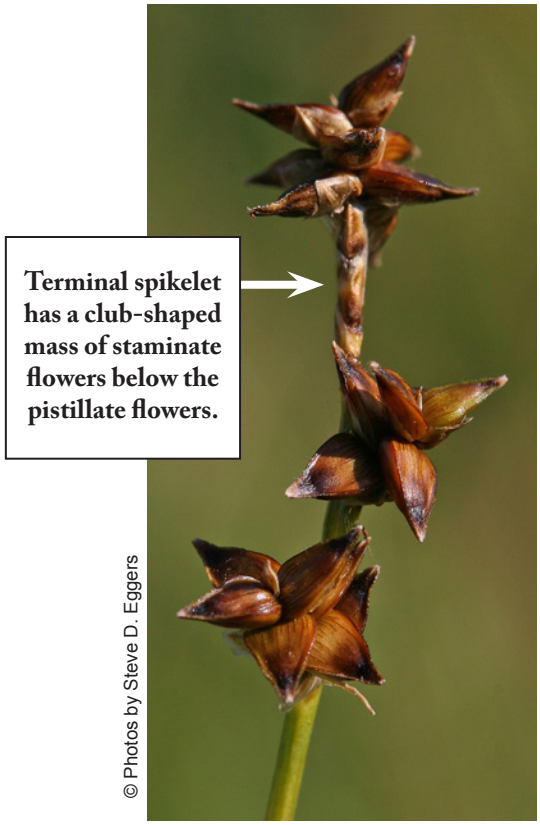
ROYAL FERN FAMILY (Osmundaceae) **C of C:** Native (7) **IND. STATUS:** OBL

SYNONYM: *Osmunda regalis* var. *spectabilis* (Willd.) Gray

FIELD CHARACTERISTICS: A perennial fern growing to 1 m. in height. Blades are bipinnate, broadly ovate, 4-8 dm. long and 3-5 dm. wide. Petioles are smooth, green to red-green, to three-quarters of the length of the blade. Fronds are dimorphic. The uppermost pinnae of fertile fronds are replaced by clusters of rusty-brown colored clusters of sporangia.

ECOLOGICAL NOTES: Royal fern is frequent in coniferous and hardwood swamps, alder thickets and bogs. It prefers acidic soils.

SOURCE: Gleason and Cronquist (1991); Swink and Wilhelm (1994); and Chadde (2002).



INTERIOR SEDGE

(*Carex interior* Bailey)

SEDGE FAMILY (Cyperaceae) **C of C:** Native (7) **IND. STATUS:** OBL

FIELD CHARACTERISTICS: A perennial sedge with stems forming dense tufts 20-70 cm. tall. Mature leaves are usually 1-2.1 mm. wide. Typically only 3(2-5) star-like, sessile spikelets per stem are present. The spikelets are monoecious (vs. dioecious in *C. sterilis*). Terminal spikelets are pistillate above and staminate below. Egg-shaped perigynia are 2.3-3.0 mm. long and 1-2 mm. wide, typically nerveless above the mid-section on the ventral surface, spreading or reflexed at maturity. Perigynium-beak teeth are obscure, rarely to 0.25 mm. Scales are rounded. Two stigmas are present and the nutlets are lens shaped.

This sedge is remarkably similar to *Carex sterilis* [pages 226-227].

ECOLOGICAL NOTES: Interior sedge occurs in bogs, coniferous swamps and calcareous fresh (wet) meadows. It also occurs on wet, calcareous soils, especially those with fluctuating water levels.

SOURCE: Fassett (1976); Gleason and Cronquist (1991); Swink and Wilhelm (1994); and Voss (1972).

SMALL YELLOW SEDGE

(*Carex cryptolepis* Mackenzie)

SEDGE FAMILY (Cyperaceae) **C of C:** Native (7 MN)(8 WI) **IND. STATUS:** OBL

FIELD CHARACTERISTICS: A clumped, perennial sedge with stems 20-60 cm. tall, surpassing its leaves. Lower portion of stem sheaths are white. Mature leaf blades are 1.5-3.5(4) mm. wide. The distinctive short, thick, prickly looking spikelets have yellowish to golden brown perigynia. Spikelets have staminate and pistillate flowers arranged toward the tip and base, respectively. Perigynia are recurved along the stem axis with lower being reflexed and flattened. Perigynia are 3.2-4.8(5) mm. long and abruptly contract into smooth beaks, about one-half as long as the body. Pistillate scales are lance-oval shaped, inconspicuous, and the same color as the perigynia.

This sedge is considered by some to be a variety of *Carex flava* (pistillate scales are brown).

ECOLOGICAL NOTES: Small yellow sedge often holds its distinctive perigynia into September. It prefers cedar swamps, calcareous wet prairies, sedge meadows and interdunal swales.

SOURCE: Gleason and Cronquist (1991); Swink and Wilhelm (1994); and Voss (1972).

BROWN SEDGE

(*Carex brunnescens* (Pers.) Poir.)

SEDGE FAMILY (Cyperaceae) **C of C:** Native (6 MN)(7 WI) **IND. STATUS:** FAC(GP) FACW(NC/NE, MW)

FIELD CHARACTERISTICS: A clump-forming, perennial sedge with stems up to 90 cm. tall. Stems are sharply triangular and rough toward the top. Leaves are green, 1-2.5 mm. wide and shorter than the stems. A bristle-like lower bract usually does not exceed the flowering stem. Sessile spikelets number 5-10, are brownish in color, and 4-8 mm. in size. Both staminate and pistillate flowers are mixed in each spikelet with staminate flowers borne below pistillate flowers. Each spikelet consists of 3-10(15) loosely spreading and ascending perigynia. Perigynia are convex on one side, up to 3 mm. long and have rounded margins (lack wings). Nerves are subtle or indistinct. Perigynia are widest near the middle of the body and taper to a short, flattened beak. The beak has minute, sharp, forward pointed teeth along its margins as seen with a 10x hand lens. Perigynia are green when fresh then turning a rich brown color with age. Perigynia are subtended by oval scales with white hyaline edges surrounding a green center.

ECOLOGICAL NOTES: Brown sedge, also known as green bog sedge, prefers peaty soils along the borders of bogs, cedar swamps and hardwood swamps. It occasionally occurs in upland forests.

SOURCE: Gleason and Cronquist (1991); Swink and Wilhelm (1994); and Voss (1972).

SECTION 3

Floodplain Forests

VII. Floodplain Forests

Floodplain forests are dominated by mature, deciduous hardwood trees growing on alluvial, mineral soils associated with riverine systems. Soils are inundated during flood events, but are usually somewhat well-drained for much of the growing season (Shaw and Fredine 1971). The most characteristic feature of floodplains is the alluvial soil that is constantly being deposited in some locations and eroded away in others. Floodplain forests typically include the northern and southern wet-mesic hardwood forest associations described by Curtis (1971). Dominant hardwoods include silver maple, green ash, river birch, swamp white oak, plains cottonwood, American elm and black willow. The shrub layer is typically sparse to lacking because of frequent flooding. Woody vines are more prevalent in floodplain forests than any other forested wetland community and include wild grape, Virginia creeper and moonseed. The herbaceous groundlayer can be sparse and includes jewelweed, nettles and certain sedges. In some cases, reed canary grass has invaded and now dominates the groundlayer.

Floodplain forests have a great diversity of plant and animal species because they serve as migration corridors. Some of the many species of wildlife that inhabit floodplain forests are wood duck, barred owl, herons, egrets and a variety of songbirds. Pools within the forest provide habitat for amphibians and invertebrates, while adjoining areas of open sand provide habitat for reptiles. During high water periods, these forests even provide habitat for fish.

Floodplain forests are extremely important for attenuation of flooding impacts. Diking and filling of floodplain forests to allow development or agricultural use can aggravate both upstream and downstream flooding impacts.

VEGETATION: The floodplain forest shown by the following two photographs is dominated by silver maple (*Acer saccharinum*) with a groundlayer dominated by wood nettle (*Laportea canadensis*) and honewort (*Cryptotaenia canadensis*). Also present are green ash (*Fraxinus pennsylvanica*), American elm (*Ulmus americana*), plains cottonwood (*Populus deltoides* ssp. *monilifera*), riverbank grape (*Vitis riparia*), common bur sedge (*Carex grayi*), jewelweed (*Impatiens capensis*), stinging nettle (*Urtica dioica* ssp. *gracilis*), clearweed (*Pilea pumila*) and cut-leaf coneflower (*Rudbeckia laciniata*).

SOILS: Calco silt loam, frequently flooded (Cumulic Endoaquolls). Landscape position is the floor of a deep valley within the Paleozoic Plateau of southeastern Minnesota.

HYDROLOGY: Adjacent to the Cannon River and inundated during spring flood events and heavy summer rainfall events.

LOCATION: Cannon River, Goodhue County, Minnesota.

April

August

Two seasonal views of a floodplain forest at approximately the same location. The upper photograph shows high water conditions during spring flooding; the lower photograph shows low water levels during late summer.

SILVER MAPLE

(*Acer saccharinum* L.)

MAPLE FAMILY (Aceraceae) **IND. STATUS:** FACW(NC/NE, MW); FAC(GP)

C of C: Native (2 WI)(3 MN)

FIELD CHARACTERISTICS: A deciduous tree growing to a height of 32 m. and 153 cm. dbh. Leaves are opposite and deeply 5-lobed with a narrow terminal leaf base. Leaves are green above and silvery white below with petioles that are usually green. Both twigs and buds are reddish. Bark is gray and smooth in young trees, becoming flaky (peeling) with age. Fruit is a winged samara 3.5-5.5(6) cm. long, which falls in May and June. In flower March-April, among the earliest of any of our tree species.

Similar to red maple (*A. rubrum*). Refer to page 327.

ECOLOGICAL NOTES: Silver maple, or soft maple, is one of the dominant trees in our floodplain forests, frequently associated with green ash (*Fraxinus pennsylvanica*), plains cottonwood (*Populus deltoides* ssp. *monilifera*) and American elm (*Ulmus americana*). It is the most flood tolerant of our tree species. Silver maple is also found in hardwood swamps, especially in southeastern Wisconsin. It is frequently used for landscaping purposes as a shade tree.

SOURCE: Fernald (1970); Petrides (1972); Smith (2008); and Voss (1985).

GREEN ASH

(*Fraxinus pennsylvanica* Marsh.)

OLIVE FAMILY (Oleaceae) **C of C:** Native (2) **IND. STATUS:**FACW(NC/NE, MW); FAC(GP)

FIELD CHARACTERISTICS: A deciduous tree growing to a height of 34 m. and 119 cm. dbh. Leaves are opposite and compound. Leaflets number 5-9 (usually 7) and are toothed, slightly petioled and 4-5 cm. long. Leaf scars form a half circle. Branches are smooth and round, or nearly so. Bark is furrowed in a very tight, regular diamond pattern of crisscrossing ridges. Fruit is a wedge-shaped samara with a round or somewhat round body and a flat wing. In flower April-May.

ECOLOGICAL NOTES: Green ash is commonly associated with floodplain forests and, to a much lesser extent, hardwood swamps. It also occurs in rich upland habitats and is frequently used for landscaping purposes.

SOURCE: Gleason and Cronquist (1991); Petrides (1972); Smith (2008); and Swink and Wilhelm (1994).

AMERICAN ELM

(*Ulmus americana* L.)

ELM FAMILY (Ulmaceae) **C of C:** Native (3) **IND. STATUS:** FACW(NC/NE, MW); FAC(GP)

FIELD CHARACTERISTICS: A deciduous tree growing to 40 m. in height and 120 cm. dbh with a characteristic vase-shaped growth form. Leaves are alternate, doubly serrate, elliptical to oblong-ovate, 8-14 cm. long, and nearly smooth to very rough above. Leaf veins are arranged in a characteristic herringbone pattern. Mature trees have dark gray bark with ridges separated by roughly diamond-shaped areas. Flowers develop in spring before the leaves unfold. Fruit is a wafer-like samara 1 cm. long that falls in May. In flower March-May.

ECOLOGICAL NOTES: American elm used to be one of the primary dominants of the floodplain forests of Minnesota and Wisconsin; however, these populations have been decimated by Dutch elm disease caused by an introduced fungus transmitted by bark beetles. American elm is also found in hardwood swamps and rich upland forests. In the past, American elm was extensively used for landscaping but Dutch elm disease has ravaged those populations as well.

SOURCE: Brockman (1979); Gleason and Cronquist (1991); and Swink and Wilhelm (1994).

Vase-shaped growth form is characteristic.

Outer bark has alternating red and white layers.

American Elm

(*Ulmus americana*)

SWAMP WHITE OAK

(*Quercus bicolor* Willd.)

BEECH FAMILY (Fagaceae) **C of C:** Native (7 WI)(8 MN) **IND. STATUS:** FACW
A species of special concern in Minnesota

FIELD CHARACTERISTICS: A large, deciduous tree to 24 m. in height and 70 cm. in dbh. Bark of mature trees is gray or brownish gray, thick, with ridges separated by deep furrows. Leaf blades are 10-19 cm. long and 7-11 cm. wide. Leaves have 3-9 small to midsize rounded lobes, the deepest sinuses extending 15-50 percent of the distance to the midvein. Upper leaf surfaces are dark green, glossy, and glabrous or glabrate. Lower leaf surfaces are pale green or grayish, dull, and densely hairy with minute, appressed, star-like hairs mixed with longer, erect hairs. Flowers are unisexual and borne separately on the same branch. Male flowers are in pendulant catkins 2-8 cm. long. Female flowers number 1-3 on a long peduncle. Fruit is an acorn 1.7-2.4 cm. long and 1.3-1.7 cm. wide where the cup covers 50-65 percent of the total length of the acorn. Acorns are on a long stalk (peduncle) 3-7 cm. long. In flower in May with fruit maturing in late August to late September.

Swamp white oak resembles bur oak (*Q. macrocarpa*), but the leaves have smaller and more uniform lobes. The acorns of swamp white oak are on long stalks and lack a fringe of hairs, as opposed to the short-stalked, fringed acorns of bur oak.

ECOLOGICAL NOTES: Swamp white oak is a characteristic species of floodplain forests. In Minnesota it is restricted to the Mississippi River floodplain in the very southeastern portion of the state. Swamp white oak occurs in larger river floodplains across southern Wisconsin.

SOURCE: Gleason and Cronquist (1991); and Smith (2008).

Unlike other oak species in our area, the acorns of swamp white oak are on long stalks (3-7 cm. long).

Leaves are "bicolor" in that the upper and lower surfaces have different color and texture. Shown here with immature acorns on the characteristic long stalk.

Swamp White Oak

(*Quercus bicolor*)

BLACK WILLOW

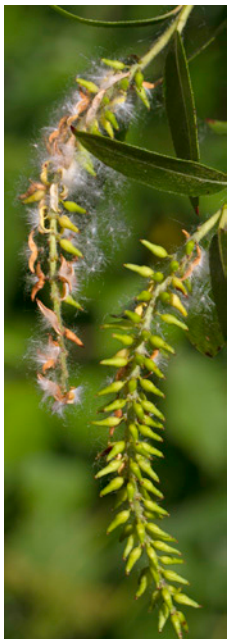
(*Salix nigra* Marsh.)

