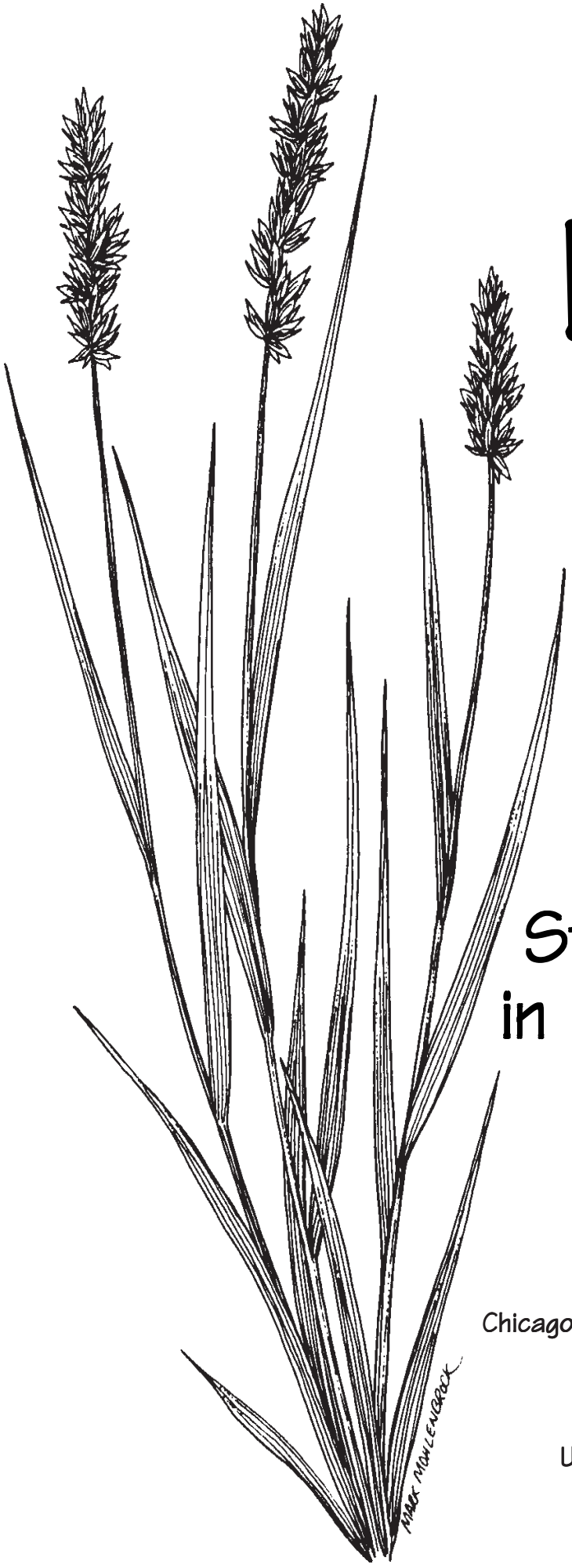


Native Plant Guide

for Streams and Stormwater Facilities in Northeastern Illinois

Prepared by

USDA Natural Resources Conservation Service's
Chicago Metro Urban and Community Assistance Office

In Cooperation with

U.S. Environmental Protection Agency, Region 5
U.S. Fish and Wildlife Service, Chicago Field Office
U.S. Army Corps of Engineers, Chicago District

December 1997 (Revised May 2004)

Native Plant Guide

for Streams and Stormwater Facilities in Northeastern Illinois

Native Plant Guide

for Streams and Stormwater Facilities in Northeastern Illinois

Native Plant Guide

for Streams and Stormwater Facilities in Northeastern Illinois

Native Plant Guide

for Streams and Stormwater Facilities in Northeastern Illinois

Preface to 2004 Revision

In December 1997, the publication "Native Plant Guide for Streams and Stormwater Facilities in Northeastern Illinois" (commonly known as the Native Plant Guide) was developed and released in a hard copy format. It was prepared by the USDA Natural Resources Conservation Services' Chicago Metro Urban and Community Assistance Office, in cooperation with U.S. Environmental Protection Agency, Region 5, U.S. Fish and Wildlife Service, Chicago Field Office, and the U.S. Army Corps of Engineers, Chicago District. The many individuals and their contributions to this cooperative effort are listed in the Acknowledgements section of the original guide.

Since its original release, the Native Plant Guide has been widely utilized as a reference in northeastern Illinois, elsewhere in Illinois and other states. It is commonly referenced in stormwater management, soil erosion and sediment control, and detention ordinances—particularly in northeastern Illinois.

In late 2003 an effort was initiated to convert the Native Plant Guide to a digital format and make it available on the Internet on the Illinois NRCS website. Two new appendices were added, and the others were updated as needed. This effort will be the first step toward a potential expansion of the Native Plant Guide and release in a browsable CD format.

Several individuals contributed to the 2004 Revision, digital conversion, and accessibility on the Illinois NRCS website. NRCS Earth Team Volunteer Kara Bowen scanned original plant species images; Visual Information Specialist Cara Clark made file updates and converted original files for digital, web and display use; State Public Affairs Specialist Paige Mitchell-Buck coordinated production and proof-reading, Public Affairs Specialist Jill Rees did graphic design of the CD cover; and Community Assistance Specialist Kent Sims gathered information and updated Appendix A and continually provided impetus and quality oversight for the expansion and success of this project. Jeff Mengler of the U.S. Fish and Wildlife Service's Chicago, Illinois Field Office, who was a significant contributor to the original Native Plant Guide, provided information for the new/revised Appendices B-E.

The digital version of the Native Plant Guide was created using Adobe Acrobat 6.0. Adobe 6.0 Reader can be downloaded free of charge from www.adobe.com.

Table of Contents

Revised 5/2004

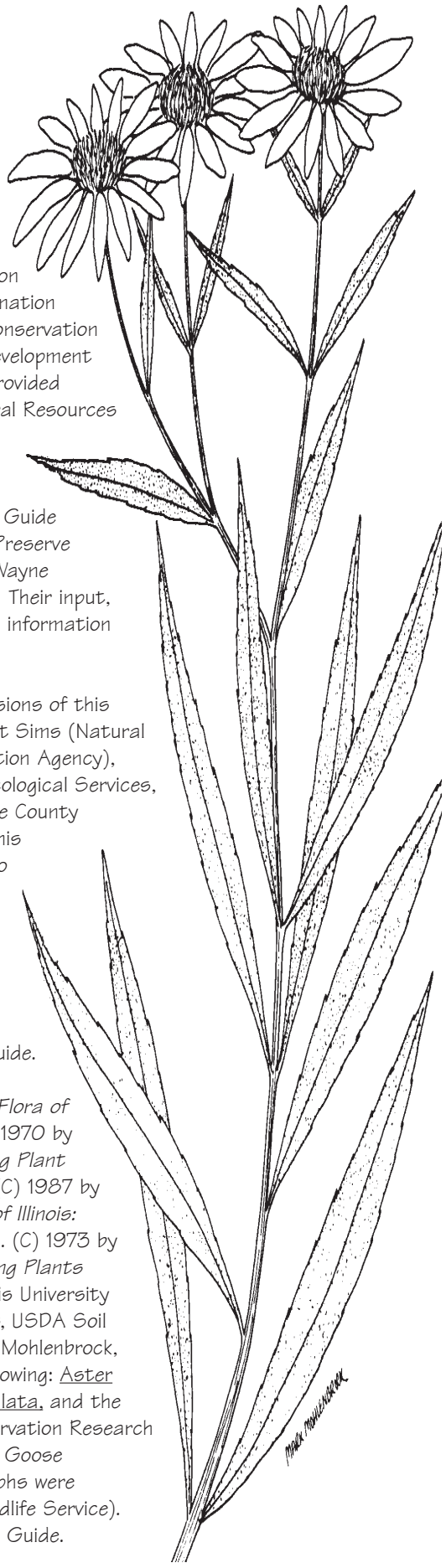
Acknowledgements

The preparation of this Guide could not have been accomplished without the contributions of a number of individuals and organizations. Jeffrey Mengler of the U.S. Fish and Wildlife Service wrote most of the text, conducted the interviews, and edited the plant species information. Sean O'Sullivan, formerly with the Natural Resources Conservation Service, contributed literature information and entered plant species data. Dr. Joy Marburger, formerly with the Natural Resources Conservation Service (then the Soil Conservation Service), contributed literature information for the initial work on this Guide. Kent Sims of the Natural Resources Conservation Service provided leadership and overall project coordination during the development of this Guide. Sue Elston of the U.S. Environmental Protection Agency provided guidance and oversight for the project. Paige Mitchell-Buck of the Natural Resources Conservation Service assisted with conception for the framework of the Guide and with its design and printing.

The following people provided input and information on the species in this Guide through interviews: Ken Klick and James Anderson (Lake County Forest Preserve District), Drew Ullberg (Kane County Forest Preserve District), and Dr. Wayne Schennum and Yolanda Benson (McHenry County Conservation District). Their input, based upon local experience, is an invaluable and fundamental part of the information provided in this Guide.

The following are acknowledged for their input through review of draft versions of this Guide: Michael Johnson, John Rogner (U.S. Fish and Wildlife Service), Kent Sims (Natural Resources Conservation Service), Sue Elston (U.S. Environmental Protection Agency), Jean Sellar (U.S. Army Corps of Engineers), Steve Apfelbaum (Applied Ecological Services, Inc.), Drew Ullberg (Kane County Forest Preserve District), Ken Klick (Lake County Forest Preserve District), Dennis Lubbs (Genesis Nursery, Inc.), and Dennis Dreher and Tom Price (Northeastern Illinois Planning Commission). We also wish to thank Tom Davenport (U.S. Environmental Protection Agency), Nancy Phillips (formerly with the U.S. Environmental Protection Agency), Jim Martin, Gene Barickman (Natural Resources Conservation Service), Gary Parker and Raymond Herman (formerly with the Natural Resources Conservation Service) for their efforts to initiate work on the earliest versions of this Guide. Dr. Gerould Wilhelm and Wayne Lampa of the Conservation Research Institute provided insightful comments on this Guide.

Illustrations in this Guide are used with permission from *The Illustrated Flora of Illinois: Flowering Plants Series: Rush to Rushes* by Mohlenbrock, R.H. (C) 1970 by Southern Illinois University Press; *The Illustrated Flora of Illinois: Flowering Plant Series: Smartweeds to Hazelnuts* by Mohlenbrock, R.H. and Thomson, P. (C) 1987 by the Board of Trustees, Southern Illinois University; *The Illustrated Flora of Illinois: Flowering Plants Series: Grass: Panicum to Danthoia* by Mohlenbrock R.H. (C) 1973 by Southern Illinois University Press; *The Illustrated Flora of Illinois: Flowering Plants Series: Lilies to Orchids* by Mohlenbrock, R.H. (C) 1970 by Southern Illinois University Press, the *Midwestern Wetland Flora, Field Office Guide to Plant Species*, USDA Soil Conservation Service; and *Prairie Plants of Illinois* by John Voigt and R.H. Mohlenbrock, and the Illinois Department of Natural Resources. Illustrations of the following: Aster lanceolatus, Coreopsis tripteris, Eupatorium maculatum, Vernonia fasciculata, and the Plant Zone Schematic were provided by Ellen Starr. Heidi Natura (Conservation Research Institute) graciously contributed the prairie plant roots illustration. The Goose Protection Structure drawings were contributed by Dan Lasky. Photographs were contributed by Jeanette Gallihugh and Jeffrey Mengler (U.S. Fish and Wildlife Service). Illustration credits for specific species are included as Appendix F in this Guide.



Effective Protection With Visual Appeal

Wet bottom detention basins incorporating emergent shoreline plantings discussed in this Guide can prevent shoreline erosion and add an aesthetically appealing appearance as depicted in the photograph above. As shown below, wetland detention basins that incorporate emergent plants across the basin bottom provide greater wildlife habitat and water quality benefits.

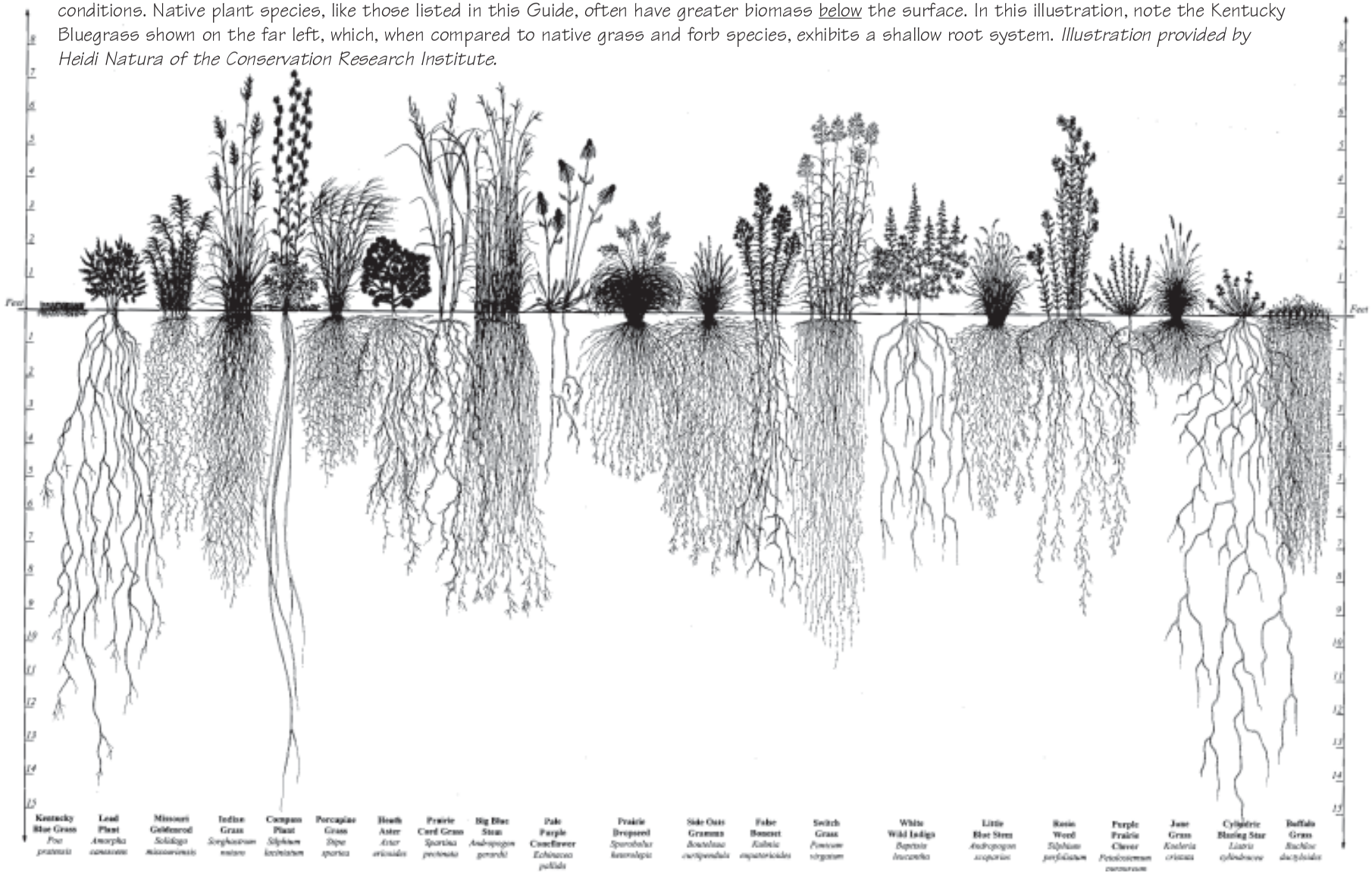
The photograph above illustrates the more traditional approach to stormwater basins with mowed turf grass shorelines, which can erode and cause water quality problems. The photograph below shows a stormwater basin with native plantings for shoreline stabilization and upland slope buffer. The shoreline and buffer plantings reduce erosion, improve water quality and wildlife habitat, and reduce maintenance costs.

The following illustrations on the Root Systems of Prairie Plants and the Plant Zone Schematic are available in a large 11x17 size as a PDF file. You may download the large size illustrations at:

ftp://ftp-fc.sc.egov.usda.gov/IL/techres/npg/NPGpp5-6-11x17.pdf

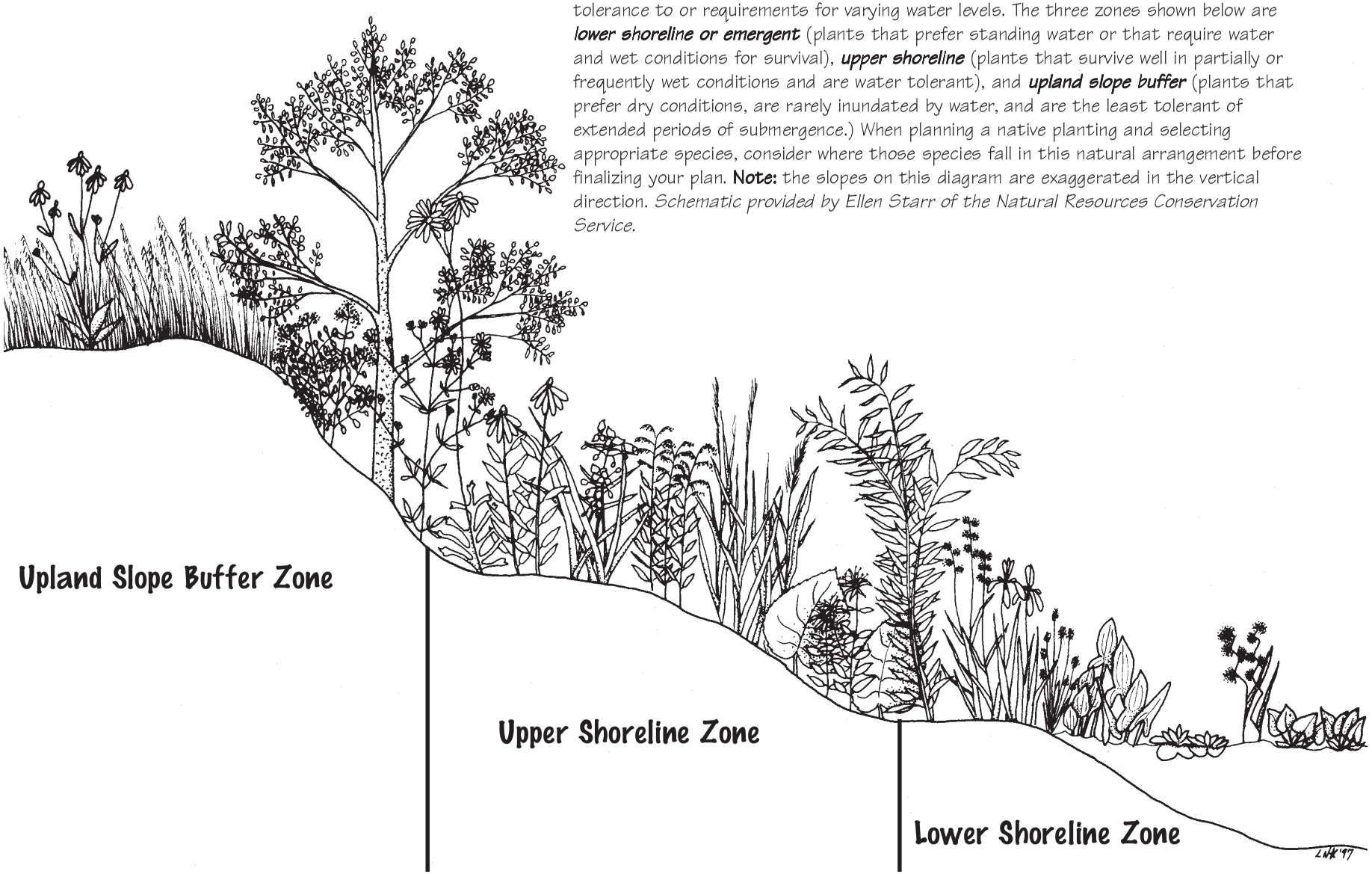
Root Systems of Prairie Plants

The fundamental basis for encouraging use of native plant species for improved soil erosion control in streams and stormwater facilities lies in the fact that native plants have extensive root systems which improve the ability of the soil to infiltrate water and withstand wet or erosive conditions. Native plant species, like those listed in this Guide, often have greater biomass <u>below</u> the surface. In this illustration, note the Kentucky Bluegrass shown on the far left, which, when compared to native grass and forb species, exhibits a shallow root system. *Illustration provided by Heidi Natura of the Conservation Research Institute.*

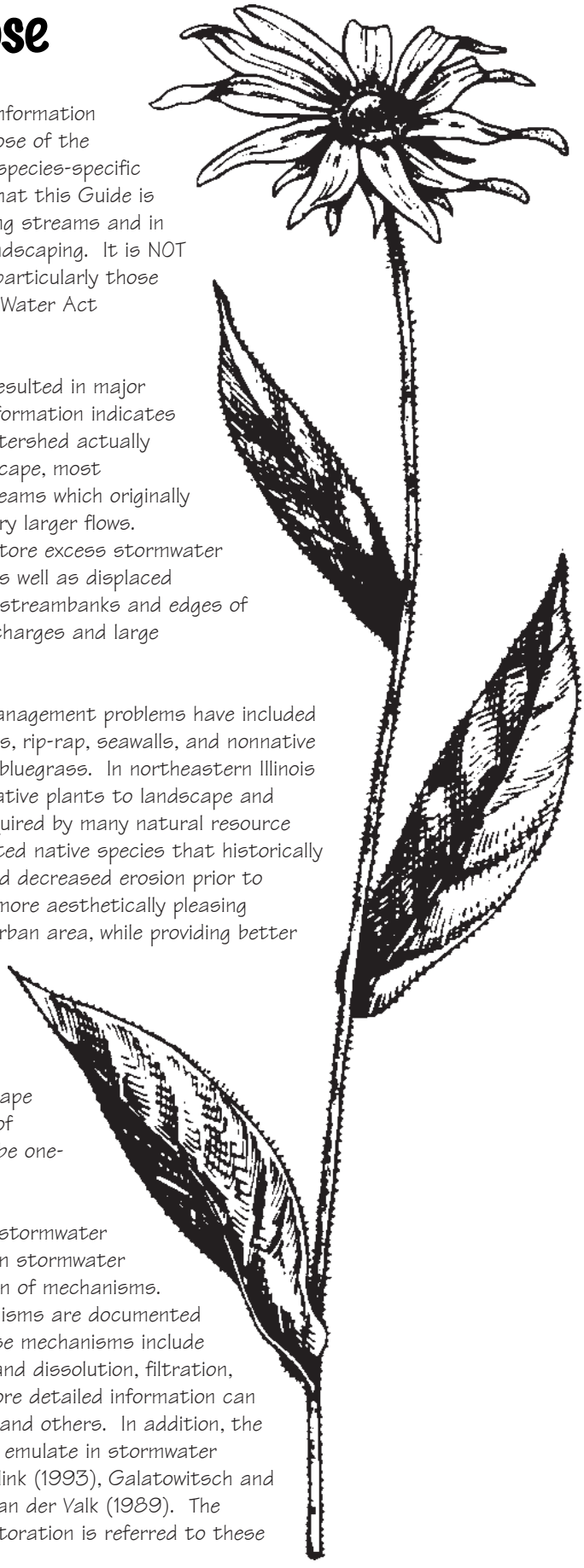


Plant Zone Schematic

The drawing below shows the natural arrangement of plant species as dictated by their tolerance to or requirements for varying water levels. The three zones shown below are ***lower shoreline or emergent*** (plants that prefer standing water or that require water and wet conditions for survival), ***upper shoreline*** (plants that survive well in partially or frequently wet conditions and are water tolerant), and ***upland slope buffer*** (plants that prefer dry conditions, are rarely inundated by water, and are the least tolerant of extended periods of submergence.) When planning a native planting and selecting appropriate species, consider where those species fall in this natural arrangement before finalizing your plan. **Note:** the slopes on this diagram are exaggerated in the vertical direction. *Schematic provided by Ellen Starr of the Natural Resources Conservation Service.*



Introduction and Purpose



In order to gain the most benefit from the concepts and information presented in this Guide, users must understand the purpose of the Guide and its limitations and must consider the detailed species-specific information. It is important to emphasize at the outset that this Guide is intended to encourage the use of native plant species along streams and in and around stormwater facilities instead of traditional landscaping. It is NOT intended for wetland or prairie restorations or creations, particularly those restorations or creations implemented as part of a Clean Water Act permitted mitigation plan.

Increased urban development in northeastern Illinois has resulted in major changes in the area's hydrologic regime. Presettlement information indicates that only a small percentage of precipitation in a given watershed actually resulted in measurable runoff. In the presettlement landscape, most precipitation was able to infiltrate into the soil. Today, streams which originally meandered have been straightened and channelized to carry larger flows. Stormwater detention basins are utilized to temporarily store excess stormwater generated by impervious surfaces and compacted lawns, as well as displaced floodplains and wetlands. Erosion commonly occurs along streambanks and edges of detention basins as a result of increased stormwater discharges and large fluctuations in water levels.

Traditional methods to control erosion and stormwater management problems have included structural measures such as rock and concrete structures, rip-rap, seawalls, and nonnative plant materials, such as reed canary grass and Kentucky bluegrass. In northeastern Illinois and elsewhere, there is a growing interest in the use of native plants to landscape and stabilize these areas. This approach, recommended or required by many natural resource and regulatory agencies, takes advantage of the deep-rooted native species that historically stabilized the soil, slowed runoff, facilitated infiltration, and decreased erosion prior to development of the area. These species may also offer a more aesthetically pleasing solution to the stormwater and erosion challenges of an urban area, while providing better wildlife habitat.

Native plantings can also provide economic benefits. The "bottom line" can be a strong motivation for installing and maintaining natural landscaping instead of conventional turfgrass. The major savings is in the lower cost of landscape maintenance. Over a ten year period, the combined costs of installation and maintenance for natural landscapes may be one-fifth of the costs for conventional landscape maintenance.

Using native vegetation along streams and in and around stormwater facilities also provides water quality benefits. Pollutants in stormwater can be removed by native vegetation through a combination of mechanisms. Physical, biological, and chemical pollutant removal mechanisms are documented to occur in wetlands and other natural communities. These mechanisms include nutrient uptake, sedimentation, adsorption, precipitation and dissolution, filtration, biochemical interactions, volatilization, and infiltration. More detailed information can be found in Strecker, *et al.* (1992), Adamus, *et al.* (1987), and others. In addition, the processes that occur in natural wetlands, which we try to emulate in stormwater management facilities, are described in Mitsch and Gosselink (1993), Galatowitsch and van der Valk (1994), Marble (1992), Hammer (1992), and van der Valk (1989). The reader who wishes to pursue a more complete wetland restoration is referred to these

five referenced publications for more detailed and comprehensive information. For prairie restorations, Packard and Mutel (1997) is recommended reading.

There are 1,638 native taxa (species or subspecies) of plants found in the Chicago region (Swink and Wilhelm 1994). Native plants are those that are believed to have grown naturally in this region prior to settlement by Europeans. An additional 892 taxa grow naturally but are believed to have been introduced by settlers from other parts of the world. Current ecological understandings indicate that many of these introduced species displace native species and reduce diversity. Of the 2,530 types of plants known in the Chicago region, more than one-third were not here prior to European settlement. Yet out of the nearly 900 nonnative species, only about 150 species are generally successful and persistent. **These 150 nonnative species dominate more than 95 percent of the vegetated landscape.** Most human disturbed or managed landscapes are nearly monocultures, vegetated by only one or a few species. A natural prairie remnant, in contrast, can contain more than 100 species within just two or three acres. This mix of more than 100 species is what is meant by diversity, and is one example of biodiversity. Thus, using native species in stormwater management facilities and for streambank and shoreline stabilization can help increase biodiversity while providing a more aesthetically pleasing landscape. The more diverse native landscapes will be able to withstand more adverse conditions, such as droughts.

Currently, there are no other comprehensive guides that provide information on native species for streams and stormwater facilities in northeastern Illinois. This Guide will provide a valuable new tool for federal, state, and local governments, park districts, developers, landscape architects, engineers, homeowners' associations, and others. While the science of using native plants in urban landscapes is expanding rapidly, much remains to be learned about most aspects of native landscaping in stormwater management facilities and streambank stabilization projects. With each project and with each native landscape restoration in the northeastern Illinois region, information about plant "preferences" and tolerances is obtained. Surprisingly little of this new knowledge is published and that which is, remains difficult for nonscientists to access and apply.

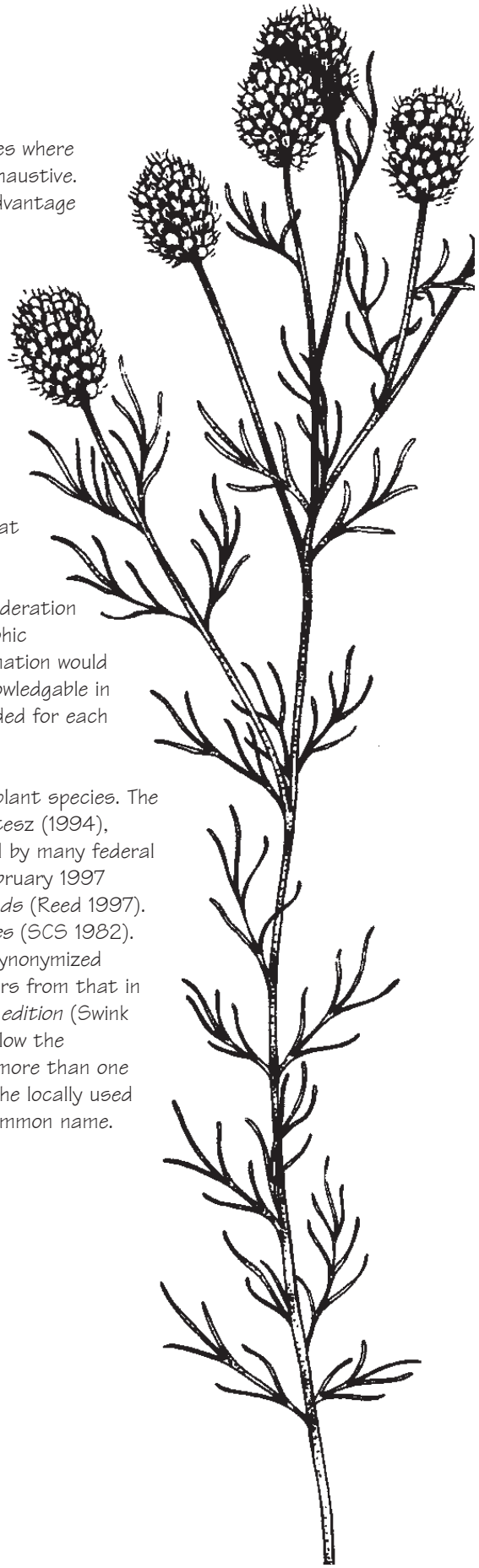
This Guide is an effort to consolidate the information available from as many different sources as possible. It also relies heavily on the knowledge and experience of local restoration ecologists and practitioners. This knowledge and experience encompasses a large amount of information that is not published and is generally not available to those from other disciplines or vocations. *The information in this Guide is intended primarily for use in stormwater management facilities and streambank stabilization projects. Wetland or prairie restorations or mitigation required under Section 404 of the Clean Water Act will likely need to go beyond the species and information in this Guide. True prairie and wetland restorations will not be constrained by detention or other goals and purposes and should include more diverse species communities.* The species selected for inclusion in this Guide are thought to be more tolerant of the harsh urban environment, relative to other more sensitive native species. Species in this Guide are also more easily established and widely available.

This Guide provides practical information in a user-friendly format and will guide the selection and placement of native species in those areas where they can best compete and survive. Individual species are presented on facing pages with several categories of information given for each. Some species were included even if all the information required in a given category was not available. Suggested mixes or lists of species for different applications are also suggested. If users of this Guide have experience or literature references that would add to the information contained herein, this information with references should be sent to: USDA Natural Resources Conservation Service's Plainfield Special Project Office, 313 Naperville Road, Suite J, Plainfield, Illinois 60544 or U.S. Fish and Wildlife Service, Chicago Field Office, 1250 South Grove Avenue, Suite 103, Barrington, Illinois 60010 for possible inclusion in future editions.

Information Sources

Information was obtained from published scientific literature sources where available, though the literature search should not be considered exhaustive. Locally-based restoration practitioners were interviewed to take advantage of the most current but as yet unpublished information on restoration and establishment techniques. In some instances this local experience conflicted with literature information. In many cases this was due to the geographic location of the research reported in the literature. As an illustration, Marburger (1993) provides an example of a species known to have different germination requirements in different parts of the United States. Differing climate, soil chemistry, geology, and genotype may influence the germination and establishment requirements of species in different locations. Therefore, local knowledge was included here preferentially over literature references that may be from other parts of the country. Thus, it should be emphasized that this Guide contains information on growing these species in the northeastern Illinois region, and this information should not be extrapolated to other geographic locations without adequate consideration of these factors. Of course, some species have widespread geographic distribution. In these cases, the application and propagation information would be applicable in a larger geographic area. Individuals or agencies knowledgable in this field should be consulted to determine if the information provided for each species is applicable in areas outside of northeastern Illinois.

Both the scientific name and common name are included for each plant species. The primary nomenclature (plant names) used in this guide follows Kartesz (1994), which has been largely adopted as a national standard and is used by many federal agencies. This is consistent with the nomenclature used in the February 1997 *Revision of the National List of Plant Species that Occur in Wetlands* (Reed 1997). Kartesz (1994) replaces the *National List of Scientific Plant Names* (SCS 1982). The Natural Resources Conservation Service maintains the 1994 Synonymized Checklist as the PLANTS database. Where this nomenclature differs from that in the most widely used local flora, *Plants of the Chicago Region, 4th edition* (Swink and Wilhelm 1994), the name used in Swink and Wilhelm is listed below the scientific name in parentheses. Please understand, however, that more than one species of plant can be referred to with the same common name. The locally used common name is included in smaller type below the predominant common name.



Native Plant Applications for Streams and Stormwater Facilities

Stormwater Detention Basins--Shoreline Stabilization

This application includes wet-bottom detention basins and ponds that have a permanent pool of open water as well as wetland detention basins, which only detain water for a limited period during and after rainfall events. Wet-bottom detention basins are those that have a permanent pool of open water, while wetland detention basins do not have permanent open water but maintain saturated conditions such that wetland vegetation can grow on the bottom. Dry detention is not a recommended Best Management Practice (BMP). Shoreline erosion is caused by wave action and water level fluctuations that can erode the shoreline and contribute to sedimentation of the pond. This in-filling of sediment from erosion of the shoreline can decrease the storage capacity of ponds, reduce water quality and clarity, and cause the shoreline to recede. The receding shoreline frequently presents additional problems with the integrity of adjacent facilities and structures, such as buildings and trails. In many cases traditional solutions to this problem, such as rip-rap, do not provide adequate long-term stabilization. Traditional engineered solutions have the added problem of providing little or no wildlife habitat, or in the case of seawalls can have a negative affect on wildlife. In addition, these traditional engineering approaches are often visually unappealing.

A number of native wetland plants can be used to effectively correct shoreline erosion. The deep roots of the plants will stabilize the soil. Stems and foliage dissipate the wave energy before it hits the shoreline. An added benefit is the wildlife habitat provided by such vegetation far exceeds that offered by rip-rap, mowed turf grass, or steel seawalls. Many native species are more tolerant of periodic inundation from wave action or fluctuating water levels than turf grasses. A continuous band of emergent plants will reduce nuisance geese problems. These shoreline plantings also provide water quality benefits through removal, uptake, and transformation of pollutants in runoff.

Plantings for shoreline stabilization in ponds can consist of two components. The first is the ***lower shoreline zone***, which occupies the shallow water around the basin's perimeter. Generally, it is from the water's edge to a water depth of 6 inches, with a seasonal maximum water depth of 18 inches. If such a shallow shelf is not present around the pond, this zone cannot be established and limited regrading to flatten slopes and establish a shelf should be considered. For shoreline stabilization, a wider shelf provides more benefit, but a minimum width depends on storage and safety needs. The second zone, the ***upper shoreline zone***, is from the water's edge to the point where the soil is no longer saturated or wet most of the year. Plant deep-rooted plants naturally adapted to shoreline settings in these areas to hold the soil together and reduce shoreline erosion.

Streambank Stabilization

Streambank erosion is a natural process that occurs when the forces of flowing water exceed the ability of the soil and vegetation to hold the banks in place. Natural rates of streambank erosion vary with stream size, velocity, amount of vegetative cover, and the type of soil. Under well-

vegetated conditions, lower order (smaller) streams show little erosion over decades. Larger streams often show erosion on the outside bank of bends, but under natural vegetated conditions, this becomes a part of the naturally meandering stream morphology. Under natural conditions, stream channels are continuously changing as the outside banks of the meanders are carved out while deposition continues on the point bars. With the urbanization of the region, society has sought to keep streams in one place so as to not disrupt the man-made environment. Furthermore, many streams have been straightened to increase conveyance and provide surface and subsurface drainage to urban and agricultural landscapes. This has caused increased velocities and in turn increased erosion. To exacerbate this further, increasing amounts of impervious surface increase the flow rates and volumes in urban streams after each storm event. In many places, these high velocity, straightened channels are lined by shallow-rooted turf grass areas and other features of the urban landscape. In this type of setting nearly all of the factors that once held streambanks in place have been removed. By reestablishing deep-rooted native vegetation along streams, streambanks can be stabilized in a more natural and longer lasting way.

