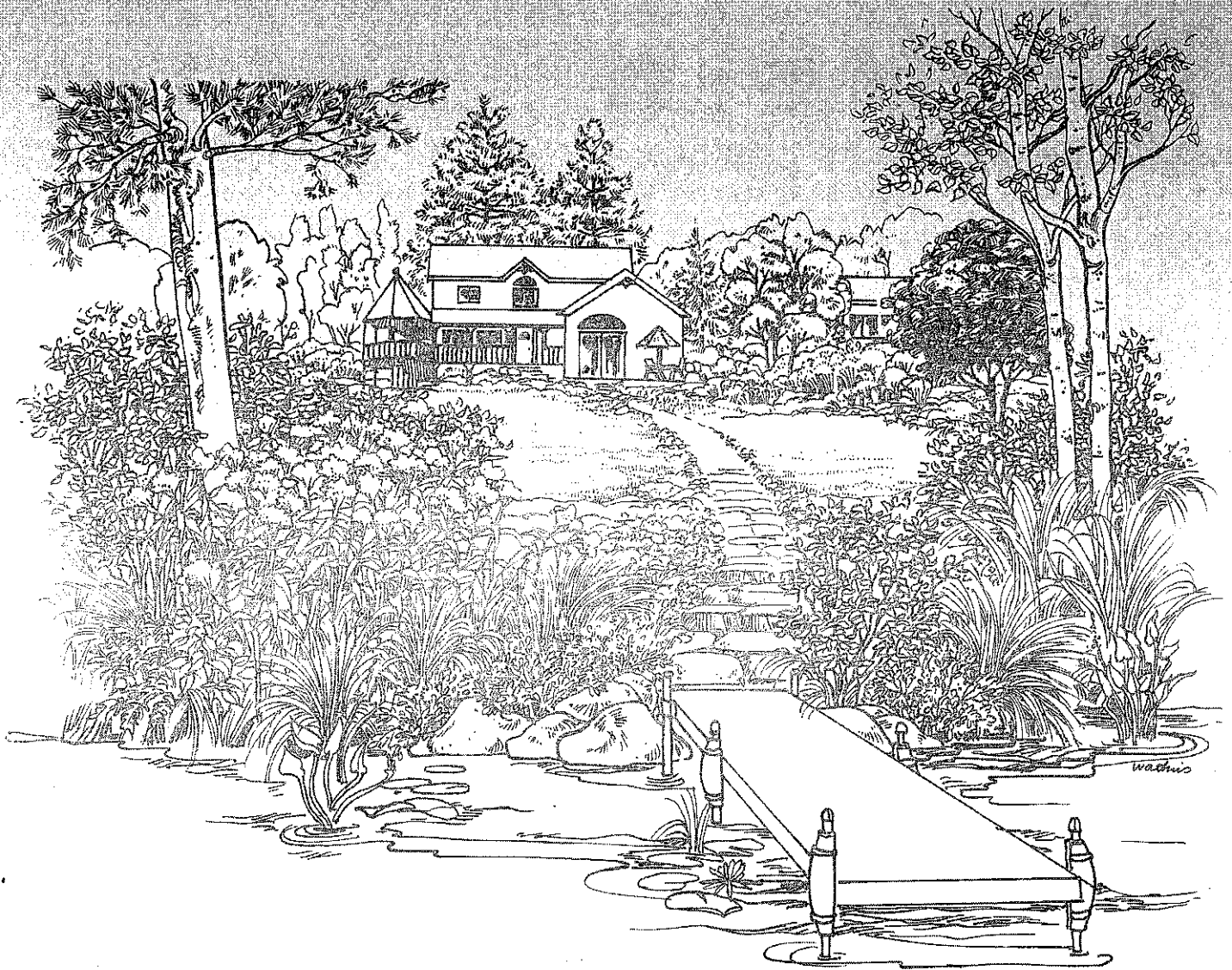


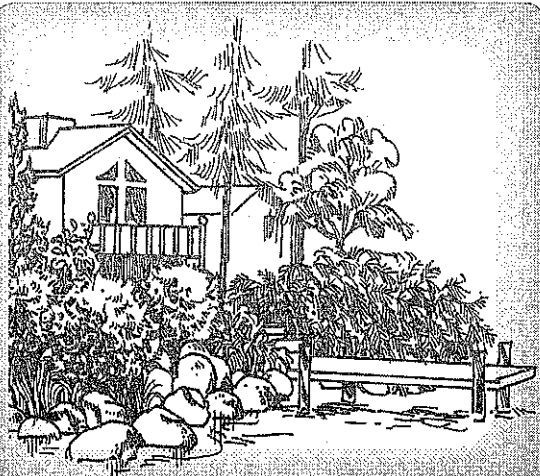
Shoreland Restoration Guide

A PUBLICATION OF THE ASHLAND, BAYFIELD, DOUGLAS, IRON COUNTIES LAND CONSERVATION DEPARTMENT



Helping to restore and protect shoreline buffers

PART ONE: The Shoreline Buffer



Values and Benefits of a Native Shoreline Buffer

LITTLE OR NO MAINTENANCE

Native vegetation, constantly adjusting to ecological changes over time, is adapted to the soil and climatic conditions of this region. Once established, it does not require mowing, watering, fertilizers, pesticides, or herbicides.

EROSION CONTROL

Curved access paths, diffused drainage, and native plants reduce erosion.

HABITAT

Bank vegetation, fallen trees, and aquatic plants enhance shallow water and terrestrial habitat and provide corridors between ecosystems. Multiple layers of native plants provide the essential food, shelter, and space for a diversity of wildlife.

WATER QUALITY

A vegetation strip allows water to percolate into the soil and absorbs nutrients and sediments that would otherwise enter the lake.

AESTHETIC & SOCIAL VALUES

A shoreline buffer provides a natural lakeshore appearance, blocks unsightly views, discourages nuisance wildlife from visiting, and provides privacy from neighbors or lake users.

POSITIVE SELF IMAGE

Restoring your shoreline to its natural state is absolutely the right thing to do.

What is a Shoreline Buffer?

A shoreline buffer is the area of land adjacent to a lake or river that is vegetated with a diverse mix of native plants including grasses, forbs, shrubs, and trees. It starts in the water and extends inland from the water on to the land. The buffer serves as a corridor between aquatic and terrestrial ecosystems and performs many important functions that protect these areas.

What does it mean to restore the shore?

People restore their shore for various reasons, such as if there is an erosion problem, a lack of native plants, or lack of wildlife habitat. They may also be required to restore in order to add on to, or alter, a structure that does not conform to zoning regulations (mitigation).

Restoration involves the stabilization of soil (if necessary) and planting of native plants along the lake edge. It does not always mean replanting the entire shoreline buffer. There are various restoration techniques depending on the existing vegetation and site conditions (see page 8). When developing a site, the best approach is to minimize disturbance and maintain as much vegetation as possible.

How much does it cost?

The cost of installing a native landscape normally runs far less than traditional landscaping. However, the cost varies depending on a variety of factors, including:

- The size of the project.
- The site preparation, restoration techniques and plant material.
- How many and what kind of plants you install.
- Whether the site requires erosion control or stabilization practices.
- Whether you do-it-yourself with the LCD's assistance or hire a professional landscaper with knowledge of native plant communities.

Generally, the cost of plants and supplies is approximately \$2.00+ per square foot, although professional rates may cost more. The cost will greatly increase if your site needs any stabilization such as rip rap, or earth movement. Planting bare-root trees and shrubs can save on the cost. The ABDI-LCD sponsors the annual Native Plant Sale.

The Land & Water Conservation Department has a cost-share program available to encourage landowners to practice conservation. The program:

- Provides technical and financial support to eligible landowners.
- Reimburses you up to 70% of the cost for erosion control, plants, materials, and labor directly related to the project. (funds are limited)
- Works with you to develop a restoration plan unique to your site.

PART TWO: Details & Strategies

1 FUNDING

Funds and technical assistance may be available for your project. Contact the Land Conservation Department for details.

2 EXAMINE CONDITIONS

A restoration will be most successful when you take into consideration everything that is happening on and near your site. Here are some things to look for and you may want to note them on a sketch.