WILLOW FAMILY (Salicaceae) **C of C:** Native (4) **IND. STATUS:** OBL(NC/NE, MW);FACW(GP)

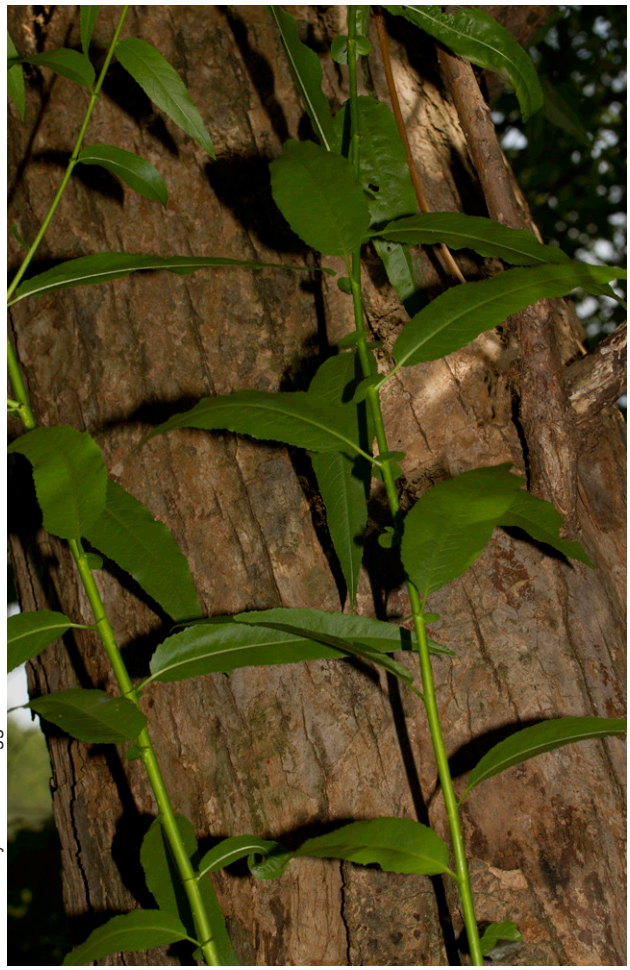
FIELD CHARACTERISTICS: A deciduous tree growing to a height of 25 m. and 45 cm. dbh; frequently with several trunks. Trunks are often leaning or horizontal to the water or ground surface. Leaves are alternate, narrowly lanceolate, 6-10(12) cm. long and serrulate. Both sides of leaves are green; upper side of the leaf is darker green than the lower. Bark of mature trees is flaky, heavily ridged and dark brown to black. Catkins, 2.5-7 cm. long, are borne among new leaves from mid-May to June.

ECOLOGICAL NOTES: A common willow of floodplain forests; it is also found along stream-banks, lakeshores, ditches and berms.

SOURCE: Brockman (1979); Fernald (1970); Smith (2008); and Gleason and Cronquist (1991).



Pistillate catkins



Unlike other tree-size willow species in our area, the leaves of black willow are green on both sides.

Black Willow

(*Salix nigra*)

WHITECRACK WILLOW

(*Salix* x *fragilis* L.)

WILLOW FAMILY (Salicaceae) **C of C:** Introduced (0) **IND. STATUS:** FAC

SYNONYM: *Salix* x *rubens* Schrank

FIELD CHARACTERISTICS: A large, deciduous tree with 1-5 upright or leaning trunks to 30 m. in height and 116 cm. dbh. Bark is gray or gray brown with deep furrows and coarse ridges. First- and second-year branchlets are yellow to yellowish-brown or yellowish-green. Petioles are 6-18 mm. long, usually with enlarged glandular dots or lobes at the summit. Leaves are elliptical to lanceolate and 7-15 cm. long and 1.3-3 cm. wide with an apex that is acuminate to caudate. Upper leaf surfaces are dark green, shiny or dull, and glabrous or nearly so. Lower leaf surfaces are pale green or pale blue-green, dull and glabrous or nearly so. Immature leaves are reddish or yellowish green and covered with long, silky hairs at first, then becoming glabrous. Male catkins are 3.5-6.5 cm. long while female catkins are 5-9 cm. long. Capsules are glabrous and 4-6 mm. long. In flower in early May to early June.

ECOLOGICAL NOTES: Whitecrack willow has been long mistaken for the native peach-leaf willow (*S. amygdaloides*) and non-native white willow (*S. alba*). It is actually a hybrid of two European species, white willow and crack willow (*S. fragilis*). Whitecrack willow was widely planted by early European settlers and escaped to the extent that today it is a common tree of floodplains and streambanks. See Smith (2008) for a key to distinguish between these tree-sized willow species.

SOURCE: Gleason and Cronquist (1991); and Smith (2008).

Whitecrack Willow

(*Salix* x *fragilis*)


Leaves and pistillate catkins


Staminate catkin

PLAINS COTTONWOOD

(*Populus deltoides* Marsh. ssp. *monilifera* (Ait.) Eckenw.)

WILLOW FAMILY (Salicaceae) **C of C:** Native (1 MN)(2 WI) **IND. STATUS:** FAC

FIELD CHARACTERISTICS: The largest deciduous tree in Minnesota and Wisconsin growing to a height of 40 m. and 200 cm. in diameter. Leaves are broadly triangular (deltoid-shaped, as in the species name) with flattened petioles and serrate margins. Leaves are 8-14 cm. long and have glands at the base. Bark of mature trees is deeply furrowed and dark gray. Flowers are in unisexual catkins. Multitudes of short-lived, minute seeds with cottony hairs are produced that can be blown for long distances. In flower April-May.

ECOLOGICAL NOTES: Plains cottonwood is a common tree of floodplain forests and streambanks as well as uplands. It is typically a pioneering species of disturbed sites such as berms, ditches, dredge spoils, stormwater ponds and quarries. Eastern cottonwood (*P. deltoides* ssp. *deltoides*) is closely related but occurs south and east of Minnesota and Wisconsin (Smith 2008).

SOURCE: Brockman (1979); Fernald (1970); Gleason and Cronquist (1991); Smith (2008); and Swink and Wilhelm (1994).

RIVER BIRCH

(*Betula nigra* L.)

BIRCH FAMILY (Betulaceae) **C of C:** Native (6) **IND. STATUS:** FACW

FIELD CHARACTERISTICS: A deciduous tree growing to a height of 25 m. and 57 cm. dbh. Bark can be reddish to brown to black, and peels in curled strips. Leaves are alternate and irregularly oval to triangular-oval, 4-8 cm. long, pale beneath, and the margins of upper portions are doubly serrate, while the lower margins are shallowly lobed. Catkins are 1.5-3 cm. long. Pistillate catkins are cone-like and disintegrate when ripe. Staminate catkins form in summer and open the following spring. In flower April-May. Similar to yellow birch (*B. alleghaniensis*) [page 328] but yellow birch leaves are not doubly serrate. Additionally, the twigs/bark of yellow birch have the scent of wintergreen, which river birch lacks.

ECOLOGICAL NOTES: River birch is found in floodplain forests and hardwood swamps. Its preferred germination sites are sandbars exposed after spring floods have receded.

SOURCE: Brockman (1979); Gleason and Cronquist (1991); Swink and Wilhelm (1994); Smith (2008); and Voss (1985).

BOX ELDER

(*Acer negundo* L.)

MAPLE FAMILY (Aceraceae) **C of C:** Native (1 MN)(0 WI) **IND. STATUS:** FAC

FIELD CHARACTERISTICS: A deciduous tree growing to 35 m. in height and 148 cm. dbh. Compound leaves are opposite with 3 to 5 (rarely 7) irregularly serrated to shallowly lobed leaflets. The moderately stout, smooth twigs are greenish to purple with a pale waxy coating. Older bark is a gray to light brown color with deep furrows. Fruit is a winged samara 3-4.5 cm. long which falls in September to October. In flower from early April to late May.

ECOLOGICAL NOTES: Box elder, also known as ash-leaf maple, is an abundantly common species of streambanks and floodplains. It is also a frequent, pioneering species of disturbed habitats on moist alluvial soils, fertile soils of vacant urban parcels, and abandoned agricultural lands.

SOURCE: Gleason and Cronquist (1991); Petrides (1986); Swink and Wilhelm (1994); and Voss (1985).

BUTTONBUSH

(*Cephalanthus occidentalis* L.)

MADDER FAMILY (Rubiaceae) **C of C:** Native (9 WI)(7 MN) **IND. STATUS:** OBL

FIELD CHARACTERISTICS: A multiple-stemmed, deciduous, tall shrub to 5 m. in height and 10 cm. dbh. Bark is gray or brown and flaking with age. First-year branchlets are glabrous and greenish to greenish brown. Second-year branchlets are brown to gray-brown with whitish lenticels. Leaves are simple, opposite or occasionally in whorls of 3. Blades are entire, ovate to ovate-oblong or elliptical, 7-14 cm. long and 3-7 cm. wide. Upper leaf surfaces are dark green, glabrous and glossy; lower leaf surfaces are pale green and sparsely hairy on the main veins. The inflorescence is a tight, spherical cluster of 100-200 flowers, each cluster 2-3 cm. in diameter. Flowers are bisexual, with flower parts in 4s. Flowers are white or greenish, tubular, 8-12 mm. long, and appear in late June to early August. Fruit is a brown, cone-shaped nutlet 5-8 mm. long that matures in September-October.

ECOLOGICAL NOTES: Buttonbush is a characteristic species of floodplains as it is very tolerant of flooding and sedimentation. However, it is relatively shade-intolerant and prefers edges or openings within the floodplain forest. It has a wide range across the eastern U.S. but only extends into eastern Minnesota along the St. Croix and Mississippi River floodplains. In Wisconsin, it occurs in larger river floodplains across the southern half of the state.

SOURCE: Gleason and Cronquist (1991); and Smith (2008).

INDIGO BUSH

(*Amorpha fruticosa* L.)

BEAN FAMILY (Fabaceae or Leguminosae) **IND. STATUS:** FACW

C of C: Native (6 WI)(4 MN)

FIELD CHARACTERISTICS: An erect, perennial, deciduous, branching shrub to about 4 m. tall. Leaves are alternate and pinnately (feather-like) compound with 4-10 or more pairs of green leaflets, 2-4.5 cm. long. Leaflets are dotted with green sessile glands beneath. Petioles are typically pubescent. The purple flowers are arranged in (1)2 to several dense racemes, 6-20 cm. long. Fruit is a glandular pod, 5-9 mm. long by 2-4.5 mm. wide. In flower June-July.

ECOLOGICAL NOTES: Indigo bush is a riparian plant of streambanks, floodplains and lakeshores. It occasionally occurs in moist upland woods. It is very common along the Mississippi River.

SOURCE: Gleason and Cronquist (1991); Smith (2008); Swink and Wilhelm (1994); and Voss (1985).

Aerial roots

COMMON POISON IVY

(*Toxicodendron radicans* (L.) Kuntze ssp. *negundo* (Greene) Gillis)

CASHEW FAMILY (Anacardiaceae) **C of C:** Native (7 MN)(4 WI) **IND. STATUS:** FACU(GP) FAC(NC/NE, MW)

SYNONYM: *Rhus radicans* L.

FIELD CHARACTERISTICS: A branching, deciduous shrub to 3 m. in height, or vines climbing to 20 m. in length. Stem diameters to 3-6 cm. with grayish to brown bark. The vine form is characterized by numerous aerial roots attached to host tree trunks (see photo: aerial roots are the copper-colored, fiber-like structures). Alternate, compound leaves are in trifoliate (3 leaflet) clusters. Leaflets are entire to few toothed or shallowly lobed and 3-12(15) cm. long. The terminal leaflet is supported by a long petiole. Mature leaflets are shiny, ovate and dark green. Immature leaflets range from reddish in spring to light green. Yellowish- to greenish-white flowers occur on ± ascending axillary panicles. The grayish-white, berry-like fruit is a spherical drupe 4-5 mm. in diameter. The resin, called urushiol and which occurs throughout the plant, can cause a severe allergic contact dermatitis.

ECOLOGICAL NOTES: Common poison ivy is very frequent in floodplain forests, especially along the Mississippi and Wisconsin Rivers. In addition, it occurs in a wide variety of habitats ranging from open sand dunes to upland fields, thickets and forests. The fruits are used as a winter food by a variety of birds and other wildlife, which aids in seed dispersal.

SOURCE: Gleason and Cronquist (1991); Smith (2008); Swink and Wilhelm (1994); and Voss (1985).

RIVERBANK GRAPE

(*Vitis riparia* Michx.)

GRAPE FAMILY (Vitaceae) **C of C:** Native (2) **IND. STATUS:** FAC(NC/NE, GP);FACW(MW)

FIELD CHARACTERISTICS: A perennial, deciduous, high-climbing, woody vine with stems to 25 m. in length and 20 cm. dbh. Mature bark is shredding and peeling. The stem pith is interrupted at the nodes by diaphragms up to 9.8 mm. thick. Tendrils are present. The simple leaves are opposite, rotund, 10-20 cm. long, with usually 3 forward pointing lobes. Leaf margins are coarse and sharply serrated. Young leaf blades tend to be pubescent underneath. As they mature, the undersides become green and glabrous with tufts of pubescent hairs between the veins. Panicles are 5-10 cm. long. Blue-black fruits are 6-12 mm. in diameter with a waxy bloom (glaucous) at maturity.

ECOLOGICAL NOTES: Riverbank grape is common in floodplain forests, wooded swamps, shrub swamps, along riverbanks, fence rows, upland forests and on sandy shores and dunes.

SOURCE: Gleason and Cronquist (1991); Swink and Wilhelm (1994); Smith (2008); and Voss (1985).

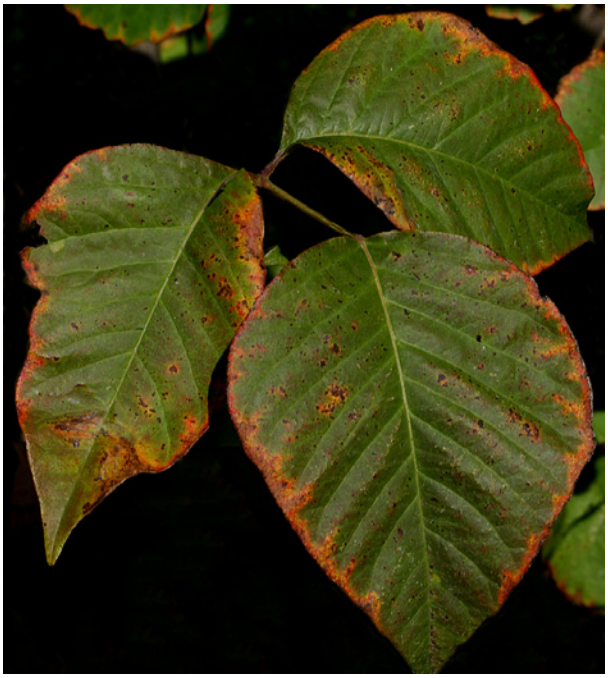
Flowers are in elongate panicles.

Fruit matures in late July to early September.

Bark peels in long, linear strips.

Riverbank Grape

(*Vitis riparia*)



Leaves of three leave it be!

Fruit matures late August to late September, often held over winter.

WESTERN POISON IVY

(*Toxicodendron rydbergii* (Small ex Rydb.) Greene)

CASHEW FAMILY (Anacardiaceae) **IND. STATUS**: FAC(NC/NE, MW); FACU(GP)

C of C: Native (1 MN)(2 WI) **SYNONYM:** *Rhus radicans* L. var. *rydbergii* (Small) Rehd.

FIELD CHARACTERISTICS: A low, deciduous shrub to 2 m. in height and 2 cm. diameter that lacks aerial roots and has little, if any, branching. Bark is smooth and gray while branchlets are brown. Leaves are alternate, deciduous and compound with 3 leaflets. Leaflets are ovate to broadly-ovate, 8-13 cm. long by 4-9.5 cm. wide, with round to obtusely-angled bases. Leaf margins have irregular and coarse or blunt teeth. Inflorescence is an erect panicle from leaf axils. Flowers are functionally unisexual, in 5 parts, with whitish flowers 1.5-3 mm. long. Fruit is a spherical drupe, whitish to pale yellowish green, and 4.5-6 mm. in diameter. In flower in June.

ECOLOGICAL NOTES: Western poison ivy is found throughout Minnesota and Wisconsin in a wide variety of habitats except those that are permanently wet. It is primarily a forest species but also spreads to native prairies, sand dunes, road ditches and even manicured lawns adjacent to forests.

SOURCE: Gleason and Cronquist (1991); Smith (2008); and Swink and Wilhelm (1994).

Autumn colors

In flower early to late June

Western Poison Ivy

(*Toxicodendron rydbergii*)

MOONSEED

(*Menispermum canadense* L.)