Bioengineering or bio-erosion control in some cases involves the use of structural elements such as coconut fiber rolls, concrete A-jacks, lunkers, and others. In most cases it also involves the establishment of native vegetation. This native vegetation can be herbaceous or woody, depending on the situation. In most cases the banks have become nearly vertical, due to the continued severe erosion in both urban and agricultural environments. In order for the native herbaceous vegetation to be successful, these slopes must be reduced to approximate those that existed prior to the accelerated erosion caused by human activities. Gradual slopes (no steeper than 5:1 horizontal: vertical) are recommended. Flatter slopes should be considered whenever possible. Woody vegetation can also be used, especially in more severe erosion situations. Trees and shrubs provide root reinforcement of the soil. Roots mechanically reinforce soil by transfer of the shear stresses in the soil to tensile resistance in the roots. Woody vegetation also provides soil reinforcement by the buttressing and arching support provided by embedded roots and stems. Native woody vegetation can also provide similar benefits to those described for the herbaceous vegetation for upland slope buffers.

Stormwater Detention Basins & Streambanks-Upland Slope Buffer

Stormwater runoff on slopes can cause significant soil erosion problems and non-point source pollution if the runoff is not slowed and the soil is not protected. Native herbaceous vegetation can provide a solution to these problems through a number of mechanisms. The above-ground portions of the plant, the leaves and stems, absorb rainfall energy and thus reduce the impact on the soil surface. Root systems physically bind the soil together so that it remains stabilized during runoff events. Root channels also help facilitate infiltration of the rain. Through these mechanisms the erosion potential on the slopes is greatly reduced. In addition, once runoff reaches the slope, the vegetation serves to slow it down and filter out sediment. Deep-rooted native species have a much greater capacity for overall erosion prevention than shallow-rooted, mowed turf grass. As with shoreline vegetation, a native plant buffer on slopes around basins and along streams offers considerably more habitat value for wildlife than mowed turf grass or other more traditional urban treatments, yet is unattractive to nuisance Canada geese. Buffers should be as wide as possible for maximum benefit. Their size is dependent on drainage area and slope, but as a rule of thumb, a 25-100 foot minimum is recommended.

Vegetated Swales

Erosion can be a problem in drainageways where the gradient is steep or water flow velocities are high. Deep-rooted native species can help to bind and stabilize the soil. Dense native vegetation can also slow runoff, thereby reducing erosive forces while filtering out some sediments and contaminants. Most native species however, are not tolerant of high salt concentrations or other contaminants which often accumulate along roads and in ditches. Caution should be exercised by using the tolerance information provided with each species in this Guide. Ditches should be configured as swales with gentle side-slopes rather than traditional square or V-shaped ditches in order to maximize water quality benefits and infiltration. See also the *Illinois Urban Manual* for design information. Drainage swales are often recommended as an alternative to pipes or ditches for water quality benefits in stormwater management systems. Swales have gentle side slopes and should be low gradient. If vegetated with deep-rooted native species, swales can provide wildlife habitat, reduce erosive forces, slow runoff rates, promote infiltration, and filter out sediments and nutrients. The species used for drainage swales should be selected based on how wet the swale will be between rain events, the water quality expected, and anticipated flow conditions. The selection of any particular species or mix of species must also include its effect on the capacity or size of a vegetated swale.

General Design, Application, & Management Considerations

Sources of Design Information

The overall design of any stormwater management facility or streambank stabilization project is very important. If designed inappropriately, it will be very difficult, if not impossible, to establish native species. It will also be difficult to realize any of the water quality or habitat benefits. A brochure entitled *Stormwater Detention Basin Retrofitting* available from the Northeastern Illinois Planning Commission (NIPC) provides guidelines for incorporating best management practices (BMP) and native plantings into existing facilities. NIPC also has a course curriculum notebook for *Urban Stormwater Best Management Practices for Northeastern Illinois* and a *Source Book: Natural Landscaping for Public Officials*, which provide design guidelines and encourage the use of native plantings.

For streambank and shoreline stabilization methods and design information, Appendix A in the *Streambank Stabilization Program* report (RUST 1995) available from DuPage County Department of Environmental Concerns is a recommended reference. The latest edition of the *Illinois Urban Manual* (NRCS/IEPA) is also a good reference for design information and specifications. Bioengineering techniques are becoming increasingly popular nationwide and new information is continually appearing in the literature. The Illinois State Water Survey has done extensive work on streambank stabilization and can be contacted for further information or refer to *"Field Manual of Urban Stream Restoration,"* (Gaboury, *et al.*, 1996) for more comprehensive stream restoration information. Other references may be available from your county Soil and Water Conservation District or from the local offices of the agencies that produced this Guide (See Appendix C).

Slopes

In most stormwater management facilities and streambank projects attempting to use native vegetation, the most gentle slopes possible should be used. Steeper slopes magnify the erosive forces and make it more difficult to establish the plant material before a major erosion event damages or destroys the plantings. Gradual slopes (no steeper than 5:1 horizontal: vertical) are particularly important along the shorelines of ponds and detention basins. Most native plants are adapted to the gentle slopes that surrounded natural ponds and wetlands or were present along streams in the presettlement condition. Appropriate BMP's for soil erosion and sediment control (see *Illinois Urban Manual*) should be used during construction at sites where native vegetation will be installed.

Soils

The condition and type of soil at the site where native plants are to be established are also important factors. Many native species are widely distributed in the United States and naturally grow in many soil textures and soil types. For most users of this Guide, however, the soil present will not be a natural soil profile, but rather a regraded situation with topsoil placed on the site as a growth medium. Soil compaction is a common cause of failure in wetland restorations and other native plantings. Care must be taken to ensure that soil compaction is minimized so that the plant roots can obtain water and oxygen. A minimum of one foot of topsoil applied with the least compaction possible is recommended. A soil with a coarser texture (higher sand and silt content than clay) is recommended because it reduces the potential for compaction. A mineral soil with a high organic content is also recommended. Organic matter in the soil increases water holding capacity, reduces compaction potential, and provides plant nutrients. Care should also be taken to ensure that the soil used does not contain a large number of weed seeds that would compete with the native plantings. Organic soils, such as peat or muck, present special problems if their hydrology is modified and should be avoided above the water line if possible.

Installation & Establishment

Detailed information is provided for each species on germination requirements and recommended establishment practices. Particular attention should be given to recommendations on seeding versus live plants or rootstock. There is no single best time to plant or seed. Generally, live plants and rootstock should be planted in the spring, approximately from last frost until mid-June. For seeding, fall or spring sowing are options. Spring seeding can be performed from March 1st through May. Fall seeding or dormant seeding can be performed after November 15. Some species are inhibited by fall planting while others are favored by fall planting. Summer seeding and planting in July, July, or August can be used if necessary, but only with adequate irrigation. Where specific information is available, this information is given within the establishment category for each species. The information provided assumes adequate seedbed preparation that includes a relatively smooth topsoil surface, free of stones, clods, sticks and other debris. Also please consult the section on soils. Recommendations are given with each species for seeding or planting method.

Water Levels

Information is provided concerning water depth preferences and inundation tolerances for all species. This information should be used with the overall guiding principle that native plants are adapted to seasonal flooding and flooding of short duration. Prior to the intensified flooding problems brought on by urbanization, natural flooding occurred occasionally, but mostly in the spring with spring rainfall and snow melt. It did not occur with each major storm event throughout the summer, as occurs in many detention basins. Many native plants cannot tolerate the widely fluctuating water levels often associated with stormwater facilities. An effort should be made to reduce or dampen the water level fluctuations and flood plantings only for short durations during the growing season. It is also important to keep in mind that many mature wetland plants can survive flooding or inundation, but the seedlings cannot. Natural marshes go through an annual draw-down cycle as well as during droughts to allow germination of new plants, which allows these seedlings to become established. Provision should be made to lower the water levels during the critical establishment period.

Irrigation

While established deep-rooted native plants are generally drought resistant, some irrigation of new plantings may be needed. If initial seeding or planting is followed by a dry period, irrigation may be required until the plants are fully established and can withstand a drought. Irrigation should be performed in a manner that does not erode the soil or wash away the seed.

Seeding Rates

Seeding rates for any species depends on the mix of species, setting, and desired result. In order to establish a dense, single-species stand, seeding rates would be heavier than that needed for a mixed species planting. Many plant vendors and installation contractors do not provide seeding rates in their catalogs as they want to adapt rates to each site or they consider rates "trade secrets." Seeding rates provided in this Guide are ranges taken from three local sources that have experience in the establishment of native plantings in northeastern Illinois. Consideration of the setting, goals and objectives, and best professional judgement should be used in determining final seeding rates for any given project. This information applies only to those species where seeding is appropriate and does not apply to rootstock, transplant, or other planting methods. In these cases, seeding rates are shown as "Not Applicable." Seeding rates listed as "Not Available" are listed as such because the source references used did not contain seeding rate information for all species. All rates are pure live seed (PLS).

Cover Crops/Mulch/Erosion Blanket

Most native vegetation installation contractors will recommend that a cover crop or mulch be used. A cover crop is a crop of quick germinating species that will serve to hold and stabilize the soil until the desired permanent vegetation is established. Mulch is a natural or artificial layer of suitable materials that aid in soil stabilization and soil moisture conservation which provides microclimatic conditions suitable for germination and growth. Both techniques are recommended for temporary soil erosion control measures. They also can provide a temporary fuel matrix to allow prescribed burning before the native vegetation is fully established. Typically, cover crops consist of nonnative species. Any cover crop used should be composed of nonpersistent species so that it is in fact only a temporary cover crop

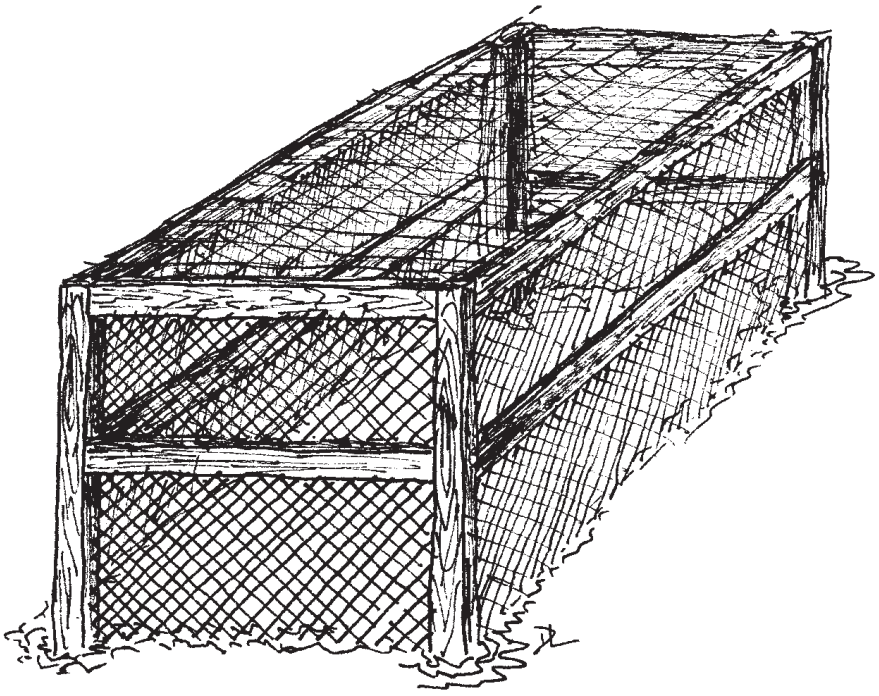
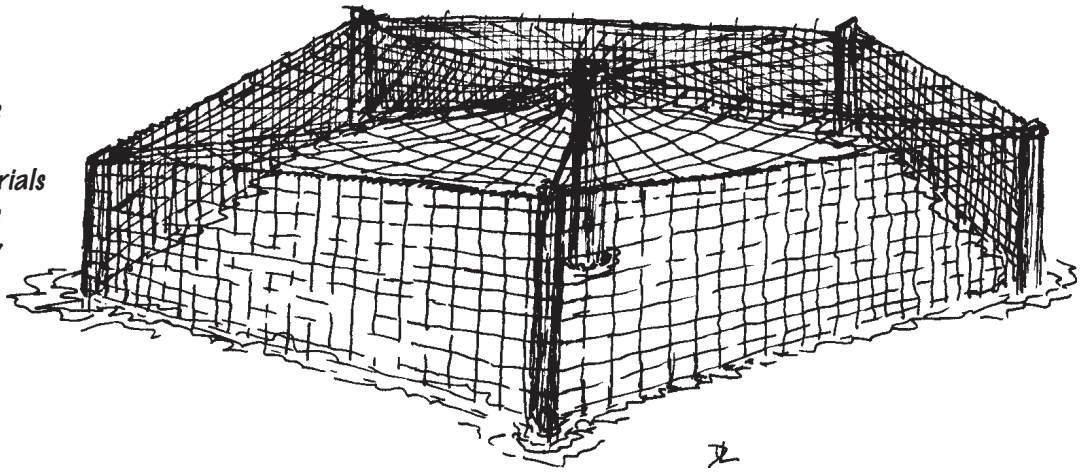


Figure 1.
Framed goose-protection structure. Made of wood and chicken wire (hardware cloth), this sturdy cage protects newly planted material while allowing them to establish in a natural setting. The structure is put in place for a period of several months, and then removed once plants are well established.

Figure 2.
Netted goose-protection structure. This is a more cost-effective version than the framed structure depicted above. While still providing reasonable protection from predators, the materials for constructing this device are relatively less expensive.



and is eventually replaced by the desired native vegetation. Many contractors have strong preferences on cover crop composition. Recommended species frequently included are: annual ryegrass (*Lolium multiflorum*), red top (*Agrostis alba*), timothy (*Phleum pratense*), wild ryes (*Elymus spp) (native*), oats (*Avena sativa*), barley (*Hordeum vulgare*), rye (*Secale cereale*) and others. Some native species such as smartweeds (*Polygonum* spp), rice cut grass (*Leersia oryzoides*), and barnyard grass (*Echinochloa crusgalli*) can also serve this purpose. Species that will persist and compete with the desired native vegetation such as Hungarian or smooth brome (*Bromus inermis*), Kentucky bluegrass (*Poa pratensis*), and fescue (*Festuca* spp) should be avoided. Properly applied nonallelopathic mulch or erosion control blanket should be used on steeper slopes. Erosion control blankets are recommended on detention basin side slopes and in vegetated swales where flowing water is present. Some native species require light for germination. This should be considered when selecting either a cover crop, mulch, or erosion blanket.

Growth Rates

It may appear that many of these native plants are very slow growing, as reported in some landscape literature sources. It should be noted, however, that for most native plants the strategy is to grow a deep root system before putting energy into above-ground growth. While it may appear that they are slow growing initially, they are simply growing beneath the ground where the growth cannot be seen, but where it will provide the important soil stabilizing benefits.

Fertilizer

As mentioned under the nutrient loading tolerance section, most native species do not require any traditional fertilization to become established. Fertilizer application promotes the growth of many undesirable weeds and should not be used. Traditional landscaping specifications should be modified to discourage fertilization of native plantings.

Depredation

Depredation refers to the problem of wildlife eating the plant material, including root stock, plant shoots, and seeds. Many of the native plant species described in this Guide are an excellent wildlife food source. When a large amount of seeds and root stock are put into an unvegetated area, it is an attractive smorgasbord of food for urban wildlife, especially resident giant Canada geese. Protective measures are required to prevent the loss of native plantings. Installation contractors have a variety of protection methods. Currently, the most successful technique involves cells or compartments of plastic or nylon mesh. The mesh must cover the sides and top of each cell or compartment and be able to prevent animals from getting under the fence. It is very important that these protective measures be monitored and maintained until the plants become fully established (See figures 1 and 2).

Naturally Invading Plant Species

There are many species of plants that may volunteer in an area of native vegetation planting. Some of these will present problems, some will not. There may be some species which are desirable natives that have appeared from a soil seed bank or that were blown or carried in from nearby sites. There will be some annual or biennial weeds that colonize recently disturbed soil, but do not persist when the planted material competes with it. Thus these species will drop out and not present any problems. A third group of species that may appear, however, are very aggressive and will overtake planted material without management and intervention. These include such species as reed canary grass (*Phalaris arundinacea*), common reed (*Phragmites australis*), buckthorn (*Rhamnus cathartica, R. frangula*), and purple loosestrife (*Lythrum salicaria*). These species tend to form monocultures (single species) and do not provide the soil-holding capacity that desired natives provide. These species can be controlled in time with various management tools. Initially, these species may need to be controlled with selective herbicide application. This should be applied in a manner that does not impact other nearby plants and is consistent with the label indications and best management practices. A licensed applicator must be used. Prescribed burning over time will promote the desired native species and reduce many of these non-fire adapted invaders. Mowing can also be used to control some of these species. Techniques used in a given area depend on which problem species are present, setting and context of the area, and preferences and recommendations of the installation contractor.

Mowing and Prescribed Fire

Most native plant species are adapted to a natural regime of fire and limited grazing. In a modern urban context, prescribed fire is used as a primary management tool to sustain native plant communities. Prescribed burning requires an Open Burning Permit from the Illinois Environmental Protection Agency (IEPA), permission from the local Fire Department, and a qualified, experienced contractor or crew. Prescribed burning can be done in urban settings in most instances, with proper planning, smoke management, and contingencies. Where burning is not possible, or in the early stages of establishment, mowing can be used as a management tool for native plantings. To reduce weed competition in early stages, native vegetation establishment areas should be mowed once or twice per year with a mower height of 6-12 inches. Normal turf management type mowing is inappropriate and will result in the loss of native plantings. See Appendix B for a list of prescribed burn contractors in northeastern Illinois.

Other Considerations

There are many factors that contribute to the success or failure of any given native vegetation planting, just as there are with engineered structures and traditional landscape plantings. This Guide attempts to provide the best available information at the time of publication, but is not an exhaustive reference nor a definitive design manual. Conditions necessary for successful native plant establishment and maintenance vary too greatly from site to site and from year to year to allow absolute guarantees of success. The use of this Guide should, however, substantially increase the likelihood of success and will provide a base of understanding for interpreting results at the project site. Best professional judgement and experience must enter into the design and implementation of any project. Finally, it is important that designs include a maintenance and monitoring plan. In the short-term (3 to 5 years), it should identify performance criteria for the landscape contractor. For example, it should also identify a responsible party for long-term maintenance once the contractor's job is complete. The long-term maintenance will generally be less costly than traditional landscape maintenance.

Suggested Plant Species Mixes

for Stormwater Applications

The suggested plant species mix lists which follow are intended to provide users with an idea of species that could be used together. **These lists should NOT be used without consideration of the specific information provided within this Guide for each species.** Each site will provide a different set of environmental conditions and an effort should be made to match the most suitable species to those conditions. In some cases, it may be best to overlap planting of different species mixes to hedge on the establishment of a hydrology regime in a given zone. Depending on the application, **it may be appropriate to select a few species from a given mix, or for maximum diversity the entire mix could be used in a given zone.** For prairie or wetland restorations, or for Section 404 (of the Clean Water Act) compensatory mitigation, planting mixes should go beyond the species listed here.

Stormwater Detention Basins, Upper Shoreline Zone (Saturated)

Scientific Name	Common Name
Alisma subcordatum	COMMON WATER PLANTAIN
Aster lanceolatus	PANICLED ASTER
Aster novae-angliae	NEW ENGLAND ASTER
Bidens cernua	NODDING BEGGARSTICKS
Bidens frondosa	COMMON BEGGARSTICKS
Calamagrostis canadensis	BLUE JOINT GRASS
Carex comosa	BRISTLY SEDGE
Carex cristatella	CRESTED OVAL SEDGE
Carex granularis	PALE SEDGE
Carex lanuginosa	WOOLY SEDGE
Carex stipata	AWL-FRUITED SEDGE
Carex vulpinoidea	FOX SEDGE
Celtis occidentalis	HACKBERRY
Cephalanthus occidentalis	COMMON BUTTONBUSH
Cornus racemosa	GRAY DOGWOOD
Cornus sericea	RED OSIER DOGWOOD
Cyperus esculentus	FIELD NUT SEDGE
Eleocharis obtusa	BLUNT SPIKE RUSH
Eleocharis smallii	CREEPING SPIKE RUSH
Elymus canadensis	NODDING WILD RYE
Elymus virginicus	VIRGINIA WILD RYE
Eupatorium maculatum	SPOTTED JOE PYE WEED
Eupatorium perfoliatum	COMMON BONESET
Glyceria striata	FOWL MANNA GRASS
Helenium autumnale	COMMON SNEEZEWEED
Helianthus grosseserratus	SAWTOOTH SUNFLOWER
Juncus effusus	COMMON RUSH
Juncus torreyi	TORREY'S RUSH
Leersia oryzoides	RICE CUT GRASS
Pycnanthemum virginianum	COMMON MOUNTAIN MINT
Quercus bicolor	SWAMP WHITE OAK
Salix amygdaloides	PEACHLEAF WILLOW
Salix nigra	BLACK WILLOW
Solidago gigantea	LATE GOLDENROD
Spartina pectinata	PRAIRIE CORDGRASS
Verbena hastata	BLUE VERVAIN
Vernonia fasciculata	COMMON IRON WEED
Viburnum lentago	NANNYBERRY

Stormwater Detention Basins, Lower Shoreline Zone (Emergent)

Scientific Name	Common Name
Acorus calamus	SWEET FLAG
Alisma subcordatum	COMMON WATER PLANTAIN
Cephalanthus occidentalis	COMMON BUTTONBUSH
Cyperus esculentus	FIELD NUT SEDGE
Iris virginica	BLUE FLAG IRIS
Juncus effusus	COMMON RUSH
Polygonum amphibium	WATER SMARTWEED
Sagittaria latifolia	BROADLEAF ARROWHEAD
Scirpus acutus	HARDSTEM BULRUSH
Scirpus americanus	CHAIRMAKER'S RUSH
Scirpus fluviatilis	RIVER BULRUSH
Scirpus tabernaemontani	SOFT-STEM BULRUSH
Sparganium eurycarpum	COMMON BURREED

Streambank Stabilization

Scientific Name	Common Name
Alisma subcordatum	COMMON WATER PLANTAIN
Carex vulpinoidea	FOX SEDGE
Celtis occidentalis	HACKBERRY
Cephalanthus occidentalis	COMMON BUTTONBUSH
Cornus racemosa	GRAY DOGWOOD
Cornus sericea	RED OSIER DOGWOOD
Eleocharis obtusa	BLUNT SPIKE RUSH
Eleocharis smallii	CREEPING SPIKE RUSH
Elymus canadensis	NODDING WILD RYE
Elymus virginicus	VIRGINIA WILD RYE
Fraxinus pennsylvanica	GREEN ASH
Glyceria striata	FOWL MANNA GRASS
Helenium autumnale	COMMON SNEEZEWEED
Leersia oryzoides	RICE CUT GRASS
Panicum virgatum	SWITCH GRASS
Salix amygdaloides	PEACHLEAF WILLOW
Salix nigra	BLACK WILLOW
Scirpus americanus	CHAIRMAKER'S RUSH
Solidago gigantea	LATE GOLDENROD
Spartina pectinata	PRAIRIE CORDGRASS
Verbena hastata	BLUE VERVAIN
Viburnum lentago	NANNYBERRY

NOTE: In severe erosion situations where the dormant willow post method is appropriate, sandbar willow (Salix interior) may be recommended due to its aggressive nature.

Upland Slope Buffers- Stormwater Ponds & Streambanks

Scientific Name	Common Name
Andropogon gerardii	BIG BLUESTEM
Aster laevis	SMOOTH BLUE ASTER
Aster lanceolatus	PANICLED ASTER
Aster novae-angliae	NEW ENGLAND ASTER
Bidens frondosa	COMMON BEGGARSTICKS
Bouteloua curtipendula	SIDE-OATS GRAMA
Celtis occidentalis	HACKBERRY
Coreopsis tripteris	TALL COREOPSIS
Cornus racemosa	GRAY DOGWOOD
Cornus sericea	RED OSIER DOGWOOD
Elymus canadensis	NODDING WILD RYE
Elymus virginicus	VIRGINIA WILD RYE
Fraxinus pennsylvanica	GREEN ASH
Monarda fistulosa	WILD BERGAMOT
Panicum virgatum	SWITCH GRASS
Petalostemum purpureum	PURPLE PRAIRIE CLOVER
Pycnanthemum virginianum	COMMON MOUNTAIN MINT
Quercus bicolor	SWAMP WHITE OAK
Quercus macrocarpa	BUR OAK
Quercus palustris	PIN OAK
Ratibida pinnata	YELLOW CONE FLOWER
Rudbeckia hirta	BLACK-EYED SUSAN
Schizachyrium scoparium	LITTLE BLUESTEM
Silphium laciniatum	COMPASS PLANT
Silphium terebinthinaceum	PRAIRIE DOCK
Solidago rigida	STIFF GOLDENROD
Sorghastrum nutans	INDIAN GRASS
Spartina pectinata	PRAIRIE CORDGRASS
Tradescantia ohiensis	SPIDERWORT
Vernonia fasciculata	COMMON IRON WEED
Viburnum dentatum lucidum	ARROW WOOD VIBURNUM
Viburnum lentago	NANNYBERRY

Vegetated Swales

Scientific Name	Common Name
Acorus calamus	SWEET FLAG
Alisma subcordatum	COMMON WATER PLANTAIN
Aster lanceolatus	PANICLED ASTER
Bidens cernua	NODDING BEGGARSTICKS
Bidens frondosa	COMMON BEGGARSTICKS
Calamagrostis canadensis	BLUE JOINT GRASS
Carex cristatella	CRESTED OVAL SEDGE
Carex lanuginosa	WOOLY SEDGE
Carex stipata	AWL-FRUITED SEDGE
Carex vulpinoidea	FOX SEDGE
Eleocharis obtusa	BLUNT SPIKE RUSH
Elymus canadensis	NODDING WILD RYE
Elymus virginicus	VIRGINIA WILD RYE
Eupatorium maculatum	SPOTTED JOE PYE WEED
Eupatorium perfoliatum	COMMON BONESET
Glyceria striata	FOWL MANNA GRASS
Helenium autumnale	COMMON SNEEZEWEED
Helianthus grosseserratus	SAWTOOTH SUNFLOWER
Iris virginica	BLUE FLAG IRIS
Juncus effusus	COMMON RUSH
Juncus torreyi	TORREY'S RUSH
Leersia oryzoides	RICE CUT GRASS
Panicum virgatum	SWITCHGRASS
Pycnanthemum virginianum	COMMON MOUNTAIN MINT
Scirpus acutus	HARD STEM BULRUSH
Scirpus americanus	CHAIRMAKER'S RUSH
Scirpus fluviatilis	RIVER BULRUSH
Scirpus tabernaemontani	SOFT-STEM BULRUSH
Solidago gigantea	LATE GOLDENROD
Spartina pectinata	PRAIRIE CORDGRASS
Verbena hastata	BLUE VERVAIN

Species Information Summary Table

The information provided in this table is a condensed format designed to be used as a quick reference for users of this Guide. The data provided in the tables is not a complete profile for each species. Users are advised to consult the specific species descriptions for a comprehensive description and evaluation for a particular application.

Scientific Name	Common Name	Preferred Water Depth	Application/Zone	Mature Height	Plant Type	Indicator Status	Nutrient Load Tolerance	Salt Tolerance	Siltation Tolerance	Light Preference	Seeding Rate (lbs/acre)
Acorus calamus	Sweet Flag	6-20 in.	Lower shoreline,veg. swales	2-6 ft.	Perennial emergent herb	OBL	Low	Low	Low	Partial to full sun	0.006-0.25
Alisma subcordatum	Common Water Plantain	0-6 in.	Upper and lower shoreline, stream banks, veg. swales	0.3-3.3 ft.	Perennial emergent herb	OBL	Moderate	Moderate	High	Full sun	0.06-0.5
Andropogon gerardii	Big Bluestem	Moist to Mesic	Upland buffers	3-9 ft.	Perennial grass	FAC-	Low	Low	Low	Full sun	2
Aster laevis	Smooth Blue Aster	Mesic to Dry	Upland buffers	3-5 ft.	Perennial herb	[UPL]*	Low	Low	Low to Moderate	Partial to full sun	0.02-0.125
Aster lanceolatus	Panicled Aster	Moist to Saturated	Upper shoreline,upland buffers,veg. swales	2-4 ft.	Perennial herb	FACW	Moderate	Moderate	High	Partial to full sun	0.06
Aster novae-angliae	New England Aster	Moist to Wet Mesic	Upper shoreline, upland buffers	1-6.5 ft.	Perennial herb	FACW	Moderate	Low	Moderate	Partial to full sun	0.03-0.2
Bidens cernua	Nodding Beggarsticks	Saturated	Upper shoreline,veg. swales	0.3-3.3 ft.	Annual emergent herb	OBL	Moderate	Low to Moderate	Moderate to High	Partial to full sun	0.25-0.5
Bidens frondosa	Common Beggarsticks	Moist	Upper shoreline,upland buffers,veg. swales	0.7-4.0 ft.	Annual emergent herb	FACW	Moderate	Moderate to High	High	Partial to full sun	0.125
Bouteloua curtipendula	Side-Oats Grama	Mesic to Dry	Upland buffers	1-3 ft.	Perennial tufted grass	UPL	Low	Not Tolerant	Low	Full sun	5
Calamagrostis canadensis	Blue Joint Grass	Saturated	Upper shoreline,veg. swales	2-5 ft.	Perennial grass	OBL	Low	Low	Moderate	Full sun	0.03-0.06

Scientific Name	Common Name	Preferred Water Depth	Application/Zone	Mature Height	Plant Type	Indicator Status	Nutrient Load Tolerance	Salt Tolerance	Siltation Tolerance	Light Preference	Seeding Rate (lbs/acre)
Carex comosa	Bristly Sedge	0-12 in.	Upper shoreline	1.5-4.0 ft.	Perennial sedge	OBL	Low	Low	Not Tolerant	Partial to full sun	0.125
Carex cristatella	Crested Oval Sedge	Moist	Upper shoreline,veg. swales	Up to 3 ft.	Perennial sedge	FACW+	Moderate	Not Available	Low	Partial to full sun	0.125
Carex granularis	Pale Sedge	Moist	Upper shoreline	0.5-2.0 ft.	Perennial sedge	FACW+	Low to Moderate	Low	Not Tolerant	Partial to full sun	0.031
Carex lanuginosa	Wooly Sedge	Moist	Upper shoreline,veg. swales	1-3 ft.	Perennial sedge	OBL	Moderate to High	Low	Moderate	Full sun	Not Available
Carex stipata	Awl-fruited Sedge	Moist.	Upper shoreline,veg. swales	Up to 3 ft.	Perennial sedge	OBL	High	Low to Moderate	Moderate	Partial to full sun	0.125
Carex vulpinoidea	Fox Sedge	6 inches or less	Upper shoreline,streambanks, veg. swales	1-3 ft.	Perennial sedge	OBL	Moderate to High	Low to Moderate	Moderate	Partial to full sun	0.06-0.5
Celtis occidentalis	Hackberry	Spring flooding, Moist	Upper shoreline, streambanks, upland buffers	Up to 80 ft.	Deciduous tree	FAC-	Moderate	Moderate	Low to Moderate	Shade tolerant	Not Applicable
Cephalanthus occidentalis	Common Buttonbush	2-3 ft.	Upper and lower shoreline, streambanks	3-10 ft.	Deciduous shrub	OBL	Moderate	Moderate to High	Moderate	Partial to full sun	Not Applicable
Coreopsis tripteris	Tall Coreopsis	Moist to Mesic	Upland buffers	3-10 ft.	Perennial herb	FAC	Low	Not Available	Low	Partial to full sun	Not Available
Cornus racemosa	Gray Dogwood	Moist to saturated	Upper shoreline, streambanks, upland buffers	Up to 8 ft.	Deciduous multistem shrub	[FACW-]*	Moderate to High	Low	Moderate to High	Partial to full sun	Not Applicable
Cornus sericea	Red Osier Dogwood	Saturated	Upper shoreline, streambanks,upland buffers	3-9 ft.	Deciduous shrub	FACW	Moderate to High	Not Tolerant	Moderate to High	Partial to full sun	Not Applicable
Cyperus esculentus	Field Nut Sedge	Seasonal flooding, up to 1 ft.	Upper and lower shoreline	1-2 ft.	Perennial sedge	FACW	High	Low	High	Full sun	Not Available
Eleocharis obtusa	Blunt Spike Rush	Saturated	Upper shoreline, streambanks, veg. swales	12-18 in.	Annual tufted herb	OBL	Moderate to High	Low to Moderate	Low	Full sun	0.02-0.4
Eleocharis smallii	Creeping Spike Rush	Saturated	Upper shoreline, streambanks	12-18 in.	Perennial herb	OBL	Low	Moderate	Low	Full sun	0.02-0.4
Elymus canadensis	Nodding Wild Rye	Mesic	Upper shoreline, streambanks, upland buffer, veg. swales	3-6 ft.	Perennial grass	FAC-	Low	Not Available	Low	Partial to full sun	0.02-2.0
Elymus virginicus	Virginia Wild Rye	Moist	Upper shoreline, streambanks, upland buffer, veg. swales	Up to 3 ft.	Perennial grass	FACW-	Moderate	Not Available	Moderate	Shade tolerant to full sun	0.06-1.0
Eupatorium maculatum	Spotted JoePye Weed	Moist to 6 in. of water	Upper shoreline, veg.swales	4-6 ft.	Perennial herb	OBL	Low	Not Available	Low	Full sun	0.06-2.0

Scientific Name	Common Name	Preferred Water Depth	Application/Zone	Mature Height	Plant Type	Indicator Status	Nutrient Load Tolerance	Salt Tolerance	Siltation Tolerance	Light Preference	Seeding Rate (lbs/acre)
Eupatorium perfoliatum	Common Boneset	Moist to 6 in. of water	Upper shoreline,veg. swales	2-3 ft.	Perennial herb	FACW+	Low to Moderate	Not Available	Low to Moderate	Full sun	0.125
Fraxinus pennsylvanica	Green Ash	0-24 in./Periodic	Streambanks, upland buffers	Up to 60 ft.	Deciduous tree	FACW	High	Moderate	High	Shade tolerant	Not Applicable
Glyceria striata	Fowl Manna Grass	Moist to saturated	Upper shoreline, streambanks,veg. swales	1-4 ft.	Perennial grass	OBL	Low to Moderate	Low	Moderate	Full shade to partial sun	0.06-0.5
Helenium autumnale	Common Sneeze Weed	Moist to saturated	Upper shoreline, streambanks,veg. swales	3-5 ft.	Perennial herb	FACW+	Moderate to High	Not Available	Moderate to High	Partial to full sun	0.12-0.5
Helianthus grosseserratus	Sawtooth Sunflower	Moist to saturated	Upper shoreline,veg. swales	3-13 ft.	Perennial herb	FACW-	Moderate	Moderate	Moderate	Full sun	Not Available
Iris virginica	Blue Flag Iris	Moist to saturated	Lower shorelines,veg. swales	up to 2.5 ft.	Perennial emergent herb	OBL	Moderate	Not Tolerant	Moderate	Partial to full sun	0.06-0.25
Juncus effusus	Common Rush	Moist to a few in. of water	Upper and lower shorelines,veg. swales	1.0-3.5 ft.	Perennial emergent herb	OBL	Moderate	Low	Moderate	Partial to full sun	Not Available
Juncus torreyi	Torrey's Rush	Moist to saturated	Upper shoreline,veg. swales	Up to 3 ft.	Perennial herb	FACW	Moderate	Low	Moderate	Partial to full sun	0.006-0.125
Leersia oryzoides	Rice Cut Grass	Moist to saturated	Upper shorelines, streambanks,veg. swales	3-5 ft.	Perennial emergent grass	OBL	Moderate to High	Low	Moderate	Partial to full sun	0.1-0.25
Monarda fistulosa	Wild Bergamot	Mesic	Upland buffers	Up to 3 ft.	Perennial herb	FACU	Moderate	Not Available	Low to Moderate	Partial to full sun	0.125-1.0
Panicum virgatum	Switch Grass	Mesic	Streambanks,upland buffers	Up to6.5 ft.	Perennial grass	FAC+	Low to Moderate	Moderate	Low to Moderate	Full sun	0.25-1.0
Petalostemum purpureum	Purple Prairie Clover	Mesic	Upland buffers	1-3 ft.	Perennial herb	UPL	Low	Not Available	Low	Full sun	0.25
Polygonum amphibium	Water Smartweed	Moist or up to 20 in.of water	Lower shoreline	Up to 3 ft.	Perennial emergent herb	OBL	Moderate	Low	Moderate to High	Partial to full sun	0.5-1.5
Pycnanthemum virginianum	Common Mountain Mint	Moist to saturated	Upper shoreline,upland buffers, veg. swales	1.6-3 ft.	Perennial herb	FACW+	Moderate	Not Available	Low to Moderate	Full sun	0.02-0.06
Quercus bicolor	Swamp White Oak	Moist	Upper shoreline, upland buffers	50-70 ft.	Deciduous tree	FACW+	Low	Low	Low	Full sun	Not Applicable
Quercus macrocarpa	Bur Oak	Moist to Mesic	Upland buffers	60-70 ft.	Deciduous tree	FAC-	Low to Hight	Low	Low to Moderate	Full sun	Not Applicable
Quercus palustris	Pin Oak	Moist to saturated	Upland buffers	Up to 75 ft.	Deciduous tree	FACW	Low	Low to Moderate	Low	Full sun	Not Applicable
Ratibida pinnata	Yellow Cone Flower	Mesic	Upland buffers	Up to 3 ft.	Perennial herb	UPL	Low to Moderate	Not Available	Low	Full sun	Not Available