EXISTING VEGETATION

What native shrubs and trees, lawn area, and non-native/invasive species are present (see page 15)? The native plants best suited to your site are usually the ones that exist there naturally. If there are no native plants, seek an undisturbed shoreline with the same soil type and moisture content as a model.

EXISTING STRUCTURES & IMPERVIOUS SURFACES

Where are the house, sidewalk, dock, and outbuildings located?

EROSION

Are there signs of erosion along the shoreline?

ACCESS & VIEW TO THE LAKE

Where is your access to, and best view of the lake?

WATER LEVEL

Where is the ordinary high water mark (see below)?

SHORELAND ZONES

Locate the aquatic, wet meadow, and upland areas based on water level and existing vegetation (see page 7).

SOIL TYPE

What is the type of soil in the lake bottom, wet meadow, and upland (see page 6).

SLOPE

Is the slope level, gentle, or steep? Estimate percent grade, if possible.

SUNLIGHT

What areas get full sun, part sun, and shade?

PREFERENCES OR CONCERNS

Are there any concerns such as privacy, wildlife viewing, maintenance re-routing paths?

STORMWATER RUNOFF GUTTER

Is there erosion at downspouts or from surface runoff? Do the gutters drain away from the lake?

GETTING STARTED

1

You may qualify for cost-share.

2

Examine the existing conditions on and near your site.

3

Review the permit requirements and general information for shoreland restoration.

4

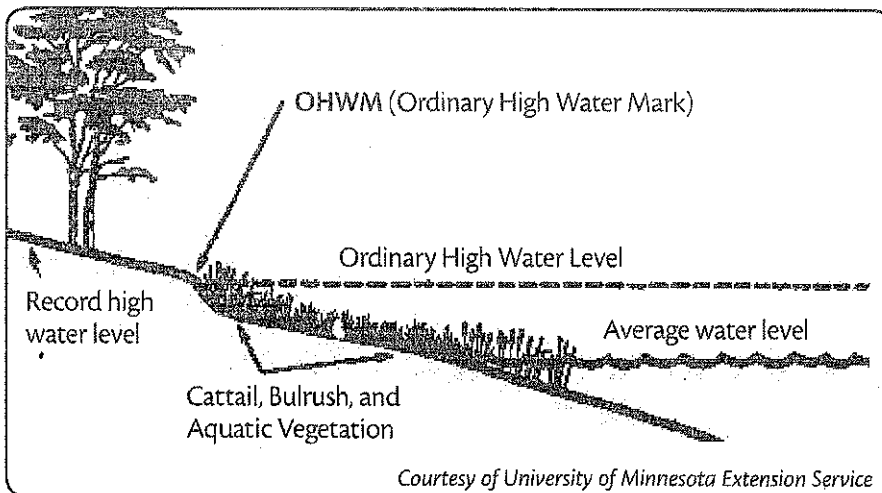
Determine your site type.

5

Choose a restoration technique(s) that is suitable for your site.

6

Develop a comprehensive plan tailored to your site including a plant list.

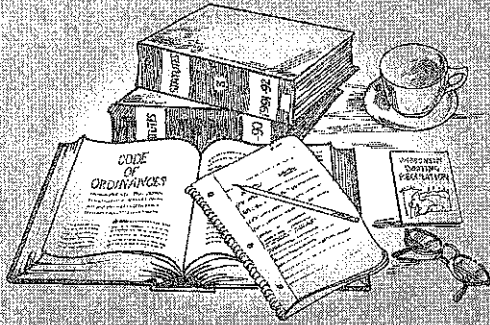


ORDINARY HIGH WATER MARK (OHWM)

The point on the shore or bank where water has left a "distinct mark." This may include a water stain on a dock or rocks, erosion, or damage to vegetation. The zoning office or DNR Water Management Specialist can help determine the OHWM on your site.

- Local zoning regulations apply to the region above the OHWM. These may affect buffer width, structure or building setback, grading, vegetation removal, etc.
- Federal, state and local regulations apply to the region below the OHWM. These may affect dock type, shoreline alterations and structures, vegetation removal and introduction, etc.

REQUIRED PERMITS



• Erosion Control

DNR permit to:

- ☞ Install any shoreline protection structure (see page 11)

• Aquatic planting & lake structures

DNR permit to:

- ☞ Plant below the OHWM (see pages 5, 11, & 13)
- ☞ Place any structure on the lakebed (wave breaks or fish cribs)

• Invasive Plant Control

DNR permit to:

- ☞ Harvest aquatic invasive plants (see pages 16-19)
- ☞ Use herbicide in the water

• Herbicide Application

DNR permit to:

- ☞ Use herbicide in the water

• Miscellaneous

Zoning permit to:

Check with your zoning office & DNR for permits on:

- ☞ Soil disturbance
- ☞ Filling/grading
- ☞ Expanding structures
- ☞ Adding paved areas, decks, or stairs

3. PERMIT REQUIREMENTS & BUFFER WIDTH

When do I need a permit?

State and local regulations are in place to help to protect shoreland areas from erosion, land disturbing activities, exotic/aggressive species, and water pollution.

Buffer Width:

In the 1960's the Wisconsin legislature adopted guidelines to describe a shoreland buffer as a strip of land extending 35 feet inland from the ordinary high water mark. However, research suggests that a 35 foot shoreland buffer may be inadequate to protect water quality. Accordingly, many Wisconsin counties including our own have established wider buffer requirements. The standard buffer widths are as follows:

(Contact your zoning department for details and permit requirements)

- ☞ Ashland County: buffer width is 50 feet for new development, or alteration to a structure that does not conform to current regulations.
- ☞ Bayfield County: buffer width is 50 feet for new development on a Class 1 or 2 lake and 75 feet on a Class 3 lake or river. For alteration on a structure that does not conform to current regulations, the buffer width is ½ of the structure setback.
- ☞ Douglas County: buffer width is ½ the structure setback for new development. The setback on a Class 1 lake is 75 feet (buffer width is 37.5'); the setback on a Class 2 lake is 100 feet; and the setback on a Class 3 lake, or river, is 125 feet.
- ☞ Iron County: buffer width is 35 feet for new development. For alteration on a structure that does not conform to current regulations, the buffer width is ½ of the structure setback.

4. DETERMINE SITE TYPE

The ABDI-LCD will work with you to develop a list of native plants that will protect your shore, meet your goals, and grow well on your site. In order to determine what plants are appropriate for your site:

Determine your soil type

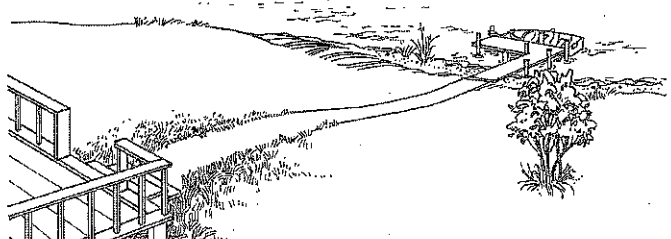
Dig several holes (6-12" deep). Is the soil dry sand to sandy loam; or loamy-rich, moist soil? Soil texture and moisture content will help you determine what zone it is. You can also take a soil sample to your local UWEX or Ag. Center for a test. (Contact UW-Extension; page 21).