MOONSEED FAMILY (Menispermaceae) **IND. STATUS:** FAC(NC/NE, MW); FACU(GP)

C of C: Native (4 MN)(5 WI)

FIELD CHARACTERISTICS: A perennial, climbing vine with twining stems to 10 m. in height and 2 cm. in diameter. Bark is green to brown. Leaves are simple and alternate with blades that are reniform to broadly ovate. Blades are 4-18 cm. long and 6-22 cm. wide with a cordate base. Leaf margins have 1-3 pairs of shallow, blunt lobes. Upper leaf surfaces are dark green and sparsely hairy while lower leaf surfaces are pale green and sparsely hairy. Flowers are unisexual, whitish to greenish, and borne in axillary panicles of 15-50. In flower early June to early July. Fruit is a glabrous, bluish black drupe 9-13 mm. in diameter that matures in mid-August to early October.

ECOLOGICAL NOTES: Moonseed is a common woody vine of floodplain forests and mesic (upland) hardwood forests. It has the ability to survive in deep shade, but prefers sunny edges and partial openings in the forest canopy.

SOURCE: Gleason and Cronquist (1991); and Smith (2008).

HOG PEANUT

(*Amphicarpaea bracteata* (L.) Fern.)

BEAN FAMILY (Fabaceae or Leguminosae) **IND. STATUS:** FAC(NC/NE, MW);FACU(GP)

C of C: Native (2 MN)(5 WI)

FIELD CHARACTERISTICS: An annual, twining vine to 1.5 m. long. Leaves are composed of 3 leaflets each of which are 2-8 cm. long, ovate and broadly rounded at the base. Inflorescence has a long peduncle from a leaf axil and includes 2 to many pale, purplish to whitish, 5-parted flowers that are 12-18 mm. long. Fruit is a pod usually with 3 seeds. In addition, some branches at the base of the stem develop small, 1-seeded, often subterranean, fruits. In flower August-September.

ECOLOGICAL NOTES: Hog peanut is a common species of hardwood swamps, shrub-carrs and inland fresh meadows as well as mesic (upland) forests and meadows.

SOURCE: Gleason and Cronquist (1991); and Black and Judziewicz (2009).

MONEYWORT

(*Lysimachia nummularia* L.)

PRIMROSE FAMILY (Primulaceae) **C of C:** Introduced (0) **IND. STATUS:** FACW

FIELD CHARACTERISTICS: A perennial, creeping, mat-forming herb with stems to 50-60 cm. long. Leaves are opposite, dotted with black glands, round or oval and 1-2.5 cm. long. Flowers are single in leaf axils on petioles to 2.5 cm. long. Sepals are triangular in shape and 6-8 mm. long. Petals are yellow, dotted with dark red and 10-15 mm. long. Fruit is a capsule. In flower June-August.

ECOLOGICAL NOTES: Moneywort is a native of Europe that escaped from cultivation and is potentially invasive in our region. It now occurs in a variety of shaded, wet habitats, especially floodplain forests.

SOURCE: Gleason and Cronquist (1991); Swink and Wilhelm (1994); and Chadde (2002).

CUT-LEAF CONEFLOWER

(*Rudbeckia laciniata* L.)

ASTER FAMILY (Compositae or Asteraceae) **IND. STATUS:** FACW(NC/NE, MW);FAC(GP)

C of C: Native (6 WI)(4 MN)

FIELD CHARACTERISTICS: A perennial herb 0.5-3 m. in height. Stems are glabrous and often glaucous. Leaves are alternate, up to 30 cm. wide, and deeply lobed (lacerated). Leaf margins are coarsely toothed to lobed. Inflorescence consists of multiple flower heads, which have both ray and disc flowers. Ray flowers are lemon-yellow while disc flowers are green-yellow. Ray flowers are 3-6 cm. long. Fruit is a 4-angled nutlet (achene). In flower July-September.

ECOLOGICAL NOTES: Cut-leaf coneflower is a characteristic species of floodplain forests and streambanks typically growing in full or partial shade. A garden cultivar known as goldenglow, which has all or most of the disc flowers converted to ray flowers, occasionally escapes to the wild.

SOURCE: Gleason and Cronquist (1991); Chadde (2002); Swink and Wilhelm (1994); and Voss (1996).

CARDINAL FLOWER

(*Lobelia cardinalis* L.)

LOBELIA FAMILY (Lobeliaceae) **C of C:** Native (7) **IND. STATUS:** OBL(NC/NE, MW) FACW(GP)

FIELD CHARACTERISTICS: A perennial herb that usually has a simple stem growing to a height of 50-150 cm. The leaves are thin, smooth, dark green, lanceolate to lance-ovate, and irregularly serrate. The racemes are terminal and 1-4 dm. long. Flowers are intense scarlet-red and 3-4 cm. long. In flower July-September.

ECOLOGICAL NOTES: Cardinal flower is found in floodplain forests, fresh (wet) meadows and along streambanks.

SOURCE: Fernald (1970); and Gleason and Cronquist (1991).

CANADA ANEMONE

(*Anemone canadensis* L.)

BUTTERCUP FAMILY (Ranunculaceae) **C of C:** Native (3 MN)(4 WI) **IND. STATUS:** FACW

FIELD CHARACTERISTICS: A perennial herb from rhizomes often forming large patches. Stems grow to 10-60 cm. in height. Leaves are all from the base and have long petioles with the exception of 2-3 leafy, sessile bracts below the flower. Leaves from the base are 4-15 cm. wide and deeply palmately-divided into 3-5 toothed segments. The white flowers are 2-5 cm. long usually with 5 petal-like sepals (but can be 4- to 20-parted) that are 1-2 cm. long. Stamens and pistils are many. Nutlets are clustered in a semi-round head. Nutlets are hairy, 3-5 mm. long with a beak 2-4 mm. in length. In flower May-August.

ECOLOGICAL NOTES: Canada anemone is frequent in floodplain forests, fresh (wet) meadows and along streambanks.

SOURCE: Chadde (2002); Black and Judziewicz (2009); and Gleason and Cronquist (1991).

WHITE AVENS

(*Geum canadense* Jacq.)

ROSE FAMILY (Rosaceae) **C of C:** Native (2) **IND. STATUS:** FAC

FIELD CHARACTERISTICS: A perennial herb with slender stems 40-100 cm. tall. Basal leaves have long petioles and mostly 3 obovate leaflets. Stem leaves mostly shorter petioled with more oblong-lanceolate to rhombic leaflets. Flowers have 5 white petals, which are nearly as long as the sepals, or longer. Head of fruits is obovoid and 10-15 mm. long. Fruit is a dry seed with a hook. In flower May-June.

ECOLOGICAL NOTES: White avens is a common forb of the shaded habitats of floodplain forests, high spots in hardwood swamps, and mesic (upland) forests.

SOURCE: Gleason and Cronquist (1991).

WOOD NETTLE

(*Laportea canadensis* (L.) Weddell)

NETTLE FAMILY (Urticaceae) **C of C:** Native (3 MN)(4 WI) **IND. STATUS:** FAC(GP) FACW(NC/NE, MW)

FIELD CHARACTERISTICS: A perennial herb 50-100 cm. in height. Alternate leaves are broadly ovate, 8-15 cm. long, coarsely serrate and hairy. Staminate flowers are in cymes from the lower axils. Pistillate flowers are in loose, elongate, spreading cymes from the upper axils. In flower July-September.

ECOLOGICAL NOTES: Wood nettle is an abundant and characteristic species of floodplain forests. It also occurs along streambanks and in rich, mesic (upland) forests. The stinging hairs can cause a severe rash similar to or worse than that caused by stinging nettle (*Urtica dioica* ssp. *gracilis*).

SOURCE: Gleason and Cronquist (1991).

STINGING NETTLE

(*Urtica dioica* L. ssp. *gracilis*)

NETTLE FAMILY (Urticaceae) **C of C:** Native (1) **IND. STATUS:** FAC(NC/NE, GP);FACW(MW)

SYNONYMS: Numerous including *U. gracilis* Ait. and *U. procera* Muhl.

FIELD CHARACTERISTICS: A tall, slender, tough-stemmed perennial herb growing to 2 m. in height. Stems are square and coarse. Leaves are opposite, stalked, heart-shaped at the base, serrate and 5-15 cm. long. Glassy stinging hairs are present on the stem and/or leaves. Greenish flowers emerge from the leaf axils. Fruit is a nutlet 1.5 mm. long. In flower June-September.

ECOLOGICAL NOTES: Stinging nettle is found in floodplain forests, along streambanks, and on dredged spoils. It is a frequent invader of disturbed or drained organic soils of inland fresh meadows, especially after fires. Stinging nettle also occurs in pastured upland woods. Skin contact with the stinging hairs of this species can be very irritating.

SOURCE: Fernald (1970); Gleason and Cronquist (1991); Voss (1985); Swink and Wilhelm (1994); and Great Plains Flora Association (1991).

FALSE NETTLE

(*Boehmeria cylindrica* (L.) Sw.)

NETTLE FAMILY (Urticaceae) **C of C:** Native (5 MN)(6 WI) **IND. STATUS:** FACW(GP) OBL(NC/NE, MW)

FIELD CHARACTERISTICS: An erect, perennial, nettle-like herb up to 60(100) cm. tall that lacks stinging hairs. The ovate leaves are opposite, coarsely toothed and have long petioles. Minute, four-parted greenish flowers occur in dense clusters along an unbranched cylindrical spike. The distinct flowering spikes are opposite and arise from leaf axils. In flower July-August.

ECOLOGICAL NOTES: False nettle is most often found in wooded swamps and on the wet alluvial soils of floodplain forests. It occasionally occurs at the edges of marshes and bogs.

SOURCE: Gleason and Cronquist (1991); Swink and Wilhelm (1994); and Voss (1985).

CANADIAN CLEARWEED

(*Pilea pumila* (L.) Gray)

NETTLE FAMILY (Urticaceae) **C of C:** Native (3) **IND. STATUS:** FACW(NC/NE, MW) FAC(GP)

FIELD CHARACTERISTICS: A typically small, annual, nettle-like herb that lacks stinging hairs, up to 50 cm. tall. It often forms small colonies. Stems are translucent and fleshy. The shiny ovate leaves are opposite, usually glabrous, have blunt toothed margins, and long petioles. Four-parted flowers occur on loose, spreading branched panicles. Nutlets are pale green to yellowish, smooth, and ≤ 1.0 mm. wide. The nutlets of the very similar bog clearweed (*Pilea fontana*) are dark olive to blackish purple, warty, and ≥ 1.1 mm. wide. In flower July-September.

ECOLOGICAL NOTES: Canadian clearweed commonly occurs in the shaded habitats of rich, wetland forests including floodplain forests. Bog clearweed tends to occur in slightly wetter, springy habitats and in bogs.

SOURCE: Gleason and Cronquist (1991); Swink and Wilhelm (1994); and Voss (1985).

HONEWORT

(*Cryptotaenia canadensis* (L.) DC.)

CARROT FAMILY (Umbelliferae or Apiaceae) **IND. STATUS:** FAC

C of C: Native (3 MN)(4 WI)

FIELD CHARACTERISTICS: A glabrous, branching, perennial herb with stems 30-80 cm. in height. Leaves are trifoliate, the lower leaves on long petioles. Leaflets are lanceolate to rhomboid or ovate and 4-15 cm. long with sharply and irregularly serrated or lobed margins. Compound umbels with unequal rays and tiny, white flowers are produced. Fruit is lance-linear in shape and 5-8 mm. long. In flower June-July.

ECOLOGICAL NOTES: Honewort commonly occurs in floodplain forests where it can be a dominant species. It also occurs in rich, mesic (upland) forests.

SOURCE: Gleason and Cronquist (1991).

VIRGINIA WILD RYE

(*Elymus virginicus* L.)

GRASS FAMILY (Gramineae or Poaceae) **IND. STATUS:** FACW(NC/NE, MW);FAC(GP)

C of C: Native (4 MN)(6 WI)

FIELD CHARACTERISTICS: A tufted, perennial grass to 50-120 cm. in height. Leaves are flat, 4-10 mm. wide and scabrous on both sides. Inflorescence is rigidly erect, 4-12(16) cm. long, often included in the summit of the uppermost leaf sheath. Spikelets are mostly paired and 2-4(5) flowered. Glumes are 10-30 mm. overall, 0.8-2 mm. wide and bowed out at the base. Lemmas are 6-9 mm. in length usually with a long, straight awn up to 10 mm. in length, but sometimes awnless. Riverbank wild rye (*Elymus riparia*) is very similar but the inflorescence is nodding; lemmas have awns longer than 10 mm.; and glumes are 0.4-0.8 mm. wide and not bowed out at the base. It occurs in similar habitats but prefers more sandy soils.

ECOLOGICAL NOTES: This grass is a common species of floodplain forests and streambanks.

SOURCE: Gleason and Cronquist (1991); Crow and Hellquist (2000); Swink and Wilhelm (1994); and Voss (1972).

Spikelets

WHITE GRASS

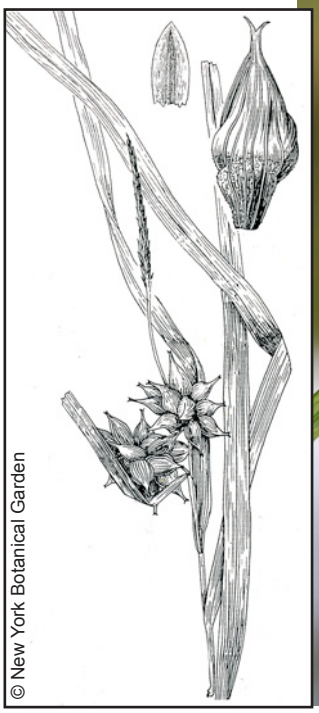
(*Leersia virginica* Willd.)

GRASS FAMILY (Gramineae or Poaceae) **C of C:** Native (5) **IND. STATUS:** FACW

FIELD CHARACTERISTICS: A perennial grass spreading from rhizomes and reaching 50-120 cm. in height. Stems are slender and weak, often reclining at the base and rooting at nodes. Leaves are rough-hairy but not scabrous to the degree of rice cut-grass (*L. oryzoides*). Leaves are 5-20 cm. long by 5-15 mm. wide with a short, flat-topped ligule. Inflorescence is an open panicle 10-20 cm. long and stiffly spreading. Spikelets are 1-flowered, oblong, overlapping, 3 mm. long by 1 mm. wide, with stiff hairs. Glumes are absent. Lemmas are 3-4 mm. long and sparsely hairy.

ECOLOGICAL NOTES: White grass is a frequent species of floodplain forests and streambanks. An additional habitat is shaded depressions in mesic hardwood forests.

SOURCE: Gleason and Cronquist (1991) and Chadde (2002).



COMMON BUR SEDGE

(*Carex grayi* Carey)

SEDGE FAMILY (Cyperaceae) **C of C:** Native (8 MN)(7 WI) **IND. STATUS:** FACW
A species of special concern in Minnesota

FIELD CHARACTERISTICS: One of our more distinctive perennial sedges. Stems are 30-90 cm. tall, solitary or form small clusters. Basal sheaths are tinted a purplish-red. Mature leaves are 4-11 mm. wide. The solitary terminal spikelet supports staminate flowers. Pistillate spikelets number 1 or 2 and are densely globular, with (7)10-35 perigynia radiating in all directions. Lance-shaped perigynia are 12.5-20 mm. by 4-8 mm., strongly nerved, with bidentate teeth. The beak is shorter than the body. Perigynia may be pubescent.

ECOLOGICAL NOTES: Common bur sedge, also known as Gray's sedge, prefers floodplain forests. It also occurs along the edges of vernal pools.

SOURCE: Gleason and Cronqist (1991); Swink and Wilhelm (1994); and Voss (1972).

SWAMP OVAL (MUSKINGUM) SEDGE

(*Carex muskingumensis* Schwein.)