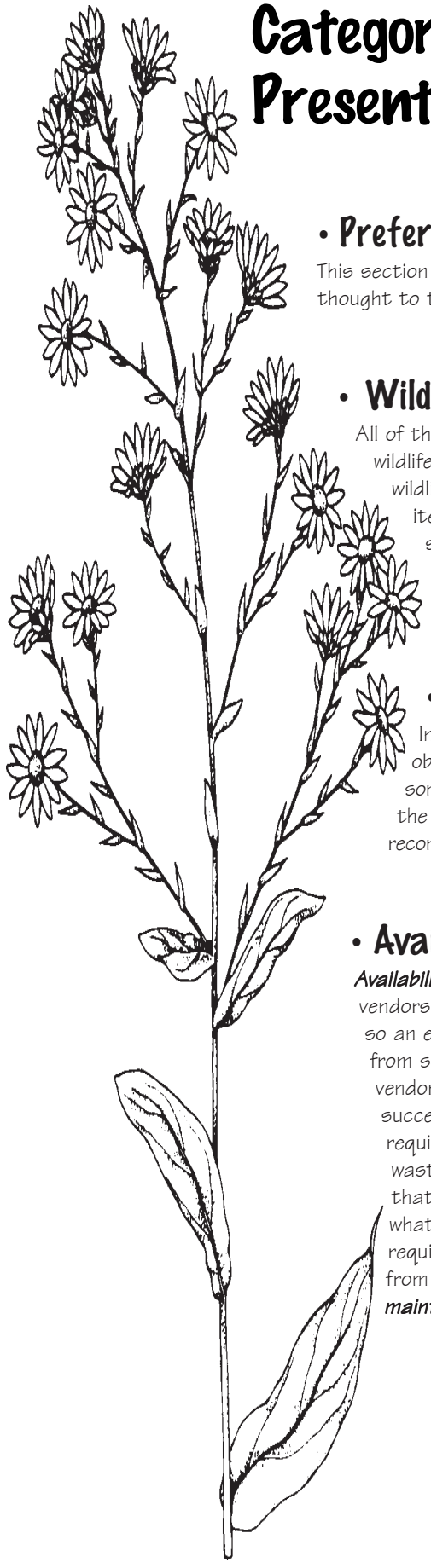
Scientific Name	Common Name	Preferred Water Depth	Application/Zone	Mature Height	Plant Type	Indicator Status	Nutrient Load Tolerance	Salt Tolerance	Siltation Tolerance	Light Preference	Seeding Rate (lbs/acre)
Rudbeckia hirta	Black-Eyed Susan	Mesic to saturated	Upland buffers	1-2 ft.	Perennial herb	FACU	Low to Moderate	Not Available	Low	Partial to full sun	0.125-0.3
Sagittaria latifolia	Broadleaf Arrowhead	6-20 in.	Lower shoreline	Up to 1.5 ft.	Perennial emergent herb	OBL	Moderate	Low	Low	Partial to full sun	0.12-0.19
Salix amygdaloides	Peachleaf Willow	Moist to saturated	Upper shoreline,streambanks	Up to 40 ft.	Desciduous shurb	FACW	Low to Moderate	Moderate	Low to Moderate	Partial to full sun	Not Applicable
Salix nigra	Black Willow	Moist to saturated	Upper shoreline,streambanks	Up to 90 ft.	Deciduous tree	OBL	Moderate to High	Low	Moderate	Full sun	Not Applicable
Schizachyrium scoparium	Little Bluestem	Dry to mesic	Upland buffers	2-3 ft.	Perennial grass	FACU-	Low	Not Available	Low	Full sun	1.0-6.0
Scirpus acutus	Hardstem Bulrush	Saturated to 3 ft. water	Lower shoreline,veg. swales	3.5-9.3 ft.	Perennial emergent herb	OBL	Low to Moderate	Moderate to High	Low to Moderate	Full sun	0.06-0.25
Scirpus americanus	Chairmaker's Rush	Saturated to 16.5 in.water	Lower shoreline,streambanks, veg. swales	Up to 4 ft.	Perennial emergent herb	OBL	Low	High	Low to Moderate	Full sun	0.06-0.125
Scirpus fluviatilis	River Bulrush	Moist up to 30 in. water	Lower shoreline,veg. swales	5-7 ft.	Perennial emergent herb	OBL	Moderate to High	Low to Moderate	High	Partial to full sun	0.06-0.125
Scirpus tabernaemontani	Soft-stem Bulrush	12-20 in.	Lower shoreline,veg. swales	3-9 ft.	Perennial emergent herb	OBL	Moderate	Low to Moderate	Moderate	Full sun	0.06-0.25
Silphium laciniatum	Compass Plant	Mesic	Upland buffers	Up to 10 ft.	Perennial herb	UPL	Low	Not Available	Low	Full sun	0.03-0.19
Silphium terebinthinaceum	Prairie Dock	Mesic to Moist	Upland buffers	Up to 10 ft.	Perennial herb	FAC-	Low to Moderate	Low	Low to Moderate	Full sun	0.03-0.19
Solidago gigantea	Late Goldenrod	Moist to saturated	Upper shoreline,streambanks, veg. swales	Up to 8 ft.	Perennial herb	FACW	Moderate to High	Not Available	Moderate	Full sun	0.125
Solidago rigida	Stiff Goldenrod	Dry to mesic	Upland buffers	Up to 6 ft.	Perennial herb	FACU-	Low to Moderate	Low	Low	Full sun	0.06-0.3
Sorghastrum nutans	Indian Grass	Mesic	Upland buffers	4-8 ft.	Perennial grass	FACU+	Low	Not Available	Low to Moderate	Full sun	2.5-6.0
Sparganium eurycarpum	Common Burreed	12 in.water	Lower shoreline	1.7-4.0 ft.	Perennial emergent herb	OBL	Low to Moderate	Low to Moderate	Low to Moderate	Partial to full sun	0.2-0.375
Spartina pectinata	Prairie Cordgrass	Saturated or up to 3 in. water	Upper shoreline,streambanks, upland buffers, veg. swales	5-7 ft.	Perennial grass	FACW+	Moderate to High	Low to Moderate	Moderate	Full sun	0.5-2.0

Scientific Name	Common Name	Preferred Water Depth	Application/Zone	Mature Height	Plant Type	Indicator Status	Nutrient Load Tolerance	Salt Tolerance	Siltation Tolerance	Light Preference	Seeding Rate (lbs/acre)
Tradescantia ohiensis	Spiderwort	Dry to mesic	Upland buffers	1-3 ft.	Perennial herb	FACU	Moderate	Not Available	Moderate	Partial to full sun	0.06-1.0
Verbena hastata	Blue Vervain	Saturated ,0-8 in.	Upper shoreline, streambanks,veg. swales	Up to 5 ft.	Perennial herb	FACW+	Moderate to High	Moderate to High	Moderate to High	Full sun	0.015-0.125
Vernonia fasciculata	Common Iron Weed	Moist to saturated	Upper shoreline and upland buffers	Up to 6 ft.	Perennial herb	FACW	Low to Moderate	Not Available	Moderate	Full sun	0.06-0.19
Viburnum dentatum lucidum	Arrow Wood Viburnum	Dry to moist	Upland buffers	Up to 10 ft.	Deciduous shrub	FACW-	Low to Moderate	Not Available	Low to Moderate	Partial to full sun	Not Applicable
Viburnum lentago	Nannyberry	Moist to saturated	Upper shoreline, streambanks,upland buffers	15-35 ft.	Deciduous tree/shurb	FAC+	Moderate	Low	Low	Partial to full sun	Not Applicable

** Indicator status categories from Reed (1988) are shown in brackets ([ ]) for those species that do not have an indicator category in Reed (1997).*
NOTE: "Not Applicable" indicates that plants would not typically be established by seed but by rootstock or transplants. Generally, these are tree and shrub species.
"Not Available" indicates that the source references used for the Guide did not contain seeding rate information for the species.

Native Plant Species List--Scientific/Common

Native Plant Species List--Common/Scientific



Categories of Information Presented for Each Species

• Preferred Water Depth and Inundation Tolerance

This section provides information on the depth of water that each species is thought to tolerate, as well as the ideal or "preferred" depth where known.

• Wildlife Value

All of the plant species in this Guide provide some habitat and are valuable for wildlife. Native vegetation provides much better habitat for all types of wildlife than mowed turf grass, rip-rap, or seawall. Information under this item identifies wildlife that is associated with that plant species. In some cases, a particular plant species is required to complete a portion of the life cycle, in others it simply provides the "preferred" habitat.

• Application/Zone

Information provided indicates the role or uses individual species have been observed to provide in reducing soil erosion. All species in this Guide provide some erosion control benefits, but this entry provides specific information on the application or zone where the species is best suited. Note that recommended species mixes for different settings are also provided.

• Availability, Establishment, & Maintenance

Availability refers to the ease of obtaining seeds, or rootstock from commercial vendors. Many native species are not widely available in the landscaping trade, so an effort has been made to select species that are known to be available from some native plant vendors. See Appendix A for a listing of known vendors. ***Establishment*** refers to requirements for plant species to be successfully established in an area. This includes various germination requirements for a species. This information is important in order to avoid wasting plant material due to a lack of information on various treatments that may be required. Information is also included about survival rates and what type of propagation works best for a given species. Some species require cuttings, plugs, or root stock, while others are readily established from untreated seed. Finally, information is provided on any long-term ***maintenance or management concerns or requirements*** for each species.

• Mature Height

This category provides a range which indicates the height above ground that a plant species may achieve when mature. Note that many deep-rooted native species can take several years to achieve full stature above ground, due to their growth strategy of putting down a deep root system first. This is the primary reason native plants can be very effective at reducing soil erosion.

• Plant Type

Information is provided on whether a species is annual, perennial, biennial and whether it is a shrub, tree, grass, sedge, or forb. See the glossary for definition of terms used for this information.

• Indicator Status

This refers to the wetland indicator categories published for all wetland plant species in the U. S. Fish and Wildlife Service's *National List of Plant Species that Occur in Wetlands: North Central (Region 3).* The categories are based upon the probabilities that each species would occur in a wetland habitat. For example, those designated OBL are thought to occur in wetland habitats more than 99% of the time. See Reed (1997) and the glossary for further information. Two species (*Aster laevis, Cornus racemosa*) were not given an indicator in Reed (1997), so the indicator categories for these two species from the previous version of the list (Reed 1988) are given in brackets.

• pH

PH is a measure of the soil acidity/alkalinity. Information is provided on the pH range a given species will tolerate. For many species, specific pH values were found in the literature, however, in some cases local experience suggests that these values may be too narrow. A widely distributed plant species may have different pH ranges or tolerances in different parts of the country, depending on other soil chemistry and climatological factors.

• Nutrient Load Tolerance

Native plants typically do not require fertilization to become established in a restoration. Experience in prairie restorations in northeastern Illinois suggests that fertilizing native plantings adds to weed problems and promotes undesirable species. For this reason, fertilizing, as in traditional landscaping, is not recommended for native plantings. Information provided under this heading refers instead to the species tolerance of excess nutrient input. High nutrient input from lawn fertilizer runoff, septic fields, or livestock yards can be detrimental to many native species. In this Guide, plant species are rated as having low, moderate, or high tolerance of excess nutrient input. The species included are those natives that are at least somewhat tolerant of disturbed, man-made environments. Those conservative species that survive only under pristine, natural conditions were not included. Thus, of the species listed, those rated as having a **low tolerance** for nutrient loading would be the least tolerant to high nutrient inputs. Those rated with **high tolerance** are those most likely to withstand relatively high nutrient levels from a direct source. A **moderate** rating indicates an intermediate level of tolerance. High, moderate, and low are relative terms that do not consider quantitative values and relate only to the species within this Guide.

• Salt Tolerance

This category provides general information on the salt (NaCl) tolerance of the species. In a few cases, quantitative values were reported in the literature, but in most cases general salt tolerance is provided based upon local observations. A scale of not tolerant, low, moderate, or high was used, based on local observations in road ditches. Again, low, moderate, and high are relative terms that do not correspond to any quantitative values. Please see discussion of these terms under the Nutrient Load Tolerance section on the opposite page. In northeastern Illinois, chloride concentrations from de-icing salt can range from as low as 20 ppm in an isolated natural wetland to as high as 3,000 ppm in a constructed wetland along a multi-lane expressway.

• Siltation Tolerance

The section provides general information on the siltation tolerance of a species. This is based largely upon local observations of species that survive in disturbed habitats where siltation is present. It should be noted that this applies to mature plants, and that young plants can be easily killed if subjected to siltation at an early stage. This problem can be very pronounced for establishment from seed. Jurik *et al* (1994) found that for many native wetland species, seedling emergence was significantly reduced with as little as 0.25cm of silt. This study was conducted using seeds in a native soil seed bank, but clearly has ramifications for seeds of native species sown in an area subject to siltation. This fact stresses the importance of providing adequate soil erosion and sediment control on project sites. High, moderate, and low tolerance ratings are given as relative terms. See discussion of these terms under the section on Nutrient Load Tolerance.

• Flowering Color and Time

Information is provided on flower color and the time of year one can expect the mature plants to flower. For some users this information may assist in plant selection, arrangement, or planning.

• Light Preference

Information is given as to the shade or sun preference or tolerance of each species.

• Seeding Rate

A range of recommended seeding rates in lbs/acre is provided for each species. Seeding rates for any species depends on the mix of species, setting, and desired result. In order to establish a dense, single-species stand, seeding rates would be heavier than that needed for a mixed species planting. Many plant vendors and installation contractors do not provide seeding rates in their catalogs as they want to adapt rates to each site or they consider rates "trade secrets." Seeding rates provided in this Guide are ranges taken from three local sources that have experience in the establishment of native plantings in northeastern Illinois. Consideration of the setting, goals and objectives, and best professional judgement should be used in determining final seeding rates for any given project. This information applies only to those species where seeding is appropriate and does not apply to rootstock, transplant, or other planting methods. All rates are pure live seed (PLS).

Acorus calamus Sweet Flag

Preferred Water Depth and Inundation Tolerance

Prefers 6-20 inches (Max: 24"/ Min: 0"). Species tolerates seasonal inundation, but may be killed by inundation of 1 foot or more of water for prolonged periods.

Wildlife Value

Provides waterfowl habitat. Muskrats will eat rhizomes. Wood ducks eat seeds. Medicinal plant with antibacterial compounds.

Application/Zone

Used in lower shoreline zones and vegetated swales. Rhizomes and roots form a mat in upper 4-8 inches of soil.

Availability, Establishment, and Maintenance

- Transplants, rhizomes and seeds are common and available from commercial vendors.
- Seeds may have dormancy requirement. About 90% germination is achieved by exposing freshly harvested seeds to cold, moist stratification for 60-90 days but seeds can be stored from 9 months to 2 years. Fall sowing provides better germination than spring by providing this cold treatment naturally.
- Rhizomes and transplants are generally more successful than seeds.
- Rhizomes are planted 2-5 inches deep. Root systems should be well-placed at a shoot base in the soil.
- Avoid flooding of newly established plants. Species requires drawdown until plants are established.
- For seed, some report 13 days are needed to germinate in a greenhouse without cold treatment. Survival rate in the field is 100%.
- Moderate rate of spread by rhizome, so use spacing of 1-3 foot centers.

Sweet Flag *Acorus calamus*

Mature Height
2-6 feet

Plant Type
Perennial emergent herb

Indicator Status
Obligate

pH
5.9-8.8

Nutrient Load Tolerance
Low

Salt Tolerance
Low

Siltation Tolerance
Low

Flowering Color and Time
Green/brown
May 25 to June 30

Light Preference
Partial to full sun

Seeding Rate
.006 - .25 lbs/acre

Alisma subcordatum Common Water Plantain

Preferred Water Depth and Inundation Tolerance

Prefers 0-6 inches, shallow marsh (Max: 20"/Min: 0"). Species tolerates periodic inundation of short duration. Found in mudflat and shoreline areas that dry up by the end of the season.

Wildlife Value

Achenes are eaten by waterfowl, songbirds, pheasants and rodents. Plants provide shade for fish. Leaves are sometimes eaten by rabbits and deer.

Application/Zone

Used in upper and lower shoreline zones, for streambank stabilization, and in vegetated swales.

Availability, Establishment, and Maintenance

- Achenes, transplants, and rootstocks are available from commercial vendors. Abundant achene production, approximately 144,000 per plant.
- Achenes require scarification to break dormancy which can be done with sandpaper. May require oscillating temperatures in moist (underwater) conditions and/or light for germination.
- Good plant establishment occurs when fresh achenes are broadcast in wet mudflats or around shorelines in the fall as this provides these treatments naturally.
- Achenes retain viability when stored in water under cold temperatures for 6 months.
- Rootstocks and transplants may be planted 2-5 inches deep in soil at a spacing determined by project design.
- This species is present and viable in the seedbank found in many hydric (wetland) soils.

Common Water Plantain *Alisma subcordatum*

Mature Height
4 inches - 3.3 feet

Plant Type
Perennial emergent herb

Indicator Status
Obligate

pH
7-8.8

Nutrient Load Tolerance
Moderate

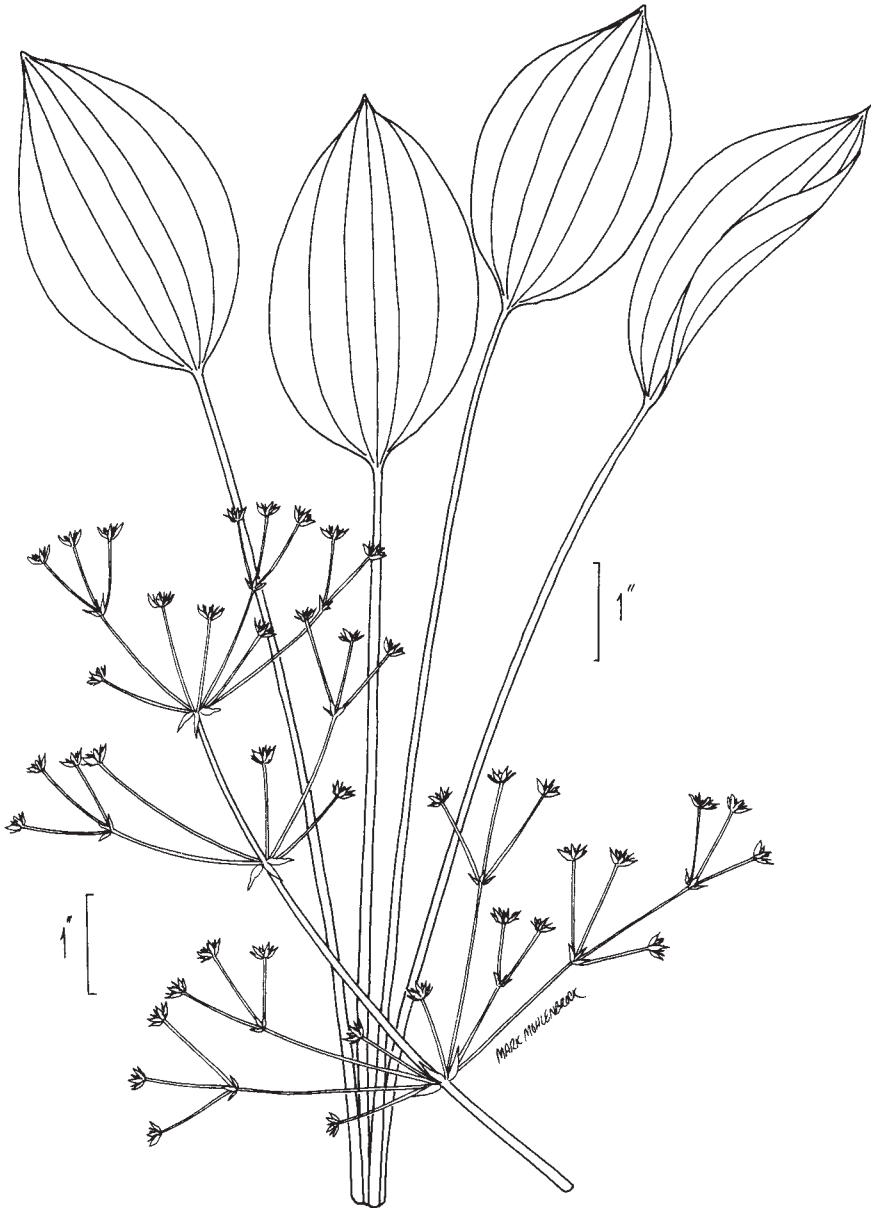
Salt Tolerance
Moderate

Siltation Tolerance
High

Flowering Color and Time
White
May to September

Light Preference
Full sun

Seeding Rate
.06 - .5 lbs/acre



Andropogon gerardii Big Bluestem

Preferred Water Depth and Inundation Tolerance

Prefers moist soil. Mesic prairie species that survives in wet prairies and fens. Species is not tolerant of flooding, but is drought tolerant.

Wildlife Value

Provides a food source for Delaware skipper and forage for deer and livestock. Also provides cover for wildlife.

Application/Zone

Used to stabilize soil and slow surface runoff. Used for upland slope buffer stabilization.

Availability, Establishment, and Maintenance

- Propagation is easy by seed. Fall planted seed germinates in April.
- If not fall planted, plant in late April to June.
- In mixed grass plantings for tall grass, use up to 75% Big Bluestem along with Indian Grass on dry to mesic sites.
- Grass seed should not be more than 40% of total prairie mix by weight.

Big Bluestem *Andropogon gerardii*

Mature Height
3-9 feet

Plant Type
Perennial grass

Indicator Status
Facultative (-)

pH
Wide range

Nutrient Load Tolerance
Low

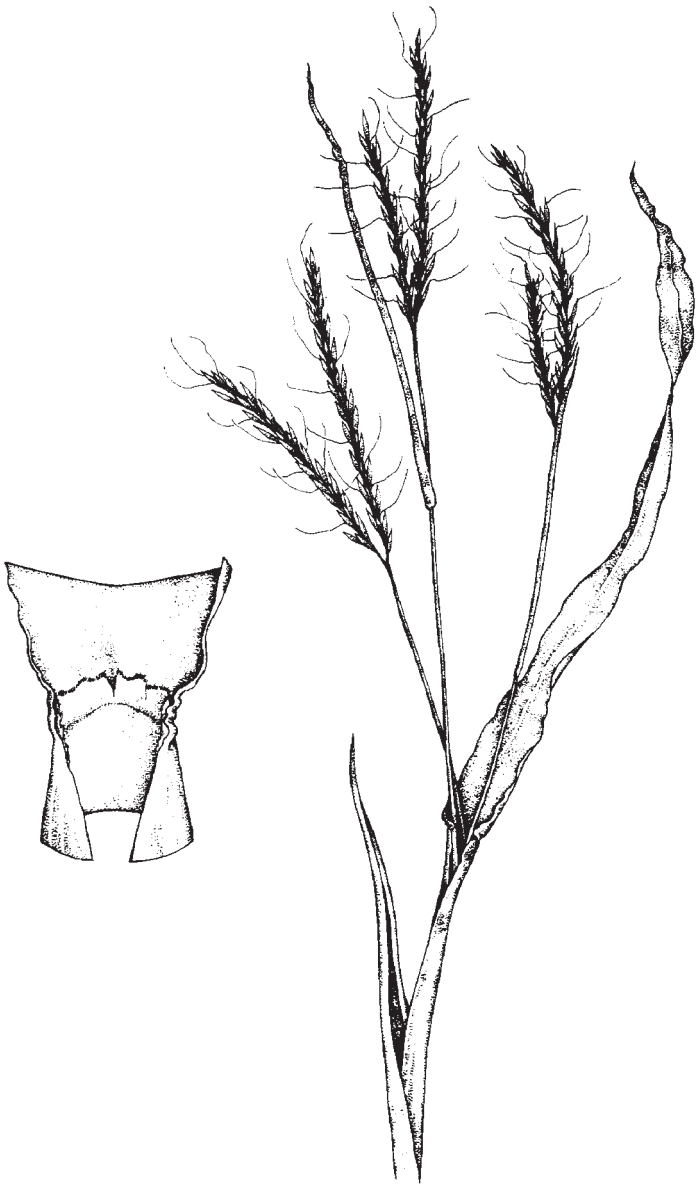
Salt Tolerance
Low

Siltation Tolerance
Low

Flowering Color and Time
Bronze to steely gray-blue
July to September

Light Preference
Full sun

Seeding Rate
2 lbs/acre



Aster laevis Smooth Blue Aster

Preferred Water Depth and Inundation Tolerance

Can tolerate wet-mesic conditions for short durations and seasonal inundation. Species prefers dry upland areas.

Wildlife Value

Attracts orange sulphur butterflies.

Application/Zone

Used to slow stormwater runoff and provide upland slope buffer stabilization.

Availability, Establishment, and Maintenance

- Easily propagated from seed. No germination treatments are needed.
- Seeds can be stored dry.
- Cuttings may be rooted.

Smooth Blue Aster *Aster laevis*

Mature Height
3-5 feet

Plant Type
Perennial herb

Indicator Status
[Upland]

pH
5-6.5

Nutrient Load Tolerance
Low

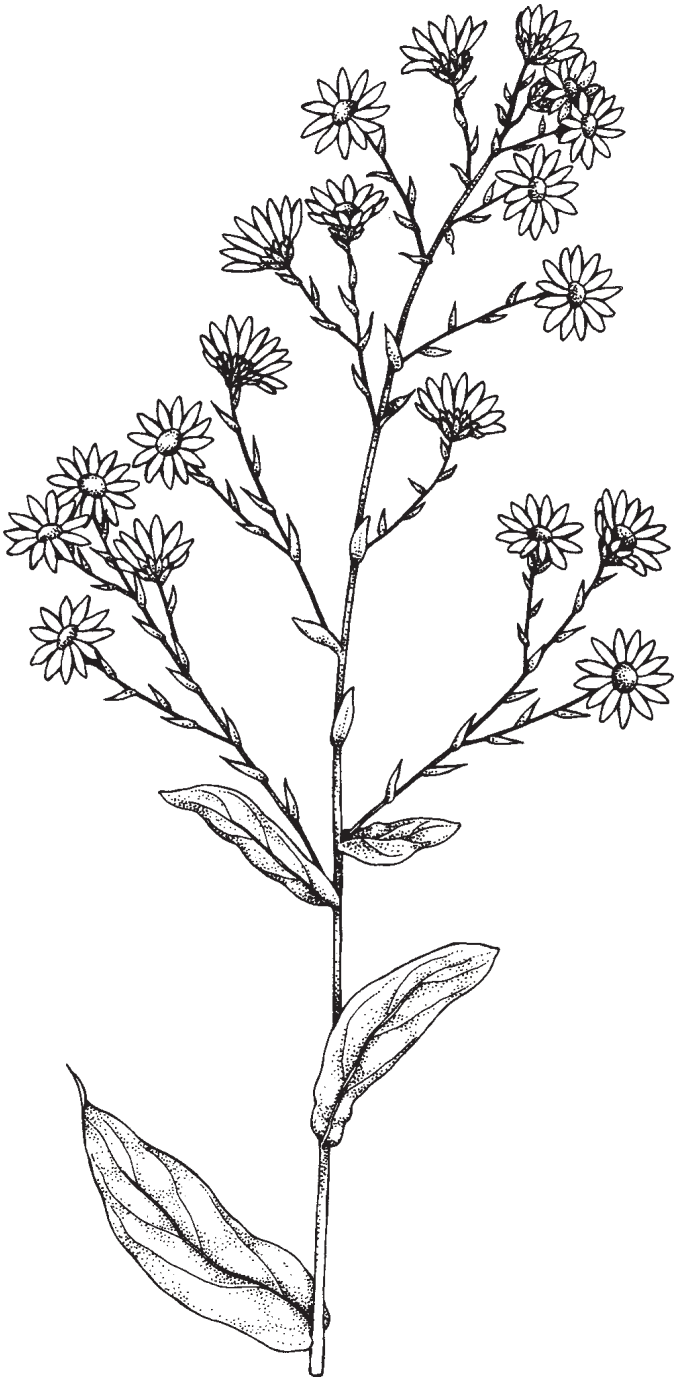
Salt Tolerance
Low

Siltation Tolerance
Low to moderate

Flowering Color and Time
Lavender-blue
August to October

Light Preference
Partial to full sun

Seeding Rate
.02 - .125 lbs/acre



Aster lanceolatus Panicled Aster

(*A. simplex*)

Preferred Water Depth and Inundation Tolerance

Prefers moist to saturated soil. Germinating seedlings are killed by 2 days of inundation. Mature plants can tolerate short periods of shallow flooding. Panicled Aster is more tolerant of inundation than New England Aster.

Wildlife Value

Provides waterfowl cover.

Application/Zone

Used in upper shoreline zone and as upland slope buffer stabilization. Also used in vegetated swales.

Availability, Establishment, and Maintenance

- Transplants, achenes, and rootstocks are available from several commercial vendors.
- Moist stratification benefits germination of achenes, but this cold treatment may not be required.
- Drill or broadcast achenes in the fall and cover them lightly with soil.
- Mature plants may be divided in the late fall or early spring.
- Most Asters studied germinate readily at 70° F.
- Can be very weedy and aggressive.

Panicled Aster

Aster lanceolatus

(A. simplex)

Mature Height
2-4 feet

Plant Type
Perennial herb

Indicator Status
Facultative Wet

pH
Not available

Nutrient Load Tolerance
Moderate

Salt Tolerance
Moderate

Siltation Tolerance
High

Flowering Color and Time
White
August to September

Light Preference
Partial to full sun

Seeding Rate
.06 lbs/acre

Aster novae-angliae New England Aster

Preferred Water Depth and Inundation Tolerance

Prefers moist soil to wet-mesic conditions. Species has limited inundation tolerance. Germinating seedlings are killed by 2 days of inundation. Mature plants appear to tolerate short periods of shallow flooding in natural areas but not in reconstructed wet areas.

Wildlife Value

Provides waterfowl cover. Attracts butterflies and honeybees.

Application/Zone

Used on moderate side slopes in prairie matrix. Used in upper shoreline zones and for upland slope buffer stabilization.

Availability, Establishment, and Maintenance

- Transplants, achenes, and rootstocks are available from several commercial vendors.
- Fresh achenes or achenes stored dry produce 95-100% germination in 3-8 days. Moist stratification of fresh achenes benefits germination. Drill or broadcast achenes in the fall and cover them lightly with soil for natural stratification.
- Mature plants may be divided in late fall or early spring. Pinching back young growth before July will cause plants to bush out. Spring cuttings of 1.5-2 inches may be rooted in sand.
- An April-May drawdown stimulates seed germination and plant growth. New England Aster can be aggressive and form monocultures.

New England Aster *Aster novae-angliae*

Mature Height
1-6.5 feet

Plant Type
Perennial herb

Indicator Status
Facultative Wet

pH
5.5-7

Nutrient Load Tolerance
Moderate

Salt Tolerance
Low

Siltation Tolerance
Moderate

Flowering Color and Time
Violet/purple, yellow center
-greenhouse grown plants may vary in color
August to October-

Light Preference
Partial to full sun

Seeding Rate
.03 - .2 lbs/acre

Bidens cernua Nodding Beggarsticks

Nodding Bur Marigold

Preferred Water Depth and Inundation Tolerance

Prefers saturated soil. Species tolerates seasonally flooded conditions for short durations.

Wildlife Value

Provides wildlife cover. Waterfowl, shorebirds, songbirds, and small mammals consume achenes.

Application/Zone

Used in upper shoreline zones and in vegetated swales. A good pioneer species.

Availability, Establishment, and Maintenance

- Plants and achenes are available from commercial vendors.
- Achenes should be broadcast on wet mudflats or shorelines and raked into the soil.
- Achenes require cold (34-36° F) moist stratification for several months before being exposed to warm temperatures for optimum germination.
- Achenes may be fall planted after drawdown on mudflats or shorelines to allow winter exposure. Drawdown in early summer will cause explosive growth from fall planted achenes.
- Early summer shallow flooding followed by drawdown promotes best seed production from established plants.

Nodding Beggarsticks *Bidens cernua*

Nodding Bur Marigold

Mature Height
4 inches - 3.3 feet

Plant Type
Annual emergent herb

Indicator Status
Obligate

pH
Not available

Nutrient Load Tolerance
Moderate

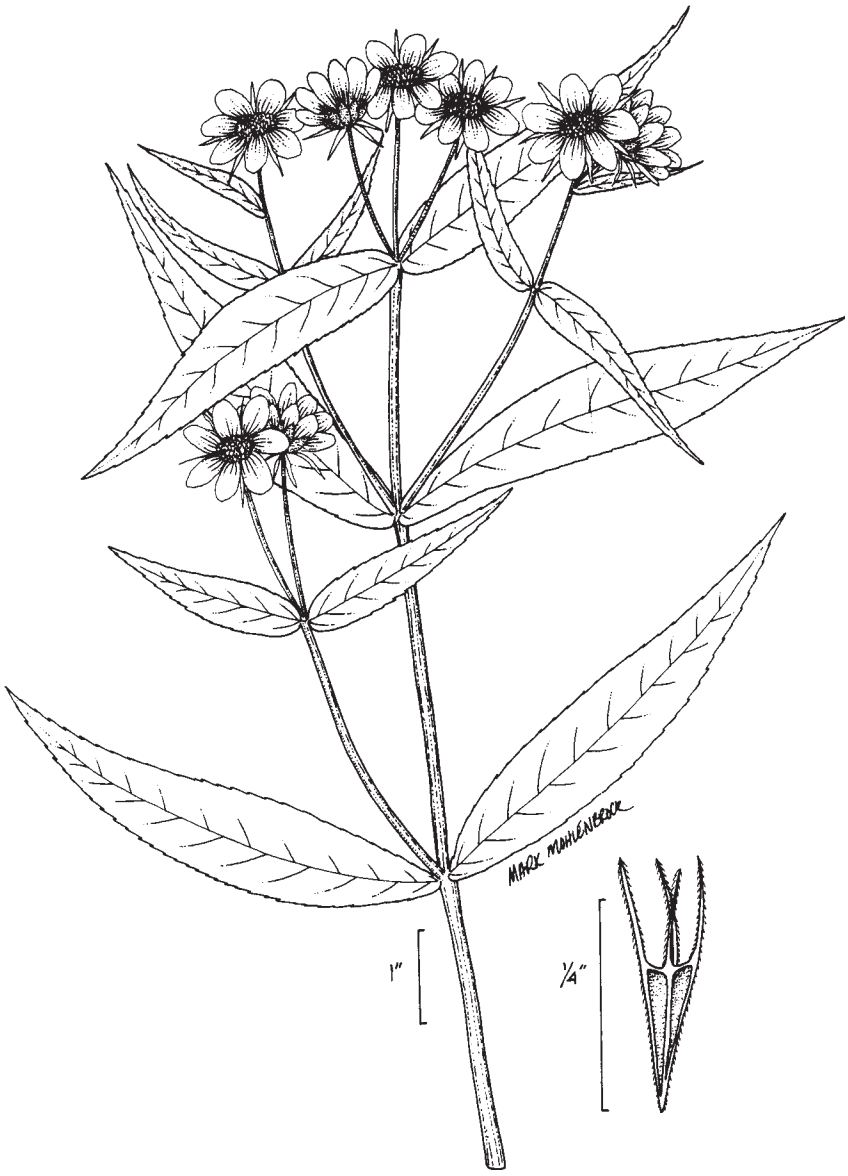
Salt Tolerance
Low to moderate

Siltation Tolerance
Moderate to high

Flowering Color and Time
Yellow
August to October

Light Preference
Partial to full sun

Seeding Rate
.25 - .5 lbs/acre



Bidens frondosa Common Beggarsticks

Preferred Water Depth and Inundation Tolerance

Prefers moist soil. Growth is favored by a 75-90% soil moisture content. Young plants have no tolerance for submergence and should not be flooded for more than 2 or 3 days in 1-2 inches of water. Mature plants have some tolerance for water level fluctuation. This species shares the same zone with *Aster lanceolatus*.