Determine what zone it is

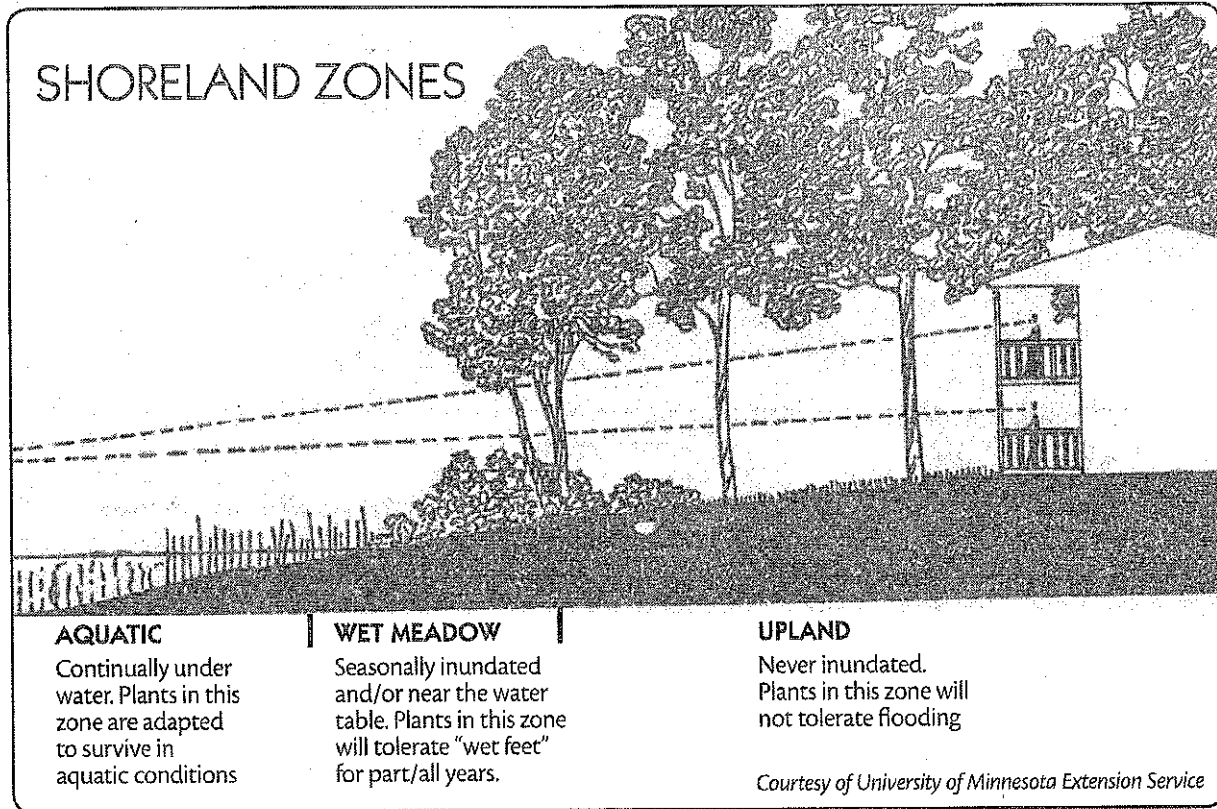
The shoreland can be divided into three general zones based upon the soil conditions and the plants that tolerate these characteristics. The zones include the aquatic zone, wet shoreline zone, and upland zone (see page 7). The boundaries between them are "gray areas" and may change as water levels fluctuate. A wide variety of natural features can occur within each zone.

University of Wisconsin Herbarium and University of Wisconsin Extension have good websites with detailed information on habitat descriptions and vegetation for these zones:

- ☞ www.botany.wisc.edu/herbarium (University of Wisconsin Herbarium)
- ☞ www.uwex.edu/ces/shoreland/zone1.htm (UW-Extension)



4. DETERMINE SITE TYPE CONT.

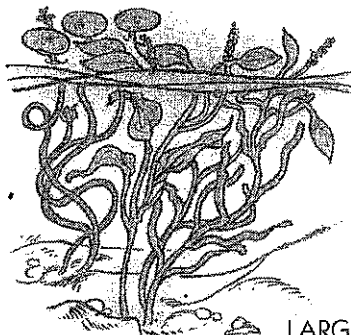


AQUATIC ZONE

Remains under water the entire year and has saturated soils.

Characteristics include:

- May support submergent, floating leaf, and emergent vegetation.
- Plant species vary according to water depth, temperature, acidity, sediments, nutrients, type of lake bottom, and wave action.
- Serves as a wave break, stabilizes lake sediments, absorbs nutrients, and provides fish habitat.



LARGE-LEAF
PONDWEED

WET SHORELINE ZONE

Subject to seasonal flooding in spring or major rain events, or drought.

Characteristics include:

- Soils consist of sand, gravel, muck, organic, or rock.
- Subject to severe erosion potential from wave and ice action, and upland runoff.
- Plants are deep-rooted to stabilize the soil. Erosion occurs when this vegetation is replaced with turf, beach sand, or rocks.

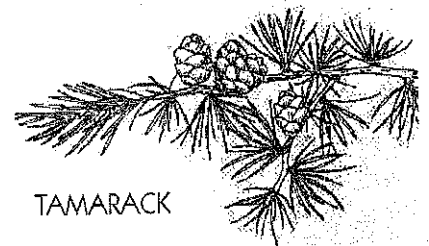
The wet shoreline zone can further be classified as one of the following:

- **Forested:** any soil type except organic. The shore typically has an abrupt bank, with upland species on the bank and wetland species below the bank. Water rarely rises over the bank.
- **Wet Meadow:** any soil type. Water levels fluctuate frequently. The slope is gradual and dominated by wetland grasses, sedges, and wildflowers. Trees may or may not be present.
- **Exposed Sandy Shore:** limited sites; occurs on exposed sandy soils. Vegetation is sparse except along the upper edge.

UPLAND ZONE

Extends from the wet shoreline zone into the upland and is never under water, unless flooded. Conditions such as soil, sunlight, and moisture influence the type of plants that will survive in this zone. Based on the soil and vegetation we can divide this zone into two broad categories:

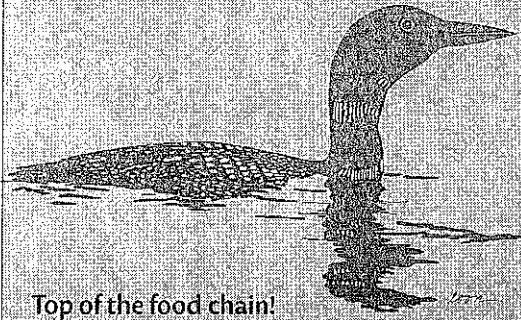
- **Dry - Mesic Forest:** consist of dry, sand to sandy loam soil. These sites are relatively nutrient-poor and can dry out quickly.
- **Mesic - Wet Mesic Forest:** consist of loam soil that is nutrient rich and retains moisture.



TAMARACK

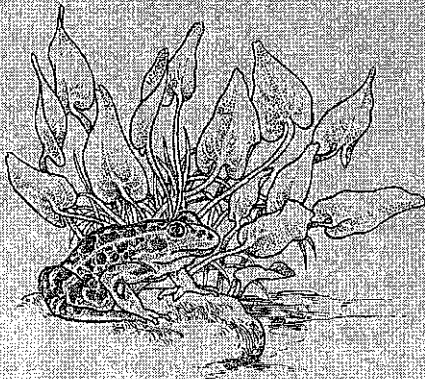


WILDLIFE BENEFITS



Top of the food chain!

The presence of loons on northern lakes is an indicator of good environmental health. When surveyed, most waterfront property owners identified their number one reason for living on the water as peace and solitude.



Frogs like this green frog are territorial!

Biologists studying the impacts of shoreline development use male green frog calls as a measure of habitat quality. Listen on summer nights for a single call sounding like a plucking banjo string to see if your lake measures up!



Some call it woody debris, some call it home!

Dead wood (snags) on the land and in the water provide essential habitat for cavity nesting birds, fish, and small invertebrates at the base of the food chain. Consider leaving dead wood in place if there is no safety hazard.

5 RESTORATION TECHNIQUES

Selecting the appropriate technique for establishing native vegetation depends on an assessment of the existing vegetative cover and site conditions. If non-native or invasive plants exist, extra effort is necessary for control (see page 15). There are four general techniques to choose from:

NO MOW/NATURAL RECOVERY

Cease mowing and trimming, and existing seeds in the soil may re-vegetate.

- Effective in aquatic and wet zones where plant seeds exist or are likely to disperse.
- Not effective on areas that have been managed for turf, other crops, or where invasive plants are present.

EDITING

Used in relatively undisturbed or undeveloped areas to utilize the existing native vegetation and to accommodate the property owner's needs. Comply with zoning regulations.

- Trim/remove selected branches or trees to create view, path, etc.
- Remove non-native or invasive species.
- Preferably remove weak branches or diseased trees that pose safety hazards.

