



## CHAPTER 5. SEEDING AND PLANTING CONSIDERATIONS

☼

**“Where native wetlands are often composed of a mix of grasses, sedges, forbs, and sometimes shrubs, this diversity of plant material produces a “micro-edge” effect in the lower reaches of the stands. These edges provide dense areas for nest concealment and paths for wildlife movement within the stands between the dense growth. Reed canary grass invasion causes a loss of plant diversity. Monotypic (one species) stands lose the “micro-edge” effect and overall structure that provides for dense nesting cover, movement lanes, singing perches, and nesting sites.”**

—William K. Volkert,  
Wildlife Educator/ Naturalist,  
DNR-Horicon Marsh

**I**n Chapter 3, we suggested that you draw a sketch of your site and determine what vegetation already exists. Chances are one of the reasons you are interested in restoring your site is to change existing vegetation dominated by invasive or weedy agricultural plants to native species beneficial to wildlife. This chapter and the following chapter on invasive species will guide you in the restoration of native vegetation.

The Hippocratic Oath’s admonition to “first do no harm” also applies to wetland vegetation. You may find many non-native plants listed as wildlife cover in various guides. Reed canary grass, giant reed grass (*Phragmites* sp.), crown vetch, and other undesirable non-native plant species are sold for erosion control and wildlife habitat. Native plants that have evolved and adapted to this region often lose out against aggressive imports that are less valuable to native wildlife. Many invasive species are extremely difficult to control once established. Native species may need to be reintroduced or encouraged to maintain a healthy and diverse wetland.

A functioning wetland needs a rich mix of native vegetation. Wetland vegetation provides food, cover, and habitat for wildlife in addition to aesthetic beauty. The assemblage of plants that colonize a site can indicate the health and diversity of a successful restoration.

Reintroducing native vegetation on a wetland site can be accomplished in a number of ways. What works on your site will depend on many factors, including its history, disturbance, the condition of the natural seed bank, soil and water factors, light levels, and the presence of invasive plants. Invasive wetland plant species and their management are discussed in Chapter 6.



# Stick With Natives .....



Art Kitchen

*Native plant community avoided during earthwork.*

## How Do I Work Around Native Plants on Site?

In most cases small patches of native plants remain on your site. You will want to treat them carefully and take great care to work around them. Remnant areas of native plants are an indication of the original wetland plant community and may expand and re-establish within your site once your restoration is complete. Identify these areas for protection and avoid planning earthwork (e.g., scrapes) in them. Point them out to your contractor, flag the areas with bright colored surveyors tape, and keep construction equipment away from these areas if possible. Upland areas with intact native vegetation should also be treated with respect, as their integrity will increase the value of the site to wildlife. Avoid using heavy equipment and stockpiling soils on native upland communities.

*Ditch at Summerton Bog with original spoil bank that was on the right now in ditch and native sedges placed on top of ditch fill.*



Alice Thompson

## ..... WETLAND PLANTS AND PLANT COMMUNITIES OF MINNESOTA AND WISCONSIN

STEVE EGGERS AND DONALD REED, 1997

This 263-page book includes photographs of 15 wetland types and 144 representative plant species. Brief descriptions of each plant species include taxonomic characteristics, habitat, and notes on wildlife use and economic values.

Price is \$13 per book with book-rate shipping and \$15 per book with 1<sup>st</sup> Class shipping.

Order from St. Paul District, United States Army Corps of Engineers,

Attn.: CENCS

Library/Sales Agent  
190- 5<sup>th</sup> Street East  
St. Paul, MN 55101-1638  
(651) 290-5680

## ..... At The Nature Conservancy's SUMMERTON BOG property in central Wisconsin, the

**RESTORATION** of a large sedge meadow - swamp forest wetland complex called for miles of ditches to be filled. Native sedges surrounded the ditch and spoil piles in one section of the site, and sedges were growing at the bottom of the ditch. The construction contractor kept his backhoe on the spoil pile and methodically scraped the sedge mat out of the ditch, placed it on the side, filled the ditch with the soil from the spoil pile, and then replaced the sedge clumps on the top of the ditch as he backed out, minimizing impact to the native community.





“One of the penalties of an ecological education is that one lives alone in a world of wounds.”