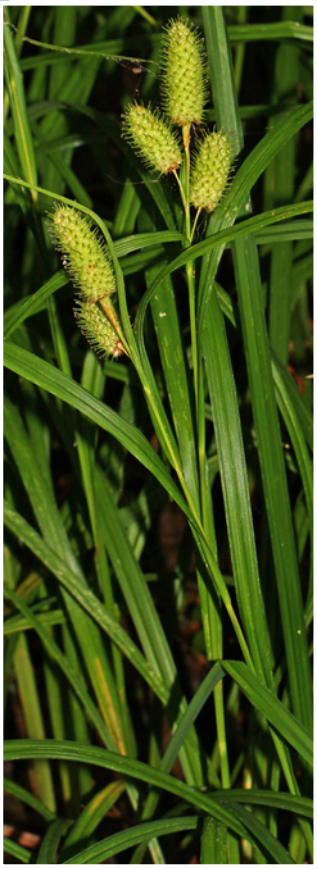
SEDGE FAMILY (Cyperaceae) **C of C:** Native (7) **IND. STATUS:** OBL

A species of special concern in Minnesota

FIELD CHARACTERISTICS: A perennial, clump-forming sedge with stout rhizomes and several conspicuous leafy stems. Fertile stems are 50-100 cm. tall. Sheaths are green-veined on the ventral (inner) side. Main leaves are 3-5 mm. wide. Five to 10 spindle-shaped, sessile spikes are tapered to points at both ends forming dense clusters about 1-2 cm. long. The perigynia are thin, scale-like, incurved, and lance-shaped, 6-10 mm. long with thin marginal wings. The tapering beak is deeply bidentate. Nutlets are narrow, lens-shaped and about 2 mm. long. This sedge is very similar to *Carex scoparia*, but larger and more robust. The vegetative form of the sedge may initially be confused with *Carex trichocarpa*.

ECOLOGICAL NOTES: Swamp oval sedge is characteristic of the floodplain forests of major river bottoms and is very common along the Mississippi River in Wisconsin. Another habitat is vernal pools.

SOURCE: Fassett (1976); Gleason and Cronquist (1991); Swink and Wilhelm (1994); and Voss (1972).



CATTAIL SEDGE

(*Carex typhina* Michx.)

SEDGE FAMILY (Cyperaceae) **IND. STATUS:** OBL

C of C: Native (9), a species of special concern in Minnesota

FIELD CHARACTERISTICS: A very distinct, clumped, perennial sedge with stems about 30-80 cm. tall. The main leaves are 5-10 mm. wide. The 1-3(6) spikelets are on short peduncles subtended by a short bract. The uppermost spikelet is mostly pistillate with a short staminate portion at the base. Lateral spikelets are all pistillate. Spikelets are 2-4 cm. long and distinctly ovoid-cylindric. Pistillate scales are acute, but blunt and awnless at the tip, and hidden by the perigynia. Perigynia are (4)5.5-6(8) mm. long, smooth, abruptly beaked, dense (30-60 per spikelet), inflated and appressed-ascending. Nutlets are concave and about twice as long as wide with an essentially straight, deciduous style.

ECOLOGICAL NOTES: Cattail sedge is typically found in floodplain forests, including Mississippi River bottomlands downsteam of St. Paul, Minnesota, as well as hardwood swamps.

SOURCE: Fassett (1976); Gleason and Cronquist (1991); Swink and Wilhelm (1994); and Voss (1972).

SECTION 3

Seasonally Flooded Basins

VIII. Seasonally Flooded Basins

Seasonally flooded basins are poorly drained, shallow depressions that typically have standing water for a few weeks each spring, but are usually dry for much of the growing season. These basins include kettles in glacial deposits (e.g., prairie potholes), low spots in outwash plains, and depressions in floodplains. They are frequently cultivated. However, even when cultivated, wetland vegetation can become established if the planted crop is stressed or drowned out. Typical species include smartweeds, beggarticks, flat sedges and wild millet. One unique aspect of seasonally flooded basins is that the alternating periods of flood and drought can eliminate perennial plants so that annual plant species typically dominate the community.

Seasonally flooded basins are of critical importance for waterfowl and shorebirds. These temporary water holding basins frequently have an abundance of invertebrates and plant seeds, which makes them ideal feeding and resting areas for migrating waterfowl and shorebirds. In spring, seasonally flooded basins are used as pairing ponds by ducks, and the abundant invertebrate population provides a protein-rich diet for egg-laying hens.

VEGETATION: This seasonally flooded basin is located within a corn (*Zea mays*) field and was photographed in May when no vegetation was visible. Annual species, and other species adept at colonizing mudflats, would become established as the growing season progressed.

SOILS: Ashkum silty clay loam (Typic Endoaquolls), a poorly-drained soil underlain by calcareous glacial till in drainageways and depressions. Landscape position is a shallow, closed depression in the nearly level plain of Glacial Lake Chicago.

HYDROLOGY: Ponding following spring snowmelt and rainfall events, as well as a high water table. Ashkum soils have a seasonal high water table with 12 inches of standing water to a water table 24 inches below the surface during April through June of most years.

LOCATION: Kenosha County, Wisconsin.

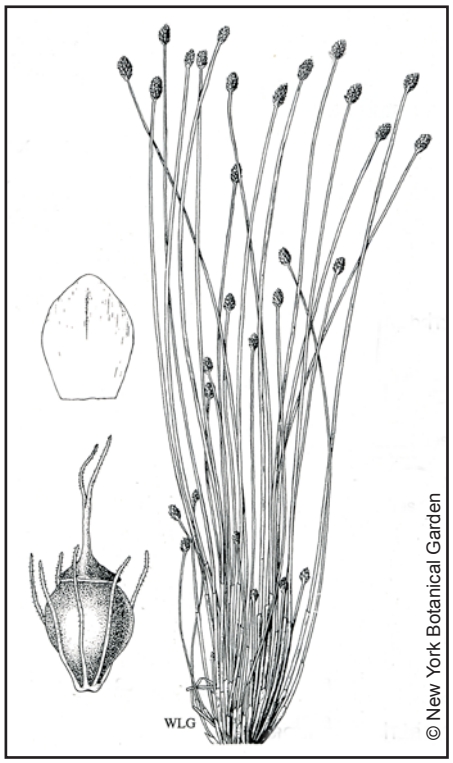
VEGETATION: The seasonally flooded basin shown above is within an alfalfa (*Medicago sativa*) field. When this photograph was taken in late August, the mudflats left by the ponded conditions of the early growing season had been colonized by nearly 100 percent vegetative cover dominated by nodding smartweed (*Persicaria lapathifolia*) and pinkweed (*Persicaria pensylvanica*). Other species present include foxtail (*Setaria viridis*), wild millet (*Echinochloa crus-galli*), common ragweed (*Ambrosia artemisiifolia*) and goosefoot (*Chenopodium album*).

SOILS: Glencoe silty clay loam (Cumulic Endoaquolls), a very poorly-drained mineral soil formed in glacial till. Landscape position is a prairie pothole depression in gently rolling terrain. Under natural conditions, this was a closed basin (no defined outlet or inlet).

HYDROLOGY: Ponding following spring snowmelt and heavy summer rainfall events. In an undrained condition, Glencoe soils have a seasonal high water table with 12 inches of standing water to a water table 12 inches below the surface during October through July of most years. However, the above example has been partially drained by a surface ditch converting this hydrologic regime to that of a seasonally flooded basin – ponded for only a few weeks during the early growing season of most years.

LOCATION: Nicollet County, Minnesota.

Post growing season. Seasonally flooded basins often become ponded following the close of the growing season. The example above illustrates conditions in early November following a snowfall that subsequently melted. In the center of the basin, the planted crop -- soybeans (*Glycine max*) -- either drowned out or was not planted that year. The outer edges of the basin were apparently too wet for the farmer to harvest the soybeans still visible. In general, the waste grain, seeds of volunteering annuals, mudflats and shallow water provided by seasonally flooded basins are of critical importance for the autumn migration of waterfowl and shorebirds. Additionally, the waste grain and seeds are an important autumn/winter food source for upland wildlife including ring-necked pheasant, gray partridge, sharp-tailed grouse, mourning dove and white-tailed deer.



BLUNT SPIKE-RUSH

(*Eleocharis obtusa* (Willd.) J.A. Schultes)

SEDGE FAMILY (Cyperaceae) **C of C:** Native (3) **IND. STATUS:** OBL

FIELD CHARACTERISTICS: A densely tufted, annual sedge with fibrous roots. Stems are up to 50 cm. in height and 0.5-2 mm. thick with sheaths that are oblique at the apex. Spikelets are ovoid, up to 16 mm. long and many-flowered. Nutlets (achenes) are lens-shaped, obovoid and 0.7-1.2 mm. long with a triangular (deltoid)-shaped cap (the tubercle) that is a different color and texture than the body of the achene. The tubercle is about three-fourths to nearly as wide as the broadest part of the achene (see ink drawing). Bristles subtending the nutlet usually number 6-7 and equal or exceed the length of the nutlet.

ECOLOGICAL NOTES: Blunt spike-rush is a frequent colonizer of mudflats, shorelines and marshes. It is commonly found in disturbed, saturated soils such as those of farmed wetlands and wetland creation or restoration sites.

SOURCE: Voss (1972); Swink and Wilhelm (1994); Gleason and Cronquist (1991); Great Plains Flora Association (1991); and Britton and Brown (1970).

WILD MILLET

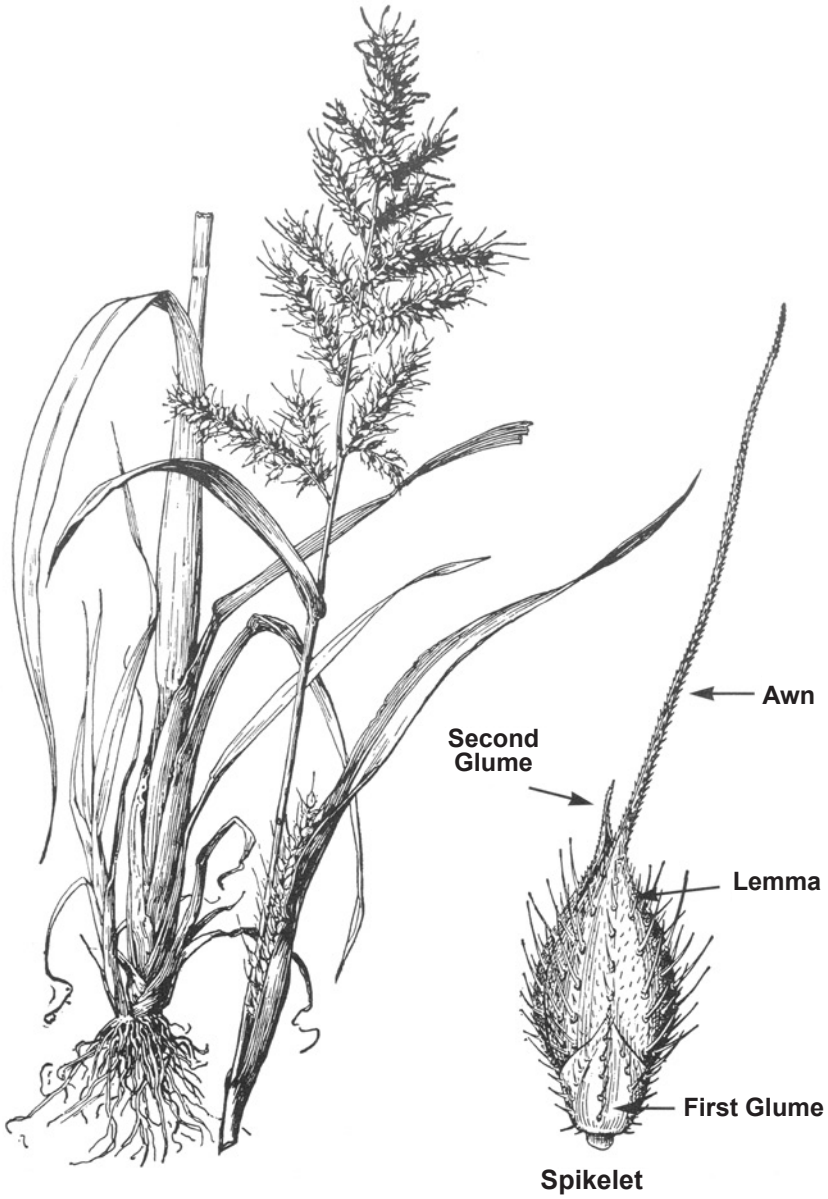
(*Echinochloa crus-galli* (L.) Beauv.)

GRASS FAMILY (Gramineae or Poaceae) **C of C:** Introduced (0) **IND. STATUS:** FACW(MW) FAC(NC/NE, GP)

FIELD CHARACTERISTICS: An annual grass with a stout stem usually 10-100 cm. tall. Leaves are lanceolate and 0.5-1.5(2.3) cm. wide. Inflorescence is a panicle 3-25 cm. long that is often green- to purple-tinged and has a bristly appearance because of numerous spines covering the spikelet, as well as an awn. The length of the awn is quite variable and may be pronounced (as shown by the ink drawing) or nearly lacking. In flower June-November.

ECOLOGICAL NOTES: Wild millet is found in disturbed areas such as cultivated lands and vacant urban parcels. It also occurs in fresh (wet) meadows and along streambanks. *Echinochloa crus-galli* is a native of Eurasia and has become naturalized here. Two native species of *Echinochloa* also occur in Minnesota and Wisconsin: *E. muricata* and *E. walteri*. Note that *E. muricata* appears in some floras under the incorrect name of *E. pungens* (Voss 1972). The seeds are an important food for waterfowl and mourning doves, as well as many other birds.

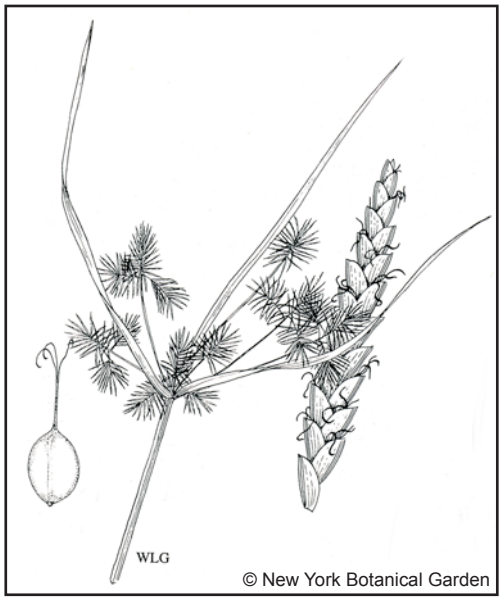
SOURCE: Fernald (1970); Gleason and Cronquist (1991); Martin *et al.* (1951); and Voss (1972).



Wild Millet

(*Echinochloa crus-galli*)

Illustration from Hitchcock (1950)



RED-ROOT FLAT SEDGE

(*Cyperus erythrorhizos* Muhl.)

SEDGE FAMILY (Cyperaceae) **C of C:** Native (3 WI)(2 MN) **IND. STATUS:** OBL

FIELD CHARACTERISTICS: An annual, cespitose sedge from fibrous, blood-red roots. Stems are 10-70 cm. tall, smooth and bluntly triangular. Leaves are 2-10 mm. wide with scabrous margins. Inflorescence is a compound umbel with one to several spikes with numerous crowded spikelets that are 8- to 39-flowered and very narrow. Small wings along the rachilla are deciduous. Scales are 1.1-1.6 mm. long and reddish brown with a green keel. Nutlets are three-sided, ovoid, 0.7-0.8 mm. long and gray, ivory or white in color.

ECOLOGICAL NOTES: Red-root flat sedge occurs on mudflats, riverbanks, borders of marshes and sandy or muddy shores. The specimen shown by the photograph was collected from a recently excavated, sandy, wetland creation site with saturated soils.

In general, members of the genus *Cyperus* have spikelets with scales in two ranks so that they are flattened, hence one common name of "flat sedge." Unlike some other members of the sedge family, the nutlets of *Cyperus* species lack a beak and are not subtended by bristles. There are approximately 14 species of *Cyperus* found in Minnesota and Wisconsin. Some species (e.g., *C. esculentus*) may become a nuisance to agriculture. However, the nutlets and tubers are a food source for wildlife.

SOURCE: Great Plains Flora Association (1991); Voss (1972); Fassett (1957); and Gleason and Cronquist (1991).