SUPPLEMENTAL PLANTING

More native plants used equals more water quality protection! Enhance existing vegetation to meet your needs:

- For erosion control:
 - Add deep-rooted and quick growing plants to stabilize the soil
 - Select species that will spread to colonize an area of erosion
- For aesthetics:
 - Screen unsightly views with appropriate vegetation
 - Interplant colorful native flowers or shrubs into existing vegetation
- For wildlife habitat:
 - "Layers" of vegetation are very important (shrubs sometimes are lacking on developed lots)
 - Plant natives that are known to attract wildlife for their food value
- For privacy:
 - Vegetative screens are aesthetically pleasing & provide wildlife habitat
 - Include conifers for year-round privacy
- For energy conservation:
 - Deciduous trees offer summer shade, and allow for passive winter heat
 - Trees/shrubs can shelter a home from prevailing winds
- For long-term sustainability:
 - Plant a variety of species to reduce the risk of loss to disease or insects
 - Plant native, sturdy, long-lived species

ACCELERATED RECOVERY

Restore the entire buffer to its pre-disturbance vegetation according to the planting instructions provided in this guide.

6. DEVELOP A COMPREHENSIVE PLAN

The ABDI-Land Conservation Department may be able to assist you in developing a comprehensive plan tailored to your site. Your plan should include:

1. The dimensions of the project.
2. Location of ordinary high water mark.
3. Location of viewing/access corridor, including dock or pier.
4. Location of existing vegetation and structures within and outside of buffer (i.e. house, garage).
5. A native plant list and planting map.
6. Project instructions including site preparation, material quantities, plant purchase, planting, and maintenance plan.
7. Guidelines and requirements for enrollment in the cost-share program.
8. Resource list, including contractors.

If bank stabilization is needed, then the plan must also include:

- A depiction of the shoreline extending to adjacent property.
- Location and method of stabilization practice, including lineal feet.
- A cross section of the bank and the ordinary high water mark.

A SHORELAND RESTORATION

Many shoreland property owners often bring to the lake landscaping practices typical of the residential yard. This often means a manicured lawn extending down to the water's edge. A manicured lawn can cause serious water quality and habitat problems for the lake.

A natural shoreline is a bridge between the terrestrial and aquatic worlds. Studies show that there can be as much as 500% more diversity of plant and animal species along a shoreline compared to upland areas. When the natural shoreline is changed to lawn, that rich diversity of life is damaged.

As in the case that follows, lakeshore property owners can help prevent negative effects by rethinking the idea of a traditional lawn. Instead of bringing urban practices to northern Wisconsin, why not retain a natural northern lakeshore?

During the summer of 2006, new property owners on Little Pike Lake in Iron County personally took on the responsibility of restoring their shoreline. The previous owners had maintained a vast, manicured lawn. Not only did the size of the lawn require extensive maintenance, but there were no benefits for fish, wildlife, or water quality.

The landowners worked closely with the Land & Water Conservation Department to design a restoration project that would be aesthetically pleasing, successful for their site, and compatible with their property needs. In order to implement the project, they received financial and technical assistance through the County's Cost-Share Program. In early September, they worked diligently to kill lawn, remove aggressive thistle patches, and plant native species along their shore. When all was said and done, 3,500 square feet was restored with more than 650 grasses and wildflowers, 68 shrubs, and 20 large trees. In addition, they installed a 6 foot fence for the first growing season to reduce deer damage. Their shoreline now provides essential habitat for all wildlife and they will enjoy more leisure time because nature will take care of the watering, weeding, and mowing.

A SHORELAND RESTORATION



Maintained lawn before restoration

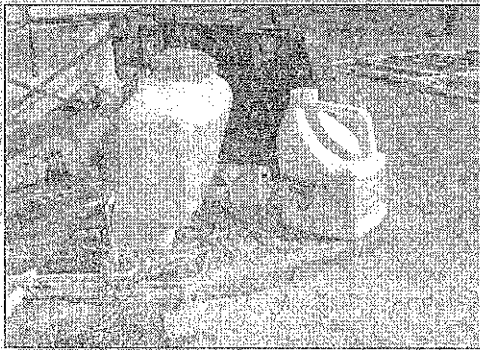


The restored buffer will help protect water quality.

VEGETATION REMOVAL & WEED SUPPRESSION



BLACK PLASTIC



HERBICIDE



WOODCHIPS

SITE PREPARATION

Proper site preparation is one of the most important steps in establishing a native shoreline buffer. This process may take up to a couple seasons depending on the existing vegetation. Once you have chosen which restoration technique is appropriate for your site, you will need to:

- 1 Remove or suppress existing/undesirable vegetation.
If native plants dominate, this is not necessary.
- 2 Protect the shore if erosion is present.

1. Remove or suppress existing vegetation

In areas where existing vegetation is inappropriate.

BLACK PLASTIC: Kills grass and dormant seeds in the soil, suitable on sunny sites

- Mow or trim existing vegetation.
- Lay 3.5 mm black plastic over the site and secure with landscaping staples.
- Leave for 6-8 weeks in hot, sunny weather.
- Remove plastic, plant into dead vegetation without tilling.

HERBICIDE: Quickly rids turf, groundcovers, and exotics on sites not near water

- Use a glyphosate consciously, according to professional recommendations.
- Apply when vegetation is actively growing.
- Shield native plants and avoid drift of herbicide into water.
- Herbicide used over water requires a DNR aquatic plant permit (see pg 21).
- Wait 7 to 10 days before planting.
- A second or third application may be necessary to kill vegetation.
- Leave dead vegetation material in place to serve as mulch.

TOPSOIL: Provides a nutrient base on poor soils such as sandy or gravelly soils

- Use high quality screened or garden soil.
- It is essential that soil is free of weed seeds.
- Be aware that even high quality soil may bring unwanted weeds.
- Spreading topsoil is not always necessary, especially on loam, organic, or high quality soils.

MULCH: Suppress weeds while buffer becomes established

- Use shredded woodchips, bark, or leaves.
- Rye, oat, or wheat straw may also be used. Request clean straw.
Refrain from hay due to the amount of weed seeds.
- Make sure mulch is free of weed seeds.
- Spread 2-4 inches thick and keep ½ inch away from stem.
- Spread *after* site has been prepared.
- Spread before planting plugs, or after planting trees and shrubs.

SITE PREPARATION CONTINUED

2. Shoreline protection

The impact of ice and wave action on lakes can be substantial. In some cases, the shoreline may need to be stabilized and protected from scour and erosion. This can be done with vegetation, bioengineering², or structural systems, or a combination.

There are numerous ways to protect the shoreline from erosion, both along the shore at the ordinary high water mark and on the upland area above the OHWM.

FOR EROSION ALONG SHORE

The following are examples of erosion control methods. These structures are placed at or below the OHWM and require a DNR permit.

WILLOW WATTLE

Linear bundles of branches used for moderate erosion. The wattles will root, sprout, and hold soil in place. They can be secured at the toe (bottom) of an eroding bank, or placed in shallow trenches on the slope.

COCONUT/COIR FIBER ROLL

This dense "log" of biodegradable coconut fiber or coir twine effectively dissipates wave energy when secured at the toe (bottom) of a slope, or anchored offshore as a wave break. Suitable for low or moderate erosion and provides for ideal plant growth.

DELTALOK/SHORESIX

Biodegradable erosion control systems that provide long-term protection and promote natural vegetation growth. Their custom fit and easy installation allow for use as a vegetated seawall or for shoreline restoration.

ROCK RIPRAP

A "hard armor" structure, that provides protection for severe erosion. The DNR will allow permits for moderate to intense erosion. Riprap placed above the OHWM needs to be planted with native plants. Additional vegetation should be incorporated to provide the most benefit.



A silt fence or should be installed to prevent loose soil from entering the water during construction. Aquatic plants may also prevent erosion.

FOR UPLAND EROSION

If you have upland erosion from water runoff, do not ignore the problem because it may get worse. Various strategies may be used to control runoff and reduce erosion. Check with your local zoning department about permit requirements.

VEGETATION

Trees, shrubs, and groundcover help water infiltrate into the soil and reduce erosion.

EROSION BLANKET

Biodegradable blankets protect bare soil on moderate slopes that have been seeded, or steeper slopes that will be planted.

MINIMIZE HARD SURFACES

Impervious surfaces (sidewalks, buildings, driveways) prevent water from soaking into the ground, leading to runoff and potential erosion. Use materials that allow water to infiltrate into the ground on driveways and sidewalks and avoid soil compaction.