Wildlife Value

Provides cover and food. Achenes are eaten by mallard ducks and ruffed grouse. Plants are eaten by muskrats.

Application/Zone

Used in upper shoreline zones, upland slope buffers, and in vegetated swales.

Availability, Establishment, and Maintenance

- Achenes are available from commercial vendors.
- Achenes have a high rate of germination after cold, moist stratification at 32-34° F for several months and spring planting.
- Fresh achenes may also be fall planted by broadcasting and raking into soil for natural stratification.
- Mid to late season drawdown (May -July) stimulates seed production from mature plants.

Common Beggarsticks *Bidens frondosa*

Mature Height
8 inches - 4 feet

Plant Type
Annual emergent herb

Indicator Status
Facultative Wet

pH
Wide range

Nutrient Load Tolerance
Moderate

Salinity Tolerance
Moderate to high

Siltation Tolerance
High

Flowering Color and Time
Yellow
August to October

Light Preference
Partial to full sun

Seeding Rate
.125 lbs/acre

Bouteloua curtipendula Side-Oats Grama

Preferred Water Depth and Inundation Tolerance

Mesic to dry prairie and savanna species. Species has no inundation tolerance.

Wildlife Value

Provides nutritious grass for grazing and is tolerant to limited grazing. Attracts birds and provides cover for grassland birds.

Application/Zone

Used for upland slope buffers. Dense rhizomatous root system works well on steep slopes to prevent erosion.

Availability, Establishment, and Maintenance

- For warm season planting, seed or divisions work well.
- Germinates easily from seed in most cases.

Side-Oats Grama *Bouteloua curtipendula*

Mature Height
1-3 feet

Plant Type
Perennial tufted grass

Indicator Status
Upland

pH
Wide range

Nutrient Load Tolerance
Low

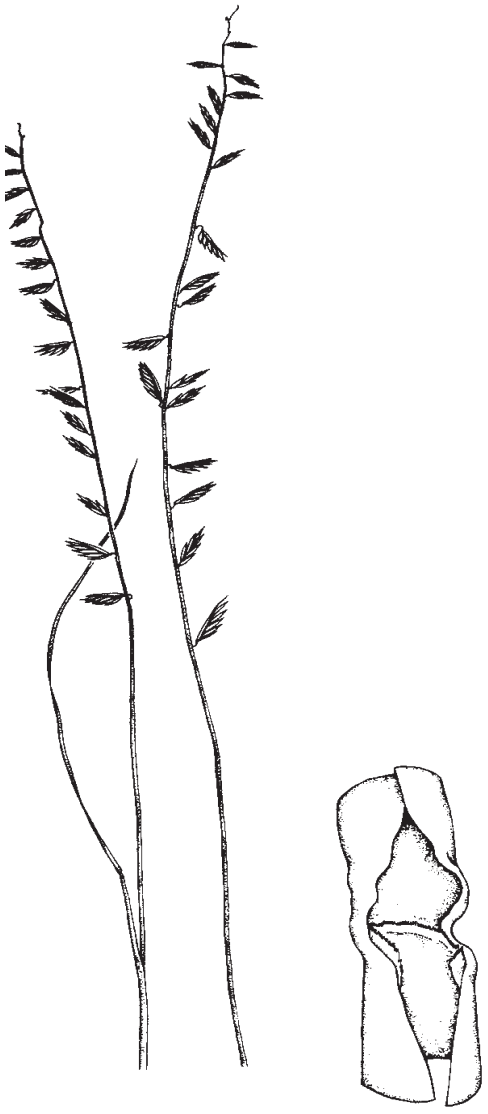
Salt Tolerance
Not tolerant

Siltation Tolerance
Low, found naturally on slopes.

Flowering Color and Timing
Purplish
July to September

Light Preference
Full sun

Seeding Rate
5 lbs/acre



Calamagrostis canadensis Blue Joint Grass

Preferred Water Depth and Inundation Tolerance

Prefers saturated soil. Tolerates temporary spring flooding up to a depth of 6 inches early in the season. Species does not tolerate permanent flooding.

Wildlife Value

Waterfowl eat seeds. Young plants are grazed by deer and muskrats.

Application/Zone

Used in upper shoreline zones and in vegetated swales.

Availability, Establishment, and Maintenance

- Locally, plugs have been most successful. These should be planted on 0.5-1.5 foot centers because of their slow spread by rhizomes.
- Soil should be moist to saturated, but not inundated during planting.
- Established stands may be mowed in alternate years for maintenance.
- *C. canadensis* rarely produces seed and even when it does, the seed is rarely viable.
- Can spread agressively by rhizome under optimal conditions.

Blue Joint Grass *Calamagrostis canadensis*

Mature Height
2-5 feet

Plant Type
Perennial grass

Indicator Status
Obligate

pH
5-8

Nutrient Load Tolerance
Low

Salt Tolerance
Low

Siltation Tolerance
Moderate

Flowering Color and Time
Brown
May to August

Light Preference
Full sun

Seeding Rate
.03 - .06 lbs/acre

Carex comosa Bristly Sedge

Preferred Water Depth and Inundation Tolerance

Prefers 0 - 12 inches. Species tolerates early seasonal flooding.

Wildlife Value

Fruits are eaten by waterfowl. Also provides food for sora and yellow rails, swamp and tree sparrows, snipe and other song birds.

Application/Zone

Used in upper shoreline zones. Marsh species that forms clumps.

Availability, Establishment, and Maintenance

- Plugs seem to work best. Plant on 0.5-1.5 foot centers because of slow rate of spread.
- There are some known cases of seed germination in restored wet areas.
- Cold, moist stratification may be needed for seeds.

Bristly Sedge *Carex comosa*

Mature Height
1.5-4.0 feet

Plant Type
Perennial sedge

Indicator Status
Obligate

pH
Not available

Nutrient Load Tolerance
Low

Salt Tolerance
Low

Siltation Tolerance
Not tolerant

Flowering Color and Time
Green
May to July

Light Preference
Partial to full sun

Seeding Rate
.125 lbs/acre

Carex cristatella Crested Oval Sedge

Preferred Water Depth and Inundation Tolerance
Prefers moist soil. Species tolerates up to 6 inches of standing water.

Wildlife Value
Achenes are eaten by waterfowl.

Application/Zone
Good pioneer species for upper shoreline zones and vegetated swales.

Availability, Establishment, and Maintenance
- Spreads quickly using fresh seed.

Crested Oval Sedge *Carex cristatella*

Mature Height
Up to 3 feet

Plant Type
Perennial sedge

Indicator Status
Facultative Wet (+)

pH
Not available

Nutrient Load Tolerance
Moderate

Salt Tolerance
Not available

Siltation Tolerance
Low

Flowering Color and Time
Green
May to July

Light Preference
Partial to full sun

Seeding Rate
.125 lbs/acre

Carex granularis Pale Sedge

Preferred Water Depth and Inundation Tolerance

Prefers moist soil. Species tolerates 1 inch of standing water for short durations. *C. granularis* is a flatwood and fen species.

Wildlife Value

Not available.

Application/Zone

Used in partially shaded upper shoreline zones.

Availability, Establishment, and Maintenance

- Has been observed recovering from soil seed bank.
- Germination is best from fresh seed.
- Store seed dry (14% moisture) cold, overwinter, and sow the following spring.

Pale Sedge

Carex granularis

Mature Height
0.5 - 2 feet

Plant Type
Perennial sedge

Indicator Status
Facultative Wet (+)

pH
Not available

Nutrient Load Tolerance
Low to moderate

Salt Tolerance
Low

Siltation Tolerance
Not tolerant

Flowering Color and Time
Green
April to July

Light Preference
Partial to full sun

Seeding Rate
.031 lbs/acre

Carex lanuginosa Wooly Sedge

(*C. pellita*)

Preferred Water Depth and Inundation Tolerance

Prefers moist soil. Species tolerates shallow (0 to 6 inches) inundation early in the season.

Wildlife Value

Achenes are eaten by waterfowl, sora and yellow rails, swamp and tree sparrows, snipe, and other songbirds.

Application/Zone

Used in upper shoreline zones and in vegetated swales.

Availability, Establishment, and Maintenance

- Fresh seed, rhizomes or divisions of plug clumps may all be used for propagation.
- This species has limited market availability.
- Fall seed with fresh seed or cold, moist stratify.

Wooly Sedge

Carex lanuginosa

(*C. pellita*)

Mature Height
1-3 feet

Plant Type
Perennial sedge

Indicator Status
Obligate

pH
Not available

Nutrient Load Tolerance
Moderate to high

Salt Tolerance
Low

Siltation Tolerance
Moderate

Flowering Color and Time
Green
April to July

Light Preference
Full sun

Seeding Rate
Not available

Carex stipata Awl-fruited Sedge

Common Fox Sedge

Preferred Water Depth and Inundation Tolerance

Prefers moist soil. Tolerates inundation to a depth of 6 inches. Species tolerates some water level fluctuation.

Wildlife Value

Provides food for sora and yellow rails, swamp and tree sparrows, snipe and other songbirds.

Application/Zone

Used in upper shoreline zones and vegetated swales.

Availability, Establishment, and Maintenance

- Spreads well from seeds.
- Store seed dry (14% moisture) cold, overwinter, and sow the following spring.
- Fall seed with fresh seed.
- Because this is a clump-forming species and has a slow rate of spread by rhizomes, plugs should be planted on 0.5-1.5 foot centers.

Awl-fruited Sedge

Carex stipata

Common Fox Sedge

Mature Height
Up to 3 feet

Plant Type
Perennial sedge

Indicator Status
Obligate

pH
Not available

Nutrient Load Tolerance
High

Salt Tolerance
Low to moderate

Siltation Tolerance
Moderate

Flowering Color and Time
Green
May to June

Light Preference
Partial to full sun

Seeding Rate
.125 lbs/acre

Carex vulpinoidea Fox Sedge

Brown Fox Sedge

Preferred Water Depth and Inundation Tolerance

Prefers water depth of 6 inches or less. Species does not tolerate extended inundation but does tolerate some fluctuation. Tolerates standing water in the spring and early summer.

Wildlife Value

Provides food for sora and yellow rails, swamp and tree sparrow, snipe and other songbirds.

Application/Zone

Used in upper shoreline zones, for streambank stabilization, and in vegetated swales.

Availability, Establishment, and Maintenance

- Seeds, rootstock, and whole plants are available.
- Readily established by seed. Seeds can be stratified by either late fall planting for overwintering or cold, dry storage.
- Seed should remain close to the soil surface because they need light for germination.
- Transplants or small clumps should be planted from early spring to June 15.
- Transplants should be planted on 0.5-1.5 foot centers because of slow rate of spread.

Fox Sedge

Carex vulpinoidea

Brown Fox Sedge

Mature Height
1-3 feet

Plant Type
Perennial sedge

Indicator Status
Obligate

pH
Not available

Nutrient Load Tolerance
Moderate to high

Salt Tolerance
Low to moderate

Siltation Tolerance
Moderate

Flowering Color and Time
Green, Brown
May to July

Light Preference
Partial to full sun

Seeding Rate
.06 - .5 lbs/acre

Celtis occidentalis Hackberry

Preferred Water Depth and Inundation Tolerance

This is a floodplain forest and flatwoods species (1st terrace). Seedlings cannot tolerate submergence, but mature trees can survive spring flooding.

Wildlife Value

Fruits are eaten by birds and small mammals. Serves as an exclusive food source of the hackberry and snout butterflies.

Application/Zone

Used in upper shoreline zones, for streambank stabilization, and upland slope buffers.

Availability, Establishment, and Maintenance

- Easily transplanted bareroot as small tree or balled and burlapped as a larger tree.
- Seeds should be stratified for 60-90 days at 41° F in a moist medium.
- Growth rate is medium, 22-30 inches per year.

Hackberry *Celtis occidentalis*

Mature Height
Up to 80 feet

Plant Type
Deciduous tree

Indicator Status
Facultative (-)

pH
6.6-8.0

Nutrient Load Tolerance
Moderate

Salt Tolerance
Moderate

Siltation Tolerance
Low to moderate

Flowering Color and Time
Greenish yellow
April to May

Light Preference
Shade tolerant

Seeding Rate
Not applicable

Cephalanthus occidentalis Common Buttonbush

Preferred Water Depth and Inundation Tolerance

Preferred water depth is 2-3 feet. Species tolerates permanently to semi-permanently flooded conditions. Ten inch tall seedlings can survive complete submergence for up to 45 days.

Wildlife Value

Seeds are eaten by waterfowl. Seed also provides food for insects, beaver, and muskrats. Plants provide nectar source and habitat for insects. Also provides nesting habitat for birds. Browsed by deer, muskrats, and beaver. Provides reptile habitat.

Application/Zone

Used in upper and lower shoreline zones and for streambank stabilization.

Availability, Establishment, and Maintenance

- Transplants and seed have limited availability from vendors. Collect seed in August-September and store in fresh water at 34° F.
- Seed can be planted in wet mudflats or shorelines and requires light for germination.
- Plants establish easily from cuttings, but cuttings should be rooted before flooding.
- Rooted cuttings survive well. Small plants or seedlings may be transplanted directly on the site at 5 feet on center density.
- Growth rate is medium, 1-2 feet per year.
- This species can form monocultures.

Common Buttonbush *Cephalanthus occidentalis*

Mature Height
3-10 feet

Plant Type
Deciduous shrub

Indicator Status
Obligate

pH
6.0-8.5

Nutrient Load Tolerance
Moderate

Salt Tolerance
Moderate to high

Siltation Tolerance
Moderate

Flowering Color and Time
White
June to August

Light Preference
Partial to full sun
Tolerates full shade but may decline

Seeding Rate
Not applicable

Coreopsis tripteris Tall Coreopsis

Preferred Water Depth and Inundation Tolerance

Wet and mesic prairie and savanna species. Survives 1 inch inundation for short periods.

Wildlife Value

Serves as a good nectar source. Attracts butterflies.

Application/Zone

Used for upland slope buffer stabilization.

Availability, Establishment, and Maintenance

- Readily available from vendors.
- No pretreatment is needed for seeds.
- Establishes readily and spreads quickly from seed.
- In some cases, can be aggressive.

Tall Coreopsis *Coreopsis tripteris*

Mature Height
3-10 feet

Plant Type
Perennial herb

Indicator Status
Facultative

pH
Not available

Nutrient Load Tolerance
Low

Salt Tolerance
Not available

Siltation Tolerance
Low

Flowering Color and Time
Yellow
July to October

Light Preference
Partial to full sun

Seeding Rate
Not available

Cornus racemosa Gray Dogwood

Preferred Water Depth and Inundation Tolerance

Prefers moist to saturated soil. Inundation of 2-4 inches is tolerated for short durations.

Wildlife Value

Fruits are eaten by birds. Provides browse and food for deer, beaver, pheasant, rabbit, woodchuck, raccoon, and squirrel. Also provides cover for American woodcock.

Application/Zone

Used in upper shoreline zones, for streambank stabilization, and for upland slope buffers.

Availability, Establishment, and Maintenance

- Seed germinates easily only after scarification.
- Shrub spreads by underground stems to form round 8-12 feet wide colonies.
- Easily rooted from cuttings.
- Has a fast growth rate. Shoots grow 3 to 6 feet in one season. This species can become too aggressive.

Gray Dogwood *Cornus racemosa*

Mature Height
Up to 8 feet

Plant Type
Deciduous multistemmed shrub

Indicator Status
[Facultative Wet (-)]

pH
5.5-8.5

Nutrient Load Tolerance
Moderate to high

Salt Tolerance
Low

Siltation Tolerance
Moderate to high

Flowering Color and Time
White
June to August

Light Preference
Partial to full sun

Seeding Rate
Not applicable

Cornus sericea Red Osier Dogwood

(*C. stolonifera*)

Preferred Water Depth and Inundation Tolerance

Prefers saturated soil. Species tolerates periodic inundation of 0-12 inches early in the season for short durations. During growing season, this species will tolerate constant inundation for less than 30 days.

Wildlife Value

Berries are eaten by many songbirds and ruffed grouse. Deer and rabbits browse twigs and buds. Thickets provide cover and nesting habitat. Provides excellent warbler habitat. Also provides food for raccoon, woodchuck, and beaver.

Application/Zone

Used in upper shoreline zones, for streambank stabilization, and upland slope buffers.

Availability, Establishment, and Maintenance

- Excellent seedling establishment. Very easy to propagate.
- Widely available as bare root or balled and burlapped.
- Can root from cuttings.
- Spreads by stolons. Fast growth rate, more than 2 feet per year.

Red Osier Dogwood

Cornus sericea

(C. stolonifera)

Mature Height
3-9 feet

Plant Type
Deciduous shrub

Indicator Status
Facultative Wet

pH
5.5-8.5

Nutrient Load Tolerance
Moderate to high

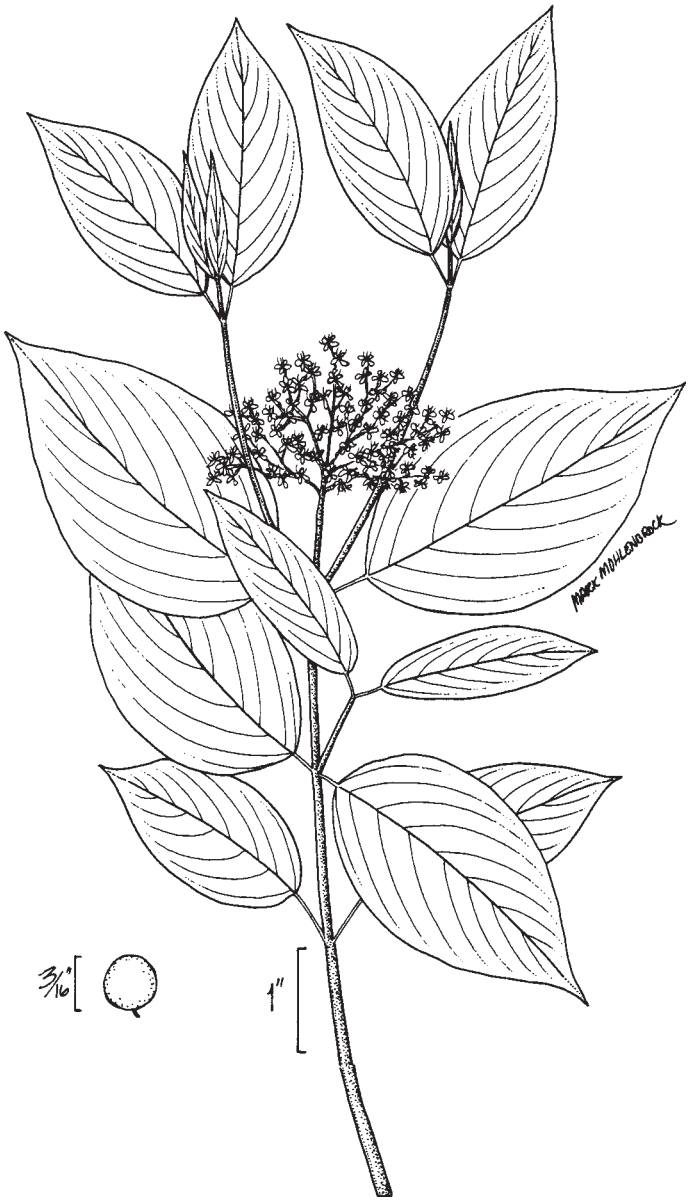
Salt Tolerance
Not tolerant

Siltation Tolerance
Moderate to high

Flowering Color and Time
White
May and August

Light Preference
Partial to full sun

Seeding Rate
Not applicable



Cyperus esculentus Field Nut Sedge

Yellow Nut Sedge;
Chufa

Preferred Water Depth and Inundation Tolerance

Tolerates seasonal or occasional flooding, up to 1 foot deep.

Wildlife Value

Seeds are eaten by waterfowl and other wildlife. Also provides cover for reptiles, amphibians, and small mammals. Waterfowl also eat rhizomes.

Application/Zone

Used in lower and upper shoreline zones where water levels fluctuate.

Availability, Establishment, and Maintenance

- Available as seed, rootstock (tuber), or transplants.
- Grows readily from seed on moist soil (mudflats).
- Draw-down stimulates new growth from tubers.
- A common plant of farmed wet areas.

Field Nut Sedge *Cyperus esculentus*

Yellow Nut Sedge;
Chufa

Mature Height
1 - 2 feet

Plant Type
Perennial sedge

Indicator Status
Facultative Wet

pH
5.0-7.5

Nutrient Load Tolerance
High

Salt Tolerance
Low

Siltation Tolerance
High

Flowering Color and Time
Yellow
Mid-July - August

Light Preference
Full sun

Seeding Rate
Not available

Eleocharis obtusa Blunt Spike Rush

Preferred Water Depth and Inundation Tolerance

Mudflat species. Needs saturated soil. Species tolerates inundation to a depth of 6 inches.

Wildlife Value

Rhizomes and achenes are eaten by waterfowl. Also provides food for rails, muskrat, and rabbit.

Application/Zone

Used in upper shoreline zones, for streambank stabilization, and in vegetated swales.

Availability, Establishment, and Maintenance

- Annual. Spreads by seed where there is no competition.
- Requires drawdown for seeds to germinate.

Blunt Spike Rush *Eleocharis obtusa*

Mature Height
12-18 inches

Plant Type
Annual tufted herb

Indicator Status
Obligate

pH
Not available

Nutrient Load Tolerance
Moderate to high

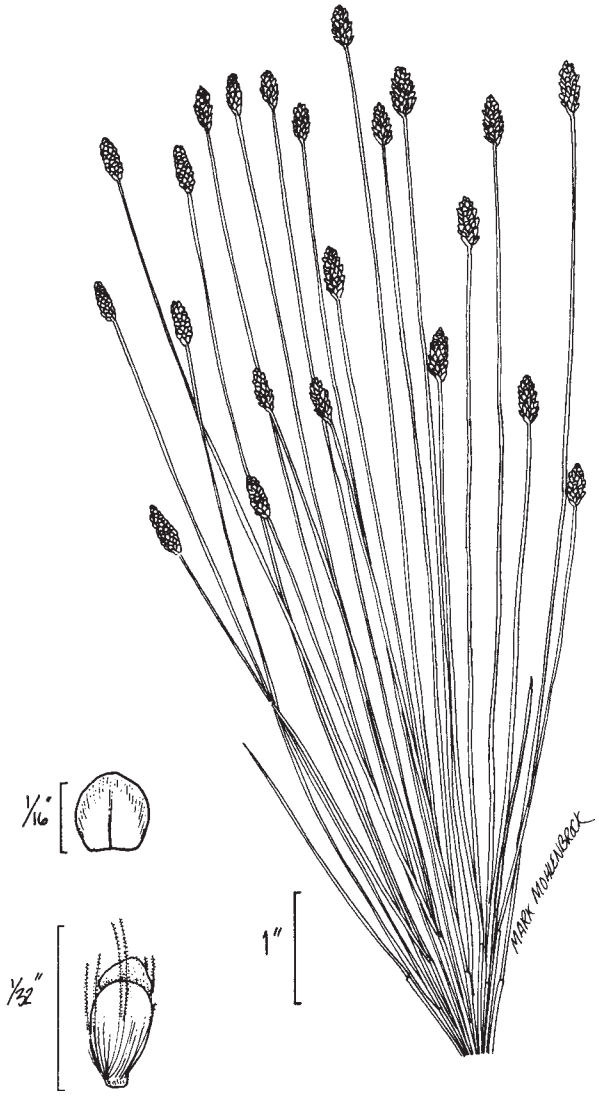
Salt Tolerance
Low to moderate

Siltation Tolerance
Low

Flowering Color and Time
Brown
June to October

Light Preference
Full sun

Seeding Rate
.02 - .4 lbs/acre



Eleocharis smallii Creeping Spike Rush

Marsh Spike Rush

Preferred Water Depth and Inundation Tolerance

Mudflat species. This species needs saturated soil.

Wildlife Value

Achenes are eaten by waterfowl.

Application/Zone

Extensive creeping rhizomes can stabilize upper shoreline zones and streambanks.

Availability, Establishment, and Maintenance

- Perennial, spreads by seed where competition is reduced.
- Sow fresh seed on mudflats (under drawdown condition).

Creeping Spike Rush *Eleocharis smallii*

Marsh Spike Rush

Mature Height
12-18 inches

Plant Type
Perennial herb

Indicator Status
Obligate

pH
Not available

Nutrient Load Tolerance
Low

Salt Tolerance
Moderate

Siltation Tolerance
Low

Flowering Color and Time
Brown
June to September

Light Preference
Full sun

Seeding Rate
.02 - .4 lbs/acre

Elymus canadensis Nodding Wild Rye

Canada Wild Rye

Preferred Water Depth and Inundation Tolerance

Mesic species. Prefers moderately well to poorly drained soil. Minimal inundation tolerance.

Wildlife Value

Provides habitat for small mammals. Vegetative parts are palatable to grazing species.

Application/Zone

Fibrous, wide spreading root system can stabilize upper shoreline zones, streambanks, upland slope buffers, and vegetated swales. Also a good pioneer species.

Availability, Establishment, and Maintenance

- Seed is widely available from commercial vendors.
- Seeding is recommended. Seed germination is better if seeds are stratified for one month at 32° F. Best germination of seed occurs if they are drilled into soil to a depth of 1-1.5 inches.
- Rangeland drill or hopper type seed broadcaster may be used to plant seeds. If broadcasting, seeds must be covered lightly with soil. Mixing seed with sand and other grass and forb species dispersed with a hand hopper or cyclone spreader facilitates establishment of prairie species in small areas.
- One source recommends planting at 0.5 to 1.0 lbs/acre because the species is too short-lived and expensive to plant at a heavier rate. A complete stand will result in two to three years if planted at this rate.
- Spreads quickly from seed but dies back after a few years.

Nodding Wild Rye *Elymus canadensis*

Canada Wild Rye

Mature Height
3-6 feet

Plant Type
Perennial grass

Indicator Status
Facultative (-)

pH
Wide range

Nutrient Load Tolerance
Low

Salt Tolerance
Not available

Siltation Tolerance
Low

Flowering Color and Time
Tan
July to October

Light Preference
Partial to full sun

Seeding Rate
.02 - 2 lbs/acre

Elymus virginicus Virginia Wild Rye

Preferred Water Depth and Inundation Tolerance

Prefers moist soil. Species tolerates inundation up to a depth of 6 inches. Can also tolerate dry soils.

Wildlife Value

Palatable to grazing species.

Application/Zone

Used in upper shoreline zones, for streambank stabilization, for upland slope buffers, and in vegetated swales.

Availability, Establishment, and Maintenance

- Fall and spring seeding is successful.
- Can become aggressive if seeded too heavily.

Virginia Wild Rye *Elymus virginicus*

Mature Height
Up to 3 feet

Plant Type
Perennial grass

Indicator Status
Facultative Wet (-)

pH
Not available

Nutrient Load Tolerance
Moderate

Salt Tolerance
Not available

Siltation Tolerance
Moderate

Flowering Color and Time
Tan
June to October

Light Preference
Partial to full sun

Seeding Rate
.06 - 1.0 lbs/acre

Eupatorium maculatum Spotted Joe Pye Weed

Preferred Water Depth and Inundation Tolerance

Prefers moist soil. Tolerates inundation up to a depth of 6 inches early in the season, as in damp meadows, open marshes, and fens. Tolerates flooding for short periods in the spring.

Wildlife Value

Attracts butterflies, bumblebees, and many other insects. Provides cover for small mammals, amphibians, and reptiles. Seeds are eaten by swamp sparrow.

Application/Zone

Used in upper shoreline zones and in vegetated swales.

Availability, Establishment, and Maintenance

- Seed works best and is readily available from commercial vendors.
- Seed has spotty germination. No treatment is necessary. Sow seed in the fall or early spring when ground is cool.
- Seed is very fine and should be planted on the soil surface.
- Division of plants, if desired, should be done in the spring but only every 2 to 4 years.

Spotted Joe Pye Weed *Eupatorium maculatum*

Mature Height
4-6 feet

Plant Type
Perennial herb

Indicator Status
Obligate

pH
Not available

Nutrient Load Tolerance
Low

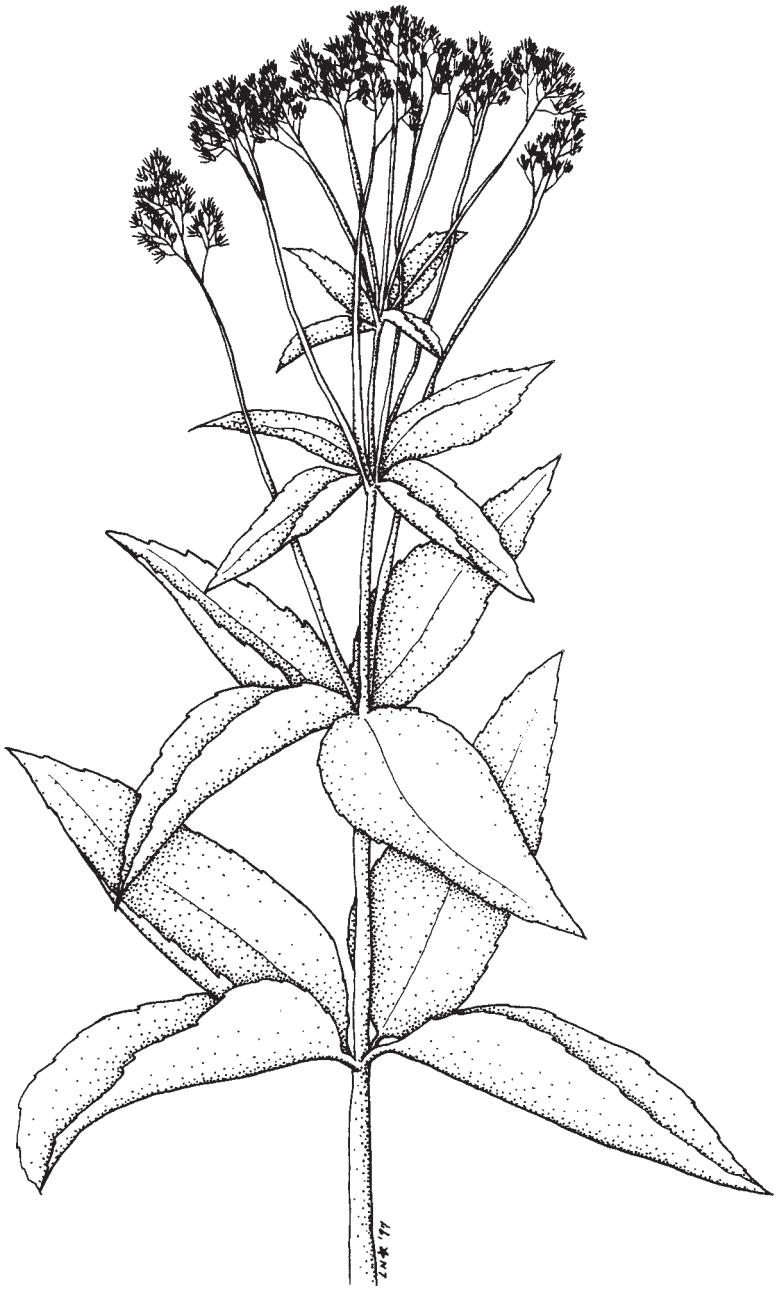
Salt Tolerance
Not available

Siltation Tolerance
Low

Flowering Color and Time
Deep rose to light pink
June to September

Light Preference
Full sun

Seeding Rate
.06 - 2.0 lbs/acre



Eupatorium perfoliatum Common Boneset

Preferred Water Depth and Inundation Tolerance

Prefers moist soil. Tolerates inundation to a depth of 6 inches early in the season, as found in wet meadows, marsh edges, fens, and prairie swales.

Wildlife Value

Achenes are eaten by waterfowl, turkey, and swamp sparrow. Mallards and grouse eat leaves. Attracts butterflies. Also provides cover for small mammals, reptiles, and amphibians.

Application/Zone

Used in upper shoreline zones and in vegetated swales. Fibrous root system binds soil and resists erosion. Provides good ground cover.

Availability, Establishment, and Maintenance

- Seed is best. Sow fine seed on soil surface in the fall or spring. No germination treatment is necessary.
- Can also be propagated by division of rootstock in the fall or spring.

Common Boneset *Eupatorium perfoliatum*

Mature Height
2-3 feet

Plant Type
Perennial herb

Indicator Status
Facultative Wet (+)

pH
Not available

Nutrient Load Tolerance
Low to moderate

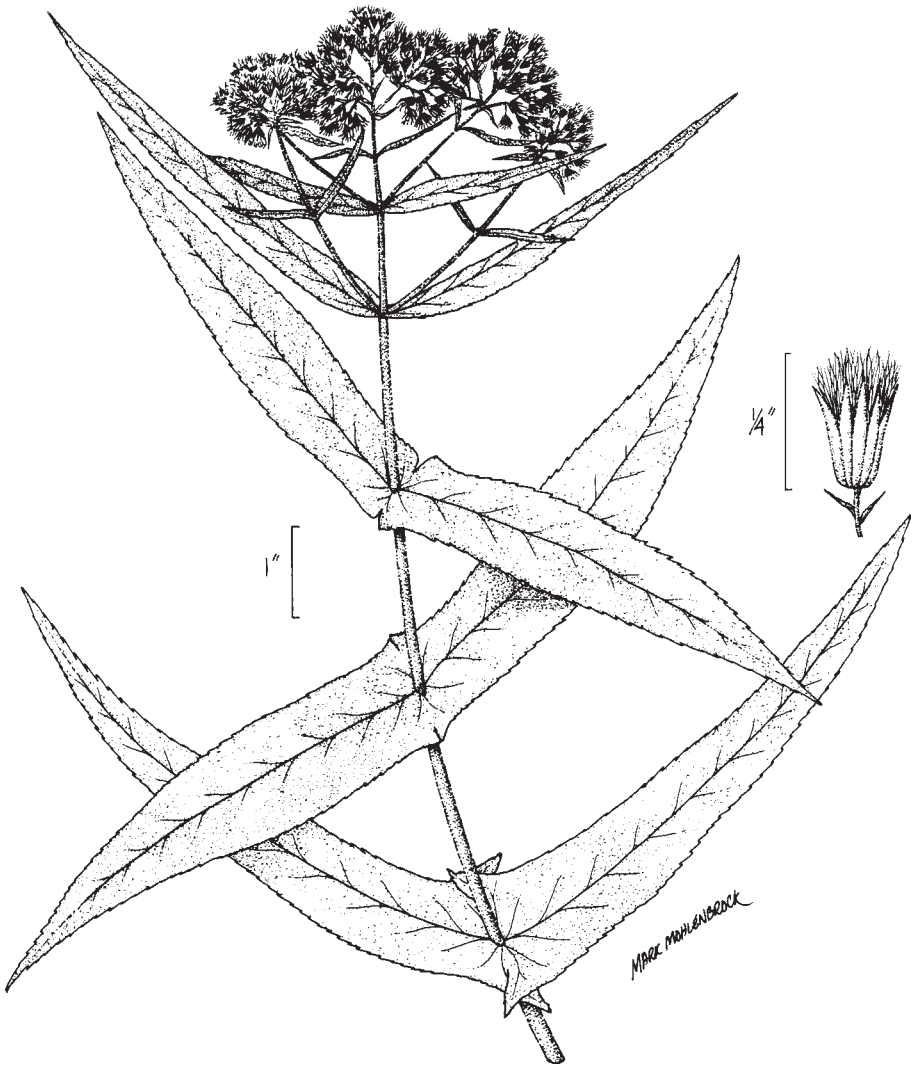
Salt Tolerance
Not available

Siltation Tolerance
Low to moderate

Flowering Color and Time
White
August to October

Light Preference
Full sun

Seeding Rate
.125 lbs/acre



Fraxinus pennsylvanica Green Ash

(*F. pennsylvanica subintegerrima*)

Preferred Water Depth and Inundation Tolerance

Natural floodplain species. Species tolerates periodic inundation of 0-24 inches for short durations.

Wildlife Value

Twigs and seeds provide forage for mammals, such as deer, beaver, and mice. Birds eat seeds and the tree provides nesting habitat. Fallen logs provide amphibian and reptile habitat. Also provides habitat for many insects.

Application/Zone

Used for streambank and upland slope buffer stabilization.

Availability, Establishment, and Maintenance

- Transplants readily and establishes itself well.
- Best seed germination has been seen after dry storage at 40° F followed by 70° F.
- Tolerates drought and sterile soils. Has fast growth rate, 2.5-3 feet per year.
- Spreads quickly by seed.