STRAW-COLOR FLAT SEDGE

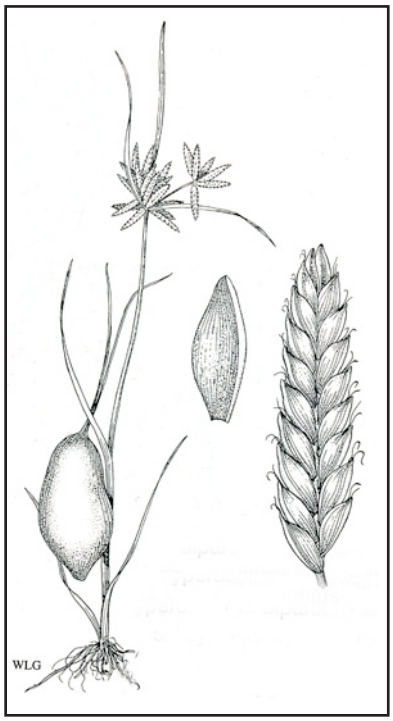
(*Cyperus strigosus* L.)

SEDGE FAMILY (Cyperaceae) **C of C:** Native (1 WI)(2 MN) **IND. STATUS**: FACW

FIELD CHARACTERISTICS: A short-lived perennial sedge with stems arising from rhizomes. The stems are bulbous at the base. Stems may be single to few, are sharply triangular, and up to 60(100) cm. tall. Leaves are crowded at the base and are 2-10(15) mm. wide. Short, cylindric spikes are usually branched at their base with numerous spikelets. Spikelets spread from the rachis at nearly right angles and are strongly compressed. The keeled scales are longer than wide, 3.5(3)-4.5(5) mm. long, persistent, and overlap each other toward the tips. Scales have a greenish mid-rib with yellowish-golden sides and are not out-curved at their tips (appressed). Scales and spikelets are deciduous at maturity. There are 3 stigmas and 3 stamens present. Nutlets are linear, 1.5-2 mm. long, and triangular in cross section.

ECOLOGICAL NOTES: Straw-color flat sedge is one of the more common flat sedges. It is a pioneer species of wetlands, including farmed wetlands and mudflats.

SOURCE: Crow and Hellquist (2000); Gleason and Cronquist (1991); Swink and Wilhelm (1994); and Voss (1972).



SHINING FLAT SEDGE

(*Cyperus bipartitus* Torr.)

SEDGE FAMILY (Cyperaceae) **C of C:** Native (3 WI)(4 MN) **IND. STATUS**: OBL(MW) FACW(NC/NE, GP)

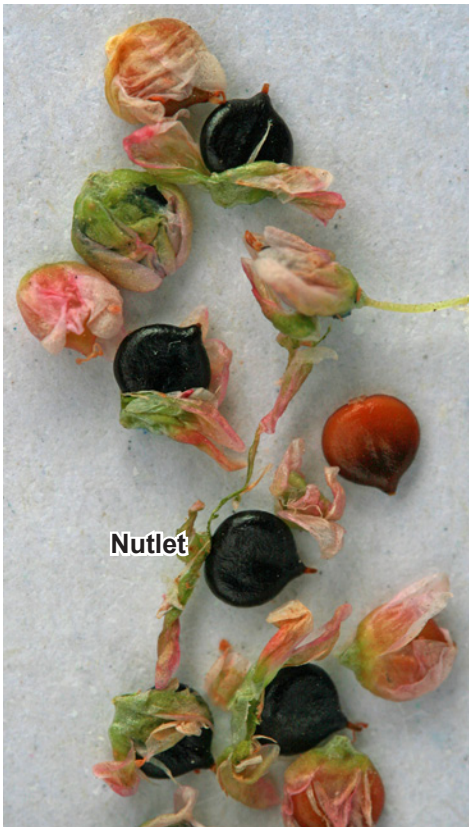
SYNONYM: *Cyperus rivularis* Kunth

FIELD CHARACTERISTICS: A tufted, annual sedge with stems about 10-20(40) cm. tall. Stem leaves are 1-3 mm. wide and usually shorter than the stem. Spikes are sessile with 3-10 spikelets that each have several flowers. Mature scales are strongly pigmented a red-brown color toward the base and margins. Scales are egg-shaped and 2-2.5 mm. long with a prominent vein that becomes incurved toward the tip. Scales are deciduous at maturity. There are 2 stigmas present. Lens-shaped nutlets are smooth, two times longer than wide, 1-1.5 mm. long, rounded at the tip, and brownish in color (not black).

Shining flat sedge can be confused with *Cyperus diandrus*, which has reddish colors concentrated more towards the tip of the scales. The scales also tend to persist at maturity.

ECOLOGICAL NOTES: Shining flat sedge occurs along lake and pond shores and in shallow marshes, ditches and swales. This annual is a colonizer of disturbed, wet soils such as those of farmed wetlands.

SOURCE: Crow and Hellquist (2000); Gleason and Cronquist (1991); Swink and Wilhelm (1994); and Voss (1972).



PINKWEED

(*Persicaria pensylvanica* (L.) M. Gomez)

SMARTWEED FAMILY (Polygonaceae) **C of C:** Native (1) **IND. STATUS:** FACW

SYNONYM: *Polygonum pensylvanicum* L.

FIELD CHARACTERISTICS: An annual herb growing to a height of 2 m. (but sometimes growing along the ground). Leaves are lanceolate, 3-15 cm. long and 1-4 cm. wide. Ocreae (swollen joints of the stem) are 0.5-1.5 cm. long with a margin that is entire or irregular, but not fringed with bristles. Inflorescence is cylindric, 2-3 cm. long and 1-1.5 cm. wide. The flower stalk (peduncle) has abundant, glandular hairs (use 10x lens). Flowers are white to pink to rose and 3-4 mm. long. Fruit is a shiny, lens-shaped nutlet 2.2-3.5 mm. broad. In flower July-September.

ECOLOGICAL NOTES: Pinkweed is found in shallow marshes and disturbed areas, especially on recently exposed mudflats, cultivated land, and dredged material disposal sites. There are about 18 species of smartweeds (*Persicaria, Polygonum)* in Minnesota and Wisconsin. The nutlets of pinkweed, and smartweeds in general, are an important food source for waterfowl and many songbirds.

SOURCE: Fernald (1970); Gleason and Cronquist (1991); Martin *et al.* (1951); and Voss (1985).

NODDING SMARTWEED

(*Persicaria lapathifolia* (L.) S.F. Gray)

SMARTWEED FAMILY (Polygonaceae) **C of C:** Native (2) **IND. STATUS:** FACW(NC/NE, MW) OBL(GP)

SYNONYM: *Polygonum lapathifolium* L.

FIELD CHARACTERISTICS: An erect, taprooted, annual herb growing to 1.5 m. in height. Leaves are variable but usually lanceolate and acuminate, often woolly underneath. Ocreae (swollen joints of stem) are not fringed with hairs (unlike some similar species). Inflorescence consists of numerous, nodding racemes that are 1-5 cm. long. Flowers (tepals) are white to pink to green and 3-4 mm. long. Outer tepals are strongly 3-nerved, each nerve divided at the summit into 2 recurved branches. Nutlets are 2-sided (lenticular) and 1.7-3.2 mm. long. In flower July-September.

ECOLOGICAL NOTES: Nodding smartweed is a common colonizer of all types of disturbed, wet to moist soils. Typical habitats include farmed wetlands, mudflats, roadsides, ditches and construction sites.

SOURCE: Gleason and Cronquist (1991); and Black and Judziewicz (2009).

Photos by Steve D. Eggers

WATER PEPPER

(*Persicaria hydropiper* (L.) Delarbre)

SMARTWEED FAMILY (Polygonaceae) **C of C:** Introduced (0) **IND. STATUS:** OBL

SYNONYM: *Polygonum hydropiper* L.

FIELD CHARACTERISTICS: An erect or sprawling, annual herb growing to 60 cm. Stems are glabrous and often reddish. Leaves are narrowly lanceolate to lance-ovate, 0.4-2.5 cm. wide, and have a sharp, peppery taste. Ocreae (swollen joints of stem) are fringed with short hairs, those of the upper half of the stem concealing self-pollinating flowers that remain closed. Inflorescence consists of racemes that are commonly nodding at the summit. Flowers (tepals) are greenish, usually with rose-pink (white) margins, and are dotted with glands (punctate). Nutlets (achenes) are 2-sided, or more commonly 3-sided, dark brown to black, dull, rough, and 2.2-3.3 mm. long. In flower July-August. Contrast these characteristics with those of dotted smartweed (*Persicaria punctata*).

ECOLOGICAL NOTES: A native of Eurasia, water pepper is a common colonizer of all types of disturbed, wet to moist soils. Typical habitats include farmed wetlands, mudflats, roadsides, ditches, construction sites and edges of marshes.

SOURCE: Crow and Hellquist (2000); Gleason and Cronquist (1991); and Black and Judziewicz (2009).

LADY'S THUMB

(*Persicaria maculosa* S.F. Gray)

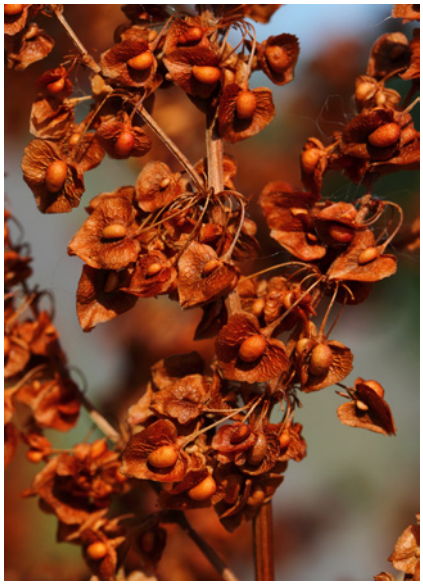
SMARTWEED FAMILY (Polygonaceae) **C of C:** Introduced (0) **IND. STATUS:** FAC(NC/NE) FACW(MW, GP)

SYNONYMS: *Polygonum persicaria* L.; *Persicaria persicaria* (L.) Small

FIELD CHARACTERISTICS: An annual herb with upright to spreading stems 20-80 cm. long. Leaves are lance-shaped, 3-15 cm. long and 0.5-3 cm. wide. Upper leaf surfaces usually have a dark blotch somewhat resembling a thumb print. Undersides of leaves are often dotted with small glands. Ocreae are 5-15 mm. long with short hairs and fringed with bristles. Flowers are rose to pink in erect, cylindric racemes 1-4 cm. long and 0.5-1 cm. wide. Fruit is a black, shiny nutlet usually lens-shaped but may be 3-angled and 2-3 mm. long. In flower July-September.

ECOLOGICAL NOTES: Introduced from Europe, lady's thumb is a common colonizer of all types of disturbed, wet to moist soils. Typical habitats include farmed wetlands, streambanks, mudflats, roadsides, ditches, construction sites and edges of marshes. Voss (1985) cautions that other smartweeds, e.g., *Persicaria lapathifolia* and *P. hydropiperoids*, sometimes have a dark blotch on the leaves; therefore, other characters need to be used to separate these species. For example, the ocreae of *P. lapathifolia* are not fringed with bristles in contrast to those of *P. maculosa*.

SOURCE: Chadde (2011); and Gleason and Cronquist (1991).



CURLY DOCK

(*Rumex crispus* L.)

SMARTWEED FAMILY (Polygonaceae) **C of C:** Introduced (0) **IND. STATUS:** FAC

FIELD CHARACTERISTICS: A stout, taprooted, perennial herb 50-150 cm. in height. Leaves are strongly crisped (wavy). Basal leaves are large, 10-30 cm. long and 1-5 cm. wide, commonly rounded or subcordate at the base, and on long petioles. Leaf shape is lance-like to oval. Stem leaves are smaller with shorter petioles. Inflorescence consists of large, branched panicles. Flower stalks drooping at the tips, 5-10 mm. long, with a swollen joint at the base. Valves are heart-shaped to broadly ovate, 4-5 mm. long and as wide, with more or less smooth margins. Grains number 3 and are often of unequal size. Fruit is a brown achene 2-3 mm. long. In flower July-September.

ECOLOGICAL NOTES: Curly dock is a Eurasian species that has become a common weed and colonizer of all types of disturbed, wet to moist soils. Typical habitats include farmed wetlands, stormwater detention basins, mudflats, roadsides, ditches, construction sites and edges of marshes.

SOURCE: Chadde (2011); and Gleason and Cronquist (1991).

Nutlets are 5-10 mm. long.

GIANT RAGWEED

(*Ambrosia trifida* L.)

ASTER FAMILY (Compositae or Asteraceae) **C of C:** Native (0) **IND. STATUS:** FAC

FIELD CHARACTERISTICS: A weedy, annual herb to 2(5) m. in height. Stems are stout and have spreading hairs in the upper part. Leaves are opposite, stalked, simple, and unlobed to 3-5 palmately divided lobes. Staminate and pistillate flowers occur in separate heads. Pistillate flowers arise from the leaf axils, while staminate flowers occur as terminal and near-terminal spike-like structures. The distinctive bur-like nutlets develop in the leaf axils, are 5-10 mm. long, and have several distinct ribs that terminate as blunt spines. In flower July-September.

ECOLOGICAL NOTES: Giant ragweed often forms large monotypic colonies on moist to wet, waste ground and the recently cultivated fields of floodplains. It also occurs along the margins of ponds, streams and ditches. Dense stands of giant ragweed are a favored winter habitat of ring-necked pheasants.

SOURCE: Gleason and Cronquist (1991); Swink and Wilhelm (1994); and Voss (1996).

COMMON COCKLEBUR

(*Xanthium strumarium* L.)

ASTER FAMILY (Compositae or Asteraceae) **IND. STATUS:** FAC

C of C: Native (0 MN)(1 WI)

FIELD CHARACTERISTICS: An annual herb growing to 20-200 cm. in height. Leaves have long petioles and are broadly ovate to suborbicular or reniform, and are generally cordate or subcordate at the base. Leaves are shallowly lobed and up to 15 cm. long. Staminate heads are in a terminal cluster. Pistillate heads are in several to many short, axillary branches. Burs are broadly cylindric to ovoid or subglobose, 1-3.5 cm. long, covered with stout, hooked prickles. Burs become somewhat woody with age. In bloom August-September.

ECOLOGICAL NOTES: Common cocklebur is a frequent colonizer of exposed, wet to moist soils. In particular, it colonizes farmed wetlands where the planted crop is drowned out or never planted due to wet conditions. Mudflats left after high water events in stormwater ponds, prairie potholes, or along shores, are other favored habitats. It is the bane of those who own long-haired dogs.

SOURCE: Gleason and Cronquist (1991); and Black and Judziewicz (2009).

BEGGARTICK

(*Bidens cernua* L.)