ARMORED DITCH/ CHANNEL

A depression lined with grass or appropriate sized rock will slow water flow, prevent erosion, and divert runoff water to a desired area.

RAIN GARDEN

A rain garden is a small basin of wetland plants that, when properly designed, will catch and absorb runoff. It is not meant to be a permanent pond.

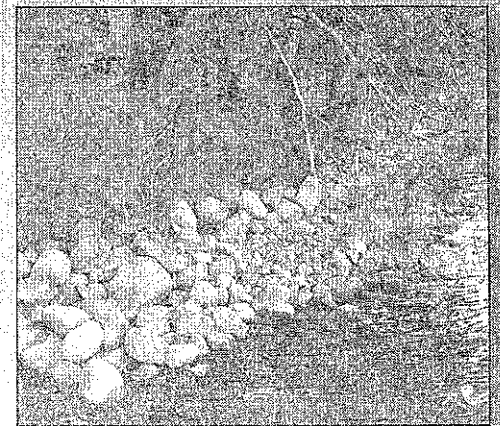
² **Bioengineering:** The use of organic and inorganic materials, combined with plants to control erosion.

EROSION CONTROL

A professional can help to determine what method is most appropriate for the site.



COCONUT COIR FIBER ROLL



ROCK RIPRAP



RAIN GARDEN



SEEDING

After site has been prepared

1. Seeding should be done after installing an erosion blanket.
2. Select seed. Use 4-8 oz. of seed for every 1,000 square feet, or more if desired.
3. Mix seeds slightly with moist sand or peat. Fill a one-gallon bucket 2/3 full with moist sand, add up to 4 ounces of seed, and mix well.
4. Rake the soil. Seed half of the amount by walking in parallel passes over the entire area, then use the remaining seed by walking in perpendicular passes.
5. Press the seed in with a rake or roll the site with a water-filled roller. NEVER roll on wet soil.
6. Mulch lightly with one half inch of straw, you should still see the seeds. Refrain from using hay, it contains weed seeds.
7. On steep slopes, lay a fiber blanket after seeding or before planting (see page 11).
8. Water immediately and regularly according to maintenance instructions (see page 14).

PLANTING

After site has been prepared

1. Space plants according to recommendations (see page 13).
2. Dig holes deep enough so the roots do not bunch. A bulb planter, or bulb auger bit attached to an electric drill will speed up planting.
3. Plant in the morning or evening hours, or on overcast or rainy days.
4. Loosen plant roots before planting.
5. Dig a hole, position the plant evenly in the ground at the same depth it was in the pot, and pack the soil firmly but gently to obtain good root to soil contact.
6. Organic, phosphorus-free fertilizer, such as 10-0-10 (middle number represents phosphorous content) can be used if necessary.
7. Water immediately and regularly according to maintenance instructions (see page 14).

PLANTING RECOMMENDATIONS

You are now ready to purchase and install your plant material. It is important to order plants from a source as close to home as possible (within 200 miles) to encourage restoration of the native plants adapted to this region.

Purchase plant material

- Order plant material from nurseries closest to your site.
- Order early to reserve plants.
- You may order from the list of nurseries provided (see page 23), keeping in mind you may have to order from a couple nurseries to purchase everything specified in your plan.
- Bring your plant list, which includes scientific names, to the nursery because some nurseries use different common names for the same plants.
- Plants in 2-inch pots or plugs work fine. Trees and shrubs can be purchased bare-root or in 2-3 gallon containers.
- Pay for the plants up front and keep all receipts- you will need them for reimbursement if you are participating in the cost-share program.
- Cost share can only reimburse you for what plants are listed on your plan.

Pre-planting preparation

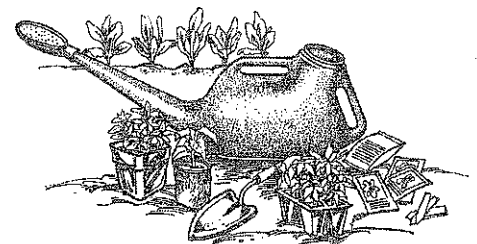
- Keep plants watered and away from the sun and wind until planting.
- Soak bare-root plants overnight before they are planted.
- Gather your tools, materials, and hose or bucket for watering.
- Lay the plants out in the designated area according to plan.

Planting considerations for grasses, flowers, shrubs, & trees

- Plant same-sized containers in stages for efficient planting. For example, position the trees and plant them, then position and install the shrubs, etc.
- It may be easier to plant trees and shrubs first, then spread the mulch. The mulch can easily be moved enough to plant grasses and flowers.
- If using an erosion blanket, lay and secure it before planting. Separate the weave to create a planting hole for plugs and small container plants. Secure the blanket after planting.

Special consideration for potted, bare-root stock, or plugs

- Potted plants: Gently remove plant from container. If roots are bound then make vertical cuts in the sides and loosen the root bottom.
- Bare-root stock: Prune long roots back to 8 inches and any damaged roots or branches. Straighten and spread roots evenly.
- Plug plants: A cordless drill and plant auger works well in light soils, or a trowel or bulb planter works in all soils. To remove plug from the pack, push the root-ball up from the bottom. Slightly separate the roots.



PLANTING RECOMMENDATIONS CONTINUED

Plant spacing³

GROUND LAYER: 25-75 plants per 100 square feet

- 1 ½ - 2 foot spacing; expect some die off
- Direct seed, grass/sedges, at 4-8 ounces per 1000 square feet
- Direct seed wildflowers at 2-4 ounces per 1000 square feet
- Maintain at least three species; 30% groundcover of grasses and sedges (Use plants or seed, there is no need to use both)

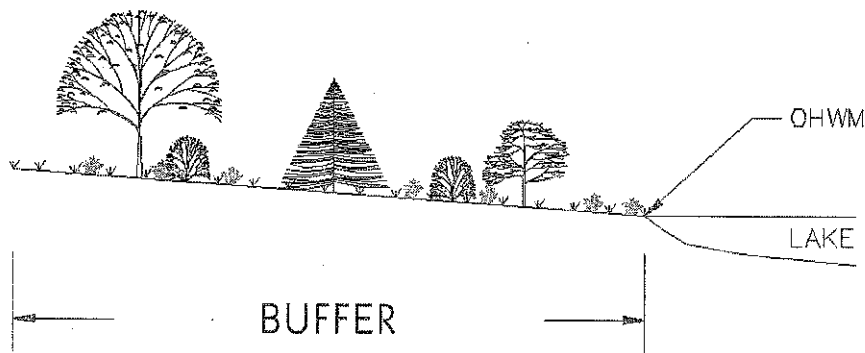
SHRUBS: 1- 4 shrubs per 100 square feet

- Allow 4-6 square feet spacing per small shrub and 6-9 feet per large shrub
- If clumped, maintain 2 foot spacing between
- Maintain at least three species

TREES: .5 - 5 trees per 100 square feet, or 9 feet spacing between tree

- Maintain at least two species

PLANT SPACING



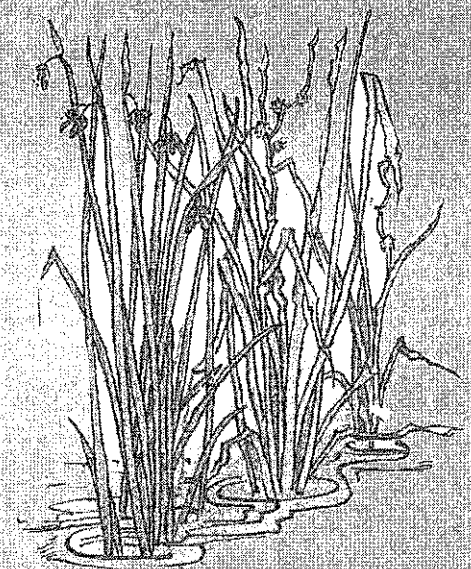
AQUATIC ZONE PLANTING

Establish a temporary protective barrier prior to planting:

1. Plant in early summer to encourage suitable root growth and establishment.
2. Plant at a density of 1.5 - 3' apart.
3. Use a spade to pry back lake sediment, place roots in hole, remove shovel and allow sediment to fold over roots. Gently press the sediment down.
4. In high wave areas you may need to anchor the plants until they become established.
5. In most cases, wave protection will be needed such as anchoring a coconut fiber bio-log in place with stakes (a permit is needed for this).