Aldo Leopold,  
*The Round River, 1953*

A mnemonic that can help as you try to identify seedlings is “**SEDGES HAVE EDGES**”. Sedges will look **triangular** at the base of the seedling, as compared to a round grass stem. The invasive reed canary grass has a round stem and can be readily identified by its long white membranous distinctive ligule you can see as you gently pull a leaf blade back from the stem (see Chapter 6 on reed canary grass).

*Left, in a seed bank study, wetland (hydric) soil samples are allowed to germinate at a greenhouse to determine whether dormant wetland species remain in the soil.*

*Right, seed bank study in greenhouse.*



## How Can I Find Out What Wetland Seeds Are Still Present and Viable?

For thousands of years wetland plants have produced and dropped seeds into the soil of your wetland. Sometimes, under the right conditions, recent seeds buried in wetland soils or under sediment may be viable (living) but dormant, even if the site has been cultivated for decades. Seeds have been known to be dormant for up to 80 or more years. These living but dormant seeds comprise what is called the seed bank.

By removing sediment overburden or restoring the original hydrology, you may provide the right conditions for dormant seeds to germinate. The seed bank may have a better chance to establish itself if the site is well drained up to the point that restoration takes place. If the site became wetter over time as drainage failed causing the dormant seeds to sprout, the young plants may have been plowed under before re-seeding. Failed drainage may result in dormant seeds responding to the wetter conditions by sprouting but failing to mature. If this happens the seed bank may be exhausted before the restoration begins. Therefore, to avoid giving the seed bank a “false start”, *it is important to maintain drainage* using pumps and maintained ditches right up until the time you begin your construction.

Does your site have dormant seeds ready to sprout once you have restored the site? The more living seeds you have, and the closer the site is to other diverse wetland sites that can serve as a source of new seed, the fewer new seeds or plants you will need to introduce into your restoration project. The viability of seed banks vary from site to site reflecting factors we do not yet fully understand. You can't always predict what kind of results you will get.

To determine if you have viable seed in your seed bank take plugs of soil just below the litter layer to test for germination. If you are planning to strip off sediment during restoration, take the plugs from the wetland soil layer that will be exposed. Take a number of samples from across your entire site. Use clean implements for collecting the soil from across your site so that you do not contaminate the samples. Take the samples home or to a reliable nursery for help. Spread the sample thinly, less than 1/4 inch deep, over sterile potting soil and water regularly so that the flats are kept moist. Make sure the flats are exposed to light. You may require some help identifying what seedlings come up, but even if you don't know the species name, just knowing that sedges, rushes, and wildflowers are germinating as opposed to reed canary grass will be of great use as you proceed with your plans.



Photos: Left, Jeff Nania Right, Joanne Kline



## Can I Rely on Plants Colonizing from Other Wetlands?

Seeds travel on water, wind, duck feathers, animal fur, and in bird and animal droppings. If your wetland has a poor seed bank, seeds blown or carried in can eventually colonize the site. The closer a natural diverse wetland is to your site, the more likely it is for this to occur. Of course, the seeds of ubiquitous species like wind-blown cattail, willow seeds, and water-borne reed canary grass can also arrive quickly in many areas of the state and establish dominance that prevents the establishment of other, less aggressive native seeds (see Case Study #1 in Chapter 13). The bottom line is, if there is no native seed bank on the site, relying on passive re-colonization in a restored wetland may prove disappointing.

## How Long Should I Wait for the Vegetation to Respond?

In many cases you will want to give your site a year to respond after restoration before you seed it with purchased or gathered seed. One situation where you may want to seed immediately with native seed stock is if you are faced with encroachment of reed canary grass or another undesirable invasive plant, and are unsure of the viability of the seed bank.

You may want to plant the emergent zone immediately where cattail will come in quickly on its own as its seeds are windblown and widespread. For unknown reasons other desirable emergents such as arrowhead, giant burreed, etc. are less likely to germinate from the seed bank. Planting live plants in the spring will boost the plant diversity in this zone.

## What Plant Species Do I Decide On?

Plant a diversity of native species that are found in your area. Higher diversity will protect your site from colonization by invasive plants. The greater the number of plant species the more hardy your vegetation will be to droughts, floods, and pathogens. Plan to plant a mixture of fast growing, pioneer (early successional) species and slower growing mid-successional species. Include species that will tolerate a variety of moisture conditions, and differing light conditions (if your site has such variation). The plants will sort themselves on the site according to their own requirements for water, light, and soil.