ASTER FAMILY (Compositae or Asteraceae) **IND. STATUS:** OBL

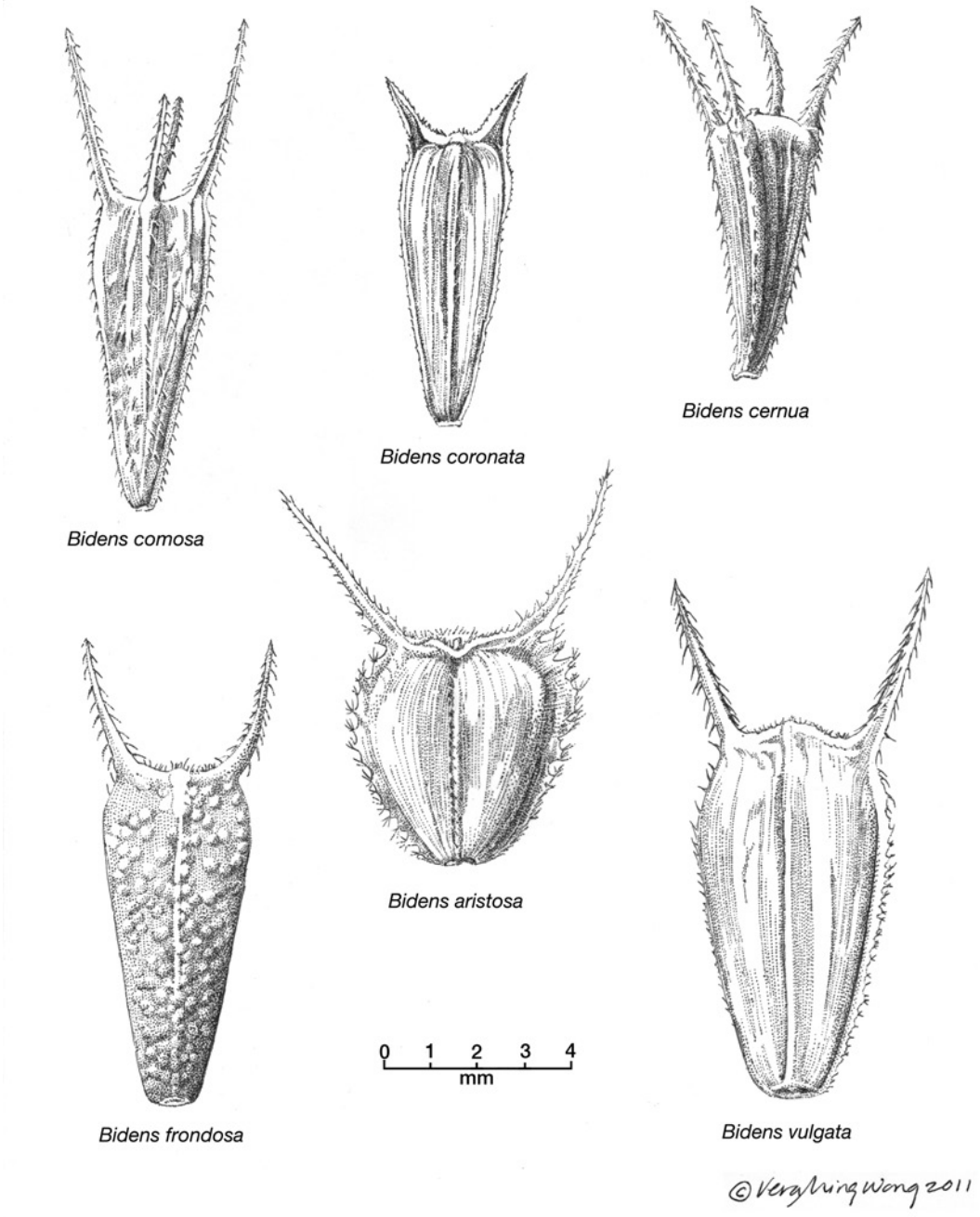
C of C: Native (3 MN)(4 WI)

FIELD CHARACTERISTICS: An annual herb growing to 10-100 cm. in height. Leaves are opposite, simple, sessile, and serrate to somewhat serrate. Flower heads are erect, but then become nodding with age. The flower disc is 12-25 mm. wide. Rays, if present, are yellow and up to 1.5 cm. long. Nutlets are smooth, curved, 5-8 mm. long and have 4 (rarely 2) barbed awns as shown by the ink drawing on the following page. In flower August-October.

ECOLOGICAL NOTES: Beggartick is a common species of fresh (wet) meadows, shallow marshes, along shores, and in areas of disturbed or exposed, wet soils and mudflats. Another name for beggarticks is stick-tights. Walking through a stand of these plants in late summer or autumn results in numerous barbed nutlets adhering to clothing.

SOURCE: Fernald (1970); and Gleason and Cronquist (1991).

Nutlets of Some Common *Bidens*



This page intentionally left blank.

Appendix A

Appendix A

KEY TO THE WETLAND GOLDENRODS (*Solidago*) OF MINNESOTA AND WISCONSIN

[Modified from Gleason and Cronquist (1991)
and Swink and Wilhelm (1994)]

1A. Flowering heads are flat-topped (inflorescence is a corymb).

2A. Leaves of lower and upper stem are dissimilar, the lower or basal leaves being better developed and usually persistent; leaves are not glandular-punctate; typically occur on calcareous soils.

3A. Branches and pedicels of the inflorescence are glabrous; leaves are flat and not triple nerved . . . . . *Solidago ohioensis*

3B. Branches and pedicels of the inflorescence are pubescent; leaves tend to be sickle-shaped (falcate), folded (conduplicate), and triple nerved . . . . . *Solidago riddellii*

2B. Leaves linear (narrow), similar on lower and upper stem, and glandular-punctate (use a 10-15x hand lens); stems are pubescent; tends to be clonal . . . . . *Euthamia graminifolia*[1]

1B. Flowering heads occur in axilliary clusters, racemes, panicles or thyrses, but never as a corymb.

4A. Inflorescence spreading, with recurved-secund branching. Branches and branchlets of the inflorescence are pubescent.

5A. Leaves very scabrous above; basal and lower cauline leaves persistent and very large; stem generally angled in cross section; typically occurs in calcareous fens and shaded seeps . . . . . *Solidago patula*

5B. Leaves triple nerved, not scabrous; leaves of lower and upper stem tend to be similar; stem glabrous and glaucous below the inflorescence and not angled; tends to be clonal . . . . . *Solidago gigantea*

4B. Inflorescence much longer than broad; branches rather short and not recurved-secund; branches and branchlets of the inflorescence are not pubescent (but may be puberulent). Stems not angled, nor glaucous below the inflorescence; typically occurs in both bogs and fens . . . . . *Solidago uliginosa*

[1] Formerly known as *Solidago graminifolia.*

Appendix B

Appendix B

KEY TO THE WETLAND ASTERS OF MINNESOTA AND WISCONSIN

[Modified from Gleason and Cronquist (1991)
and Swink and Wilhelm (1994)]

1A. Involucral bracts and peduncles glandular-pubescent; leaves auriculate-clasping; herbage often glandular; rays very numerous, violet or amethyst to rosy, rarely blue or white; large discs yellow to yellow-orange, distinctive . . . . . *Symphyotrichum novae-angliae*

1B. Plant with inflorescence pubescent or glabrous, but not glandular.

2A. Stem leaves with perfoliate or auriculate-clasping bases.

3A. Stems reddish, coarsely hispid; leaves not serrate and not conspicuously crowded; inner involucral bracts taper to a slender tip; rays violet; nutlets glabrous; clonal . . . . . *Symphyotrichum puniceum*

3B. Stems green or with purple lines or nodes, glabrous or sparingly hispid; leaves not serrate but conspicuously crowded, particularly towards the inflorescence; inner involucral bracts taper to a slender tip; rays very pale blue or lavender; nutlets pubescent; clonal . . . . . *Symphyotrichum firmum*

3C. Stems zig-zag and pubescent to glabrous toward the base; leaves nearly perfoliate and coarsely serrate; rays blue to pale purple; nutlets strigose; not clonal; rare . . . . . *Symphyotrichum prenanthoides*

2B. Stem leaves usually not clasping at the base (not auriculate).

4A. Flowering heads are flat-topped (inflorescence is a corymb); rays white; not clonal . . . . . *Doellingeria umbellata*

4B. Flowering heads not flat-topped.

5A. Stem leaves entire or serrate, more than 8 mm. wide, not linear.

6A. Leaves pubescent beneath; rays white to slightly purple . . . . . *Symphyotrichum ontarionis*

6B. Leaves glabrous or only pubescent along the veins.

7A. Leaves entire or subentire, 5 times as long as wide; usually scabrous above; rays usually bluish-purple . . . . . *Symphyotrichum praealtum*

7B. Leaves mostly serrate, usually less than 5 times as long as wide; usually not scabrous above.

Appendix B

8A. Flower heads secund (racemes 1-sided); leaves usually villous or puberulent beneath, at least along the midrib; rays usually white; not clonal . . . . . .*Symphyotrichum lateriflorum*

8B. Flower heads form a panicle and are usually not secund; inflorescence leafy; leaves are usually glabrous beneath, except for occasionally ciliated margins; rays usually white; clonal . . . . . *Symphyotrichum lanceolatum*

5B. Leaves essentially entire, less than 8 mm. wide, linear.

9A. Leaves yellowish green, with revolute margins, generally scabrous above; areolae isodiametric . . . . . *Symphyotrichum praealtus*

9B. Leaves green to dark green, margins not revolute, glabrous or scabrous. areolae mostly rectangular.

10A. Ray flowers about 10 mm. long; flower heads few, subcorymbose, terminal; plant slender; rays white to pale lavender; typically found in open cold bogs and open fens . . . . . *Symphyotrichum boreale*

10B. Ray flowers less than 10 mm. long; flower heads numerous, forms a panicle; plant stouter; generally not found in cold bogs . . . . . *Symphyotrichum lanceolatum*

Appendix C

Appendix C

KEY TO THE *UTRICULARIA* SPECIES OF MINNESOTA AND WISCONSIN

-Donald M. Reed-

1A. Leaves minute, simple and filiform or narrowly linear; leaves and bladders[1] embedded in substrate; not free floating; flowers 1-6 on scape:

2A. Flowers yellow, spur down curved; bracts accompanied each by a pair of branchlets ……..……..……..*U. cornuta*

2B. Flowers violet, spur up curved; bracts not accompanied by branchlets ……*U. resupinata*

1B. Leaves dichotomously branched or dissected, not minute; leaves all or mostly on stems in the water, free floating; flowers 1 – 20 on scape(s):

3A. Upper leaves in whorls (4-9); bladders borne at leaf segment apex; flowers rose -purple……..……..*U. purpurea*

3B. Upper leaves alternate; bladders borne at base or on sides of leaf segments; flowers yellow:

4A. Leaf segments flattened, nearly to fully as wide as the primary segments; lower corolla lip about 2 times as long as the upper lip:

5A. Bladders located on specialized branches lacking leaves; leaf segment margins spinulose-toothed; lower corolla lip 8-12 mm with well developed palate……...*U. intermedia*

5B. Bladders located on leafy branches; leaf segments entire; lower corolla lip 4-8 mm with small or no palate……..….*U. minor*

Note: The taxonomy of *Utricularia* x *ochroleuca*, which would be located in this couplet, is disputed and is treated here as the hybrid *Utricularia intermedia* x *minor*.

4B. Leaf segments terete, filiform, progressively narrower in successive segments; lower and upper corolla lips essentially equal in length:

[1] Tans (1987) notes that *U. cornuta* may occasionally lack bladder–traps.

Appendix C

6A. Leaf segments with many bladders, stems loosely floating beneath water surface; flowers mostly 6-20 per peduncle; plants large, robust, more than 30 cm. long:

7A. Peduncles with 1- few widely scattered bract-like scales below the lowest bract; emergent scapes 1 mm. or more in diameter; lower corolla lip 1-2 cm. long……*U. macrorhiza*

7B. Peduncles without scales below the lowest bract; emergent scapes less than 1 mm. in diameter; lower corolla lip 6-8 mm. long… ……..…….*U. geminiscapa*

6B. Leaf segments with 1-few bladders, stems forming tangled mats beneath water surface; flowers 1-6 per peduncle; plants small, slender, less than 30 cm. long……..……*U. gibba*

Sources: Crow and Hellquist (2000); Gleason and Cronquist (1991); R.L. McGregor *et al.* (1991); Swink and Wilhelm (1994); Tans (1987); and Voss (1996).

Glossary

acid: having more hydrogen ions than hydroxyl ions: a pH of less than 7.

aerobic: a condition in which free molecular oxygen is present.

alien: a non-native (introduced) species, which may or may not be naturalized.

alkaline: basic, having more hydroxyl ions than hydrogen ions; a pH of greater than 7.

anaerobic: a condition in which free molecular oxygen is absent.

annual: a plant that completes its life cycle in one growing season, then dies.

auriculate: having ear-shaped lobes at the base.

awn: a bristle, often located in a terminal position on a specific plant part.

axil: the upper angle formed between the axis and a lateral organ such as a leaf or branch that arises from it

beak: a relatively stout tip such as on a nutlet.

biennial: a plant that completes its life cycle in two years, usually flowering and producing fruit the second year, and then dies.

bract: a modified leaf or scale-like structure that arises from the base of an inflorescence.

calcareous: limy, rich in calcium, usually in the form of calcium carbonates.

calciphile: a plant species with a high tolerance of calcium.

callosites: a hardened thickening of plant tissue.

calyx: the frequently green outer series of floral leaves (or sometimes the only ones); the sepals collectively.

CFR: Code of Federal Regulations.

clasping: partly surrounding another organ at the base.

clonal: forming clones.

clone: a group of vegetatively produced, genetically identical individuals.

colonial: forming colonies.

colony: a group of individuals of the same species produced vegetatively, or by seed, that may or may not be genetically identical.

Glossary

community: in reference to plants, an interacting assemblage of plant populations sharing a given habitat.

composite: a member of the aster family (Compositae).

corolla: the inner series of floral leaves, often showy; the petals collectively.

dbh: diameter at breast height; a measure of tree diameter at 4.5 feet above the ground or root collar.

deciduous: falling off, usually at a certain season after completion of the normal function.

dichotomous: forking into two directions of essentially equal branches.

dioecious: producing male and female flowers on different individual plants

disc: in the aster family (Compositae), a group of tubular flowers located in the central part of the flower head.

dolomite: in Minnesota and Wisconsin, a bedrock mineral consisting of calcium magnesium carbonate ($CaMg(CO_3)_2$).

dominant: a species that exerts a considerable influence on, or defines the character of, a community because of such factors as its number, coverage, and/or size.

ericaceous: refers to members of the heath family (Ericaceae).

fen: in a broad sense, wetlands that are predominately supported by groundwater discharge; fens can be segregated by soil chemistry, water chemistry and vegetation, e.g., calcareous fens.

floret: a small or reduced flower, such as that of grasses.

follicle: a dry fruit that splits open along one seam.

forbs: herbaceous plants, excluding the grasses, rushes and sedges; especially used to describe broad-leaved, flowering plants.

frond: the leaf of ferns; also, the vegetative structure of duckweeds (Lemnaceae) that is not differentiated into stem and leaf.

genus: the first part of the scientific name for an organism, always capitalized (plural, genera).

glabrous: smooth.

glaucous: covered with a pale, waxy coating or "bloom."

glume: a specialized, scale-like leaf at the base of a grass spikelet.

graminoid: grass-like plants including grasses, sedges and rushes.

growing season: that portion of the year when soil temperatures at 19.7 inches below the surface exceed biologic zero (41 degrees F.). This can be approximated by the number of frost-free days (i.e., the period between the last frost of spring and first frost of autumn).

herb: a herbaceous (non-woody) plant.

hispid: having rigid hairs.

hybrid: a cross-breed between two species.

hydric soils: soils formed under conditions of saturation, flooding or ponding long enough during the growing season to develop anaerobic conditions in the upper part.

hydrophyte: a plant that grows in water or on a substrate saturated at a frequency and duration during the growing season sufficient to affect plant occurrence.

hypersaline: extremely salty; very high concentration of dissolved salts.

inflorescence: the entire flower cluster of a plant.

isodiametric: having equal diameters.

keel: a longitudinal ridge (like the keel of a boat).

lagg: a moat, or open water area at the border between a bog and uplands.

leaflet: one of the blades of a compound leaf.

lemma: the lowermost scale-like leaves at the base of a grass floret.

lenticel: a small dot (opening) on the bark of young trees or shrubs.

ligule: in the grasses (Gramineae), a papery extension at the summit of a leaf sheath.

lip: one part of a two-lipped (bilabiate) flower; in the orchids (Orchidaceae), the odd petal that is usually the lowest.

macroscopic: visible without magnification.