Remember: planting below the ordinary high water mark may require a DNR permit. Check with your water management specialist (page 21).



SOFT-STEM BULRUSH

³Wisconsin Biology Technical Note 1: Shoreland Habitat
www.wi.nrcs.usda.gov/technical/technotes.html

WATERING

- Regular watering during the first two months of a planting is critical.
- Water immediately after planting, then once daily for two weeks, unless it rains.
- Water by hand or with a timer for at least 30 minutes a day.
- Once the plants are established, water only if dry periods occur.
- If drainage is poor, water less often and only in the morning.
- Use lake water if possible. It is often warmer and more nutrient-rich than well water.
- Pumping from the lake is allowed in Wisconsin as long as no type of structure is left in.

PROTECT AGAINST DEER

Whitetail deer and other animals may damage plantings, especially trees and shrubs. Plants can be protected either by physical or chemical means. These include:

- Install a 4-6' high fence supported with wooden stakes or posts.
- Cover plants with bird netting.
- Install tree shelters to shield young seedlings from deer browse.
- Use a biological spray with a bad taste or odor.
- Move any bird feeders away from project location.

Products may need to be varied if deer become accustomed to the protection method.

CONTROL INVASIVE PLANTS

- Control any invasive plants on site (see page 15).
- Monitor on an annual basis.

CARE AND MAINTENANCE

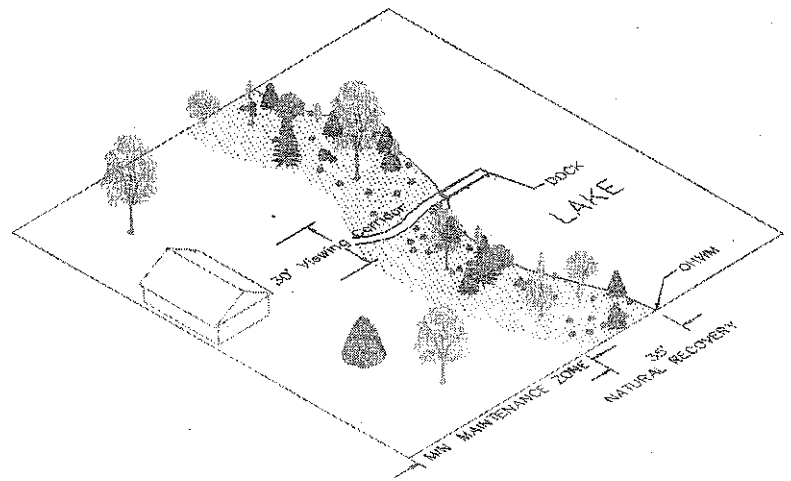
The easiest, and most ideal, buffer maintenance is to leave the buffer alone and allow natural vegetation to recover. If you have removed lawn and restored your buffer, then your new plants may need nurturing for the first two summers, or until they become well established. After that, you can relax and let nature take care of the weeding, watering, fertilizing, and mowing (see sidebar for tips on caring for new plants).

SHORELINE BUFFER ZONE

It extends along the entire length of shore and inland from the Ordinary High Water Mark 35 to 50 feet depending on the county zoning ordinance (see page 6). The following activities are Best Management Practices (BMPs) that will help to protect the shore:

- Leave trees, shrubs, and groundcover in place, including leaves, pine needles and grass to provide constant ground cover.
- Only remove vegetation if it is dead, poses a safety concern, or is invasive.
- Refrain from clearcutting, filling, grading or land disturbing activities.
- Exclude heavy wheeled or tracked equipment.
- Refrain from storage of vehicles, boats, docks or other equipment (unless it occurs during the non-growing season AND vegetation is unaffected).
- Refrain from using fertilizer unless a soil test indicates it is necessary. If necessary, then use only phosphorous-free fertilizer.
- Refrain from using herbicides unless approved for controlling invasives.

ZONES & CORRIDORS



VIEWING OR ACCESS CORRIDOR

The viewing/access corridor may be up to 30 feet wide and extends from the lake inland, along the length of the shore. In order to maintain this corridor, the following Best Management Practices include:

- Leave groundcover intact.
- Limited tree removal, trimming, and mowing should only be done when necessary, this practice is known as editing.
- Refrain from clearcutting, filling, grading or land disturbing activities.
- Locate walkways, paths, and stairs in the corridor; and place docks and lifts in the water immediately in front of the corridor.

WET MEADOW

Wet Meadow- Well-drained, moist to wet, loam or clay substrate.

☀ Full sun ☁ Part sun ☁ Shade

Common Name	Scientific Name	Height (ft)	Flower Color	Sunlight
Grasses & Sedges				
Blue-joint grass	<i>Calamagrostis canadensis</i>	3-4'	NA	☀
Bottlebrush sedge	<i>Carex retrorsa</i>	2-3'	NA	☀ ☁
Bebb's sedge	<i>Carex bebbii</i>	2'	NA	☀
Fringed sedge	<i>Carex crinita</i>	2-4'	NA	☀ ☁ ☁
Green bulrush	<i>Scirpus atrovirens</i>	3-4'	NA	☀
Lake sedge	<i>Carex lacustris</i>	2-4'	NA	☀
Rattlesnake grass	<i>Glyceria canadensis</i>	2-3'	NA	☀ ☁
Switchgrass	<i>Panicum virgatum</i>	3-5'	NA	☀ ☁
Soft rush	<i>Juncus effuses</i>	2-4'	NA	☀ ☁
Tussock sedge	<i>Carex stricta</i>	2-3'	NA	☀
Wool grass	<i>Scirpus cyperinus</i>	3-4'	NA	☀
Wildflowers				
Arrow-leaved aster	<i>Aster sagittifolius</i>	2-4'	Lt. Purple	☀ ☁
Blue flag iris	<i>Iris versicolor</i>	2-3'	Blue	☀ ☁
Blue vervain	<i>Verbena hastata</i>	3-4'	Purple	☀
Boneset	<i>Eupatorium perfoliatum</i>	2-3.5'	White	☀ ☁
Bottle gentian	<i>Gentiana andrewsii</i>	1-2.5'	Blue	☀ ☁
Common milkweed	<i>Asclepias syriaca</i>	2-5'	Pink	☀ ☁ ☁
Culver's root	<i>Veronicastrum virginicum</i>	3-5'	White	☀ ☁
Fiat-top aster	<i>Aster umbellatus</i>	1-5'	Cream	☀ ☁
Grass-leaved goldenrod	<i>Euthamia graminifolia</i>	2-3'	Yellow	☀ ☁
Great St. John's wort	<i>Hypericum pyramidatum</i>	5-6'	Yellow	☀ ☁
Green coneflower	<i>Rudbeckia laciniata</i>	3-12'	Yellow	☀ ☁
Joe pye weed	<i>Eupatorium maculatum</i>	2-4'	Purple	☀ ☁
Monkey flower	<i>Mimulus ringens</i>	6-40"	Blue	☀ ☁
Northern bugleweed	<i>Lycopus uniflorus</i>	2-32"	White	☀ ☁
Obedient plant	<i>Physostegia virginiana</i>	2-3'	Pink	☀ ☁
Ox eye sunflower	<i>Helioopsis helianthoides</i>	3-4'	Yellow	☀
Pale spike lobelia	<i>Lobelia spicata</i>	1-3.5'	Lt. blue	☀ ☁
Panicled aster	<i>Aster lanceolatus</i>	1-4'	White	☀ ☁
Purple-stemmed/ Swamp aster	<i>Aster puniceus</i>	2-6'	Purple	☀ ☁
Sensitive fern	<i>Onoclea sensibilis</i>	2'	NA	☁
Swamp milkweed	<i>Asclepias incarnata</i>	3-4'	Dark pink	☀ ☁
Tall meadow rue	<i>Thalictrum dasycarpum</i>	2-5'	White	☀ ☁
White turtlehead	<i>Chelone glabra</i>	2-3'	White	☀ ☁
Wild bergamot	<i>Monarda fistulosa</i>	1-3'	Violet	☀ ☁
Short Shrub				
Sweet gale/ Bayberry	<i>Myrica gale</i>	3'	Brown	☀
Swamp rose	<i>Rosa palustris</i>	1-4'	Pink	☀ ☁
Tall Shrub				
Meadowsweet	<i>Spiraea alba</i>	3-4'	White	☀
Winterberry	<i>Ilex verticillata</i>	6'	None	☀
Steeplebush	<i>Spiraea tomentosa</i>	2.5-3'	Pink	☀