Green Ash

Fraxinus pennsylvanica

(*F. pennsylvanica subintegerrima*)

Mature Height
Up to 60 feet

Plant Type
Deciduous tree

Indicator Status
Facultative Wet

pH
6.1-7.5

Nutrient Load Tolerance
High

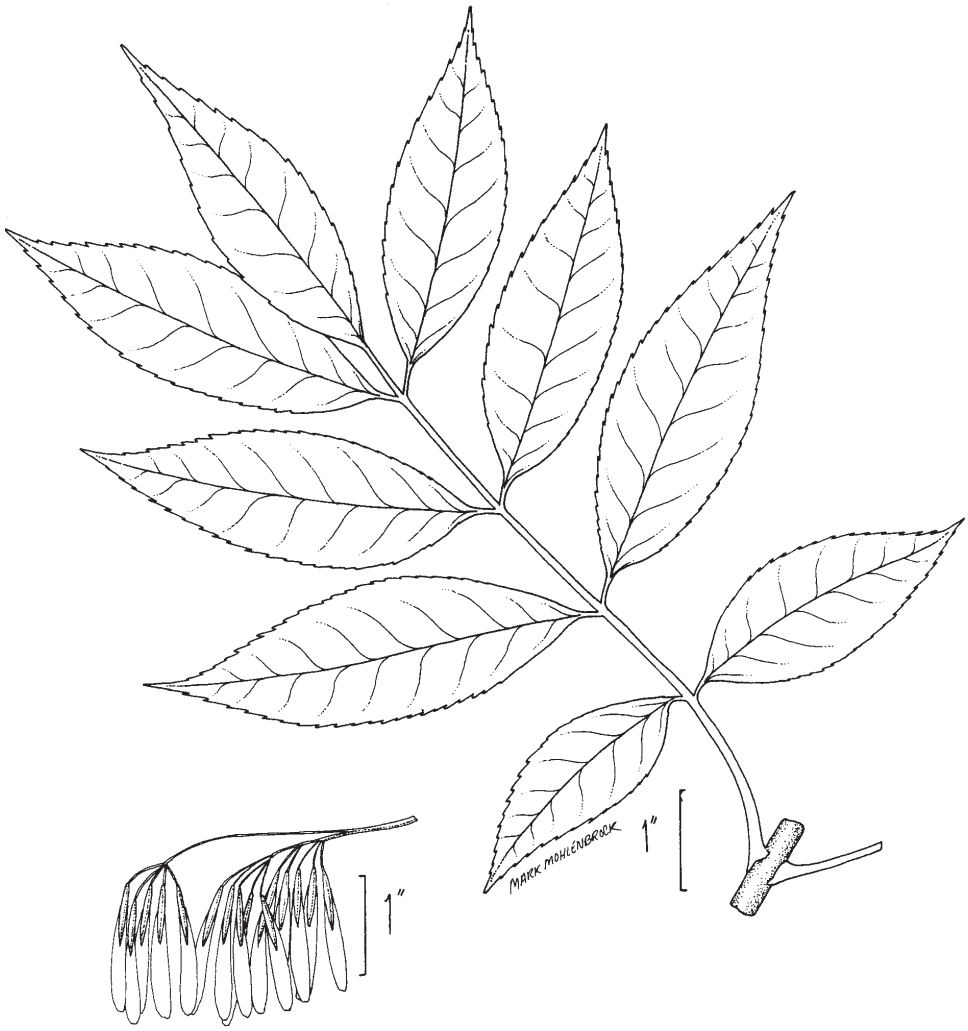
Salt Tolerance
Moderate

Siltation Tolerance
High

Flowering Color and Time
April to May

Light Preference
Shade tolerant

Seeding Rate
Not applicable



Glyceria striata Fowl Manna Grass

Preferred Water Depth and Inundation Tolerance

Prefers moist to saturated areas.

Wildlife Value

Provides food for waterfowl, especially ducks, and for muskrat and deer.

Application/Zone

Good pioneer species in upper shoreline zones, for streambank stabilization, and in vegetated swales.

Availability, Establishment, and Maintenance

- Good availability, but may not be a northeastern Illinois ecotype.
- Good establishment from seed, but less competitive against reed canary grass.
- Cold, moist stratification helps break dormancy of seed. Cold storage in water for three months or fall planting to allow overwintering provides good germination.
- Mixing seed with sand facilitates hand broadcasting and results in more even planting.
- Transplants are best planted in the spring.
- Requires light for seed germination.

Fowl Manna Grass *Glyceria striata*

Mature Height
1-4 feet

Plant Type
Perennial grass

Indicator Status
Obligate

pH
Not available

Nutrient Load Tolerance
Low to moderate

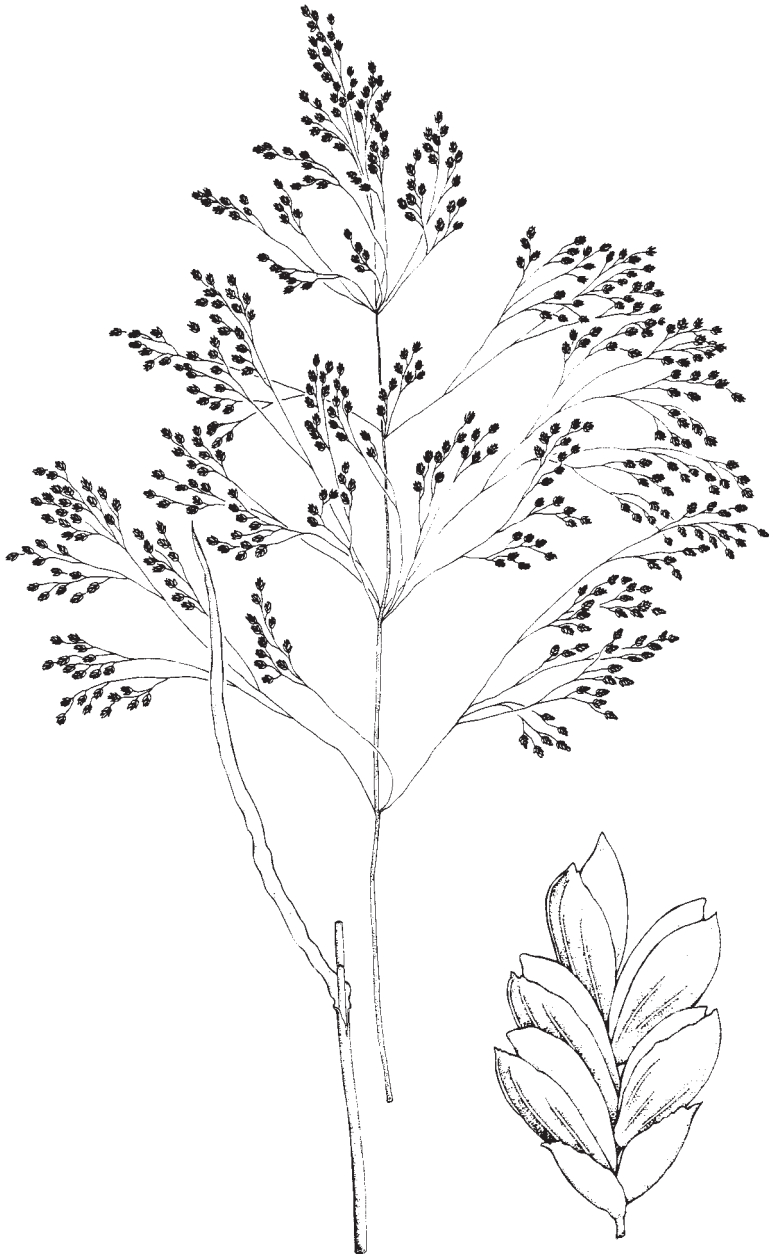
Salt Tolerance
Low

Siltation Tolerance
Moderate

Flowering Color and Time
Green
May to August

Light Preference
Full shade to partial sun

Seeding Rate
.06 - .5 lbs/acre



Helenium autumnale Common Sneeze Weed

Preferred Water Depth and Inundation Tolerance

Prefers moist to saturated soil. Tolerates brief, shallow inundation like that found in wet prairies, fens, and sedge meadows.

Wildlife Value

Attracts butterflies and provides cover.

Application/Zone

Fibrous root system can help stabilize upper shoreline zones, streambanks, and vegetated swales.

Availability, Establishment, and Maintenance

- Propagate by divisions or seed in the spring.
- Seed is widely available from commercial vendors.
- Excellent germination of seed occurs within 4 weeks.

Common Sneeze Weed *Helenium autumnale*

Mature Height
3-5 feet

Plant Type
Perennial herb

Indicator Status
Facultative Wet (+)

pH
6-7

Nutrient Load Tolerance
Moderate to high

Salt Tolerance
Not available

Siltation Tolerance
Moderate to high

Flowering Color and Time
Yellow
August to November

Light Preference
Full sun to partial shade

Seeding Rate
.12- .5 lbs/acre

Helianthus grosseserratus Sawtooth Sunflower

Preferred Water Depth and Inundation Tolerance

Prefers moist to saturated soil. Species tolerates seasonal inundation like that found in sedge meadows and wet prairies.

Wildlife Value

Provides nectar and pollen for bees and other insects. Achenes are eaten by insects, birds, and small mammals. Also provides reproduction and foraging habitat for Gorgone checkerspot butterfly.

Application/Zone

Used for soil stabilization in upper shoreline zones and vegetated swales. Also a good pioneer species.

Availability, Establishment, and Maintenance

- Achenes may benefit from cold stratification.
- Plants may be subdivided in the fall and planted in a new site. Stem cuttings may be taken in the spring and rooted for transplanting.
- Achenes may be sown with a rangeland drill or a hopper style planter. Hand seeding with a small hopper may be used in small areas.
- Fall seeding works with fresh seed.
- This species has a quickly spreading growth habit and can become weedy.

Sawtooth Sunflower *Helianthus grosseserratus*

Mature Height
3-13 feet

Plant Type
Perennial herb

Indicator Status
Facultative Wet (-)

pH
Not available

Nutrient Load Tolerance
Moderate

Salt Tolerance
Moderate

Siltation Tolerance
Moderate

Flowering Color and Time
Yellow to cream
July to October

Light Preference
Full sun

Seeding Rate
Not available

Iris virginica

(*Iris virginica shrevei*)

Blue Flag Iris

Virginia Blue Flag
Wild Flag

Preferred Water Depth and Inundation Tolerance

Prefers wet meadow zone, seasonally flooded to a depth of 3 inches early in the spring. Species will not tolerate constant inundation of more than 6-8 inches.

Wildlife Value

Seeds are eaten by waterfowl and muskrat. Hummingbirds have been observed feeding on nectar. Also provides cover for amphibians, foraging habitat for snakes, and habitat for many insect species.

Application/Zone

Used in lower shoreline zones and vegetated swales.

Availability, Establishment, and Maintenance

- Seeds, transplants, and rhizomes are available from several commercial vendors.
- Seeds require cold, moist stratification for 120 days. Alternatively, they can be planted on the soil surface in the fall. Warm spring temperatures (higher than 75° F) and light will trigger germination.
- Locally, few positive results have been observed from seeding on-site. Seeds are usually eaten by birds and insects.
- In the greenhouse, 99% germination has been observed from seed in 9 days.
- Rhizomes and transplants should be planted in the spring.
- Rhizomes may be temporarily refrigerated until planting. Plant them in 2-3 inches of soil on 0.5-1.5 foot centers, allowing growing points to be visible above the soil surface.
- Young shoots should not be inundated by water.
- **CAUTION:** Severe dermatitis may result from handling rhizomes.

Blue Flag Iris

Iris virginica

Virginia Blue Flag
Wild Flag

(*Iris virginica shrevei*)

Mature Height
Up to 2.5 feet

Plant Type
Perennial emergent herb

Indicator Status
Obligate

pH
Not available

Nutrient Load Tolerance
Moderate

Salt Tolerance
Not tolerant

Siltation Tolerance
Moderate

Flowering Color and Time
Purple
May to July

Light Preference
Partial to full sun

Seeding Rate
.06 - .25 lbs/acre

Juncus effusus Common Rush

Preferred Water Depth and Inundation Tolerance

Prefers a few inches of standing water to moist soil (Max: 12"/Min: 0"). Species will tolerate some fluctuation in water levels. Tolerates drought in summer.

Wildlife Value

Seeds are eaten by songbirds and waterfowl. Plants are eaten by muskrats, deer, and small rodents. Provides cover for ducks and spawning habitat for sunfish. Also provides nesting habitat for rails and habitat for many species of insects.

Application/Zone

Used in upper and lower shoreline zones and in vegetated swales.

Availability, Establishment, and Maintenance

- Seeds, container grown transplants, rootstocks, and rhizomes are available from commercial vendors. Seed is becoming more widely available.
- Seeds are extremely small, difficult to disseminate, and may require cold to break dormancy.
- Seed may be stored in fresh water or wet sand at 35-40° F for 4 to 9 months and then spring seeded by hand broadcasting.
- Fresh seed may also be fall planted to allow overwintering to break dormancy.
- Seeds need alternating temperatures and light for best germination.
- One source recommends a seeding rate of up to 4 oz/acre in mixes.
- Rhizomes and rootstocks should be spring planted 2-3 inches deep on 0.5-1.5 foot centers because of slow rate of spread in saturated soil.

Common Rush

Juncus effusus

Mature Height
1.0-3.5 feet

Plant Type
Perennial emergent herb

Indicator Status
Obligate

pH
Not available

Nutrient Load Tolerance
Moderate

Salt Tolerance
Low

Siltation Tolerance
Moderate

Flowering Color and Time
Green or Brown
May to September

Light Preference
Partial to full sun

Seeding Rate
Not available

Juncus torreyi Torrey's Rush

Preferred Water Depth and Inundation Tolerance

Prefers moist to saturated soil. Species tolerates up to 2 inches of inundation for short durations.

Wildlife Value

Provides food for muskrat, marsh birds, and waterfowl. Also provides spawning ground for bluegill and other fish species.

Application/Zone

Rhizomatous root system stabilizes upper shoreline zones and vegetated swales.

Availability, Establishment, and Maintenance

- Appears to establish from seed naturally and is becoming more available from vendors.
- Fall seed or cold moist stratify.
- Because of a slow rate of spread, transplant on 0.5-1.5 foot centers once established.
- Spreads more quickly by rhizome.

Torrey's Rush

Juncus torreyi

Mature Height
Up to 3 feet

Plant Type
Perennial herb

Indicator Status
Facultative Wet

pH
Not available

Nutrient Load Tolerance
Moderate

Salt Tolerance
Low

Siltation Tolerance
Moderate

Flowering Color and Time
Green to brown
July to October

Light Preference
Partial to full sun

Seeding Rate
.006 - .125 lbs/acre

Leersia oryzoides Rice Cut Grass

Preferred Water Depth and Inundation Tolerance

Prefers moist to saturated soil. Young plants do not tolerate submergence for longer than 2 - 3 days (Max: 8"/Min: saturated soil). Mature plants tolerate seasonal to permanent flooding. This species also has an observed tolerance to water level fluctuations.

Wildlife Value

Seeds and roots are eaten by waterfowl, rails, herons, and muskrats. Songbirds also eat seeds. Plants provide cover for many reptiles, amphibians, insects, and fish.

Application/Zone

Used in upper shoreline zones, for streambank stabilization, and in vegetated swales. Provides good sediment stabilization.

Availability, Establishment, and Maintenance

- Seeds, rhizomes, rootstocks, and container grown plants are readily available from several commercial vendors.
- Once source reports that fall seeding is preferred. Seed dormancy can be broken by overwintering or by cold water stratification.
- Other sources report excellent greenhouse germination following cold, dry storage.
- Temperature and light do not seem to affect seed germination.
- A low rate of establishment has been observed in restorations from seed.
- Rhizomes should be planted 2-5 inches deep on 1-3 foot centers in the spring.
- Seeds, rootstocks, and rhizomes should be planted in saturated soil and not inundated during establishment. Plants should attain a height of 4-6 inches before water level is gradually increased.
- Rate of spread is moderate to sometimes aggressive once plants are established.

Rice Cut Grass *Leersia oryzoides*

Mature Height
3-5 feet, erect or sprawling

Plant Type
Perennial emergent grass

Indicator Status
Obligate

pH
6.0-7.0

Nutrient Load Tolerance
Moderate to high

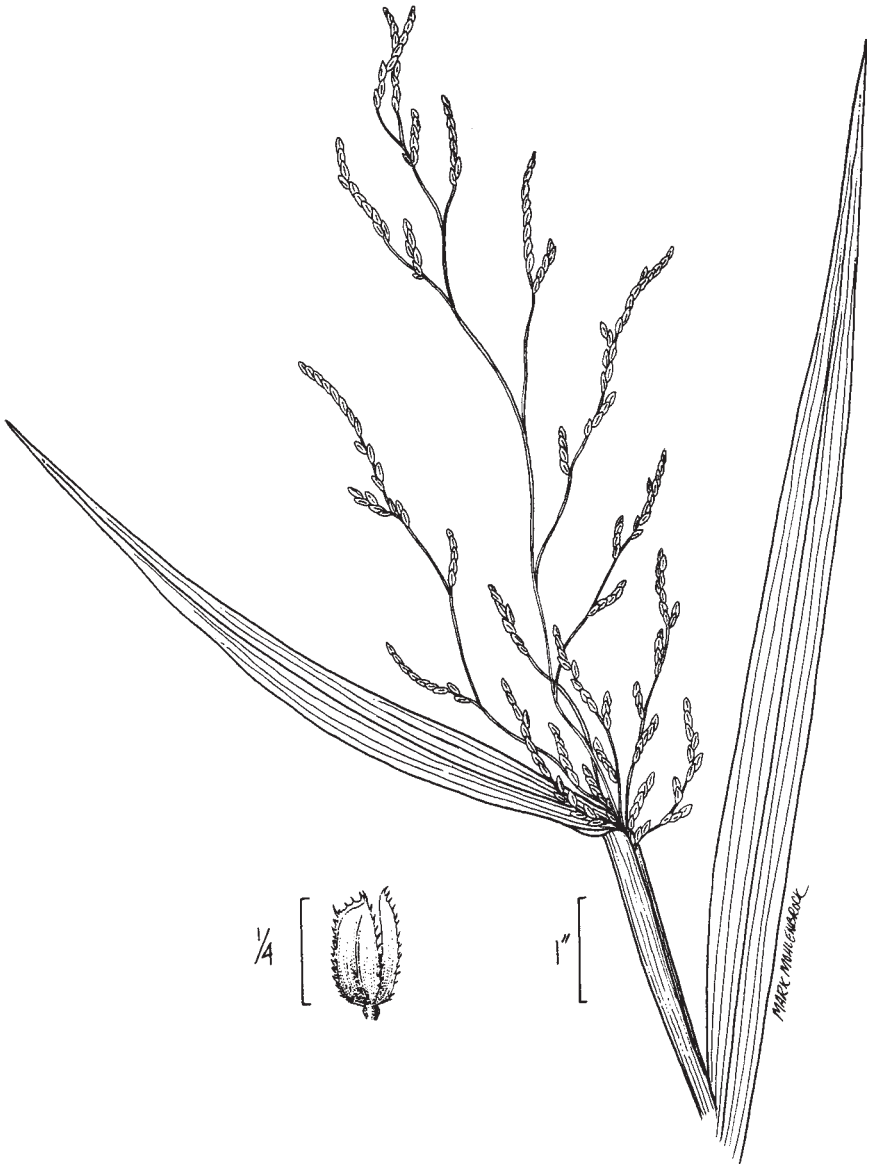
Salt Tolerance
Low

Siltation Tolerance
Moderate

Flowering Color and Time
Greenish white
June to October

Light Preference
Partial to full sun

Seeding Rate
.1 - .25 lbs/acre



Monarda fistulosa Wild Bergamot

Preferred Water Depth and Inundation Tolerance

Mesic prairie species. Minimal inundation tolerance.

Wildlife Value

Palatable in early growth by grazing species. Attracts butterflies and honeybees.

Application/Zone

Used for upland slope buffer stabilization. Slows water run off and reduces soil erosion.

Availability, Establishment, and Maintenance

- No pretreatment is needed for seed.
- Establishes readily from seed. Seed germinates best with light at warmer temperatures and should be stored dry.
- For divisions, divide mature clumps in March before stems are sent up. Dig up the plant and divide clump into sections. Replant divisions immediately.
- Can also be established from cuttings.

Wild Bergamot *Monarda fistulosa*

Mature Height
Up to 3 feet

Plant Type
Perennial herb

Indicator Status
Facultative Upland

pH
Not available

Nutrient Load Tolerance
Moderate

Salt Tolerance
Not available

Siltation Tolerance
Low to moderate

Flowering Color and Time
Pink, lavender, purple, and rarely white
August to October

Light Preference
Partial to full sun

Seeding Rate
.125- 1 lb/acre

Panicum virgatum Switch Grass

Preferred Water Depth and Inundation Tolerance

Occurs in mesic prairie and buffer slopes. Species has some tolerance of early spring inundation. Drought tolerant.

Wildlife Value

Seeds and young foliage provide food for teal, widgeon, and black duck. Seeds are a food source for many songbirds and small mammals. Provides cover for most wildlife.

Application/Zone

Used for streambank and upland slope buffer stabilization.

Availability, Establishment, and Maintenance

- Widely available as seed or plants.
- Best seed germination results with alternating temperatures. Requires light for germination.
- Seeds have an 80% germination rate at 70° F with no treatments but will germinate at cooler temperatures.
- Has slow rate of spread by rhizome. Plant on 0.5-1.5 foot centers.

Switch Grass *Panicum virgatum*

Mature Height
Up to 6.5 feet

Plant Type
Perennial grass

Indicator Status
Facultative (+)

pH
Not available

Nutrient Load Tolerance
Low to moderate

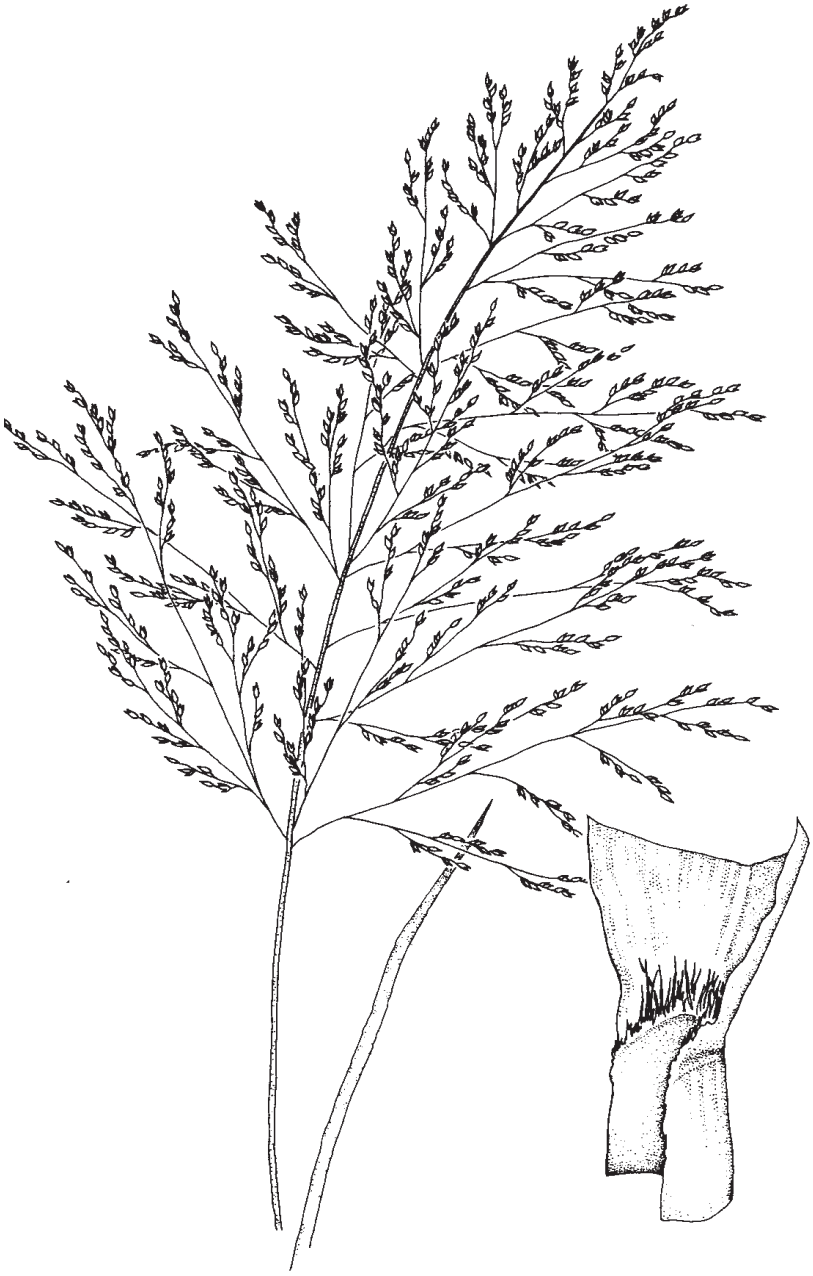
Salt Tolerance
Moderate

Siltation Tolerance
Low to moderate

Flowering Color and Time
Beige
July to October

Light Preference
Full sun

Seeding Rate
.25 - 1 lb/acre



Petalostemum purpureum Purple Prairie Clover

Preferred Water Depth and Inundation Tolerance

Mesic prairie species. Species does not tolerate inundation.

Wildlife Value

Highly palatable and nutritious for grazing.

Application/Zone

Used for upland slope buffer stabilization. Deep taproot with extensive vertical branching helps to stabilize sandy soils in prairie and dry slopes.

Availability, Establishment, and Maintenance

- Propagation is best by seed. Seed can be scarified by removing the hull, stratifying at 33-38° F for 10 days. Inoculation with Santofoin type F rhizobium produces more vigorous plants, but is not necessary. Seed can then be planted in the spring and will emerge in 6 to 10 days.
- Seed can also be planted in the fall for overwintering instead of the above treatments, but the treatments may increase the germination rate.
- Transplanting is difficult because of the deep taproot but can be done with potted plants.
- This species is not competitive in early growth and may be difficult to establish in clayey, reworked soil.

Purple Prairie Clover *Petalostemum purpureum*

Mature Height
1-3 feet

Plant Type
Perennial herb

Indicator Status
Upland

pH
5.5-6.5

Nutrient Load Tolerance
Low

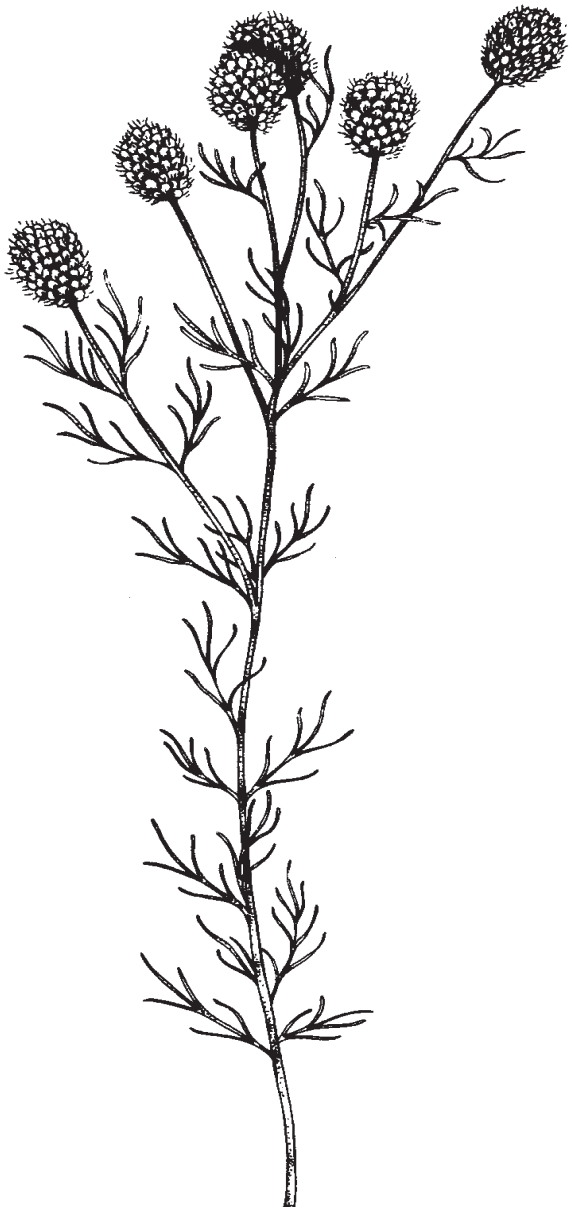
Salt Tolerance
Not available

Siltation Tolerance
Low

Flowering Color and Time
Purple
July to September

Light Preference
Full sun

Seeding Rate
.25 lbs/acre



Polygonum amphibium Water Smartweed

(*P. amphibium stipulaceum*) Water Knot Weed

Preferred Water Depth and Inundation Tolerance

Species has a wide tolerance for inundation (Max: 20"/Min: moist soil).

Wildlife Value

Seeds are eaten by waterfowl. Serves as a major food source for purplish copper butterfly. Also provides cover for waterfowl and fish.

Application/Zone

Used in lower shoreline zones. Wave tolerant.

Availability, Establishment, and Maintenance

- Achenes, cuttings, rootstocks, and rhizomes may be used. Plants and rootstocks have limited availability from commercial vendors. Collect achenes when they are mature (July-Sept.).
- One source recommends storing achenes in fresh, 32-34° F water for 3 to 6 months to stratify.
- Other sources indicate that seed germinates best when stored dry at 40° F followed by light at 70° F.
- Broadcast in the spring on wet site.
- To use cuttings, take 2-6 inch cuttings from top shoots and plant on site in wet area by burying lower part of cutting. Spring drawdown increases plant production.
- Achene production is high in areas shallowly flooded during the growing season.

Water Smartweed

Water Knot Weed

Polygonum amphibium

(P. amphibium stipulaceum)

Mature Height
Up to 3 feet

Plant Type
Perennial emergent herb

Indicator Status
Obligate

pH
5.4-8.8

Nutrient Load Tolerance
Moderate

Salt Tolerance
Low

Siltation Tolerance
Moderate to high

Flowering Color and Time
Red to pink
June to August

Light Preference
Partial to full sun

Seeding Rate
.5 - 1.5 lbs/acre

Pycnanthemum virginianum Common Mountain Mint

Preferred Water Depth and Inundation Tolerance

Prefers moist to saturated soil in sedge meadow, wet prairie, and mesic prairie zones. Species tolerates inundation only early in the season for short periods.

Wildlife Value

Attracts butterflies.

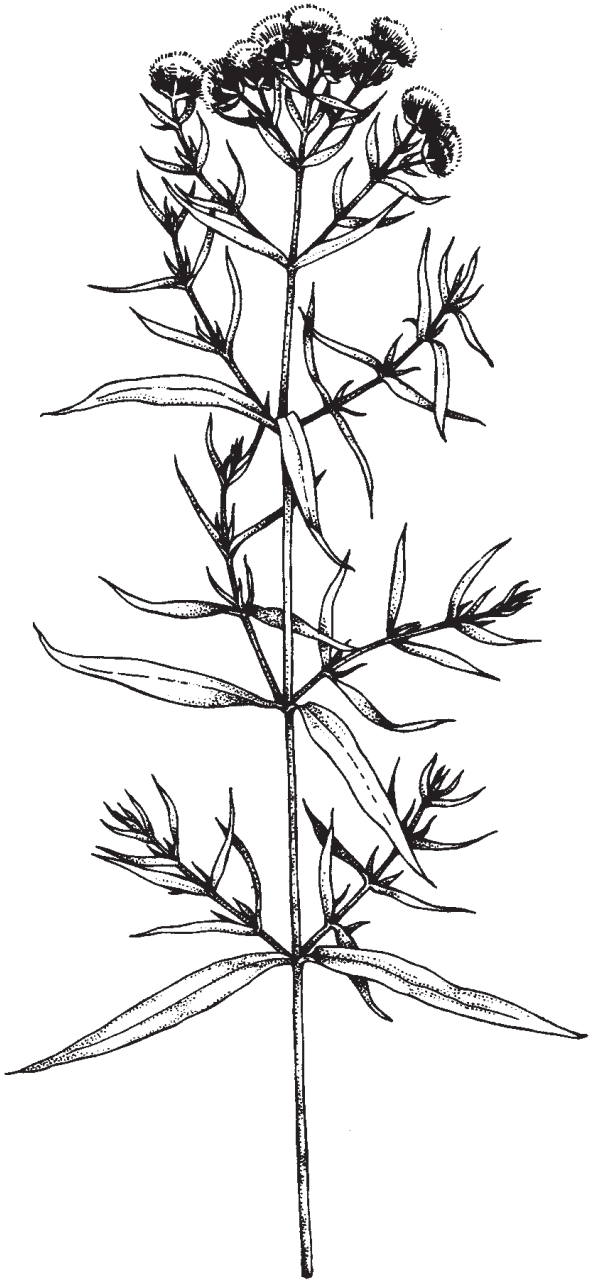
Application/Zone

Stoloniferous growth habit stabilizes soil on upper shoreline zones, upland slope buffers, and in vegetated swales.

Availability, Establishment, and Maintenance

- Can be established from seed, as this species quickly invades new restoration areas.
- Propagation can be achieved by cuttings and division in the spring. The tops of young plants can be pinched off to provide a more sturdy growth habit.
- Tolerates limited mowing.

Common Mountain Mint *Pycnanthemum virginianum*



Mature Height
20-36 inches

Plant Type
Perennial herb

Indicator Status
Facultative Wet (+)

pH
5-7

Nutrient Load Tolerance
Moderate

Salt Tolerance
Not available

Siltation Tolerance
Low to moderate

Flowering Color and Time
White with purple spots
July to August

Light Preference
Full sun

Seeding Rate
.02 - .06 lbs/acre

Quercus bicolor Swamp White Oak

Preferred Water Depth and Inundation Tolerance

Floodplain and terrace species. Prefers moist soil that dries out towards the end of the growing season. Species tolerates spring flooding.

Wildlife Value

Acorns from this species are an important food source for many small mammals, deer, and birds. Provides habitat for many birds, reptiles, and amphibians.

Application/Zone

Used in upper shoreline zones and for upland slope buffer stabilization.

Availability, Establishment, and Maintenance

- Available as balled and burlapped or bareroot stock.
- Tap roots make most oaks difficult to transplant, but *Quercus bicolor* has a more fibrous root system, making transplanting easier.

Swamp White Oak *Quercus bicolor*

Mature Height
50 to 70 feet

Plant Type
Deciduous tree

Indicator Status
Facultative Wet (+)

pH
Not available

Nutrient Load Tolerance
Low

Salt Tolerance
Low

Siltation Tolerance
Low

Flowering Color and Time
May

Light Preference
Full sun

Seeding Rate
Not applicable

Quercus macrocarpa Bur Oak

Preferred Water Depth and Inundation Tolerance

Prefers moist soil and is drought tolerant. Species tolerates moderate dormant-season flooding.

Wildlife Value

Acorns of this species are eaten by squirrels, wood ducks, deer, rabbit, and mice. Also used as cover and for nesting sites.

Application/Zone

Planted in shelter belts for wind erosion control. Provides upland slope buffer stabilization.

Availability, Establishment, and Maintenance

- Limited availability from commercial vendors.
- Seed must be stored moist for a short time only. Seed germination is improved by stratification. Seeds germinate readily at most temperatures if protected from grubs and other depredation. Seeds may die if moisture falls below 20 - 22%.
- Seedlings develop a deep tap root and extensive lateral roots, making the species difficult to transplant, though bag or pot-grown trees can readily be transplanted.
- Best success has been observed with small bare root seedlings which require watering to reduce transplant shock.
- Fall planting works best.

Bur Oak *Quercus macrocarpa*

Mature Height
60-70 feet

Plant Type
Deciduous tree

Indicator Status
Facultative (-)

pH
Not available

Nutrient Load Tolerance
Low to high

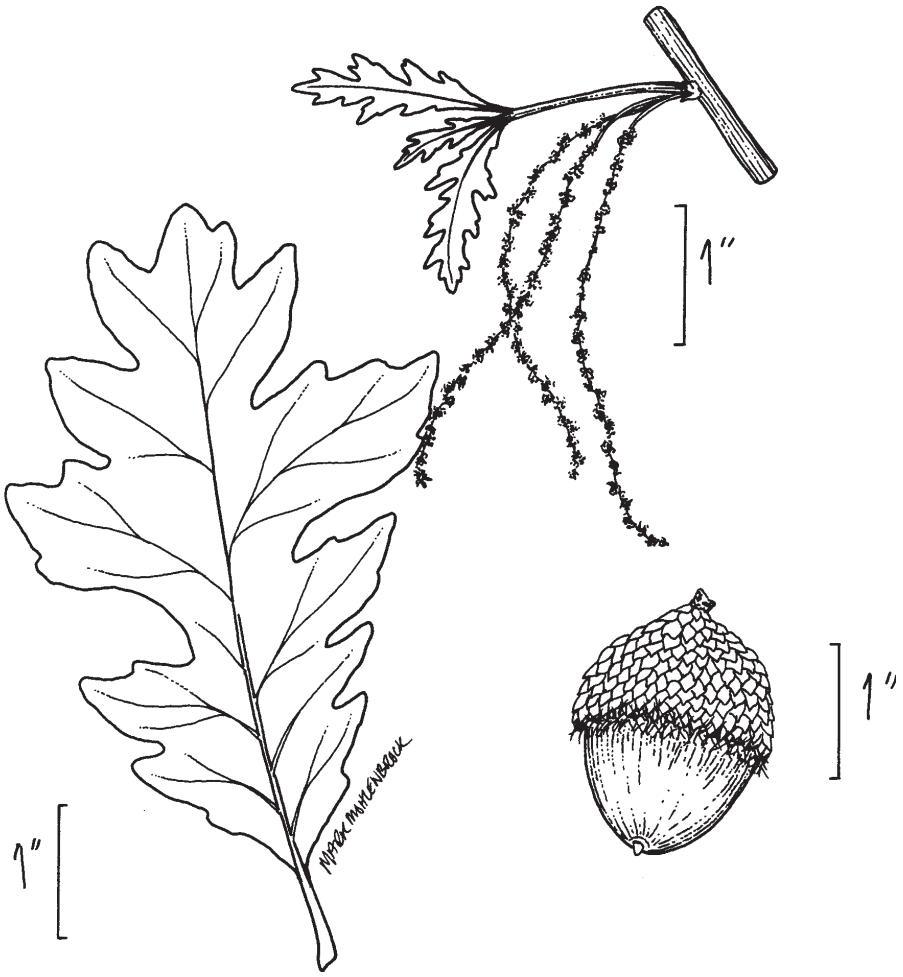
Salt Tolerance
Low

Siltation Tolerance
Low to moderate

Flowering Color and Time
April to May

Light Preference
Full sun
Not shade tolerant

Seeding Rate
Not applicable



Quercus palustris Pin Oak

Preferred Water Depth and Inundation Tolerance

Prefers moist to saturated soils, but will tolerate up to 3 inches of standing water for short periods.