-merous: A Greek suffix referring to the number of members of a set, e.g., 5-merous meaning that flower parts are in 5s.

mesic: intermediate between dry and wet conditions, moderately moist.

mixosaline: of intermediate salinity; somewhat salty.

monoecious: with unisexual flowers, both types borne on the same individual plant.

monotype: a plant community consisting of only one species.

muck: a soil consisting of partially decomposed plant remains where the decomposition has progressed to a point where the contributing plant species cannot be identified; an organic soil as opposed to mineral soils.

native: an indigenous species.

nerve: a ridge or vein on a plant structure.

nonpersistent emergent: an aquatic emergent plant whose upper portions (stems, leaves) die back at the end of the growing season (e.g., arrowhead).

nutlet: a small dry fruit that does not split open along a seam or surface; as used herein, synonymous with achene.

ocrea: a stipular, tube-shaped sheath that surrounds the stem just above the leaf base; a characteristic of the smartweed family (Polygonaceae).

oogonia: eggs of algae.

ovary: the lower, usually enlarged portion of the pistil, in which the seeds are produced.

peat: a soil consisting of partially decomposed plant remains in which the contributing plant species can still be identified; an organic soil as opposed to mineral soils.

pedicel: the stalk of a single flower.

perennial: a plant species living three or more years.

perfect flower: a flower having both pistils and stamens.

perigynium: a flask-like papery structure that surrounds the ovary in *Carex* (plural, perigynia).

persistent emergent: an aquatic emergent plant that remains standing through the winter and at least until the start of the next growing season (e.g., cattails).

petiole: the stalk of a leaf.

pinnae: one of the primary lateral divisions of a pinnately compound leaf.

pinnatifid: a deeply lobed, pinnate-like pattern cut along a central axis; the inter-segmented clefts, however, do not reach the axis.

pioneer: a plant species that characteristically first colonizes exposed soils.

pistil: the seed producing organ of a flower, composed of an ovary, and one or more styles and stigmas.

pistillate: having only pistils (lacking staminate (pollen-producing) organs).

pith: the spongy central portion of stems and branches.

prostrate: laying flat on the ground.

pubescent: hairy.

punctate: dotted.

rachis: a main axis, such as that of a compound leaf.

ray: in the aster family (Compositae), a strap-shaped marginal flower radiating from the flower head.

receptacle: in the aster family (Compositae), an enlarged summit of the flower stalk to which the flowers are attached.

recurved: curved backward.

revolute: having the margins rolled backward.

rhizome: an underground stem, usually growing horizontally.

rosette: a dense, circular, clump of leaves.

saline: salty; having a high concentration of dissolved salts.

samara: a dry fruit that does not split open along a seam and has a well-developed wing.

scabrous: rough.

scale: a minute, modified leaf subtending an individual flower, especially referring to sedges (Cyperaceae).

secund: arranged along only one side of the axis.

sepal: a single segment of the calyx, usually green.

septate: with hard cross partitions.

sessile: lacking a stalk.

silique: a seed pod consisting of 2 fused flower pistils, usually longer than wide. The outer walls of the fused pistil (referred to as a valves) typically separate when ripe leaving a persistent partition (the replum). Shorter seed pods of similar structure are called a silicle. These seed pods are characteristic of the mustard family (Cruciferae).

sorus: a cluster of sporangia, as in ferns (plural: sori).

spikelet: a small spike with reduced flowers on a central axis; applied to the flower cluster (inflorescence) of grasses (Gramineae) and sedges (Cyperaceae).

sporangia: a case or structure that contains spores.

spur: a flower part that is a hollow, pointed projection.

stamen: the male or pollen-producing organ of the flower.

staminate: having only stamens (lacking pistillate (seed producing) organs).

stand: a particular example of a plant community.

stigma: the terminal portion of a pistil which is receptive to pollen.

stipe: a stalk.

stipule: an appendage at the base of a leaf.

stolon: an above-ground, horizontal stem.

strigose: having straight, stiff hairs that are flattened along a surface.

style: the stalk-like portion of a pistil connecting the stigma and ovary.

tepal: in a given plant, sepals and petals that strongly resemble each other.

thyrse: an inflorescence resembling a compact panicle.

tuber: a starchy, enlarged portion of a rhizome or root.

tubercle: a small enlargement or appendage, usually distinct in color or texture, as in the "cap" on the nutlet of spike-rushes.

unisexual: having only stamens (staminate) or pistils (pistillate).

upland: an area that does not have the hydrologic conditions necessary for the development of hydric (wetland) soils and establishment of wetland plant communities.

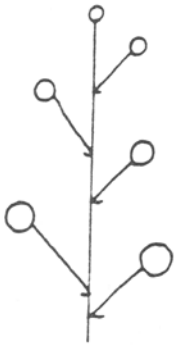
whorl: a group of three or more parts surrounding a node.

villous: having long, soft hairs that are not matted.

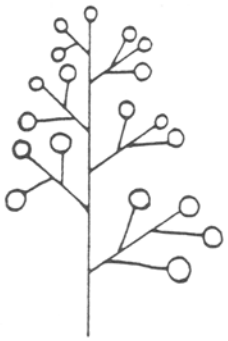
wetlands (regulatory definition): areas saturated or inundated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions.

wetlands (scientific definition): an ecosystem that depends on constant or recurrent, shallow inundation or saturation at or near the surface of the substrate. The minimum essential characteristics are recurrent, sustained inundation or saturation at or near the surface and the presence of physical, chemical and biological features reflective of recurrent, sustained inundation or saturation. Common diagnostic features of wetlands are hydric soils and hydrophytic vegetation. These features will be present except where specific physiochemical, biotic or anthropogenic factors have removed them or prevented their development (National Research Council 1995).

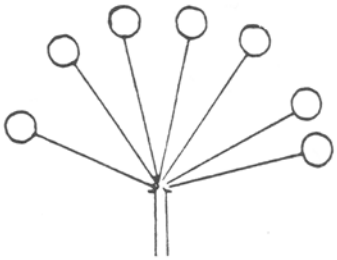
Spike



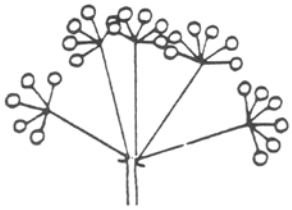
Raceme



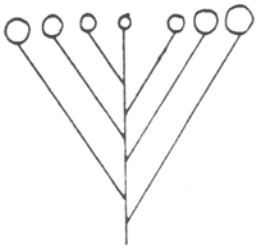
Panicle



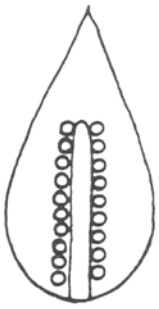
Umbel



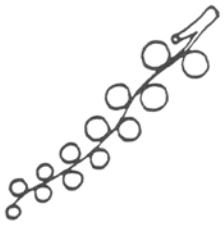
Compound Umbel



Corymb

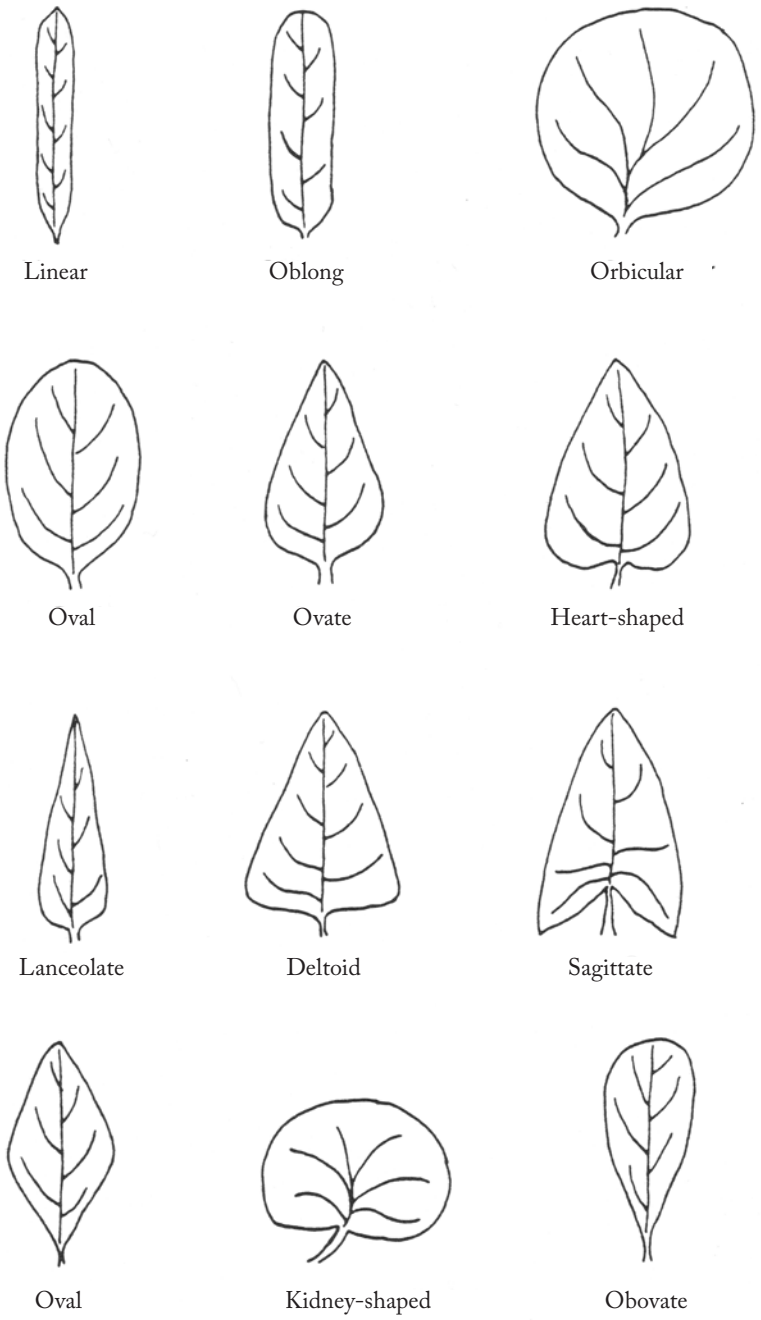


Spathe and Spadix

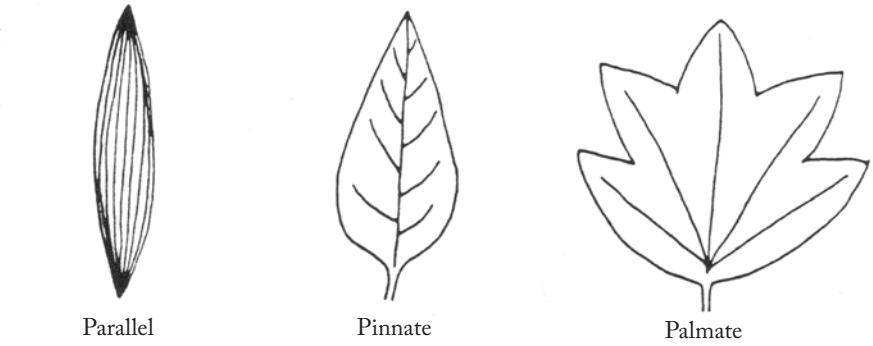


Catkin

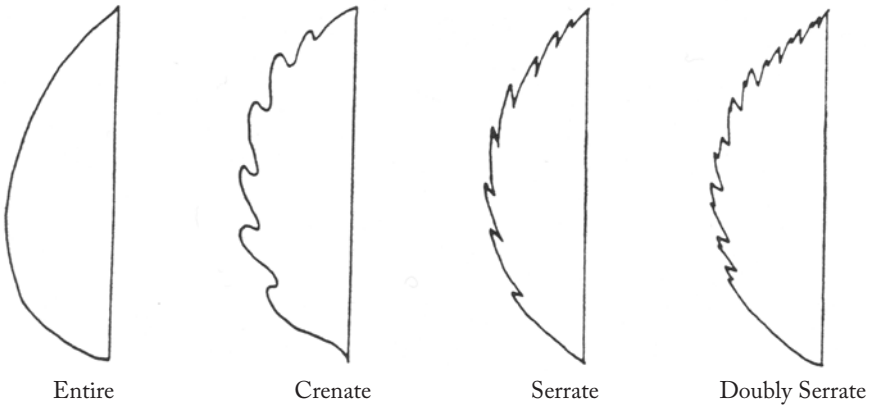
Inflorescence Types

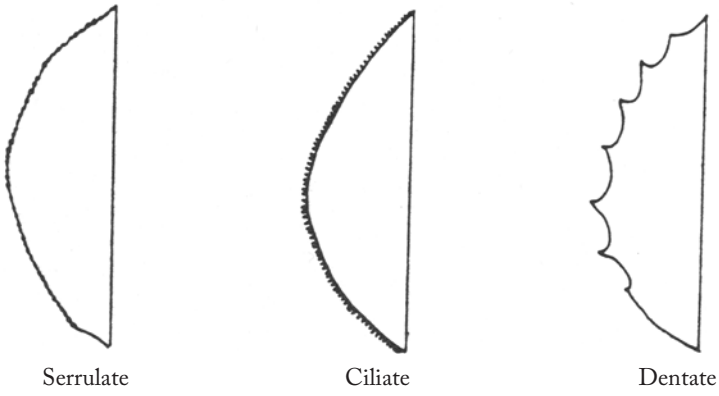

Linear
Oblong
Orbicular
Oval
Ovate
Heart-shaped
Lanceolate
Deltoid
Sagittate
Oval
Kidney-shaped
Obovate