Seeds for your wetland can be hand collected from wetland sites or purchased at Wisconsin native seed suppliers. If you hand-collect seed, be certain to seek permission from landowners, avoid state lands, and always leave at least half the seed behind for natural regeneration. If you intend to purchase seeds, work with a local supplier who grows or collects local native plant stock, rather than buying seed from other states or regions that may not be adapted to Wisconsin and that could be less successful. Seed gathered from a source as close to your site as possible will be most appropriate for your site as plants have genetic variation that allows them to adapt to local conditions. Be wary of prepared seed mixes from commercial sources. A seed mixture should be carefully considered and prepared separately for each site.

## NATIVE PLANT GENETICS

It is very important to use seeds collected from local Wisconsin plants in restoration. Plants have evolved adaptations to many factors, including a region's soils and climate, which determine the season when plants germinate, bloom, set seed, and go dormant. Genetically determined blooming dates may reflect the time when natural pollinators are present or when the danger of frost ends. In addition, plants imported from other regions of the country can contaminate the local "gene pool" and damage local stock if cross-pollination results in offspring no longer adapted to local conditions. This is particularly grave if the local plant is rare, threatened, or endangered.

The Department of Natural Resources maintains a **CURRENT LIST OF NATIVE PLANT NURSERIES** located throughout the state. You may contact the DNR for a copy.

[www.dnr.wi.gov/org/land/er/invasive/info/nurseries.htm](http://www.dnr.wi.gov/org/land/er/invasive/info/nurseries.htm)

Native Plant Conservation Program Manager  
Bureau of Endangered Resources  
P.O. Box 7921  
101 S. Webster Street  
Madison, WI 53707  
(608) 267-5066

The WWA "**WETLAND RESOURCE DIRECTORY**" available on the WWA web site lists many native plant nurseries and private consultants in Wisconsin and the region.



Photos: Alice Thompson

*Top, Jewelweed (Impatiens capensis).*

*Bottom, Sneezeweed (Helenium autumnale).*

*Left, vegetated buffer surrounds wetland restoration.*

*Right, vegetated buffer surrounds wetland restoration. Native prairie plantings are in the foreground.*



Photos: Art Kitchen

Your planting will depend on the area of the state that you are in, the soil type and water level of your wetland, the competing vegetation on site, and how you will manage the site. For example, if you are going to manage an open marsh and meadow and use prescribed burns to maintain your site, you need to use plants tolerant to burns, such as wet meadow, sedge meadow, marsh, or prairie species. However, tree plantings such as white cedar or tamarack will not be compatible with burning. You need to make a choice whether to keep a site open with burning or other methods, or to shade the wetland over the long term with shrub or tree plantings.

If you are concerned about reed canary grass already on the site or invading the site, you have many considerations. Refer to Chapter 6 for more details on native plantings as a strategy to control invasive or unwanted species.

There are a number of good references that list some of the common wetland species in the state (see Chapter 1 and Appendix A). Furthermore, you can contact a native plant nursery for more detailed listings and for recommendations on your site. Consult with a private wetland ecologist, a Wisconsin DNR wetland specialist, or an ecologist at a local college or university for ideas on wetland plantings. Visit WWA's *Wetland Resource Directory* on-line at [www.wiscwetlands.org](http://www.wiscwetlands.org) for access to a list of area nurseries, agency staff, wetland professionals, and college or university faculty.

### What about Buffer Zones?

Planting a high quality upland buffer is well worth your time and resources. The edge of a wetland gradually merges with uplands, and wetland species such as ducks, cranes, turtles, snakes, and amphibians use uplands for nesting, feeding, and shelter. If disconnected from quality upland habitat the wetland will never be as useful to wildlife species as a wetland-upland complex. Current recommendations are for a minimum of a 100-foot wide upland buffer, with an optimum width of 300 feet or more. The vegetation you plant or manage should depend on where the site is located in the state (i.e. prairie vs. forest), the site's specific features, and how you can manage it. Because prairie and oak uplands are so scarce on our landscape compared to pre-settlement times, planted and managed prairie and savanna buffers are an ecologically sound option that provide excellent wildlife habitat in those parts of the state that were once prairie. Be certain that you can ideally manage the site with prescribed burns before you spend money on prairie seed.