EXPOSED SANDY SHORE

Exposed Sandy Shore- *Sparsely vegetated, dropped water level.*

☀ Full sun ☁ Part sun ☁ Shade

Common Name	Scientific Name	Height (ft)	Flower Color	Sunlight
Grasses & Sedges				
Blue-joint grass	<i>Calamagrostis canadensis</i>	3-4'	Straw	☀
Fringed sedge	<i>Carex crinita</i>	2-4'	NA	☀ ☁ ☁
Narrow panicle rush	<i>Juncus brevicaudatus</i>	1-2'	NA	☀ ☁
Soft-rush	<i>Juncus effuses</i>	2-4'	NA	☀ ☁
Soft-stem bulrush	<i>Scirpus validus</i>	4-5'	Brown	☀
Wool grass	<i>Scirpus cyperinus</i>	6'	Brown	☀ ☁
Wildflowers				
Blue flag iris	<i>Iris versicolor</i>	2-3'	Blue	☀ ☁
Blue vervain	<i>Verbena hastata</i>	3-4'	Purple	☀
Boneset	<i>Eupatorium perfoliatum</i>	2-3.5'	White	☀ ☁
Grass-leaved goldenrod	<i>Euthamia graminifolia</i>	2-3.5'	Yellow	☀ ☁
Jewelweed	<i>Impatiens capensis</i>	2-6'	Orange	☀ ☁
Joe pye weed	<i>Eupatorium maculatum</i>	2-4'	Purple	☀ ☁
Marsh St. John's wort	<i>Triadenum fraseri</i>	2-5'	Yellow	☀ ☁
Short Shrubs				
Meadowsweet	<i>Spiraea alba</i>	3-4'	White	☀ ☁
Steeplebush	<i>Spiraea tomentosa</i>	2-3.5'	Pink	☀ ☁
Sweet gale/Bayberry	<i>Myrica gale</i>	3'	Brown	☀ ☁
Tall Shrubs				
Speckled alder	<i>Alnus rugosa</i>	15'	NA	☀ ☁
Winterberry	<i>Ilex verticillata</i>	6'	NA	☀ ☁



WET TO MESIC WOODLAND

Wet to Mesic Woodland- Moist or wet, loam-silt substrate.

 Full sun  Part sun  Shade

Common Name	Scientific Name	Height (ft)	Flower Color	Sunlight
Grasses, Sedges, Ferns				
Blue-joint grass	<i>Calamagrostis canadensis</i>	3-6'	NA	
Bottlebrush grass	<i>Elymus hystrix</i>	3-4'	NA	  
Cinnamon fern	<i>Osmunda cinnamomea</i>	2-3'	NA	 
Interrupted fern*	<i>Osmunda claytoniana</i>	2.5-4'	NA	 
Lady fern*	<i>Athyrium filix-femina</i>	3'	NA	 
Little bluestem	<i>Schizachyrium scoparium</i>	1-3'	NA	
Maidenhair fern	<i>Adiantum pedatum</i>	2'	NA	
Ostrich fern	<i>Matteuccia struthiopteris</i>	3'	NA	
Pennsylvania sedge	<i>Carex pensylvanica</i>	.5-1.5'	NA	  
Sensitive fern	<i>Onoclea sensibilis</i>	1-2'	NA	
Switchgrass	<i>Panicum virgatum</i>	3-5'	NA	 
Woolgrass	<i>Scirpus cyperinus</i>	3-5'	NA	
Wildflowers				
Arrow-leaved aster	<i>Aster sagittifolius</i>	2-4'	Lt. Purple	 
Blue vervain	<i>Verbena hastata</i>	3-4'	Purple	
Bunchberry	<i>Cornus canadensis</i>	.3-.5'	White	 
Butterfly weed	<i>Asclepias tuberosa</i>	1-2'	Orange	 
Calico aster	<i>Aster lateriflorus</i>	2-3'	White	 
Canada anemone	<i>Anemone canadensis</i>	1-2'	White	 
Canada mayflower	<i>Maianthemum canadense</i>	.5'	White	 
Downy yellow violet	<i>Viola pubescens</i>	.5-.8'	Yellow	 
Flat-topped aster	<i>Aster umbellatus</i>	2.5-3.5'	White	 
Harebell	<i>Campanula rotundifolia</i>	1-1.5'	Blue	 
Jack-in-the-pulpit*	<i>Arisaema triphyllum</i>	.5-1'	Brown-green	 
Large-leaved aster	<i>Aster macrophyllus</i>	.5-1.5'	Blue	  
Large-flowered trillium	<i>Trillium grandiflorum</i>	1'	White	 
Obedient plant	<i>Physostegia virginiana</i>	2-3'	Pink	 
Ox eye sunflower	<i>Heliopsis helianthoides</i>	3-4'	Yellow	
Pearly everlasting	<i>Anaphalis margaritacea</i>	1.5-2'	White	 
Purple-stemmed/ Swamp aster	<i>Aster puniceus</i>	3-5'	Purple	 
Red baneberry	<i>Actaea rubra</i>	1-3'	White	 
Solomon's seal	<i>Polygonatum biflorum</i>	1-4'	Green	 
Wild bergamot	<i>Monarda fistulosa</i>	2-3.5'	Violet	 
Wild columbine	<i>Aquilegia canadensis</i>	2-3'	Red-yellow	  
Wild strawberry	<i>Fragaria virginiana</i>	4-6"	White	 
Zig zag goldenrod	<i>Solidago flexicaulis</i>	2'	Yellow	 
Short shrubs				
American fly honeysuckle	<i>Lonicera canadensis</i>	2-3.5'	White	 
Black chokeberry	<i>Aronia melanocarpa</i>	3-6'	White	
Bush honeysuckle	<i>Diervilla lonicera</i>	1-4'	Yellow	  
Smooth juneberry/ Serviceberry	<i>Amelanchier laevis</i>	8-10'	White	 
Velvetleaf blueberry	<i>Vaccinium myrtilloides</i>	2'	White	 

* Wettest sites

WET TO MESIC WOODLAND

Wet to Mesic Woodland- *Moist or wet, silt-loam substrate.*

☀ Full sun ☁ Part sun ☁ Shade

Common Name	Scientific Name	Height (ft)	Flower Color	Sunlight
Tall Shrubs				
American hazelnut	<i>Corylus americana</i>	8-15'	NA	☀ ☁
Chokecherry	<i>Prunus virginiana</i>	30'	White	☀ ☁ ☁
Elderberry	<i>Sambucus canadensis</i>	6-12'	White	☀ ☁ ☁
Highbush cranberry	<i>Viburnum trilobium</i>	10-12'	White	☀ ☁
Nannyberry	<i>Viburnum lentago</i>	10-15'	White	☀ ☁ ☁
Ninebark	<i>Physocarpus opulifolius</i>	8-10'	White	☀ ☁
Pagoda dogwood	<i>Cornus alternifolia</i>	16'	White	☀ ☁ ☁
Pussy willow	<i>Salix discolor</i>	15-20'	NA	☀ ☁
Red osier dogwood	<i>Cornus stolonifera</i>	6-18'	NA	☀ ☁
Round-leaved dogwood	<i>Cornus rugosa</i>	6-12'	White	☀ ☁
Winterberry	<i>Ilex verticillata</i>	6'	NA	☀ ☁
Trees				
American mountain-ash	<i>Sorbus americana</i>	30'	NA	☀ ☁
American plum	<i>Prunus americana</i>	10-20'	NA	☀ ☁
Balsam fir	<i>Abies balsamea</i>	75'	NA	☀ ☁ ☁
Basswood	<i>Tilia americana</i>	100'	NA	☀ ☁
Green ash	<i>Fraxinus pennsylvanica</i>	50-75'	NA	☀ ☁
Hemlock	<i>Tsuga canadensis</i>	60-75'	NA	☀ ☁ ☁
Red maple	<i>Acer rubrum</i>	50'	NA	☀ ☁
Sugar maple	<i>Acer saccharum</i>	75-100'	NA	☀ ☁
Tamarack	<i>Larix laricina</i>	65'	NA	☀
Paper birch	<i>Betula papyrifera</i>	80'	NA	☀ ☁
Northern red oak	<i>Quercus rubra</i>	150'	NA	☀ ☁
Northern white cedar	<i>Thuja occidentalis</i>	50'	NA	☀ ☁
White pine	<i>Pinus strobus</i>	100'	NA	☀ ☁
White spruce	<i>Picea glauca</i>	75'	NA	☀ ☁
Yellow birch	<i>Betula alleghaniensis</i>	60-90'	NA	☀ ☁