Leaf Shapes

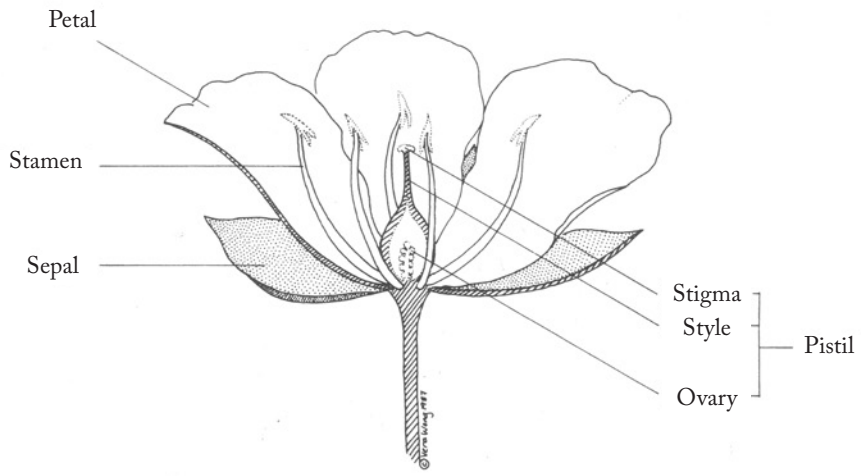


Leaf Venation

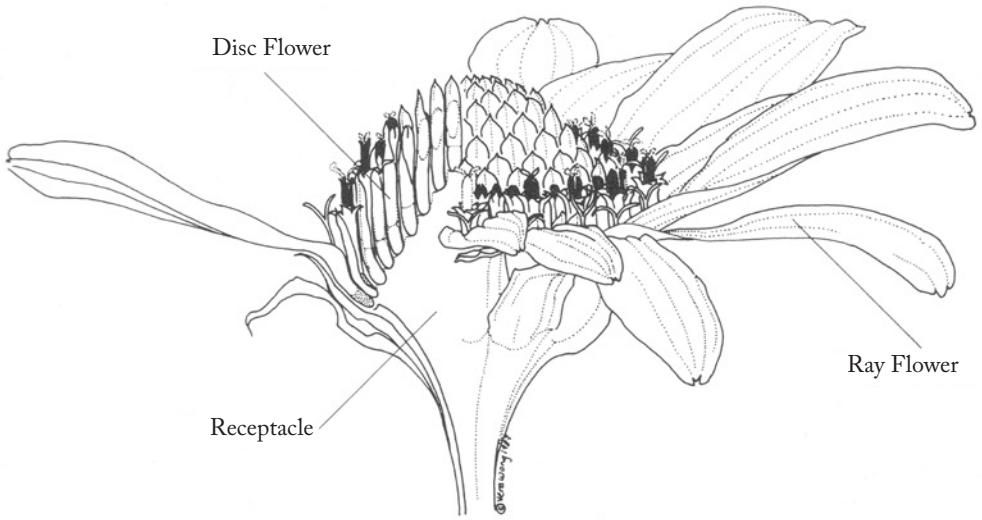




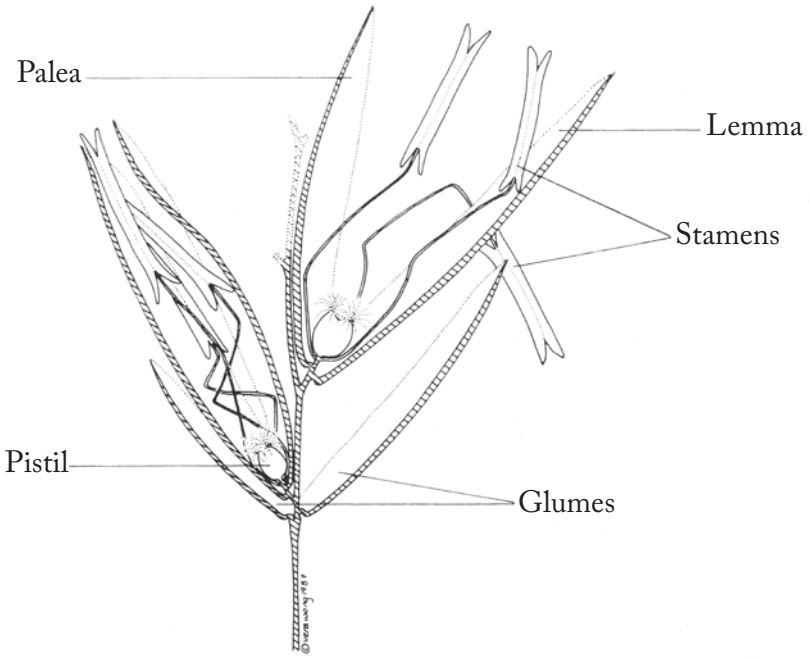
Leaf Margins



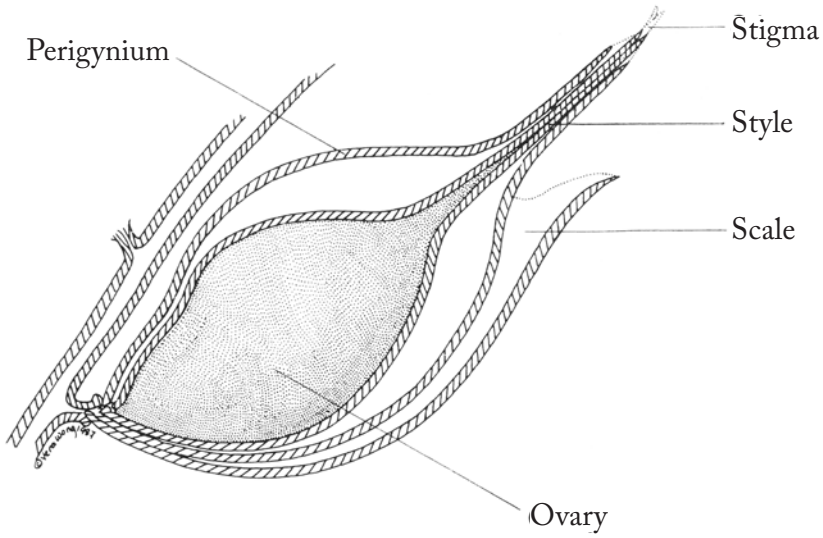
Cross Section of a Typical Flower



Cross Section of a Typical Composite Flower (Compositae)



Cross Section of a Typical Grass Spikelet



Cross Section of a Perigynium (*Carex*)

Bibliography

Almendinger, James and Jeanette Leete. 1998. *Peat Characteristics and Groundwater Geochemistry of Calcareous Fens in the Minnesota River Basin, USA.* Biogeochemistry Vol: 43, No. 1:17-41.

Bernthal, Thomas. 2003. *Development of a Floristic Quality Assessment Methodology for Wisconsin.* Wisconsin Department of Natural Resources, Bureau of Integrated Science Services, Madison, Wisconsin. PUB-SS-986 2003. 19 pp.

Black, Merel and Emmet Judziewicz. 2009. *Wildflowers of Wisconsin and the Great Lakes Region – Second Edition.* University of Wisconsin Press, Madison, Wisconsin. 275 pp.

Boelter, Don and Elon Verry. 1977. *Peatland and Water in the Northern Lake States.* U.S. Department of Agriculture, Forest Service, General Technical Report NC-31. 22 pp.

Britton, Nathaniel and Addison Brown. 1970. *An Illustrated Flora of the Northern United States and Canada.* Volumes I-III. Dover Publications Inc., New York, New York. 2,052 pp.

Brockman, Frank. 1979. *Trees of North America.* Golden Press, Western Publishing Company, Inc., Racine, Wisconsin. 280 pp.

Chadde, Steve. 2002. *A Great Lakes Wetlands Flora – Second Edition.* PocketFlora Press, Laurium, Michigan. 648 pp.

Chadde, Steve. 2011. *A Great Lakes Wetland Flora – Third Edition*. 649 pp.

Coffin, Barbara and Lee Pfannmuller, Editors. 1988. *Minnesota's Endangered Flora and Fauna.* University of Minnesota Press, Minneapolis. 473 pp.

Courtenay, Booth and James Zimmerman. 1972. *Wildflowers and Weeds.* D. Van Nostrand Company, New York. New York. 144 pp.

Crow, Garrett and C. Barre Hellquist. 2000. *Aquatic and Wetland Plants of Northeastern North America.* University of Wisconsin Press, Madison, WI. 536 pp.

Cowardin, Lewis, Virginia Carter, Francis Golet, and Edward LaRoe. 1979. *Classification of Wetlands and Deepwater Habitats of the United States.* U.S. Department of the Interior, Fish and Wildlife Service, Washington, D.C. 103 pp.

Crum, Howard. 1978. *Mosses of the Great Lakes Forest.* University Herbarium, University of Michigan, Ann Arbor, Michigan. 404 pp.

Curtis, John. 1971. *The Vegetation of Wisconsin.* University of Wisconsin Press, Madison, Wisconsin. 657 pp.

Bibliography

Elias, Thomas. 1980. *The Complete Trees of North America.* Van Nostrand Reinhold Company, New York, New York. 948 pp.

Environmental Laboratory. 1987. *Corps of Engineers Wetlands Delineation Manual.* Technical Report Y87-1. U.S. Army Engineer Waterways Experiment Station, Vicksburg, Mississippi. 98 pp. plus appendices.

Fassett, Norman. 1951. *Grasses of Wisconsin.* University of Wisconsin Press, Madison, Wisconsin. 173 pp.

Fassett, Norman. 1957. *A Manual of Aquatic Plants.* University of Wisconsin Press, Madison, Wisconsin. 405 pp.

Fassett, Norman. 1976. *Spring Flora of Wisconsin - Fourth Edition Revised* by Olive Thomson. University of Wisconsin Press. Madison, Wisconsin. 413 pp.

Fernald, Merritt. 1970. *Gray's Manual of Botany.* D. Van Nostrand Company, New York, New York. 1,632 pp.

Flora of North America. 2002. *Magnoliophyta: Commelinidae (in part): Cyperaceae*. Vol. 23.

Glaser, Paul, Gerald Wheeler, Eville Gorham, and Herbert Wright, Jr. 1981. *The Patterned Mires of the Red Lake Peatland, Northern Minnesota: Vegetation, Water Chemistry, and Landforms.* Journal of Ecology 69:575-599.

Glaser, Paul. 1987. *The Ecology of Patterned Boreal Peatlands of Northern Minnesota: A Community Profile.* Biol. Report 85(7.14). U.S. Fish and Wildlife Service, Washington, D.C. 98 pp.

Gleason, Henry and Arthur Cronquist. 1991. *Manual of Vascular Plants of Northeastern United States and Adjacent Canada.* D. Van Nostrand Company. New York, New York. 910 pp.

Great Plains Flora Association. 1991. *Flora of the Great Plains.* University of Kansas Press, Lawrence, Kansas. 1,402 pp.

Hipp, Andrew. 2008. *A Field Guide to Wisconsin Sedges.* University of Wisconsin Press, Madison, Wisconsin. 265 pp.

Hitchcock, A.S. 1950. *Manual of the Grasses of the United States. Volumes One and Two.* Misc. Publication No. 200, U.S. Department of Agriculture. U.S. Government Printing Office, Washington, D.C. 1,451 pp.

Holmgren, Noel. 1998. *The Illustrated Companion to Gleason and Cronquist's Manual – Illustrations of the Vascular Plants of Northeastern United States and Adjacent Canada.* The New York Botanical Garden, Bronx, New York. 937 pp.

Johnson, Charles. 1985. *Bogs of the Northeast.* University Press of New England, Hanover, New Hampshire. 269 pp.

Kartesz, John. 1994. *A Synonymized Checklist of the Vascular Flora of the United States, Canada and Greenland.* Timber Press, Portland, Oregon. 1,438 pp.

Bibliography

Lichvar, Robert and Jennifer Gillrich. 2011. *Final Protocol for Assigning Wetland Indicator Status Ratings to the 2011 National Wetland Plant List*. ERDC/CRREL TN-11-1. Hanover, NH: U.S. Army Engineer Research and Development Center.

Mack, John and Mary Kentula. 2010. *Metric Similarity in Vegetation-Based Wetland Assessment Methods*. EPA/600/R-10/140. U.S. Environmental Protection Agency, Office of Research and Development, Washington, D.C.

Marschner, Francis. 1930. *The Original Vegetation of Minnesota*. U.S. Department of Agriculture, Forest Service, North Central Forest Experiment Station, St. Paul. Minnesota.

Martin, Alexander, Herbert Zim, and Arnold Nelson. 1951. *American Wildlife and Plants - A Guide to Wildlife Food Habits*. Dover Publications, Inc., New York, New York. 500 pp.

Minnesota Department of Natural Resources. 2003. *Field Guide to the Native Plant Communities of Minnesota: The Laurentian Mixed Forest Province*. Ecological Classification Program, Minnesota County Biological Survey, and Natural Heritage and Nongame Research Program. Minnesota DNR, St. Paul, MN. 352 pp.

Minnesota Department of Natural Resources. 2005. *Field Guide to the Native Plant Communities of Minnesota: The Prairie Parkland and Tallgrass Aspen Parklands Provinces*. Ecological Classification Program, Minnesota County Biological Survey, and Natural Heritage and Nongame Research Program. Minnesota DNR, St. Paul, MN. 362 pp.

Minnesota Department of Natural Resources. 2005. *Field Guide to the Native Plant Communities of Minnesota: The Eastern Broadleaf Forest Province*. Ecological Classification Program, Minnesota County Biological Survey, and Natural Heritage and Nongame Research Program. Minnesota DNR, St. Paul, MN. 394 pp.

Mitsch, William and James Gosselink. 2000. *Wetlands – Third Edition*. Van Nostrand Reinhold Company, New York, New York. 920 pp.

Milburn, Scott, Michael Bourdaghs and Jason Husveth. 2007. *Floristic Quality Assessment for Minnesota Wetlands*. Minnesota Pollution Control Agency, St. Paul, Minnesota. 197 pp.

Mohlenbrock, Robert. 1972. *The Illustrated Flora of Illinois – Grasses* (*Bromus to Paspalum*). Second Edition. Southern Illinois University Press. 404 pp.

Mohlenbrock, Robert. 1973. *The Illustrated Flora of Illinois – Grasses* (*Panicum to Danthonia*). Second Edition. Southern Illinois University Press. 455 pp.

Mohlenbrock, Robert. 1999. *The Illustrated Flora of Illinois – Sedges: Carex*. Southern Illinois University Press. 328 pp.

National Research Council. 1995. *Wetlands: Characteristics and Boundaries*. National Academy of Sciences, Washington, D.C.

National Wetland Plant List, U.S. Army Corps of Engineers. http://wetland_plants.usace.army.mil/

Bibliography

Niering, William. 1994. *Wetland Vegetation Change: A Dynamic Process.* Wetland Journal Vol. 6, No. 4 (6-10).

Ownbey, Gerald and Thomas Morley. 1991. *Vascular Plants of Minnesota – A Checklist and Atlas.* University of Minnesota Press, Minneapolis, Minnesota. 307 pp.

Peterson, Roger and Margaret McKenny. 1968. *A Field Guide to Wildflowers of Northeastern and Northcentral North America.* Houghton Mifflin Company, Boston, Mass. 420 pp.

Petrides, George. 1972. *A Field Guide to Trees and Shrubs.* Houghton Mifflin Company, Boston, Mass. 428 pp.

Pohl, Richard. 1966. *Grasses of Iowa*. Iowa State Journal of Science Vol. 40, No. 4 (341-567).

Reed, Porter. 1988. *National List of Plant Species That Occur in Wetlands - North Central (Region 3).* National Wetland Inventory, U.S. Department of the Interior, Fish and Wildlife Service, St. Petersburg, Florida. 90 pp.

Reed, Porter. 1996. *(Draft) National List of Vascular Plant Species That Occur in Wetlands: 1996 National Summary.* National Wetland Inventory. U.S. Department of the Interior, Fish and Wildlife Service, St. Petersburg, Florida. 462 pp.

Sanders, Dale.1982. Map of the prairie pothole region derived from the film: *Vital Heritage - Swamps, Bogs and Marshes.* Naturalist 33(1):1.

Shaw, Samuel, and C. Gordon Fredine. 1971. *Wetlands of the United States.* Circular 39. U.S. Department of the Interior, Fish and Wildlife Service, Washington. D.C. 67 pp.

Sloan, Charles. 1972. *Ground-water Hydrology of Prairie Potholes in North Dakota.* U.S Department of the Interior, Geological Survey Professional Paper 585-C. U.S. Government Printing Office, Washington, D.C. 28 pp.

Smith, Welby. 1993. *Orchids of Minnesota.* University of Minnesota Press, Minneapolis, Minnesota. 172 pp.

Smith, Welby. 2008. *Trees and Shrubs of Minnesota.* University of Minnesota Press, Minneapolis, Minnesota. 703 pp

Stewart, Robert and Harold Kantrud. 1972. *Vegetation of Prairie Potholes, North Dakota, in Relation to Quality of Water and Other Environmental Factors.* U.S. Department of the Interior, Geological Survey Professional Paper 585-D. U.S. Government Printing Office, Washington, D.C. 36 pp.

Swink, Floyd and Gerould Wilhelm. 1994. *Plants of the Chicago Region.* The Morton Arboretum, Lisle, Illinois. 921 pp.

Tiner, Ralph. 1991. *The Concept of a Hydrophyte for Wetland Identification.* BioScience Volume 41, Number 6, 236-247.

Tryon, Rolla. 1980. *Ferns of Minnesota.* University of Minnesota Press, Minneapolis, Minnesota.165 pp.

USDA Plants Database. http://plants.usda.gov

Bibliography

USDA Web Soil Survey. http://websoilsurvey.nrcs.usda.gov/app/HomePage.htm

Vance, Fenton, James Jowsey, and James McLean. 1984. *Wildflowers of the Northern Great Plains.* University of Minnesota Press, Minneapolis, Minnesota. 336 pp.

Voss, Edward. 1972. *Michigan Flora. Part I - Gymnosperms and Monocots.* Cranbrook Institute of Science, Bloomfield Hills, Michigan and the University of Michigan Herbarium. 488 pp.

Voss, Edward. 1985. *Michigan Flora. Part II – Dicots (Saururaceae—Cornaceae).* Cranbrook Institute of Science, Bloomfield Hills, Michigan and the University of Michigan Herbarium. 724 pp.

Voss, Edward. 1996. *Michigan Flora. Part III – Dicots (Pyrolaceae—Compositae).* Cranbrook Institute of Science, Bloomfield Hills, Michigan, and the University of Michigan Herbarium. 622 pp.

Weller, Milton. 1981. *Freshwater Marshes -- Ecology and Wildlife Management.* University of Minnesota Press, Minneapolis, Minnesota. 146 pp.

Wisflora: Wisconsin Vascular Plant Species, University of Wisconsin Herbarium. http://www.botany.wisc.edu/wisflora/

Wovcha, Daniel, Barbara Delany and Gerda Nordquist. 1995. *Minnesota's St. Croix River Valley and Anoka Sandplain – A Guide to Native Habitats.* University of Minnesota Press, Minneapolis, Minnesota. 234 pp.

Wright, Herbert, Barbara Coffin and Norman Aaseng, Editors. 1992. *The Patterned Peatlands of Minnesota.* University of Minnesota Press, Minneapolis, Minnesota. 327 pp.

Index