Photos: Alice Thompson

*Left, planting shrubs and trees in a disturbed stream corridor.*

*Right, white cedar planted in disturbed reed canary grass alongside a stream.*

## What about Trees and Shrubs?

In many regions of the state forested wetlands were once common. They included black spruce and tamarack bogs, tamarack and white cedar swamps, floodplain forests, and hardwood swamps. Historical aerial photos of your site can reveal wooded wetlands. However, in many cases the wetlands were drained and logged long before the earliest photos were taken. Native shrubs can provide important transitional zones to uplands in many wetlands. Tree and shrub plantings as a management tool to shade reed canary grass are discussed in more detail in Chapter 6. Your local Wisconsin DNR forester frequently works with landowners on forest management and plantings. Contact him or her for information on tree and shrub stock, prices, and availability. Local county land conservation departments may also sell native trees and shrubs at a very reasonable cost. Typically plant orders are placed in winter and picked up in the spring.

Managing and expanding remnant upland woodlands can also provide important wildlife habitat. Try to determine the types of uplands that were once on your site. The NRCS soils book described in Chapter 3 discusses the type of vegetation each soil unit on your site was formed under, and may provide insight into what types of vegetation were once there.



## Manage Your Soil . . . . .



### Do I Need a Cover Crop?

Planting a cover crop on the upland buffers of adjacent wetlands will hold disturbed soil in place after construction. Because wetlands are flat and not subject to severe erosion, wetland cover crops are generally not used. If wetlands are seeded, “pioneer” (i.e. fast establishing) species should be intermixed with more conservative (i.e. slower growing or establishing) wetland species. This way the native pioneer plants will occupy space quickly while the conservative species establish themselves.



Troy Weddy, New York Natural Heritage Program

## DO HIGH NUTRIENTS MEAN LOW DIVERSITY?

It may seem counter-intuitive, but high nutrient conditions produce lower plant diversity. Think of it this way: for hundreds of years in a low nutrient wetland the plants have adapted in creative ways to survive. Some plants such as pitcher plants trap insects that decompose and provide nutrients, some plants co-exist with nitrogen-fixing bacteria on their roots and utilize nitrogen from the atmosphere, while other plants recycle nutrients or hold on to leaves to avoid nutrient loss. Each of the adaptations a plant species evolves is different and drives diversity. No strategy is perfect; there are trade-offs, and many plants can co-exist using different strategies. Now take this diverse plant community and add nutrients. All of a sudden, the conditions are ripe for a fast growing, highly productive bulky species to out-compete and tower over the diverse, slow growing low nutrient adapted plants. This results in the highly diverse wetland plants being crowded out by the invader, reducing the overall diversity on the site.

*Pitcher plants (the mouth shown here) trap insects to utilize nutrients in a low nutrient bog.*

To establish a cover crop on upland buffer sites, plant seed oats, as they are cheap and easily spread. Oats or annual rye are generally used in spring and early summer (e.g., April 15 to June 15). In the fall or winter, winter wheat can be planted in mineral soil and annual rye in mineral or peat soils (e.g., September 10 to October 15). Do not use excessive amounts of annual rye as it is slightly allelopathic (it produces a chemical to discourage other plant growth). Cover crops are usually added to the native prairie upland seed mix so that the total mix is at least 30 pounds per acre.

## What about Erosion?

Earthwork in former wetland areas does not create a serious erosion problem because the disturbed ground is flat. However, slopes that exceed a 4:1 ratio in steepness or areas close to streams may need some erosion control before they are vegetated. Biodegradable straw erosion matting (e.g., Curlex<sup>®</sup> biomatting; see construction terms on page 99) can be unrolled and pinned onto freshly seeded surfaces. It can be purchased at any type of construction supply store. You can also use weed-free mulch or straw to cover 90% of the soil, especially on shallow slopes.

## Do I Need to Add Topsoil?

Do **not** add topsoil if you have original hydric soil on the final surface in the restored wetland. If you are constructing a scrape in an area of shallow topsoil with clay underneath, you need to make sure you first strip off and stockpile the top organic soil layers, excavate the clay only, and finally cover the exposed clay basin with the stockpiled organic soil.