Wildlife Value

Acorns of this species are eaten by wildlife. Also used as cover and nesting sites.

Application/Zone

Used for upland slope buffer stabilization.

Availability, Establishment, and Maintenance

- Readily transplantable due to shallow fibrous root system.
- Seed must be stratified at 32-41° F for 30 to 45 days. Must be kept moist or seeds will die.
- **CAUTION:** Only use in eastern sector in sandier, more acidic soils. Does not do well in calcareous till soils with higher clay content and high pH.

Pin Oak

Quercus palustris

Mature Height
Up to 75 feet

Plant Type
Deciduous tree

Indicator Status
Facultative Wet

pH
Slightly acidic

Nutrient Load Tolerance
Low

Salt Tolerance
Low to moderate

Siltation Tolerance
Low

Flowering Color and Time
Pink
July to September

Light Preference
Full sun
Not shade tolerant

Seeding Rate
Not applicable

Ratibida pinnata Yellow Cone Flower

Preferred Water Depth and Inundation Tolerance

Mesic prairie species. Species has no inundation tolerance.

Wildlife Value

Palatable to grazing species in young growth. Attracts butterflies and other insects.

Application/Zone

Extensive fibrous root systems are used to stabilize soil on upland slope buffers.

Availability, Establishment, and Maintenance

- Establishes easily from seed. Seed can be sown in the fall or spring. Best results can be reached by stratifying seed at 33-38° F for 30 days, but this is not essential for germination.
- Older plants can be divided and planted in the spring, but an extensive root system makes this difficult.

Yellow Cone Flower *Ratibida pinnata*

Mature Height
Up to 3 feet

Plant Type
Perennial herb

Indicator Status
Upland

pH
6-7

Nutrient Load Tolerance
Low to moderate

Salt Tolerance
Not available

Siltation Tolerance
Low

Flowering Color and Time
Yellow
July to September

Light Preference
Full sun

Seeding Rate
Not available

Rudbeckia hirta Black-Eyed Susan

Preferred Water Depth and Inundation Tolerance

Mesic to wet prairie species. Species has limited inundation tolerance.

Wildlife Value

Attracts butterflies and is used for cover.

Application/Zone

Extensive fibrous root system stabilizes soil on upland slope buffers.

Availability, Establishment, and Maintenance

- Easily established from seed. No pretreatment of seed is necessary.
- This species can be very aggressive.
- This species is early successional and will "thin out" in mature restorations.

Black-Eyed Susan

Rudbeckia hirta

Mature Height
1 to 2 feet

Plant Type
Perennial herb

Indicator Status
Facultative Upland

pH
4.5-7.5

Nutrient Load Tolerance
Low to moderate

Salt Tolerance
Not available

Siltation Tolerance
Low

Flowering Color and Time
Yellow with black/brown center
June to July

Light Preference
Partial to full sun

Seeding Rate
.125 - .3 lbs/acre

Sagittaria latifolia Broadleaf Arrowhead

Common Arrowleaf
Duck Potato

Preferred Water Depth and Inundation Tolerance

Prefers water depth of 6-20 inches (Max: 24"/Min: saturated mudflats). Species will tolerate some inundation for relatively short periods.

Wildlife Value

Provides waterfowl and wildlife food. Smaller tubers and seeds are eaten by rails, ducks, and swans, especially canvasback duck, Canada geese, gadwall duck, trumpeter swan, and whistling swan. Tubers and plants are eaten by muskrats, porcupines, beaver, and many others. Also provides habitat for macroinvertebrates and game fish--especially channel catfish, white bass, shiners, and shad. Also provides habitat for frogs, snakes and turtles. May serve as nesting material for black tern. Newly planted rootstock is frequently devoured by Canada geese.

Application/Zone

Used in lower shoreline zones.

Availability, Establishment, and Maintenance

- Seed, tubers, rootstock, and transplants are available from commercial vendors. Rootstock establishment is most common and the easiest method.
- Fall seeding is recommended to provide cold stratification. Broadcast the seed and cover with a thin layer of soil.
- Plant tubers 2-3 inches in the ground in the spring. Transplants and tubers are usually planted on 2-6 foot centers and must be protected from depredation. Tubers and seed should be kept in moist to saturated soil conditions. Tubers require a 6 to 8 week cold treatment to break dormancy.
- Gradually raise the water level as shoots emerge. This species has a rapid rate of spread by runners and tubers.
- Tubers survive freezing and oxygen depletion.
- This species has high seedbank longevity.

Broadleaf Arrowhead *Sagittaria latifolia*

Common Arrowleaf
Duck Potato

Mature Height
Leaves 2-8 inches
Inflorescence 4-30 inches

Plant Type
Perennial emergent herb

Indicator Status
Obligate

pH
5.9-8.8

Nutrient Load Tolerance
Moderate

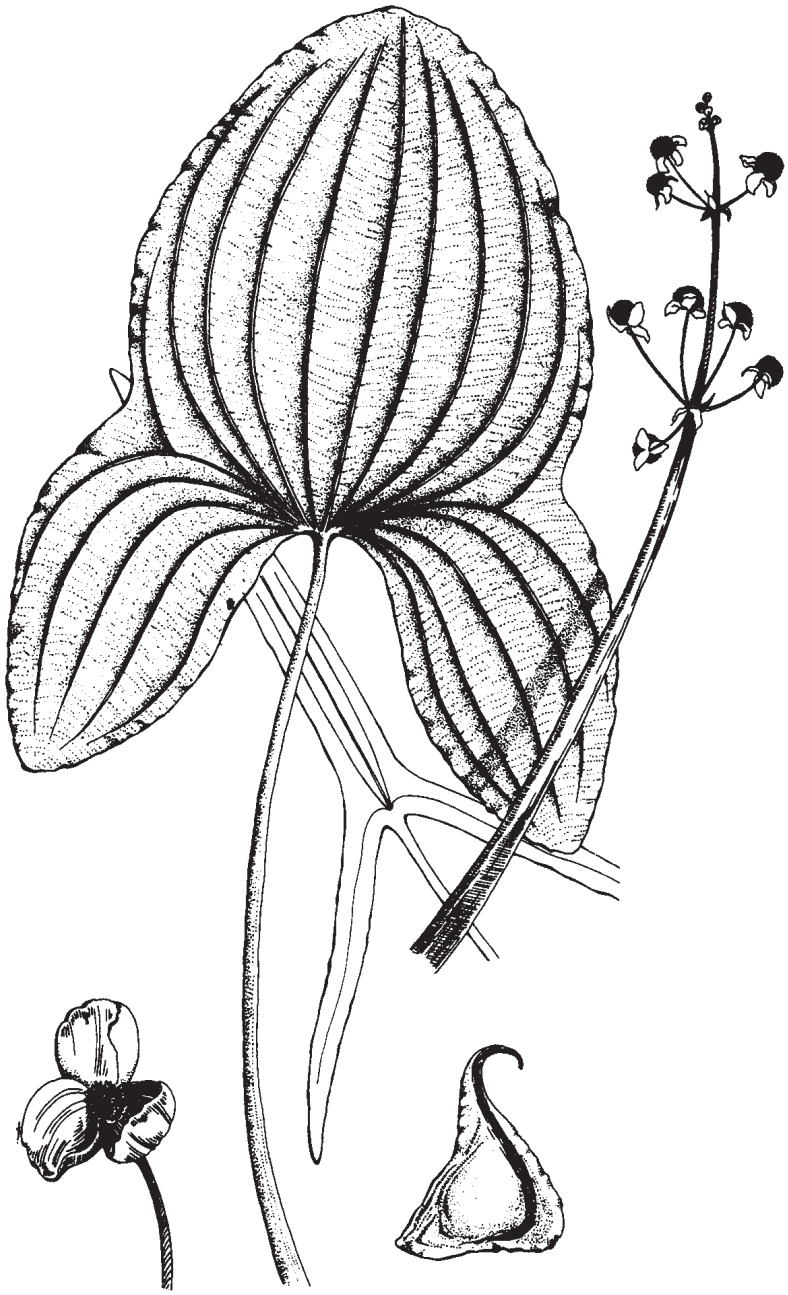
Salt Tolerance
Low

Siltation Tolerance
Low

Flowering Color and Time
White
July to September

Light Preference
Partial to full sun

Seeding Rate
.12 - .19 lbs/acre



Salix amygdaloides Peachleaf Willow

Preferred Water Depth and Inundation Tolerance

Sedge meadow species. Species tolerates 0-18 inches inundation for short periods.

Wildlife Value

Provides cover and nesting habitat for songbirds, marsh birds, amphibians, and reptiles.

Application/Zone

Used in upper shoreline zones and for streambank stabilization.

Availability, Establishment, and Maintenance

- Root by cuttings.
- Limited availability from commercial vendors.

Peachleaf Willow *Salix amygdaloides*

Mature Height
Up to 40 feet

Plant Type
Deciduous shrub

Indicator Status
Facultative Wet

pH
Not available

Nutrient Load Tolerance
Low to moderate

Salt Tolerance
Moderate

Siltation Tolerance
Low to moderate

Flowering Color and Time
Green
April to June

Light Preference
Partial to full sun

Seeding Rate
Not applicable

Salix nigra Black Willow

Preferred Water Depth and Inundation Tolerance

Natural floodplain species. Species tolerates periodic inundation with up to 2 feet of water for short durations.

Wildlife Value

Provides nesting habitat for birds. Serves as a food source for morning cloak butterfly, songbirds, waterfowl, woodpeckers, beaver, squirrel, and deer.

Application/Zone

Used in upper shoreline zones and for streambank stabilization.

Availability, Establishment, and Maintenance

- Root by cuttings. Spreads by suckers.
- Has rapid growth rate, 3 to 6 feet per year.

Black Willow

Salix nigra

Mature Height
Up to 90 feet

Plant Type
Deciduous tree

Indicator Status
Obligate

pH
6.0-8.0

Nutrient Load Tolerance
Moderate to high

Salt Tolerance
Low

Siltation Tolerance
Moderate

Flowering Color and Time
Yellow-green
April to May

Light Preference
Full sun

Seeding Rate
Not applicable

Schizachyrium scoparium Little Bluestem

(*Andropogon scoparius*)

Preferred Water Depth and Inundation Tolerance

Dry to mesic prairie species. No inundation tolerance.

Wildlife Value

Palatable and nutritious for grazing species. Provides cover for grassland birds.

Application/Zone

Branching, numerous vertical roots extending to a depth of 6 feet can stabilize upland slope buffers and generally will hold soil and prevent erosion wherever established.

Availability, Establishment, and Maintenance

- Best by seed. No pretreatment of seed is necessary. Germinates in April when planted in the fall.
- In mixed grass plantings use 75% Little Bluestem on dry, dry mesic, or mesic short grass plantings. Equal amounts of Side-oats Grama may also be used on dry mesic or dry areas.

Little Bluestem

Schizachyrium scoparium

(*Andropogon scoparius*)

Mature Height
2-3 feet

Plant Type
Perennial tufted grass

Indicator Status
Facultative Upland (-)

pH
Wide range

Nutrient Load Tolerance
Low

Salt Tolerance
Not available

Siltation Tolerance
Low

Flowering Color and Time
Reddish-brown
August to September

Light Preference
Full sun

Seeding Rate
1 - 6 lbs/acre

Scirpus acutus Hardstem Bulrush

Preferred Water Depth and Inundation Tolerance

Prefers saturated soils in fens and water levels to a depth of 3 feet in marsh areas. Species tolerates semi-permanently flooded conditions.

Wildlife Value

Waterfowl and shorebirds eat achenes. Muskrats and geese eat rhizomes and stems. Provides preferred nesting habitat for redhead and canvasback ducks. Also provides spawning and nursery habitat for northern pike and other fish species.

Application/Zone

Used in lower shoreline zones and in vegetated swales. Resists wave action and water level changes.

Availability, Establishment, and Maintenance

- Achenes, rootstocks, rhizomes, and transplants are available from commercial vendors.
- Achenes do not germinate readily unless they are stratified under cold, wet conditions for several months and then exposed to light and warm temperatures. Fresh collected achenes can be planted in the fall in wet mudflats after drawdown for spring germination.
- Spring planting of rootstocks and rhizomes is preferred due to greater success. Rhizomes are planted at a depth of 2-5 inches in saturated substrate and at a depth of 4-6 inches in water. Rhizomes should be placed 3 feet apart in a clustered arrangement.
- Hardstem Bulrush is a rather slow spreading plant when propagating from rhizomes. It may take up to 3 years to develop into a thick stand.

Hardstem Bulrush *Scirpus acutus*

Mature Height
3.5-9.3 feet

Plant Type
Perennial emergent herb

Indicator Status
Obligate

pH
6.7-9.1

Nutrient Load Tolerance
Low to moderate

Salt Tolerance
Moderate to high

Siltation Tolerance
Low to moderate

Flowering Color and Time
Reddish brown
May to September

Light Preference
Full sun

Seeding Rate
.06 - .25 lbs/acre

Scirpus americanus Chairmaker's Rush

(*S. pungens*)

Preferred Water Depth and Inundation Tolerance

Prefers saturated soil to inundation 16.5 inches deep. Species tolerates seasonally flooded conditions. Also has more than 50% mortality in water depths of more than 20 inches.

Wildlife Value

Serves as an important source of wildlife food. Achenes are eaten by waterfowl such as, pintail, lesser scaup, gadwall, canvasback, ringneck duck, rails, and shorebirds. Muskrats eat stems and rhizomes. Stems provide habitat for ducks and small mammals.

Application/Zone

Used in lower shoreline zones, for streambank stabilization, and in vegetated swales. Resists wave action and water level changes.

Availability, Establishment, and Maintenance

- Achenes, tubers, rootstock, and rhizomes are available from several commercial vendors.
- Achenes have dormancy requirements. Fall collected achenes require cold (34-36° F), wet stratification for 6-12 months and then warm temperatures (75-80° F) to germinate. Fall seeding provides better germination than spring due to the stratifying effects of overwintering. Seeds germinate better with light and alternating temperatures.
- Rhizomes have good survival when planted in spring through summer. They are planted in saturated substrate at depths of 2-5 inches and on 2-6 foot centers because of their rapidly spreading growth habit.
- Young, newly established plants should not be totally flooded with water. Manipulation of water levels with drawdowns and flooding are recommended for best establishment results.
- This species is also sensitive to oxygen depletion.

Chairmaker`s Rush

Scirpus americanus

(*S. pungens*)

Mature Height
Up to 4 feet

Plant Type
Perennial emergent herb

Indicator Status
Obligate

pH
6.7-8.9

Nutrient Load Tolerance
Low

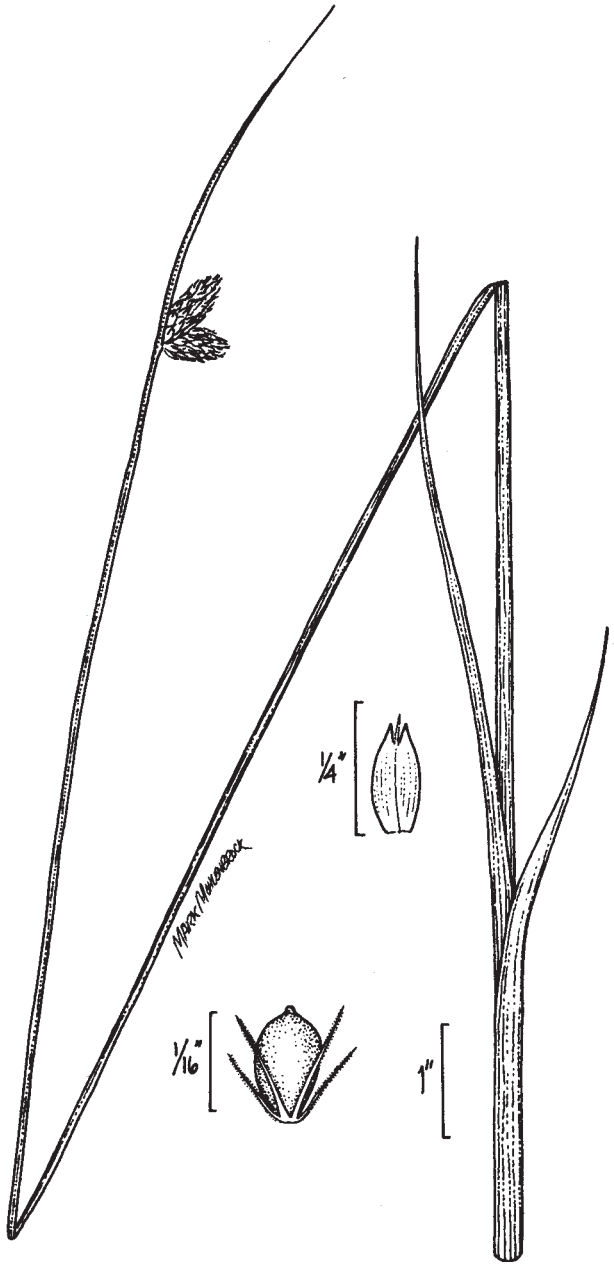
Salt Tolerance
High

Siltation Tolerance
Low to moderate

Flowering Color and Time
Brown
May to September

Light Preference
Full sun

Seeding Rate
.06 - .125 lbs/acre



Scirpus fluviatilis River Bulrush

Preferred Water Depth and Inundation Tolerance

Tolerates semipermanent to permanently flooded conditions (Max: 30"/Min: 2" to moist soil).

Wildlife Value

Achenes are eaten by ducks, geese, rails, and shorebirds. Muskrats eat aerial stems and rootstocks. Provides spawning habitat for bluegills and bass.

Application/Zone

Used in lower shoreline zones for erosion control at a depth of 1-6 inches (shallow standing water). Plants may be uprooted by wave action. Also used in vegetated swales.

Availability, Establishment, and Maintenance

- Rhizomes, rootstock, tubers, and transplants are available from several commercial vendors. Seed production is erratic, so there is sporadic availability from vendors.
- Seed also needs cold water treatment. Rhizomes, tubers, and rootstock are preferred for propagation. Rhizomes should be planted at soil depths of 2-5 inches and spaced 1-3 feet apart.
- Spring planting assures greater survival of transplants. Maintain moist substrate to a coupleinches of water during plant establishment in order to prevent flooding of young shoots.
- Avoid planting in deep shoreline water since it reduces plant spread. Mudflat conditions are preferred for planting.
- This species spreads quickly vegetatively and can form monocultures.

River Bulrush *Scirpus fluviatilis*

Mature Height
5-7 feet

Plant Type
Perennial emergent herb

Indicator Status
Obligate

pH
7.0-9.1

Nutrient Load Tolerance
Moderate to high

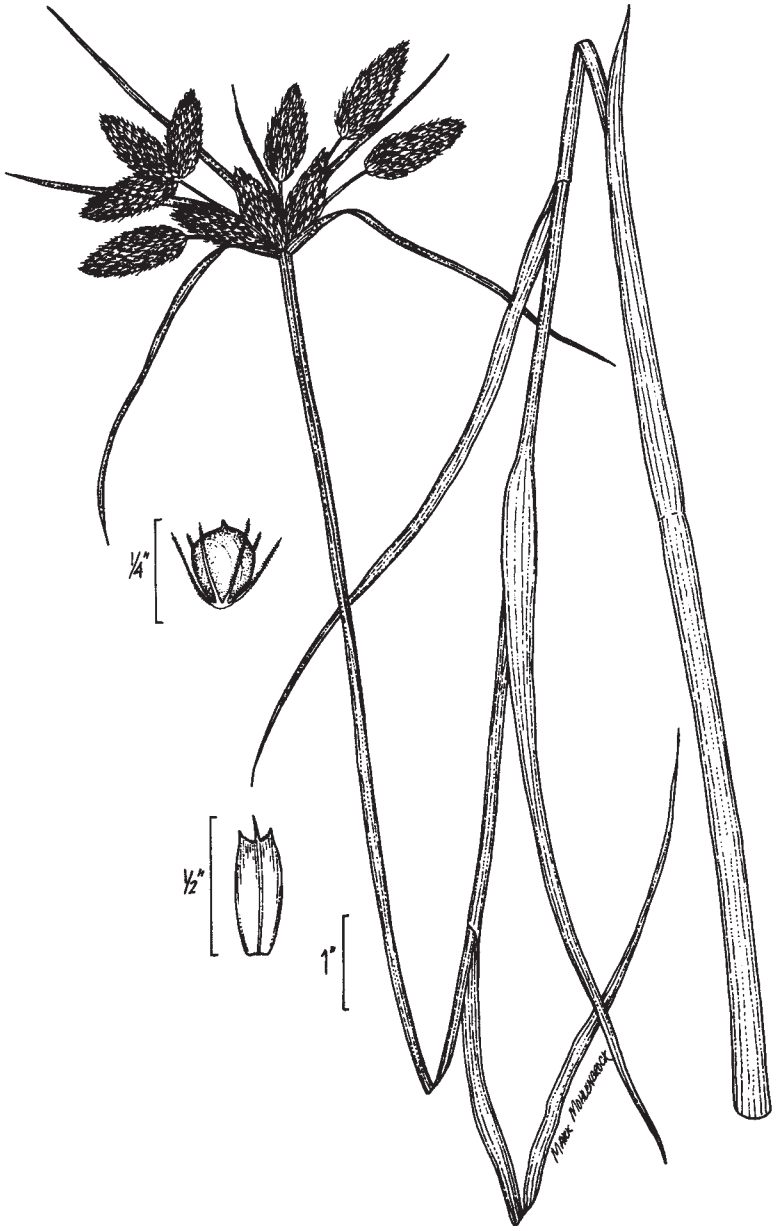
Salt Tolerance
Low to moderate

Siltation Tolerance
High

Flowering Color and Time
Brown
May to September

Light Preference
Partial to full sun

Seeding Rate
.06 - .125 lbs/acre



Scirpus tabernaemontani Soft-stem Bulrush

(*S. validus creber*) Great Bulrush

Preferred Water Depth and Inundation Tolerance

Prefers water at a depth of 12-20 inches (Max: 4'/Min: saturated soil to 6"). Species tolerates flooding of 2 feet or more, but not total inundation, for 3 weeks or longer during the growing season.

Wildlife Value

Achenes are eaten by many waterfowl, shorebirds, and rails. Plants are eaten by muskrats. Provides valuable nesting cover for waterfowl and habitat for insects and young fish.

Application/Zone

Excellent for lower shoreline zone stabilization. Also used in vegetated swales.

Availability, Establishment, and Maintenance

- Achenes, rhizomes, rootstocks, and container plants are available from several commercial vendors.
- Seeding in the fall is more successful than in the spring. Sow fresh collected achenes on wet mudflats at the end of the growing season. Seeded area must be kept wet and covered with 1-2 inches of water during the winter, followed by spring drawdown. Avoid submergence of young seedlings.
- Rootstock, rhizomes, and transplants are the preferred material for more reliable plant establishment. Best results are achieved with spring planting. Plant rootstocks and rhizomes at a depth of 5-6 inches in soil. Entire plants may be planted in 6 inches of soil and up to 1 foot of water. Space propagules on 2-6 foot centers because of their rapid rate of spread.
- Manipulation of water levels is desirable for promoting seed germination and vegetative establishment. Late spring drawdown is most favorable with gradual increase of water level.
- Because muskrats and Canada geese may depredate new plantings, control measures must be taken.
- This species is sensitive to oxygen depletion.

Soft-Stem Bulrush *Scirpus tabernaemontani*

Great Bulrush (*S. validus creber*)

Mature Height
3-9 feet

Plant Type
Perennial emergent herb

Indicator Status
Obligate

pH
6.5-8.5

Nutrient Load Tolerance
Moderate

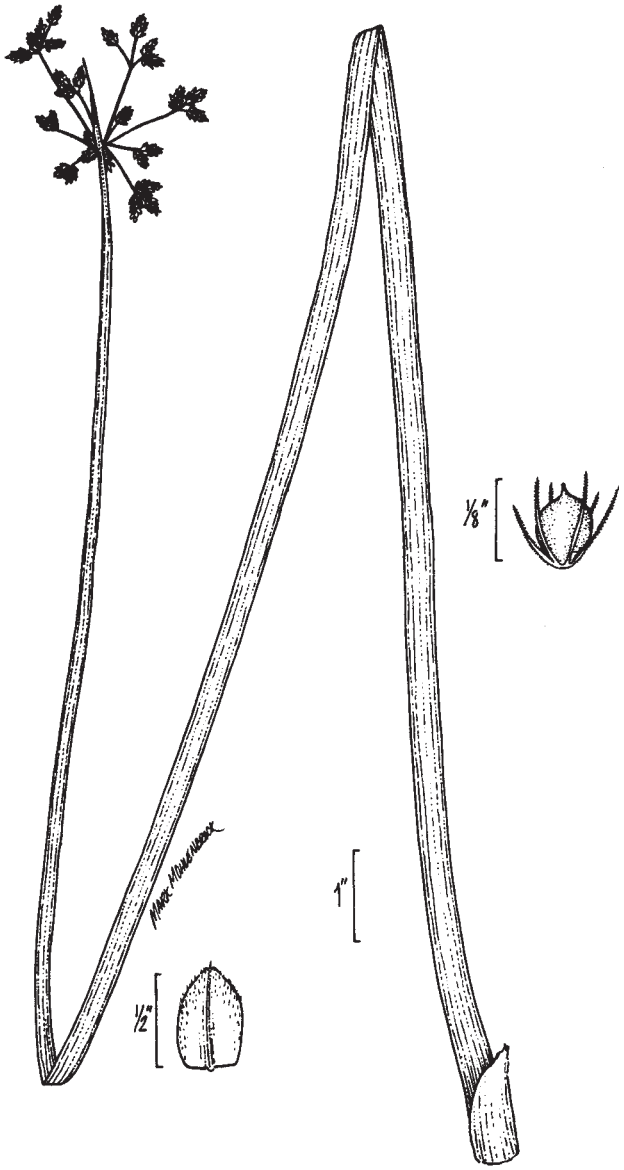
Salt Tolerance
Low to moderate

Siltation Tolerance
Moderate

Flowering Color and Time
Brown
June to August

Light Preference
Full sun

Seeding Rate
.06 - .25 lbs/acre



Silphium laciniatum Compass Plant

Preferred Water Depth and Inundation Tolerance

Usually a mesic prairie species, which does not tolerate inundation in artificial situations. This is not necessarily true in natural areas, as it is occasionally seen in sedge meadows and wet prairies.

Wildlife Value

Songbirds eat seed. Deer graze on plant. This species attracts butterflies and provides a food source for silphium weevil.

Application/Zone

Used for upland slope buffer stabilization.

Availability, Establishment, and Maintenance

- Propagation is very successful from seed. Because of a tough seed coat, moist, cold stratification at 33-38° F for 10-60 days is beneficial. After stratification, sow seeds at a shallow depth (1/2 inch) in the spring.
- This is a very slow growing plant above ground. It may only grow one leaf in the first year and may need some protection.
- Direct seeding has been moderately successful.
- Deep taproot discourages transplanting, but can be successful if the taproot is not broken.
- Fall seeding can be very successful.

Compass Plant *Silphium laciniatum*

Mature Height
Up to 10 feet

Plant Type
Perennial herb

Indicator Status
Upland

pH
4.5-7.5

Nutrient Load Tolerance
Low

Salt Tolerance
Not available

Siltation Tolerance
Low

Flowering Color and Time
Yellow
July to September

Light Preference
Full sun

Seeding Rate
.03 - .19 lbs/acre

Silphium terebinthinaceum Prairie Dock

Preferred Water Depth and Inundation Tolerance

Wet prairie or sedge meadow species. Species tolerates 0-6 inches of inundation for short durations early in the season.

Wildlife Value

Palatable to grazing species. Attracts butterflies and other insects.

Application/Zone

Used for upland slope buffer stabilization.

Availability, Establishment, and Maintenance

- Easily propagated from seed.
- To produce bare root transplants, sow seed 1/2 inch deep in late summer. Late planting is necessary because of rapid growth of taproot and will produce transplant stock in the fall or early the following spring.
- On permanent sites, use transplants in the fall or early spring, or sow unstratified seed in the fall or stratified seed in the spring.
- Requires light for germination.

Prairie Dock *Silphium terebinthinaceum*

Mature Height
Up to 10 feet

Plant Type
Perennial herb

Indicator Status
Facultative (-)

pH
4.5-7.5

Nutrient Load Tolerance
Low to moderate

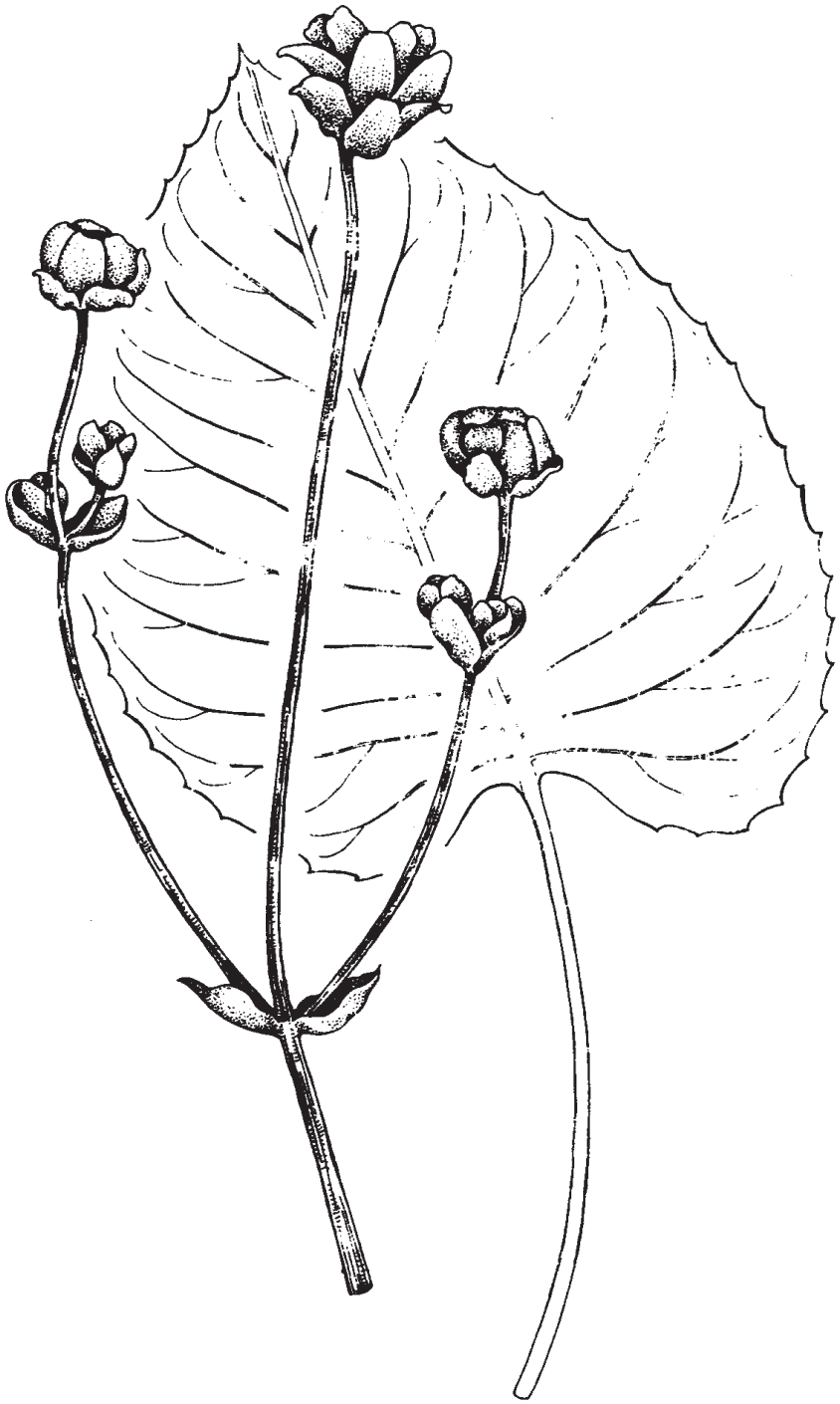
Salt Tolerance
Low

Siltation Tolerance
Low to moderate

Flowering Color and Time
Yellow
July to September

Light Preference
Full sun

Seeding Rate
.03 - .19 lbs/acre



Solidago gigantea Late Goldenrod

Preferred Water Depth and Inundation Tolerance

Prefers moist to saturated soil.

Wildlife Value

Provides cover for small mammals and songbirds.

Application/Zone

Used in upper shoreline zones, for streambank stabilization, and in vegetated swales.

Availability, Establishment, and Maintenance

- Available as divisions, stem cuttings, and seed.
- Seed germinates quickly in warm humid conditions.
- Can be aggressive and form monocultures in restorations and natural areas.

Late Goldenrod *Solidago gigantea*

Mature Height
Up to 8 feet

Plant Type
Perennial herb

Indicator Status
Facultative Wet

pH
Not available

Nutrient Load Tolerance
Moderate to high

Salt Tolerance
Not available

Siltation Tolerance
Moderate

Flowering Color and Time
Yellow
July to October

Light Preference
Full sun

Seeding Rate
.125 lbs/acre

Solidago rigida Stiff Goldenrod

Preferred Water Depth and Inundation Tolerance

Prefers dry to mesic soil. Species has a minimal flooding tolerance.

Wildlife Value

Provides cover and food for songbirds. Attracts insects.

Application/Zone

Used for upland slope buffer stabilization.

Availability, Establishment, and Maintenance

- Widely available as seed and establishes readily from seed.
- Excellent germination and coverage can be achieved by direct fall seeding on bare soil.
- Seed can be broadcast by hand or drilled.

Stiff Goldenrod *Solidago rigida*

Mature Height
Up to 6 feet

Plant Type
Perennial herb

Indicator Status
Facultative Upland (-)

pH
Not available

Nutrient Load Tolerance
Low to moderate

Salt Tolerance
Low

Siltation Tolerance
Low

Flowering Color and Time
Yellow
Mid July to October

Light Preference
Full sun

Seeding Rate
.06 - .3 lbs/acre

Sorghastrum nutans Indian Grass

Preferred Water Depth and Inundation Tolerance

Prefers mesic prairie zone. Species has no inundation tolerance.

Wildlife Value

Palatable and very nutritious to grazing species. Attracts butterflies. Provides cover for small mammals and songbirds.

Application/Zone

Dense, tangled root system binds soil well and can stabilize upland slope buffers. Slows runoff.

Availability, Establishment, and Maintenance

- Propagation by seed is best. Can be planted in the fall or late April to June.
- Debearding produces free-flowing seed that can usually be sown by drill or by hand broadcasting but debearding is not necessary.
- This species is first to establish matrix in prairie restorations, then reduces dominance and gives way to Big Bluestem after 3 - 5 years.
- Be cautious of non-local seed and hybrids.

Indian Grass *Sorghastrum nutans*

Mature Height
4-8 feet

Plant Type
Perennial grass

Indicator Status
Facultative Upland (+)

pH
Wide range

Nutrient Load Tolerance
Low

Salt Tolerance
Not available

Siltation Tolerance
Low to moderate

Flowering Color and Time
Golden brown
August to September

Light Preference
Full sun

Seeding Rate
2.5 - 6.0 lbs/acre

Sparganium eurycarpum Common Burreed

Preferred Water Depth and Inundation Tolerance

Prefers 12 inches of water in shallow marsh and water margins (Max: 24"/Min: 2").

Wildlife Value

Achenes are eaten by waterfowl, pheasant, and beaver. Muskrats eat the entire plant. Leafy growth is good cover for nesting ducks, muskrats, and marsh birds. Tubers are eaten by ducks.