* Wettest sites



DRY TO DRY MESIC WOODLAND

Dry to Dry Mesic Woodland- Well-drained, dry, sand-sandy loam substrate. ☀ Full sun ☁ Part sun ☁ Shade

Common Name	Scientific Name	Height (ft)	Flower Color	Sunlight
Grasses & Sedges				
Canada wild rye	<i>Elymus Canadensis</i>	2-3'	NA	☀ ☁
Little bluestem	<i>Schizachyrium scoparium</i>	1-3'	NA	☀ ☁
Pennsylvania sedge	<i>Carex pensylvanica</i>	.5-1.5'	NA	☀ ☁ ☁
Poverty oat grass	<i>Danthonia spicata</i>	1-2'	NA	☀ ☁
Wildflowers				
Black eyed susan	<i>Rudbeckia hirta</i>	2-3'	Yellow	☀ ☁
Bunchberry	<i>Cornus canadensis</i>	3-5"	White	☁ ☁
Butterfly weed	<i>Asclepias tuberosa</i>	1.5'	Orange	☀ ☁
Calico aster	<i>Aster lateriflorus</i>	2-3'	White	☀ ☁
Canada mayflower	<i>Maianthemum canadense</i>	.5'	White	☁ ☁
False solomon's seal	<i>Smilacina racemosa</i>	8"	White	☀ ☁
Fireweed	<i>Epilobium angustifolium</i>	3-4'	Purple	☀ ☁
Harebell	<i>Campanula rotundifolia</i>	1.5-2'	Violet	☀ ☁
Lance leaf coreopsis	<i>Coreopsis lanceolata</i>	2-3'	Yellow	☀ ☁
Large-leaved aster	<i>Aster macrophyllus</i>	8-18"	Blue	☀ ☁ ☁
Pearly everlasting	<i>Anaphalis margaritacea</i>	1-1.5'	White	☀ ☁
Rough blazing star	<i>Liatris aspera</i>	1.5-3'	Purple	☀ ☁
Showy goldenrod	<i>Solidago speciosa</i>	1-3'	Yellow	☀
Smooth aster	<i>Aster laevis</i>	2-3'	Blue	☀ ☁
Twinflower	<i>Linnaea borealis</i>	4"	Pink	☀ ☁
Wild bergamot	<i>Monarda fistulosa</i>	2-3.5'	Violet	☀ ☁
Wild columbine	<i>Aquilegia canadensis</i>	2.5-3'	Red-yellow	☀ ☁ ☁
Wood anemone	<i>Anemone quinquefolia</i>	.5-1'	White	☁ ☁
Woodland strawberry	<i>Fragaria vesca</i>	6-10"	White	☀ ☁ ☁
Short Shrubs				
Black chokeberry	<i>Aronia melanocarpa</i>	3-6'	White	☀
Bush honeysuckle	<i>Diervilla lonicera</i>	3-4'	Yellow	☀ ☁ ☁
Dwarf serviceberry	<i>Amelanchier spicata</i>	2-5'	White	☀ ☁
Low bush blueberry	<i>Vaccinium angustifolium</i>	1-3'	White	☀ ☁
Ninebark	<i>Physocarpus opulifolius</i>	6'	White	☀ ☁
Snowberry	<i>Symphoricarpos</i>	2-3'	NA	☀ ☁
Swamp fly honeysuckle	<i>Lonicera canadensis</i>	3-6'	Yellow	☀ ☁
Sweetfern	<i>Comptonia peregrina</i>	2-3'	NA	☀ ☁
Tall Shrubs				
American hazelnut	<i>Corylus americana</i>	8-15'	NA	☀ ☁
Juneberry/ Serviceberry	<i>Amelanchier laevis</i>	8-10'	White	☀ ☁
Pagoda dogwood	<i>Cornus alternifolia</i>	16'	White	☀ ☁ ☁
Trees				
Northern red oak	<i>Quercus borealis</i>	80'	NA	☀ ☁
Paper birch	<i>Betula papyrifera</i>	80'	NA	☀ ☁
Red maple	<i>Acer rubrum</i>	50'	NA	☀ ☁
Red pine	<i>Pinus resinosa</i>	100'	NA	☀ ☁
Sugar maple	<i>Acer saccharum</i>	50-75'	NA	☀ ☁
White oak	<i>Quercus alba</i>	75'	NA	☀ ☁
White pine	<i>Pinus strobus</i>	100'+	NA	☀ ☁

AQUATIC VEGETATION

Aquatic Vegetation-

Sand / gravel substrate (unless noted) in the near shore, littoral zone.

☀ Full sun ☀ Part sun ☁ Shade

Common Name	Scientific Name	Height (Ft)	Flower Color	Sunlight
Emergent (1-18" deep water)				
American bur-reed	<i>Sparganium americanum</i>	3'	NA	☀ ☀
American water-plantain	<i>Allisma subcordatum</i>	.5-3.5'	White	☀ ☀
Arum-leaved arrowhead	<i>Sagittaria cuneata</i>	1'		☀ ☀
Beaked sedge	<i>Carex rostrata</i>	2-4'	NA	☀ ☀
Blue flag iris	<i>Iris versicolor</i>	1.5-3.5'	Violet	☀ ☀
Common arrowhead	<i>Sagittaria latifolia</i>	2-4'	White	☀ ☀
Hardstem bulrush	<i>Scirpus acutus</i>	4-6'	NA	☀
Monkey flower	<i>Mimulus ringens</i>	1-3'	Blue	☀ ☀
Pickereelweed	<i>Pontederia cordata</i>	4'	Purple	☀ ☀
Rattlesnake grass	<i>Glyceria canadensis</i>	2-3'	NA	☀
Softstem bulrush	<i>Scirpus validus</i>	10'	NA	☀
Spike-rush	<i>Eleocharis elliptica</i>	.5-1'	NA	☀ ☀
Sweet flag	<i>Acorus americanus</i>	2-3.5'	Yellow-green	☀
Tussock sedge	<i>Carex stricta</i>	2-4'	NA	☀
Yellow water buttercup	<i>Ranunculus flabellaris</i>	2'	Yellow	☀
Submerged				
Common waterweed	<i>Elodea canadensis</i>	1-3'	White	☀
Large-leaf pondweed	<i>Potamogeton amplifolius</i>	3-6'	NA	☀
Wild celery	<i>Vallisneria americana</i>	1-3'	NA	☀
Floating				
Spatterdock	<i>Nuphar variegata</i>	Floating	Yellow	☀ ☀
Watershield	<i>Brasenia schreberi</i>	Floating	Purple	☀ ☀
Water smartweed	<i>Polygonum amphibium</i>	Floating	Pink	☀ ☀
White water-lily	<i>Nymphaea odorata</i>	Floating	White	☀ ☀

* Note: Aquatic plantings require a DNR permit.

The previous native plant lists were developed for shoreland restoration in Ashland, Bayfield, Douglas, and Iron Counties. They were compiled from local landscapers and specific sources, including:

Burnett County Land Conservation Department. 2001. Burnett County Shoreland Restoration Guide

Elias, J. 2001. Vegetation Surveys in Bayfield, Douglas, and Iron Counties. Prepared for the Ashland, Bayfield, Douglas, and Iron Counties Land Conservation Department.

University of Wisconsin Herbarium website:
<http://www.botany.wisc.edu/herbarium>