*Lack of topsoil on the border of a scrape creates bare areas fifteen years after construction.*

Alice Thompson

## Do I Need Fertilizer?

No, the wetland plants you want to encourage are competitive against weedy invasive plants in low nutrient soil. As discussed previously, controlling fertilizer runoff onto the site is very important. Do not add to your problem by fertilizing any seeding or plantings.



## Get Your Vegetation Started . . . . .



### When Should I Plant?

The timing of planting is important to maximize the chances that seeds or plants will survive. Seeds are usually planted in spring or fall. The spring planting season varies from year to year but is generally from April 15 to June 15 in southern Wisconsin. Seeds can be planted once the frost is out of the ground but before the heat of summer. The fall planting typically occurs after a hard frost and before a heavy snow falls—generally from October 15 to December 1. Seeds planted in the fall will lie dormant through the winter and germinate in the spring.

The “window” for planting rootstock is between May 1 and June 15, after the danger of frost has passed, but early enough to establish strong roots before fall. You may be able to plant until late July if the wetland has stable water levels. Do not plant live plant material in the fall because plants are vulnerable to frost heave and wildlife predation.

### Do I Need to Pre-treat Seeds?

If you plant in the fall the seed will overwinter and the combination of moisture and cool weather will prepare the seeds for sprouting in spring. If you plant in spring the seeds of many species will lie dormant unless they are pre-treated to mimic overwintering. To break seed dormancy, either ask the supplier to pre-treat the seeds or do it yourself. Your supplier can give you specific directions on how to pre-treat the seed. One treatment method is to mix the seeds with moist vermiculite, sand, or soil, and store the mixture in a refrigerator for several weeks.

### How Do I Plant the Seeds?

There are several ways to seed wetland soils. If the site has been freshly graded, the seed can be spread by hand and lightly raked into the soil. Large areas can be planted using a seed broadcaster mounted on a vehicle that can traverse the bare soil. But be aware that some native seeds can have debris or rough surfaces that may jam and get caught in mechanical seeders.

Upland areas need to be prepared and then seeded by hand and raked, or the seed can be broadcast with a mounted seeder on a vehicle and then lightly raked with a drag. The site can also be seeded with a billion or no-till drill that pushes the seed into the soil. A description of different types of seeders can be found in Chapter 9. Prairie nurseries can give great advice on how to plant your site if you purchase seed from them.



*Joe Pye weed (Eupatorium maculatum) is common in sedge meadows.*



*Seeds of native plants are collected or purchased for sowing into the restoration site.*



*Tractor pulling billion seeder used for native prairie seeding.*



Jeff Nania

*Sedge clump in forested wetland.*



Alice Thompson

## What about Rootstock or Plants?

As mentioned earlier, selective planting of live plants may be very useful for increasing diversity in your wetland, particularly in the emergent plant zone. Planting live plants or rootstock is usually done by hand and is labor and time intensive. Plant stock can be costly as well. If you decide to plant live plants or rootstock make sure you are planting at an appropriate depth. You may need to construct enclosures around new plantings to prevent muskrats, geese, and other wildlife from devouring your rootstock before it becomes established. One technique for giving your roots and tubers a head start is to grow them in buckets before planting them outside. Take 5-gallon buckets and fill them first with a layer of sand and then with a layer of soil from your site. Plant the tubers, add water until it saturates the soil to the surface, and keep them watered and in the sun. Transfer them to your site once the plants have grown 6 inches or higher and the plant and soil/root ball easily pulls off the sand layer.

## Do I Just Plant and Wait?

No, aggressive follow-up and control measures are critical in the first three years. You may need to hand pull weeds, use spot herbicide, or use combinations of water level fluctuation, mowing, or burning to control undesirable plants. Refer to Chapter 6 for more invasive plant management advice and Chapter 10 on post-restoration management considerations.

## Conclusion



The vegetation that develops in your wetland is the cornerstone to the diversity of wildlife your site will attract. All the effort you put into understanding your site and its original vegetation is time well spent. Be sure to read Chapters 6 and 11 to plan long-term management on your site and to deal with invasive plants that will invariably find their way into your restored wetland. 