Application/Zone

Used in lower shoreline zones for erosion control along lake and pond margins. The spreading root system makes an excellent buffer against wave action.

Availability, Establishment, and Maintenance

- Corms, rhizomes, rootstock, and transplants are available from several commercial vendors.
- Achenes have prolonged dormancy and low germination rates. They are also buoyant and float to the waterline. Achenes may be scarified and stored in 36-37° F water for at least one year for good germination. Overwintering in water that is allowed to freeze has also been successful.
- Corms and rhizomes are more successful than seed and can be planted in soil inundated with 2 inches of water or saturated soil in the spring. This species has a rapid rate of spread and should be planted on 2-6 foot centers.
- Potted, seed-grown plants are available and transplant well.

Common Burreed *Sparganium eurycarpum*

Mature Height
20 inches to 4 feet

Plant Type
Perennial emergent herb

Indicator Status
Obligate

pH
6.7-8.8

Nutrient Load Tolerance
Low to moderate

Salt Tolerance
Low to moderate

Siltation Tolerance
Low to moderate

Flowering Color and Time
White
June to August

Light Preference
Partial to full sun

Seeding Rate
.2 - .375 lbs/acre

Spartina pectinata Prairie Cordgrass

Preferred Water Depth and Inundation Tolerance

Prefers wet meadow conditions and saturated soil to 3 inches of inundation. Species will tolerate seasonal inundation.

Wildlife Value

Early growth provides some forage value to rodents and deer. Older growth is not readily grazed. Also provides food for waterfowl, marsh birds, and shore birds. Muskrats eat roots. Also used for wildlife cover and provides nesting habitat for marsh wren.

Application/Zone

Used in upper shoreline zones, for streambanks, upland slope buffer stabilization and in vegetated swales.

Availability, Establishment, and Maintenance

- Rhizomes and young transplants are used since seed viability can be very low.
- Preferred planting of rhizomes is 5 inches deep on 1-3 foot centers in April or May. Young transplants are most successful and widely used.
- A minimum of 1 gallon of water per linear foot per row or 1 acre inch of water should beapplied after planting. Plants require saturated, not flooded, soil to maintain stand.
- Plantings may be burned annually to stimulate seed production. Competes well with reed canary grass when established.

Prairie Cordgrass *Spartina pectinata*

Mature Height
5-7 feet

Plant Type
Perennial grass

Indicator Status
Facultative Wet (+)

pH
4.7-7.8

Nutrient Load Tolerance
Moderate to high

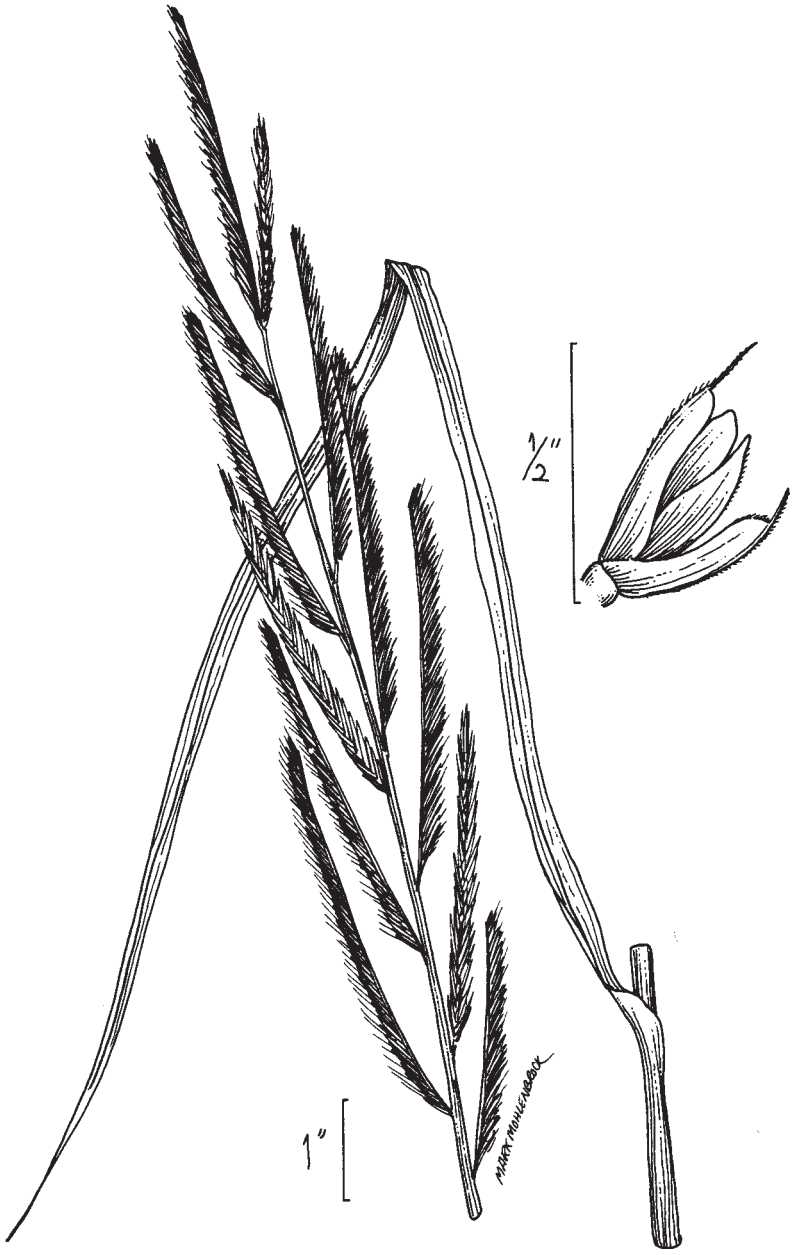
Salt Tolerance
Low to moderate

Siltation Tolerance
Moderate

Flowering Color and Time
Greenish yellow
July to August

Light Preference
Full sun

Seeding Rate
.5 - 2.0 lbs/acre



Tradescantia ohiensis Spiderwort

Preferred Water Depth and Inundation Tolerance

Dry to mesic species. Species has some tolerance of early seasonal flooding for short durations. Drought tolerant.

Wildlife Value

Not available

Application/Zone

Used for upland slope buffer stabilization.

Availability, Establishment, and Maintenance

- Available as seed or plants.
- For best results from seed, sow fresh seed in fall, or store the seeds in cold, moist storage for 120 days before planting.
- Kelp-based fertilizers also stimulate germination.

Spiderwort *Tradescantia ohiensis*

Mature Height
1-3 feet

Plant Type
Perennial herb

Indicator Status
Facultative Upland

pH
Not available

Nutrient Load Tolerance
Moderate

Salt Tolerance
Not available

Siltation Tolerance
Moderate

Flowering Color and Time
Purple
Mid May to October

Light Preference
Partial to full sun

Seeding Rate
.06 - 1.0 lbs/acre

Verbena hastata Blue Vervain

Preferred Water Depth and Inundation Tolerance

Species tolerates moderate inundation of 0-8 inches of water as found in wet prairies, stream banks, and marshes.

Wildlife Value

Seeds are eaten by wildlife. Attracts butterflies. Small mammals eat shoots.

Application/Zone

Used in upper shoreline zones, for streambank stabilization, and in vegetated swales.

Availability, Establishment, and Maintenance

- Seed is widely available from commercial vendors.
- Propagation is easy by seed. Seed may need cold, moist stratification at 33-38° F for 30-90 days. Alternatively, some have found best germination of seed when stored dry at 40° F then shifted to 70° F with light. Sow on the surface of the soil because seeds require light to germinate.
- Division works well in the spring. Cuttings work well in the summer.
- This is a good pioneer species.

Blue Vervain *Verbena hastata*

Mature Height
Up to 5 feet

Plant Type
Perennial herb

Indicator Status
Facultative Wet (+)

pH
6-7

Nutrient Load Tolerance
Moderate to high

Salt Tolerance
Moderate to high

Siltation Tolerance
Moderate to high

Flowering Color and Time
Purple/Blue
July to September

Light Preference
Full sun

Seeding Rate
.015 - .125 lbs/acre

Vernonia fasciculata Common Iron Weed

Preferred Water Depth and Inundation Tolerance

Wet prairie, sedge meadow, and shallow marsh species. Species tolerates inundation of 2-3 inches early in the season.

Wildlife Value

Serves as a nectar source for insects.

Application/Zone

Stoloniferous habit stabilizes upper shorelines and upland slope buffers.

Availability, Establishment, and Maintenance

- The germination percentage for Common Iron Weed is very low which may be because it produces many nonviable seeds. Germination rates can be increased by sowing stored seed in a seed frame outdoors in June. If soil temperature is consistently warm, germination and seedling growth are very rapid.
- Transplant seedlings to individual containers when a rosette-like cluster of 3 to 4 four leaves develop and then move plants to the site when roots fill containers.
- For cuttings, take 4-6 inch stem cuttings in June or July. Root in a 50/50 mix of peat moss and sand. They should be well-rooted in 4 to 5 weeks and may then be transplanted into 3 to 4 inch pots. When well established, they may be transplanted on site or overwintered indoors in the pots for spring planting.
- Cuttings may not be necessary because establishment from seed has been observed in restorations.
- Seed availability may be sporadic due to an insect pest.

Common Iron Weed *Vernonia fasciculata*

Mature Height
Up to 6 feet

Plant Type
Perennial herb

Indicator Status
Facultative Wet

pH
5.6-7

Nutrient Load Tolerance
Low to moderate

Salt Tolerance
Not available

Siltation Tolerance
Moderate

Flowering Color and Time
Purple
July-August

Light Preference
Full sun

Seeding Rate
.06 - .19 lbs/acre

Viburnum dentatum lucidum Arrow Wood Viburnum

(*V. recognitum*)

Preferred Water Depth and Inundation Tolerance

Prefers dry to moist soil.

Wildlife Value

Provides cover and nesting habitat for songbirds.

Application/Zone

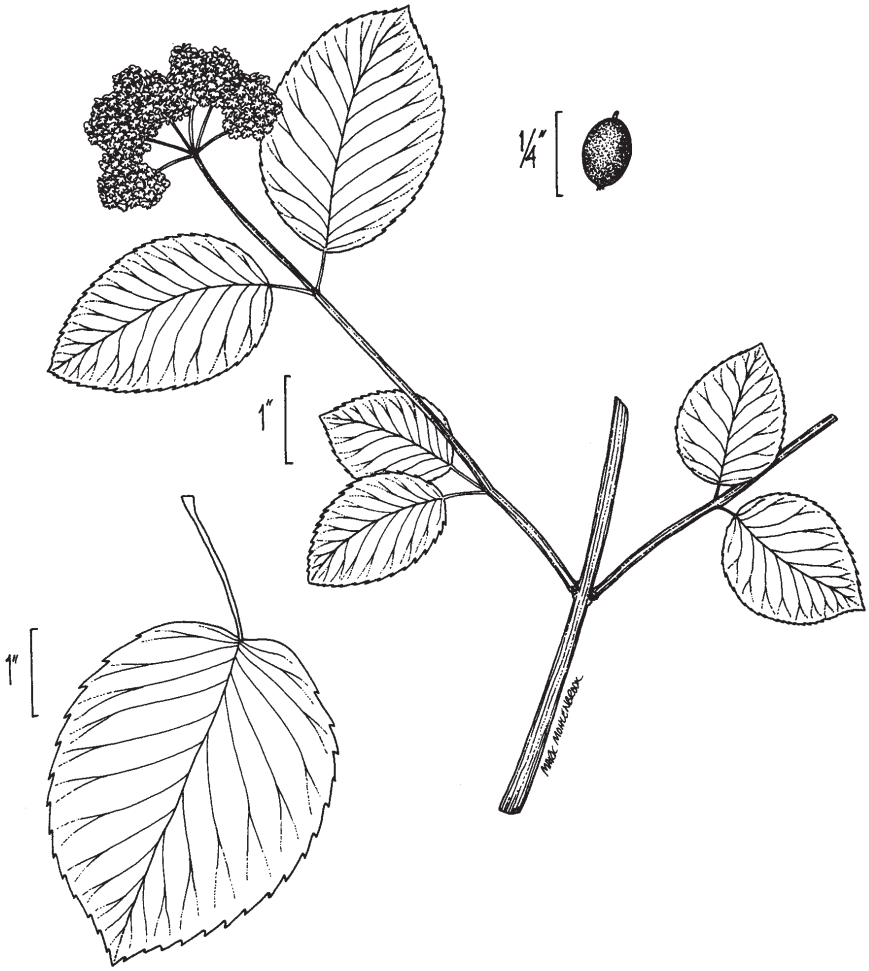
Used for upland slope buffer stabilization.

Availability, Establishment, and Maintenance

- Available as bare root or balled and burlapped. Spreads vegetatively.
- For seeds warm, moist stratification followed by cold, moist stratification has been reported to break dormacy.

Arrow Wood Viburnum *Viburnum dentatum lucidum*

(*V. recognitum*)



Mature Height
Up to 10 feet

Plant Type
Deciduous shrub

Indicator Status
Facultative Wet (-)

pH
Not available

Nutrient Load Tolerance
Low to moderate

Salt Tolerance
Not available

Siltation Tolerance
Low to moderate

Flowering Color and Time
White
May to June

Light Preference
Partial to full sun

Seeding Rate
Not applicable

Viburnum lentago Nannyberry

Preferred Water Depth and Inundation Tolerance

Prefers moist to saturated soils in mesic woods. Species tolerates 1 inch of standing water.

Wildlife Value

Edible fruits attract birds. Provides food and nesting habitat for songbirds, such as, gray catbird, common flicker, American robin, eastern bluebird, cedar waxwing, and other species.

Application/Zone

Used in upper shoreline zones, for streambank stabilization, and on upland slope buffers.

Availability, Establishment, and Maintenance

- Available as bare root, container-grown, or balled and burlapped.
- Spreads vegetatively by suckers.
- Has fast growth rate, 2-2.5 feet per year.
- Some observations indicate berry pulp may need to be washed from the seed in order to achieve better germination.
- Moist, warm stratification of seeds followed by moist, cold stratification has been reported to break dormacy by some sources.

Nannyberry *Viburnum lentago*

Mature Height
15-35 feet

Plant Type
Small tree/shrub

Indicator Status
Facultative (+)

pH
6.0-7.5

Nutrient Load Tolerance
Moderate

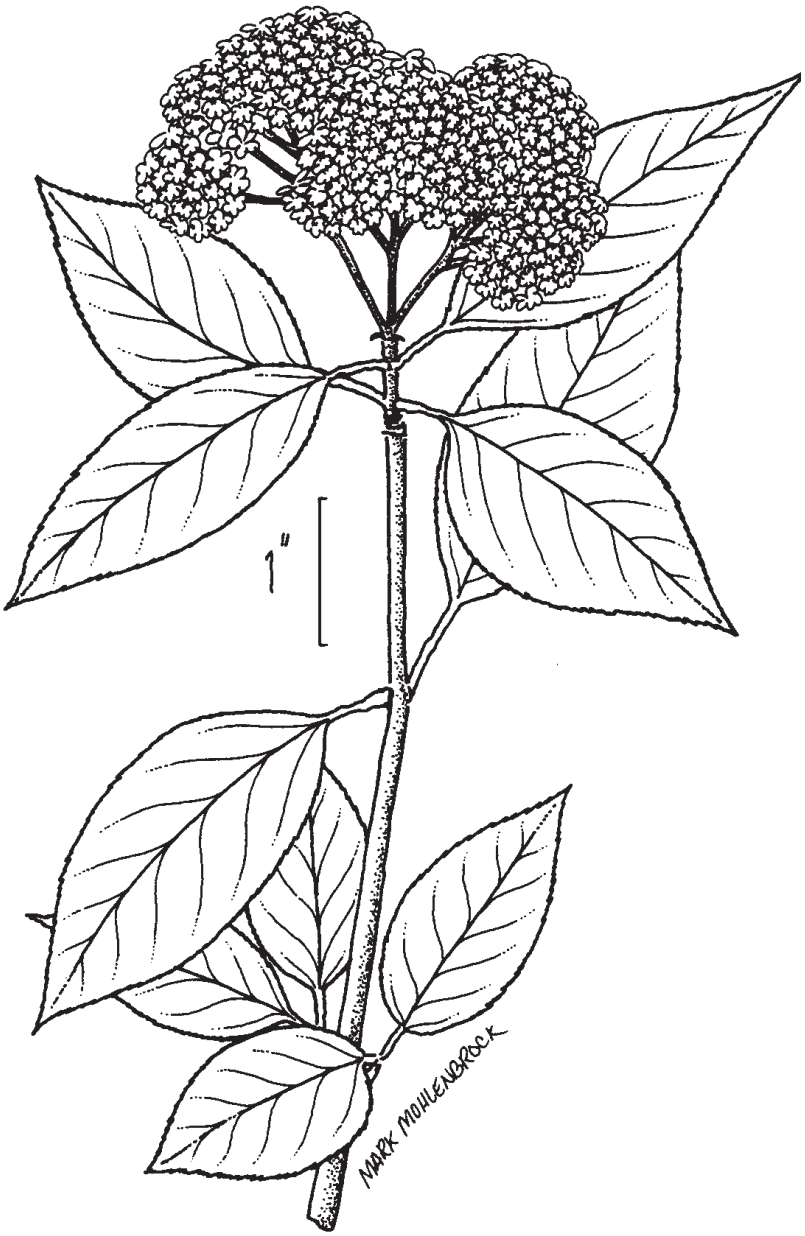
Salt Tolerance
Low

Siltation Tolerance
Low

Flowering Color and Time
White
May to June

Light Preference
Partial sun to full sun
Shade tolerant

Seeding Rate
Not applicable



Appendix A

Contacts for Further Information

U.S. Fish and Wildlife Service
Chicago, Illinois Field Office
1250 South Grove Ave., Suite 103
Barrington, Illinois 60010
Phone: (847) 381-2253
Fax: (847) 381-2285

U.S. Army Corps of Engineers
Chicago District, Regulatory Branch
111 N. Canal Street, 6th Floor
Chicago, IL 60606-7206
Phone: (312) 846-5535
Fax: (312) 353-4110
http://www.lrc.usace.army.mil/co-r

U.S. Environmental Protection Agency
Region 5, WW-16J
77 West Jackson Blvd.
Chicago, IL 60604
Phone: (312) 353-2308
Fax: (312) 886-7804

Kane-DuPage SWCD
USDA-NRCS
2315 Dean Street, Suite 100
St. Charles, IL 60174
Phone: (630)-584-7961 x 3
Fax: (630) 584-9534
http://www.kanedupageswcd.org
http://www.il.nrcs.usda.gov

Lake County SWCD
USDA-NRCS
100 N. Atkinson Road, Suite 102-A
Grayslake, IL 60030-7805
Phone: (847) 223-1056
Fax: (847) 223-1127
http://www.lakeswcd.org
http://www.il.nrcs.usda.gov

McHenry County SWCD
USDA-NRCS
1648 South Eastwood Drive
Woodstock, IL 60098
Phone: (815) 338-0099 x 3
Fax: (815) 338-7731
http://www.mchenryswcd.org
http://www.il.nrcs.usda.gov

North Cook County SWCD
USDA-NRCS
899 Jay Street
Elgin, IL 60120
Phone: (847) 468-0071 x 2
Fax: (847) 608-8302
http://www.northcookswcd.org
http://www.il.nrcs.usda.gov

Will-South Cook SWCD
USDA-NRCS
1201 Gouger Road
New Lenox, IL 60451
Phone: (815) 462-3106 x 3
Fax: 815-462-3176
http://www.will-scookswcd.org
http://www.il.nrcs.usda.gov

Chicago Botanic Garden
1000 Lake Cook Road
Glencoe, IL 60022
Phone: (847) 835-5440
http://www.chicagobotanic.org

DuPage County Dept. of Development and OEnvironmental Concerns
421 North County Farm Road
Wheaton, IL 60187
Phone: (630) 682-7220
Fax: (630) 784-3773
http://www.dupageco.org

Kane County Department of Environmental Management
719 S. Batavia Avenue, Bldg. A
Geneva, IL 60134
Phone: (630) 208-5118
Fax: (630) 208-5137
http://www.co.kane.il.us/Environment/index.htm

Lake County Health Department
Lakes Management Unit
3010 Grand Avenue
Waukegan, IL 60085
Phone: (847) 377-8030
Fax: (847) 249-4972
http://www.co.lake.il.us/health/ehs

Lake County Stormwater Management Commission
333-B Peterson Road
Libertyville, IL 60048
Phone: (847) 918-5260
Fax: (847) 918-9826
http://www.co.lake.il.us/smc

Northeastern Illinois Planning Commission
Natural Resources Department
222 South Riverside Plaza, Suite 1800
Chicago, IL 60606
Phone: (312) 454-0400
Fax: (312) 454-0411
http://www.nipc.cog.il.us

Appendix B

List of Native Plant Material Vendors

The following is a list of sources that provide wetland, forest, and prairie plant material and seeds for species native to northeastern Illinois. This information is provided as a public service and does not constitute a recommendation or endorsement, nor does the absence of a firm from the list constitute a negative endorsement. While an effort has been made to provide a complete and accurate listing, omissions or other errors may occur and, therefore, other available sources of information should be consulted.

This list was compiled by the U.S. Fish and Wildlife Service's Chicago, Illinois Field Office. Contact their office, using the information in Appendix A, for any updates or corrections to the list.

Yearly Native Plant Sales

Kane-DuPage SWCD
2315 Dean Street, Suite 100
St. Charles, IL 60174
Phone: (630)-584-7961 x 3
Fax: (630) 584-9534
http://www.kanedupageswcd.org

Lake County SWCD
100 N. Atkinson Road, Suite 102-A
Grayslake, IL 60030-7805
Phone: (847) 223-1056
Fax: (847) 223-1127
http://www.lakeswcd.org

McHenry County SWCD
1648 South Eastwood Drive
Woodstock, IL 60098
Phone: (815) 338-0099 x 3
Fax: (815) 338-7731
http://www.mchenryswcd.org

North Cook County SWCD
899 Jay Street
Elgin, IL 60120
Phone: (847) 468-0071 x 2
Fax: (847) 608-8302
http://www.northcookswcd.org

Will-South Cook SWCD
1201 Gouger Road
New Lenox, IL 60451
Phone: (815) 462-3106 x 3
Fax: 815-462-3176
http://www.will-scookswcd.org

Lake County Forest Preserves
2000 N. Milwaukee Ave.
Libertyville, IL 60048
Phone: (847) 968-3333, x 0

Citizens for Conservation
211 N. Ela Rd.
Barrington, IL 60011
Phone: (847) 382-7283

McHenry County Defenders
Wildflower Propagation & Preservation Committee
132 Cass St.
Woodstock, IL 60098
Phone: (815) 338-0393

Schaumburg Community Garden Club
c/o Spring Valley Nature Sanctuary
1111 E. Schaumburg Rd.
Schaumburg, IL 60194
Phone: (847) 985-2100

Nurseries

Illinois

Country Road Greenhouses
(Wholesale)
19561 E. Twombly Road
Rochelle, IL 61068
Phone: (815) 384-3311
Fax: (815) 384-5015
http://www.prairieplugs.com

Genesis Nursery, Inc.
(Wholesale)
RR 1, Box 32
Walnut, IL 61376
Phone: (815) 438-2220

The Natural Garden
38W443 Hwy. 64
St. Charles, IL 60175
Phone: (630) 584-0150
Fax: (630) 584-0185

Possibility Place Nursery
(Retail by appointment only)
7548 W. Monee-Manhatten Rd.
Monee, IL 60449
Phone: (708) 534-3988
Fax: (708) 534-6272
http://www.possibilityplace.com

Indiana

J.F. New Nursery
128 Sunset Drive
Walkerton, IN 46574-1078
Phone: (574) 586-2412
http://www.jfnew.com

Spence Restoration Nursery
(Wholesale)
P.O. Box 546
Muncie, IN 47308
Phone: (765) 286-7154
Fax: (765) 286-0264
http://www.spencenursery.com

Iowa

Ion Exchange Seed/Plant Nursery
Rt. 1, Box 48C
Harper's Ferry, IA 52146
Phone: (800) 291-2143

Wisconsin

Kester's Wild Game Food Nurseries
P.O. Box 516
Omro, WI 54963
Phone: (920) 685-2929
Fax: (920) 685-6727
http://www.kestersnursery.com

Northwind Perennial Farms
7047 Hospital Road
Burlington, WI 53105
Phone: (262) 248-8229
http://www.northwindperennialfarm.com

Prairie Nursery
P.O. Box 306
Westfield, WI 53964
Phone: (800) 476-9453
Fax: (608) 296-2741
http://www.prairienursery.com

Prairie Ridge Nursery
9738 Overland Road
Mt. Horeb, WI 53572
Phone: (608) 437-5245
Fax: (608) 437-8982
http://www.prairieridgenursery.com

Shady Acres Perennial Nursery
5725 South Martin Road
New Berlin, WI 53146
Phone: (262) 679-1610
http://www.shadyacresnursery.com

Taylor Creek Nursery
17921 Smith Rd.
P.O. Box 256
Brodhead, WI 53520
Phone: (608) 897-8641
Fax: (608)897-8486
http://www.appliedeco.com

Appendix C

Prescribed Burn Contractor List

The following is a list of consultants in the northeastern Illinois area that provide controlled burning as a service. This information is provided as a public service and does not constitute a recommendation, endorsement or certification of their qualifications or performance record, nor does the absence of a firm from the list constitute a negative endorsement. While an effort has been made to provide a complete and accurate listing, omissions or other errors may occur and therefore other available sources of information should be consulted. Those seeking professional services are advised to use independent judgment in evaluating the credentials of any firms appearing on this list.

This list was compiled by the U.S. Fish and Wildlife Service's Chicago, Illinois Field Office. Contact their office, using the information provided in Appendix A, for any updates or corrections to the list.

Applied Ecological Services, Inc.
Mark O'Leary
120 West Main Street
West Dundee, IL 60118
Phone: (847) 844-9385
Cell: (708) 906-8185

Aramark - ServiceMaster
David Wachtel
2300 Warrenville Road
Downers Grove, Illinois 60515
Phone: (630) 271-2281

Christopher B. Burke Engineering Ltd.
Jedd Anderson
9575 West Higgins Road, Suite 600
Rosemont, IL 60018
Phone: (847) 823-0500

Conservation Land Stewardship
Ken Willis
375 W. First Street
Elmhurst, Illinois 60126
Phone: (630) 559-2039

ENCAP, Inc.
Joe Alaniz/Carl Peterson
12961 State Route 38
P.O. Box 847
Cortland, IL 60112-0847
Phone: (815) 758-1621

Eubanks & Associates, Inc.
Dave Eubanks
10350 Dearlove Rd., Unit D
Glenview, Illinois 60025
Phone: (847) 824-8325

Integrated Lakes Management
Jim Bland
83 Ambrogio Drive, Suite K
Gurnee, Illinois 60031
Phone: (847) 244-6662

LaFayette Home Nursery, Inc.
Dave Lahr
LaFayette, IL 61449
Phone: (309) 995-3311

Landscape Resources, Inc.
Brian Baumgartner
1135 South Lake Street
Montgomery, IL 60538
Phone: (630) 801-1122
Fax: (630) 801-1433

Natural Resource Management, Inc.
Doug Short
P.O. Box 702
Beecher, Illinois 60401
Phone: (708) 935-2100

Pizzo and Associates
Jack Pizzo
10729 Pine Road
Leland, Illinois 60531
Phone: (815) 495-2300

V3 Consultants
Tom Slowinski
7325 Janes Avenue, Suite 100
Woodridge, IL 60517
Phone: (630) 724-9200

Appendix D

Natural Areas Contractor List

The following is a list of contractors that provide services including brush cutting, herbicide application, drain tile removal and other similar services in northeastern Illinois. This information is provided as a public service and does not constitute a recommendation or endorsement, nor does the absence of a firm from the list constitute a negative endorsement. While an effort has been made to provide a complete and accurate listing, omissions or other errors may occur and therefore, other available sources of information should be consulted.

This list was compiled by the U.S. Fish and Wildlife Service's Chicago, Illinois Field Office. Contact their office, using the information in Appendix A, for any updates or corrections to the list.

Applied Ecological Services, Inc.
Mark O'Leary
120 West Main Street
West Dundee, IL 60118
Phone: (847) 844-9385
Cell: (708) 906-8185

Aramark - ServiceMaster
David Wachtel
2300 Warrenville Road
Downers Grove, Illinois 60515
Phone: (630) 271-2281

Arbor Images
Kevin Remer
W296 Spring Prairie Road
Burlington, WI 53105
Phone: (262) 763-4645
Fax: (262) 763-5090

Backtrack Construction
John Suchy
372 West County Line Road
Barrington, IL 60010
Phone: (847) 381-6182
Cell (847) 204-0245

Brush Busters
Don Schroeder
18370 Burns Parkway
Anoka, MN 55303
Phone: (763) 441-8651
Cell: (612) 865-1043
Fax: (763) 441-4847

Civil Engineering Services, Inc.
Rick Woodford
700 E. Diehl Road, Suite 180
Naperville, Illinois 60563
Phone: (630) 577-1551

Conservation Land Stewardship
Ken Willis
375 W. First Street
Elmhurst, Illinois 60126
Phone: (630) 559-2039

ENCAP, Inc.
Joe Alaniz/Carl Peterson
12961 State Route 38
P.O. Box 847
Cortland, IL 60112-0847
Phone: (815) 758-1621

Eubanks & Associates, Inc.
Dave Eubanks
10350 Dearlove Rd., Unit D
Glenview, Illinois 60025
Phone: (847) 824-8325

Illinois Natural Areas Improvements
Bryon Walters
3885 E 550th Road
Mendota, IL 61342
Phone: (815) 252-9605
Fax (815) 539-6377

Integrated Lakes Management
Jim Bland
83 Ambrogio Drive, Suite K
Gurnee, Illinois 60031
Phone: (847) 244-6662

J.F. New & Associates
Clayton Wooldridge
722 W. Exchange
Crete, Illinois 60417
Phone: (708) 367-1130

Landscape Resources, Inc.
Brian Baumgartner
1135 South Lake Street
Montgomery, IL 60538
Phone: (630) 801-1122
Fax: (630) 801-1433

Natural Resource Management, Inc.
Doug Short
P.O. Box 702
Beecher, Illinois 60401
Phone: (708) 935-2100

Pizzo and Associates
Jack Pizzo
10729 Pine Road
Leland, Illinois 60531
Phone: (815) 495-2300

Turning Leaf Restoration
David Hodge
1158 Pinetree Lane
Bartlett, IL 60103
Phone: (630) 540-7533
Cell: (630) 624-5323

Witness Tree Native Landscapes
June Keibler, Mary Zaander
121 Ford Street
Geneva, Illinois 60134
Phone: (630) 262-1160

Brad Woodson
14401 Trinity Ct.
Woodstock, IL 60098
Phone: (815) 337-6040 (Home)
Phone: (815) 653-2297 (Work & MCCD)

Appendix E

Wetland and Natural Areas Consultant List

The following is a list of consultants that provide wetland and/or natural area consulting services in northeastern Illinois. This information is provided as a public service and does not constitute a recommendation or endorsement, nor does the absence of a firm from the list constitute a negative endorsement. While an effort has been made to provide a complete and accurate listing, omissions or other errors may occur and therefore, other available sources of information should be consulted.

This list was compiled by the U.S. Fish and Wildlife Service's Chicago, Illinois Field Office. Contact their office, using the information in Appendix A, for any updates or corrections to the list.

Applied Ecological Services, Inc.
120 West Main Street
West Dundee, IL 60118
Phone: (847) 844-9385
http://www.appliedeco.com
Contact: Mark O'Leary

Christopher B. Burke Engineering, Ltd.
9575 W. Higgins Road, Suite 600
Rosemont, IL 60018
Phone: (847) 823-0500
http://www.cbbel.com
Contact: Jedd Anderson

Conservation Design Forum, Inc.
375 West First Street
Elmhurst, Illinois 60126
Phone: (630) 559-2000
http://www.cdfinc.com
Contact: James Patchett/Ken Johnson

Conservation Services, Inc.
9313 Bull Valley Road
Woodstock, IL 60098
Phone: (815) 338-7664
Contact: Ken Fiske

CTE Engineers, Inc.
303 East Wacker Drive, Suite 600
Chicago, IL 60601-5276
Phone: (312) 938-0300
http://www.cte-eng.com
Contact: Brian Smith

Cowhey Gudmundson Leder, Ltd.
300 Park Boulevard, Suite 205
Itasca, IL 60143
Phone: (630) 250-9595
http://www.cgl-ltd.com
Contact: Irma Terry

EnCAP, Inc.
12961 State Route 38
P.O. Box 847
Cortland, IL 60112-0847
Phone: (815) 758-1621
Contact: Mark Southern/Carl Peterson

EquiPoise, Inc.
2119 West Morse Avenue
Chicago, IL 60645
Phone: (773) 761-2431
Contact: J. Marshall Eames

Graef, Anhalt, Schloemer, & Associates, Inc.
One Honey Creek Corporate Center
125 South 84th Street, Suite 401
Milwaukee, WI 53214-1470
Phone: (414) 259-1500
http://www.gasai.com
Contact: Eric Parker

Hey & Associates, Inc.
26575 West Commerce Dr., Suite 601
Volo, IL 60073
Phone: (847) 740-0888
http://www.heyassoc.com
Contact: Gary Schaefer/Vince Mosca

Integrated Lakes Management
83 Ambrogio Drive, Suite K
Gurnee, IL 60031
Phone: (847) 244-6662
http://www.lakesmanagement.com
Contact: James Bland/Sandy Kubillus

Joseph A. Schudt & Assoc.
19350 South Harlem Avenue
Frankfort, IL 60423
Phone: (708) 720-1000
http://www.jaseng.com
Contact: Matt Anderson

Montgomery-Watson-Harza
175 W. Jackson Blvd., Suite 1900
Chicago, IL 60604-2814
Phone: (312) 831-3000
http://www.montgomerywatsonharza.com
Contact: John Chitty

Natural Areas Ecosystem Management, Inc.
10015 Wright Road
Harvard, IL 60033
Phone: (815) 648-2252
Contact: Randolph J. Stowe

Planning Resources, Inc.
402 West Liberty Drive
Wheaton, IL 60187
Phone: (630) 668-3788
Contact: Lan Richart/Juli Crane

Raisanen & Associates, Inc.
3250 N. Arlington Heights Rd., Suite 106
Arlington Heights, IL 60004
Phone: (847) 870-7762
http://www.raisanen.com
Contact: Donald Raisanen

STS Consultants, Ltd.
750 Corporate Woods Pkwy.
Vernon Hills, IL 60061-3153
Phone: (847) 859-7871
http://www.stsconsultants.com
Contact: Bill Weaver

Ted Gray & Associates, Inc.
822 Hillgrove Avenue, Suite 205
Western Springs, IL 60558
Phone: (708) 784-9930
Contact: Ted Gray

TAMS Consultants, Inc.
111 N. Canal Street, Suite 305
Chicago, IL 60606
Phone: (312) 902-7100
http://www.tamsconsultants.com

V3 Consultants, Inc.
7325 Janes Avenue, Suite 100
Woodridge, IL 60517
Phone: (630) 724-9200
http://www.v3consultants.com
Contact: Thomas Slowinski

Appendix F

Illustration Credits

In order to maintain consistency, species names (scientific and common) in this appendix have been altered to match those used in this guide and may differ from the names used in the publications referenced below. Page numbers listed below correspond with the references listed.

1. The following are illustrations used from ***The Illustrated Flora of Illinois Series*** published by SIU Press. These illustrations are being used with permission from SIU Press. This permission is not transferable, therefore, the illustrations cannot be reproduced without formally requesting permission from SIU Press.

The Illustrated Flora of Illinois: Flowering Plants Series: Rush to Rushes by Mohlenbrock R.H. (C) 1970 by Southern Illinois University Press:

Acorus calamus (Sweet Flag) ..... page 126
Sagittaria latifolia (Common Arrow leaf) ..... page 46
Sparganium eurycarpum (Common Burreed) ..... page 164
Tradescantia ohiensis (Spiderwort) ..... page 176

The Illustrated Flora of Illinois: Flowering Plants Series: Smartweeds to Hazelnuts by Mohlenbrock R.H. and Thompson P. (C) 1973 by the Board of Trustees, Southern Illinois University:

Quercus palustris (Pin Oak) ..... page 149,150

The Illustrated Flora of Illinois: Flowering Plants Series: Grasses: Panicum to Danthonia by Mohlenbrock R.H. (C) 1973 by Southern Illinois University Press:

Andropogon gerardii (Big Bluestem) ..... page 198
Bouteloua curtipendula (Sideoats Grama) ..... page 307
Panicum virgatum (Switch Grass) ..... page 66
Schizacharium scoparium (Little Bluestem) ..... page 207
Sorghastrum nutans (Indian Grass) ..... page 194

The Illustrated Flora of Illinois: Flowering Plants Series: Lilies to Orchids by Mohlenbrock R.H. (C) 1970 by Southern Illinois University Press:

Iris shrevi (called Iris virginiaca in this Guide) (Blue Flag Iris) page 160

2. The following are illustrations provided by Ellen Starr of the USDA Natural Resources Conservation Service.

Aster lanceolatus (Panicled Aster)
Coreopsis tripteris (Tall Coreopsis)
Eupatorium maculatum (Spotted Joe Pye Weed)
Vernonia fasciculata (Common Iron Weed)

3. The following are illustrations used from ***Prairie Plants of Illinois*** by Voight J.W. and Mohlenbrock R.H., Printed by the authority of the State of Illinois, issued by the Department of Conservation, Division of Forest Resources and Natural Heritage.

Aster laevis (Smooth Blue Aster) ..... page 65
Monarda fistulosa (Wild Bergamot) ..... page 169
Petalostemum purpureum (Purple Prairie Clover) ..... page 183
Pycnanthemum virginianum (Common Mountain Mint) ... page 197
Ratibida pinnata (Yellow Cone Flower) ..... page 199
Rudbeckia hirta (Black-Eyed Susan) ..... page 203
Silphium laciniatum (Compass Plant) ..... page 215
Silphium terebinthinaceum (Prairie Dock) ..... page 219
Solidago rigida (Stiff Goldenrod) ..... page 227

4. The following are illustrations used from ***Midwestern Wetland Flora: Field Office Guide to Plant Species*** prepared by Biotic Consultants Inc. of Carbondale, Illinois for the USDA-Soil Conservation Service.

Alisma subcordatum (Common Water Plantain)
Aster novae-angliae (New England Aster)
Bidens cernua (Nodding Beggarsticks)
Bidens frondosa (Common Beggarsticks)
Calamagrostis canadensis (Blue Joint Grass)
Carex comosa (Bristly Sedge)
Carex cristatella (Crested Oval Sedge)
Carex granularis (Pale Sedge)
Carex lanuginosa (Wooly Sedge)
Carex stipata (Awl-fruited Sedge)
Carex vulpinoidea (Fox Sedge)
Celtis occidentalis (Hackberry)
Cephalanthus occidentalis (Common Buttonbush)
Cornus racemosa (Gray Dogwood)
Cornus sericea (Red Osier Dogwood)
Cyperus esculentus (Field Nut Sedge)
Eleocharis obtusa (Blunt Spike Rush)
Eleocharis smallii (Creeping Spike Rush)
Elymus canadensis (Nodding Wild Rye)
Elymus virginicus (Virginia Wild Rye)
Eupatorium perfoliatum (Common Boneset)
Fraxinus pennsylvanica (Green Ash)
Glyceria striata (Fowl Manna Grass)
Helenium autumnale (Common Sneeze Weed)
Helianthus grosseserratus (Sawtooth Sunflower)
Juncus effusus (Common Rush)
Juncus torreyi (Torrey's Rush)
Leersia oryzoides (Rice Cut Grass)
Polygonum amphibium (Water Smartweed)
Quercus bicolor (Swamp White Oak)
Quercus macrocarpa (Bur Oak)
Salix amygdaloides (Peachleaf Willow)
Salix nigra (Black Willow)
Scirpus acutus (Hardstem Bulrush)
Scirpus americanus (Chairmaker's Rush)
Scirpus fluviatilis (River Bulrush)
Scirpus tabernaemontani (Soft-stem Bulrush)
Solidago gigantea (Late Goldenrod)
Spartina pectinata (Prairie Cordgrass)
Verbena hastata (Blue Vervain)
Viburnum dentatum lucidum (Arrow Wood Viburnum)
Viburnum lentago (Nannyberry)

Glossary of Terms

Achene: a dry, single seeded fruit that doesn't split at maturity, similar to a small nut.

Adventive: an exotic plant that is introduced and naturalized.

Allelopathic: any direct or indirect harmful effect of chemicals from one plant on nearby plants.

Annual Plant: a plant that completes its life cycle and dies in one year or less.

Arch Abutment: the part of an arch that directly receives thrust or pressure.

Best Management Practices (BMPs): A practice or combination or practices that are determined to be the most effective and practicable means of controlling point and non-point source pollutants. BMPs include structural devices which temporarily store or treat urban stormwater runoff to remove pollutants, reduce flooding, and protect aquatic habitats. BMPs also include non-structural approaches, such as public education efforts to prevent the dumping of household chemicals into storm drains.

Biennial Plant: a plant that lives for tow years, producing vegetative growth the first year, usually blooming and fruiting in the second year, and then dying.

Bog: a wetland with extensive peat accumulation and a low pH (acid).

Brackish: slightly salty; term applied to water with a saline content that is intermediate between that of freshwater and sea water.

Broadcast: to cast seed widely over the surface of the soil.

Buffer: A protected strip of land along the edge of a stream, lake, or wetland; usually maintained in natural or native vegetation. Buffers provide wildlife habitat, protect shores and banks from erosion, filter water pollutants, and screen sensitive areas from potential adverse effects of development activity.

Buttress Pile: a pile (pier) that supports or strengthens something.

Calcareous: possessing a sufficient quantity of free calcium carbonate or magnesium carbonate to effervesce carbon dioxide visibly when treated with cold 0.1 normal hydrochloric acid; which contribute to a basic condition.

Corm: a short, vertical, often swollen, underground stem, many "bulbs" are actually corms.

Detention Basin: a stormwater facility for storing runoff, with a controlled release of water during and after the rainfall event.

Division: plant propagation by dividing a parent plant into 2 or more. Many parts of plants can be split, including roots, crowns, bulbs, leaves, fronds, etc.

Drawdown: when the water level in a marsh or pond is lowered to expose the bottom sediment.

Drill: sowing seed in rows, usually by machine. The advantage is in more careful spacing of seed and assured seed-soil contact.

Emergent: a rooted, herbaceous, wetland or aquatic plant which manifests some of its adult growth above the waterline, but is rooted underwater.

FAC (Facultative): an indicator category for plants, estimating the probability of a given species to occur in wetlands at 34% to 66%. A positive (+) sign attached to the category indicates a frequency toward the higher end of the probability, and a negative (-) sign indicates a frequency toward the lower end of the probability. The indicator category does not equate to the degrees of wetness tolerated by a given species.

FACU (Facultative Upland): an indicator category for plants, estimating the probability of a given species to occur in wetlands at 1% to 33%. A positive (+) sign attached to the category indicates a frequency toward the higher end of the probability, and a negative (-) sign indicates a frequency toward the lower end of the probability. The indicator category does not equate to the degrees of wetness tolerated by a given species.

FACW (Facultative Wetland): an indicator category for plants, estimating the probability of a given species to occur in wetlands at 67% to 99%. A positive (+) sign attached to the category indicates a frequency toward the higher end of the probability, and a negative (-) sign indicates a frequency toward the lower end of the probability. The indicator category does not equate to the degrees of wetness tolerated by a given species.

Fen: a wetland area usually calcareous in nature, which has a supply of mineral rich ground water as the primary water source and has accumulated peat.

Flatwoods: a low lying woodland composed of hardwood tree species in the canopy which usually occupies the first terrace, not the primary floodplain.

Forested Wetland: a wetland with trees, in this area often adventive, but also including swamps and bottomland hardwood forests.

Genotype: a class or group of individuals sharing a specified genetic makeup.

Hydrologic Regime: the duration and timing of surface water characteristics, as well as, ground water fluctuations.

Impervious: a layer which does not allow water to pass through it.

Influorescence: an individual flower cluster, the arrangement of flowers on a plant.

Inundation: a condition in which water from any source temporarily or permanently covers a land surface.

Loam: a soil texture. Soil material that contains 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand.

Marl: an earthy, unconsolidated deposit consisting chiefly of calcium carbonate mixed with clay or other impurities in varying proportions.

Marsh: wetland that is inundated much or all of the growing season and contains forbs and grasses but not many woody species. A periodically wet or continually flooded area where the surface is not deeply submerged' covered dominantly with sedges, cattails, rushes, or other emergent plants.

Mesic: an area with well drained but moist soil for much of the growing season or year.

Mortality: of or pertaining to the death or death rate of a population.

OBL(Obligate): an indicator category for plants, estimating the probability of a given species to occur in wetlands at 99%. It does not estimate the degree of wetness tolerated by a given species.

Organic Soil: a soil that contains a high percentage (greater than 20 or 30%) of organic matter throughout the upper part of the soil profile.

Peat: a deposit of organic materials in a wet area where the material accumulates more quickly than it decomposes. The material is unconsolidated soil material consisting largely of un-decomposed or only slightly decomposed organic matter accumulated under conditions of excessive moisture and must contain indenfiable original fibers to correctly be called peat. Muck is the same material decomposed past recognition.

Perennial: a non-woody plant which lives more than two years, as distinguished from annuals and biennials.

Prairie: a level to hilly tract of land that has a dominance of grasses and forbs, has a scarcity of shrubs, and is almost treeless. The natural plant community consists of various mixes of native species.

Prairie Swale: a linear depresson that is a least seasonally wet with slowly or non-flowing water and that is heavily vegetated with native grasses and forbs. Prairie swales serve as infiltration measures.

Propagule: a reproductive product of a parent plant. Propagules may be sexual in origin, such as, seeds, or asexual, such as, cuttings.

Pure Live Seed (PLS): the product of the percentage of germination plush the had seed and the percentage of pure live seed, divided by 100.

Rhizome: a horizontal or upright stem found underground or growing across the surface of the substrate, modified for reproduction or for food storage. It is particularly apparent in the rapid underground spread of many grasses.

Saturated: a soil layer with soil water pressure at zero or positive, It is not necessary for all soil pores to be filled with water for a soil to be saturated; some pores may have entrapped air or other gases. In the 1987 US Army Corps of Engineers wetland delineation manual, a soil is saturated when the capillary fringe occurs within 12 inches of the surface.

Scarification: the act of treating a hard coated seed by mechanical abrasion or with acid to fascilitate water absorbtion and hasten germination .

Sedge Meadow: a native wetland plant community dominated by sedges.

Shrub-Scrub Wetland: an area dominated by woody vegetation less than 6 meters (20 feet) tall. Multiple stemmed species, immature tree species, and stunted species may all be found. In this geographic area the species are often adventive.

Stolon: a running stem or branch, aerial or along the surface of the substrate that can root at the nodes.

Stratification: cold treatment to break seed dormancy.

Substrate: the base or substance upon which a plant grows; or, a subsoil or layer underneath another layer.

Suckers: a shoot originating from the roots or lower part of the stem of a plant and usually developing rapidly.

Swale: a wide, shallow ditch or depression used to temporarily convey, store, and filter runoff. *See Prairie Swale.*

Swamp: an area saturated with water throughout much of the year but with the surface of the soil usually not deeply submerged; usually characterized by tree or shrub vegetation. A wetland that is saturated or inundated and contains woody plants. Often used in conjunction with a particular tree name, such as, cypress swamp.

Terrace: a level and ordinarily narrow plain usually with a steep front bordering a river or lake, but often above the primary floodplain in the landscape.

UPL(Upland): an indicator category for plants, estimating the probability of a given species to occur in uplands at 99%.

Watershed: all land and water within the confines of a drainage divide, or, the land which is tributary to a given river, lake, or stream.

Wet Meadow: a wetland that is inundated early in the season and dries out later in the season.

Wet Prairie: a prairie that is composed of grasses, sedges, and forbs and is situated in a moisture regime that is drier than a sedge meadow, but wetter than a mesic prairie. *See Mesic and Prairie.*

Bibliography

Adamus, P.R., F.J. Clairain Jr., R.D. Smith, and R.E.Young. 1987. Wetland evaluation technique (WET); volume II: methodology. Operational draft technical report. US Army Corps of Engineers, Waterways Experiment Station, Vicksburg, MS. 206pp.

Anderson, R.C., P. Bandyopadhay, C. Morton, W. Scott, and V. Tetzlaff. Niche partitioning and phonological and morphological separation between 2 sunflower species. Castaenea. 53:236-242.

Anderson, R.N. 1952. Seed germination and plant development of the weed *Polygonum coccineum*. MS Thesis. University of Nebraska. Lincoln, NE.

Anderson, R.N. 1968. Germination and establishment of weeds for experimental purposes. Weed Sciences Society of America. Urbana, IL.

Arnason, T., R.J. Hebda, and T. Johns. 1981. Use of plants for food and medicine by native people of eastern Canada. Can. J. Bot. 59:2189-2325.

Art, H.A. 1991. The wildflower gardeners guide: midwest, great plains, and Canadian prairie edition. A Gardenway Publishing Book. Storey Communications. Pownal, VT. 192pp.

Baly, I.L., and E.A. Freeman. 1977. Seasonal variation of selected cations in *Acorus calamus*. Aquatic Botany 3:65-84.

Brenholm, T.L., and A.G. van der Valk. 1994. Sedge establishment studies: how age and storage conditions affect germination and viability of *Carex seed*. Technical Paper No. 3, Wetlands Research, Inc., Chicago, IL. 4pp.

Bolland, W., and C.J. Burk . 1992. Some effects of acidic growing conditions on three emergent macrophytes; *Zizania aquatica, Leersia orzoides, Peltandra virginica*. Envir. Pol. 76:211-217.

Bonner, F.T. 1974. *Cephalanthus occidentalis*, Common Buttonbush. pg 301-302 In: USDA Handbook 450. Seeds of woody plants of the United States. USDA Forest Service, Washington D.C.

Brodie, G.A., D.A. Hammer, and D.A. Tomljanovich. 1989. Treatment of acid drainage with a constructed wetland at the Tennessee Valley Authority 950 coal mine. In: D.A. Hammer (ed) pg 201-210. Constructed wetlands for waste water treatment. Lewis Publishers Inc., Chelsea, MI.

Brodie, G.A., D.A. Hammer, and D.A. Tomljanovich. 1989. Constructed wetlands for treatment of an ash pond seepage. In: D.A. Hammer (ed) pg 211-220. Constructed wetlands for waste water treatment. Lewis Publishers Inc. Chelsea, MI.

Clark, W.R., and R.T. Clay. 1985. Standing crop of *Sagittaria* in the upper Mississippi River. Can. J. Bot. 63:1453-1457.

Conn, J.S. 1990. Seed viability and dormancy of 17 weed species after burial for 4.7 years in Alaska. Weed Science 38:134-138.

Conner, W.H., J.G. Gosselink, and R.T Parrando. 1981. Comparison of the vegetation of three Louisiana swamp sites with different flooding regimes. Amer. J. Bot. 68:320-331.

Coppin, N.J. and I.G. Richards. 1990. Use of vegetation in civil engineering. Butterworths, London. 292pp.

Crocker, W., and W.E. Davis. 1914. Delayed germination in seed of *Alisma plantago*. Botany Gazette 58:285-321.

Daukas, P., D. Lowry, and W.W. Walker Jr. 1989. Design of wet detention basins and constructed wetlands for treatment of stormwater runoff from a regional shopping mall in Massachusetts. In: D.A. Hammer (ed) pgs 686-694. Constructed wetlands for wastewater treatment. Lewis Publishers Inc. Chelsea, MI.

Dehgan, B., M. Gooch, F. Almira, and M. Kane. 1989. Vegetative propagation of Florida native plants. Vol III Shrubs. Proceedings of the Florida State Horticulture Society 102:254-260.

Densco, I. 1982. Effects of ecological factors on the germination of the seed of *Leersia orzoides*. Novenyvedelen Plant Prot. (Budapest) 18:312-318.

Deno, N.C. 1993. Seed germination theory and practice. Second edition, fifth printing. Self Published. Norman C. Deno, Pennsylvania State University, State College, PA. 242 pp.

Directory of wetland plant vendors. U.S. Army Corps of Engineers Report WRP-SM-1. Waterways Experiment Station. Vicksburg, MS.

Dirr, M.A. 1990. Manual of woody landscape plants. Stipes Publishing Company, Champaign, IL. 552pp.

Eggers, S.D. and D.M. Reed. 1987. Wetland plants and plant communities of Minnesota and Wisconsin. US Army Corps of Engineers, St. Paul District. St. Paul, MN. 201pp.

Emerson, F.B. Jr. 1961. Experiments in the establishment of food and cover plants in marshes created for wildlife in New York state. New York Fish and Game Journal 8:130-144.

Faber-Langendoen, D., and P.F. Maycock. 1989. Community patterns and environmental gradients of buttonbush ponds in lowland forest of southern Ontario. Can. Field. Nat. 103:479-485.

Faber-Langendoen, D., and S.T. Dina. 1987. Growth responses of *Cephalanthus occidentalis* to varying light levels and flooding. Transact. Missouri Academy of Sciences 21:55-62.

Fasset, N.C. 1960. A manual of aquatic plants. University of Wisconsin Press, Madison, WI. 405pp.

Fernald, M.L. 1950. Gray's manual of botany, eighth edition - illustrated. Dioscorides Press, Portland, OR. 1632pp.

Fredrickson, L.H., and T.S. Taylor. 1982. Management of seasonally flooded impoundments for wildlife. Resource publication 148. US Fish and Wildlife Service. Washington D.C.

Fredrickson, L.H. 1991. Strategies for water level manipulation in a moist soil system. Leaflet 13.4.6, US Dept. of the Interior, Fish and Wildlife Service.

Fulton, G.W., J.L. Richardson, and W.T. Barker. 1986. Wetland soils and vegetation. North Dakota Agricultural Experiment Station Report 106:1-16.

Gaboury, M., R. Newbury, and C. Watson. In Press 1996. Non-Point pollution control program, Illinois Department of Natural Resources. Field manual of urban stream restoration. Illinois State Water Survey. Illinois Department of Natural Resources.

Galatowitsch, S.M., and A.G. van der Valk. 1994. Restoring prairie wetlands, an ecological approach. Iowa State University Press, Ames, IA. 246pp.

Garbisch, E.W., and S.M. McInnch. 1992. Seed information for wetland plant species of the Northeast United States. Restoration Management Notes 10:85-86.

Garbisch, E.W., S.M. McInnch, H.J. Swartz, and G.J. Salvaggio. 1996. The effects of controlled chilling on five wetland herbaceous plant species. Wetland Journal 8(2) 20-25.

Geyer, W.A., and N.F. Rogers. 1972. Spoils Change the Tree Growth on Coal Mine Spoils in Kansas. Journal of Soil and Water Conservation 27:114-116.

Gillespie, J. 1995. Personnel communication. Country Wetlands Nursery Ltd. Muskego, WI.

Gleason, H.A., and A. Cronquist. 1963. Manual of vascular plants of northeastern United States and adjacent Canada. D. von Nostrand Co. New York, NY. 810pp.

Gray, D.H., and A.T. Leiser. 1989. Biotechnical slope protection and erosion control. Van Nostrand Reinhold Company, New York, NY. 263pp.

Hamet-Ahti, L. 1980. The *Juncus effusus* aggregates in eastern North America. Annuls Bot. Fennici 17:183-191.

Hammer, D.A. 1992. Creating fresh water wetlands. Lewis Publishers Inc. Chelsea, MI. 298pp.

Harris, S.W., and W.H. Marshall. 1960. Germination and planting experiments on Softstem and Hardstem Bulrush. Journal of Wildlife Management 24:134-139.

Hitchcock, A.S., and A. Chase. 1971. Manual of grasses of the United States, Volume I Dover Publishers Inc. New York, NY. 569pp.

Hogg, E.H., and V.J. Lieffers. 1991. Seasonal changes in shoot regrowth potential in *Calamagrostis canadensis*. Oecologia 85:596-602.

Horner, R.R., J.J. Skupien, E.H. Livingston, and H.E. Shaver. 1994. Fundamentals of urban runoff management: technical and institutional issues. Terene Institute and U.S. Environmental Protection Agency, Washington D.C. 302pp.

Isley, D. 1944. A study of conditions that affect the germination of *Scirpus* seed. Cornell University Agricultural Experiment Station Memo 257:1-8.

Jones, S.B., and L.E. Foote. 1990. Gardening with native wildflowers. Timber Press Inc. Portland, OR. 195pp.

Jorga, W., and G. Weise. 1981. Aquatic plants and their importance for embankment stabilization and improvement of water quality. Acta. Hydrochem. Hydrobiology 9:37-56.

Jurik, T.W., S.C. Wang, and A.G. van der Valk. 1994. Effects of sediment load on seedling emergence from wetland seed banks. Wetlands 14(3): 159-165.

Kadalek, J.A., and W.A. Wentz. 1974. State of the art survey and evaluation of marsh plant establishment techniques. Volume 1. Report D-74-9 US Army Corps of Engineers. Vicksburg, MS.

Kantrud, H.A., J.B. Miller, and A.G. van der Valk. 1989. Vegetation of the wetlands of the prairie pothole region. In: A.G. van der Valk (eds.) pp 132-177. Northern prairie wetlands. Iowa State University Press. Ames, IA.

Kartesz, J.T. 1994. A synonymized checklist of the vascular flora of the United States, Canada, and Greenland, volume I - checklist, volume II - thesaurus. Timber Press, Portland, Oregon. Vol. I: 622pp, Vol. II: 816pp.

Kato, T., M. Tsunakawa, N. Sasaki, H. Aizawa, K. Fujita, Y. Kitahara, and N. Takahashi. 1977. Growth and germination inhibitors in rice husks. Phytochem. 16:45-48.

Kaut, R.B. 1985. Reproductive phonology and biology in annual and perennial *Alismataceae*. Aquatic Botany 22:153-164.

Keddy, P.A., and T.H. Ellis. 1985. Seedling recruitment of 11 wetland plant species along a water level gradient: shared or distinct response? Can. J. Bot. 63:1876-1879.

Kester, W. 1992. Personal communication. Kesters Wild Game Food Nursery Inc. Wisconsin.

Klebesadel, L.J., C.I Branton, and J.J. Koranda. 1962. Seed characteristics of bluejoint and techniques for threshing. Journal of Range Management 15:227-228.

Lamoureux, W.J. 1970. Aquatic plants for fish and wildlife. Technical bulletin #1. Royal Botanic Gardens. Hamilton, Ontario 29pp.

Larmen, M.M. 1989. Arrowhead or duck potato. Minnesota Horticulture. 108:207.

Larson, J.L. 1993. Personal communication. Applied Ecological Services. Brodhead, WI.

Larson, J.L. 1989a. Purple loosestrife in a southeast sedge meadow. University of Wisconsin-Milwaukee Field Station Bulletin. 22:1-11.

Larson, J.L. 1989b. The life history and primary production of shoots of *Carex scoparia* and *Scirpus cyperinus* in a southeast Wisconsin sedge meadow. Ph.D. Dissertation. University of Wisconsin, Milwaukee.

Larson, J.L., and F.W. Stearns. 1990. Factors influencing seed germination in *Carex scoparia*. Wetlands 10:277-283.

Lazenby, A. 1955. Germination and establishment of *Juncus effusus*, the effect of different companion species and of variation in soil and fertility conditions. Journal of Ecology 43:103-119.

Leif, J.W., and E.A. Oelke. 1990. Growth and development of giant burreed. Weed Tech. 4:849-854.

Lieffers, V.J. 1984. Emergent communities of oxbow lakes in northeastern Alberta: salinity, water level fluctuation and succession. Can. J. Bot. 62:310-316.

Loucks, W.L., and R.A. Keen. 1973. Submersion tolerance of selected seedling trees. Journal of Forestry 71:496-497.

Low, J.B., and F.C. Bellrose. 1944. The seed and vegetative yield of waterfowl food plants in the Illinois river valley. Journal of Wildlife Managers 8:7-22.

Marble, A.D. 1992. A guide to wetland functional design. Lewis Publishers, Chelsea, MI. 222pp.

Marburger, J.E. 1993. Biology and management of *Sagittaria latifolia* willd. (Broadleaf Arrowhead) for wetland restoration and creation. Restoration Ecology 1(4) 248-255.

Mariner, R.D. and L. Mertz-Erwin. 1991. Landscaping techniques and materials for urban Illinois stream corridors and wetland edges. Report prepared by Northeastern Illinois Planning Commission for Illinois Department of Energy and Natural Resources, Springfield, IL 111pp.

Martin, A.C., H.S. Zim, and A.L. Nelson. 1951. American wildlife and plants, a guide to wildlife food habits. McGraw-Hill Book Co., New York, NY. 500pp.

Maun, M.A., and J. Lapierre. 1986. Effects of burial by sand on seed germination and seedling emergence of 4 dune species. Amer. J. Bot. 73:450-455.

McAtee, W.C. 1939. Wildfood plants. Collegiate Press Inc. Ames, IA. 214pp.

McClain, W.E. 1997. Prairie establishment and landscaping. Technical publication #2, Division of Natural Heritage, Illinois Department of Natural Resources. Springfield, Illinois. 62pp.

McDonald, M.E. 1955. Cause and effects of a die-off of emergent vegetation. Journal of Wildlife Management 19:24-35.

McInnich, S.M., and E.W. Garbisch. 1991. Oxygen requirement of dormant wetland plants. Wildflower 4:8-13.

McInnich, S.M., and E.W. Garbisch. 1996. The establishment of *Scirpus pungens* from large and small rhizomes as a function of water depth. Wetland Journal 8(2) 24-27.

McKee, C.E., and A.C. van der Valk . 1989. The Impact of duration of drainage on the seed banks of northern prairie wetlands. Can. J. Bot. 67:1878-1884.

McKendrick, J.D., A.L. Brundage, and V.L. Burton. 1977. Quality of bluejoint hay is influenced by time of harvest. Agroborealis 9:26-29.

Michaub, S.C., and C.J. Richardson. 1989. Efficiencies of substrate, vegetation, water levels, and microbial population: relative radial oxygen loss in 5 wetland plants. In: D.A. Hammer (ed) pg 501-507. Constructed wetlands for wastewater treatment. Lewis Publishers Inc. Chelsea, MI.

Ministry of Agriculture Fisheries and Food. 1962. The control of rushes. Advisory Leaflet 433. Swindon Press Ltd, England.

Mitchell, W.W. 1979. Three varieties of native Alaskan grasses for revegetation purposes. Circular 32. Agricultural Experiment Station, University of Alaska. Fairbanks, AK.

Mitsch, W.J., and J.G. Gosselink. 1993. Wetlands, 2nd edition. Van Norstrand Reinhold, New York, NY. 722pp.

Mohlenbrock, R. (ed.) 1988. Field guide to Illinois wetlands. Illinois Department of Conservation, Division of Planning. 244pp.

Mohlenbrock, R.H. 1986. Guide to the vascular flora of Illinois. Southern Illinois University Press. Carbondale and Edwardsville, IL. 507pp.

Moore, D.R.J., and P.A. Keddy. 1988. Effects of water depth gradients on the germination of lake shore plants. Can. J. Bot. 66:548-552.

Morgan, M.D. 1990. Seed germination characteristics of *Iris virginicus*. American Midl. Nat. 124:209-213.

Nawrot, J.R. 1993. Personal communication. Southern Illinois University. Carbondale, IL.

Newbury, R.W. and M.N. Gaboury. 1993. Stream analysis and fish habitat design, a field manual. Newbury Hydraulics, Ltd., Gibsons, BC, Canada. 256pp.

Newcomb, L. 1977. Newcombs wildflower guide. Little, Brown and Company, Canada. 490pp.

Nichols, G.E. 1934. The influence of exposure to winter temperatures upon seed germination in various native American plants. Ecology 15:364-373.

Nichols, S.A. 1975. The impact of overwinter drawdown on the aquatic vegetation of the Chippewa flowage in Wisconsin. Trans. WI Acad. Sci. 63:176-186.

Nishimura, N., T. Suyama, and N. Ohga. 1985. Aspects of indicator plants as critical for grassland development in wetlands. XV International Grassland Congress. Kyoto, Japan. August 24-31. Pgs. 660-662.

Northeastern Illinois Planning Commission. 1997. Source Book On Natural Landscaping for Public Officials. Book available from the Northeastern Illinois Planning Commission, Chicago, IL.

Northeastern Illinois Planning Commission. Undated. Stormwater detention basin retrofitting techniques to improve stormwater pollutant removal and runoff rate control. Brochure available from the Northeastern Illinois Planning Commission, Chicago, IL.

Norton, D.C., A.M. Cody, and A.W. Gabel. 1987. *Subaquilia calamagrostis* and its biology in *Calamagrostis* species in Iowa, Ohio, and Wisconsin. J. of Nematology 19:260-262.

Oakes, A.J. 1990. Ornamental grasses and grasslike plants. Van Nostrand Reinhold. New York, NY. 614pp.

Packard, S. and C.F. Mutel. eds. 1997. The tallgrass prairie restoration handbook. Society for Ecological Restoration. Island Press, Washington D.C. 463pp.

Payne, N.F. 1992. Techniques for wildlife habitat management of wetlands. McGraw-Hill Inc. New York, NY. 549pp.

Pescitelli, S. and Rung, R. Undated. An evaluation of selected emergent plant species potential for habitat enhancement and streambank stabilization. Available from Illinois Department of Natural Resources, Division of Fisheries, Yorkville, IL. 32pp.

Phillips, H.R. 1985. Growing and propagating wildflowers. University of North Carolina Press. Chapel Hill, NC. 331pp.

Price, T.H., and D.W. Dreher. 1993. Urban stormwater best management practices for northeastern Illinois. Northeastern Illinois Planning Commission, Chicago, IL.

Pyrah, G.L. 1969. Taxonomic and distributive studies in *Leersia*. Iowa State J. Sci. 44:215-270.

Redington, C. B. 1994. Plants in wetlands. Redington field guides to biological interactions. Kendall/Hunt Publishing Co., Dubuque, IA 394pp.

Reed, P.B. 1997. Revision of the national list of plant species that occur in wetlands. US Department of the Interior, Fish and Wildlife Service, Washington D.C. 253pp.

Richards, P.W., and A.R. Chapham. 1941. Biological flora of the British isles. Journal of Ecology 29:362-391.

Rock, T. 1981. Prairie propagation handbook. Wehr Nature Center, Milwaukee County Department of Parks, Recreation and Culture. Franklin, WI. 7pp.

Roseboom, D., R. Twait, and T. Hill. 1989. Restoration of Peoria lake: Wallop Breaux Sportfishing Restoration Project F-55-R. IDOC, Division of Fisheries. Aledo, IL.

RUST Environment and Infrastructure. 1995. Streambank stabilization program. Unpublished report prepared in cooperation with Applied Ecological Services, Inc. for DuPage County Stormwater Management Division, Department of Environmental Concerns, Wheaton, IL 36pp.

Salvaggio, G.J. 1996. Effects of thermoperiod and photoperiod on the germination of ten herbaceous wetland species. Wetland Journal 8(2) 16-19.

Sanders, T.B., J.L. Hamrick, and L.R. Holden. 1979. Allozyme variation in *Elymus canadensis* from the tallgrass prairie region: geographic variation. American Midl. Nat. 101:1-12.

Sanders, T.B., and J.L. Hamerick. 1980. Variation in the breeding system of *Elymus canadensis*. Evolution 34:117-122.

Sharp, W.M. 1951. Environmental requirements of a fresh water marsh and the ecology of some aquatic plants. Pennsylvania Cooperative Wildlife Research Unit. Read at N.E. Game Conference, Wilmington Delaware, February 23, 1951. 6pp. *Cited in* Ould P. and C. Holbrow. Undated. An aquatic plant fact book and selected bibliography. Unpublished preliminary report prepared by Ducks Unlimited (Canada).

Sherrod, K.C., T.G. Ciravolo, and K.W. McLeod. 1987. Growth of woody seedlings under varying light conditions. Amer. J. Bot.

Shipley, B., and M. Paren. 1991. Germination responses of 64 wetland species in relation to seed size, minimum time to reproduction and seedling relative growth rate. Functional Ecology 5:111-118.

Shirley, S. 1994. Restoring the tall grass prairie. University of Iowa Press. Iowa City, IA. 330pp.

Silvics of North America Volumes 1 and 2. US Forest Service, Ag Handbook 654.

Smith, J.R., and B.S. Smith. 1980. The prairie garden. University of Wisconsin Press. Madison, WI. 219pp.

Soots, R.F. Jr., and M.C. Landin. 1978. Developement and management of avian habitat on dredged material islands. US Army Corps of Engineers Technical Report DS-78-18. Vicksburg, MS.

Spence, D.H.N. 1982. The zonation of plants in fresh water lakes. Advances in Ecological Restoration 12:37-125.

Squires, L. and A.G. van der Valk. 1992. Water depth tolerances of the dominant emergent macrophytes of the delta marsh, Manitoba. Can. J. Bot. 70:1860-1867.

Steinbauer, G.P., and D. Neil. 1948. Dormancy and germination of seeds of the burreeds. Michigan Academy of Scientific Arts Letters 34:33-37.

Steussy, T.F., D.M. Spooner, and K.A. Evans. 1986. Adaptive significance of ray cordiallas in *Helianthus grosseserritus*. American Midl. Nat. 115:191-197.

Stewart, R.E. and H.A. Kantrud. 1972. Vegetation of prairie potholes, North Dakota, in relation to quality of water and other environmental factors. U.S. Geological Survey professional paper 585-D. 36pp. *Cited in* Ould P. and C. Holbrow. Undated. An aquatic plant fact book and selected bibliography. Unpublished preliminary report prepared by Ducks Unlimited (Canada).

Stoynoff, N.A., and W. J. Hess. 1986. Bluff City fen: communities, vegetation history and management. Trans Illini Academy of Science 79:53-58.

Strecker, E.W., J.M. Kersnar, E.D. Driscoll, and R.R. Horner. 1992. The use of wetlands for controlling stormwater pollution. The Terrene Institute, Washington D.C. 66pp.

Suehiro, K., K. Hozumi, and K. Shinozaki. 1984. Growth of three species of *Bidens* under different levels of soil moisture control. Bot. Mag. Tokyo 97:163-170.

Surrency, D. 1991. Evaluation of aquatic plants for constructed wetlands. In: Constructed wetlands form water quality improvement. International Symposium at the University Of West Florida. October 21-24. Pensacola, FL.

Swanson, G.A., and H.F. Duelobert. 1989. Wetland habitats of waterfowl in the prairie pothole region. pg. 228-267 In: A.G. van der Valk (ed) Northern prairie wetlands. Iowa State University Press. Ames, IA.

Swink F., and G. Wilhelm. 1994. Plants of the Chicago region, 4th edition. Indiana Academy of Science Indianapolis, IN. 921pp.

Taylor, K.S., and S.F. Hamblin 1963. Handbook of wildflower cultivation. MacMillan, New York, NY. 307pp.

Thunhorst, G.A. 1993. Wetland planting guide for the northeastern United States. Environmental Concern, Inc., St. Michaels, MD. 179pp.

Tyrell, L.E. 1987. A floristic survey of buttonbush swamps in Gahanna Woods State Nature Preserve, Franklin County, Ohio. Michigan Pot. 26:29-38.

Uhler, F.M. 1944. Control of undesirable plants in waterfowl habitats. North American Wildlife Transactions 9:295-303.

U.S. Army Corps of Engineers, 1978. Wetland habitat development with dredged material: engineering and plant propagation. Technical Report DS-78-1-6. Waterways experiment station. Vicksburg, MS.

U.S. Department of Agriculture, Natural Resources Conservation Service. 1995. 1995 Illinois urban manual, a technical manual designed for urban ecosystem protection and enhancement., Champaign, IL.

U.S. Department of Agriculture, Soil Conservation Service. 1982. National list of scientific plant names, Vol. 1 - list of plant names, Vol. 2 - synonymy. SCS-TP-159. US Department of Agriculture, Soil Conservation Service, Washington D.C. Vol. 1: 416pp, Vol. 2: 438pp.

U.S. Department of Agriculture, Soil Conservation Service. Undated. Midwestern wetland flora-field office guide to plant species. USDA Soil Conservation Service Midwest Technical Center, Lincoln, NE.

van der Valk, A.G. 1989. Northern prairie wetlands. Iowa State University Press, Ames, IA. 400pp.

Warburton, D.B., W.B. Kimstra, and J.R. Nawroot . 1985. Aquatic macrophyte propagation and planting practices for wetland establishment. In: R.P. Brooks et al. (Eds.) Pgs. 139-152. Wetlands and water management on mined lands, Proceedings. Oct 23-24 Pennsylvania State University, PA.

Weller, M.W. 1989. Plant and water level dynamics in an east Texas shrub/hardwood bottomland wetland. Wetlands 9:73-88.

Willard, D.E., and A.K. Hiller. 1989. Wetland dynamics: considerations for restored and created wetlands. In: J.A. Kustler and M.E. Kentula (eds.) pg. 47-54. Wetland creation and restoration: the status of the science. Vol II. U.S. Environmental Protection Agency. Corvallis, OR.

Willard, D.E., V.M. Finn, and D.A Levine. 1989. Creation and restoration of riparian wetlands in the agricultural midwest. In: J.A. Kustler and M.A. Kentula (eds.) pg. 333-343. Wetland creation and restoration: the status of the science. Vol I. U.S. Environmental Protection Agency. Corvallis, OR.

Wooten, J.W. 1971. The monoecious and dioecious conditions in *Sagittaria latifolia*. Evolution 25:549-553.