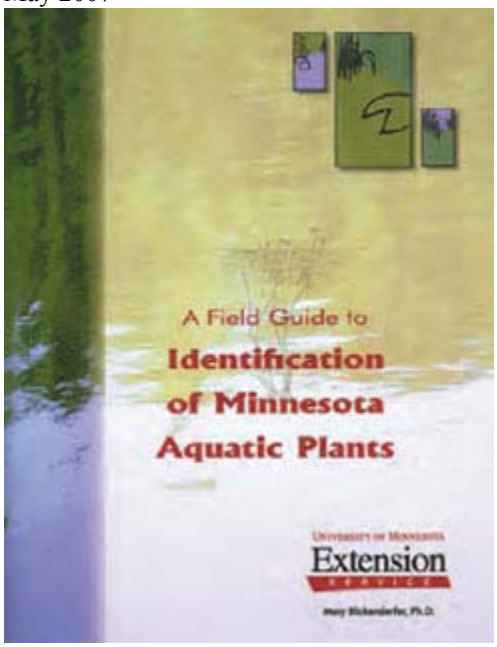
from shore to shore
for Minnesota citizens promoting the health of our rivers and lakes

Plants

A Field Guide to Identification of Minnesota Aquatic Plants: New for 2007

May 2007



This is a useful guide for people with no prior botanical training to identify most families of aquatic plants found in Minnesota lakes and rivers—even when the plants are not blooming. This laminated publication includes detailed information on aquatic invasive species, a glossary of basic botanical terms, and aquatic plant references. Cost: $20 Item: 08242

To purchase online, visit shop.extension.umn.edu.

Posted in Plants, Lakes | | No Comments »

What do Ice Ridges and Curlyleaf Pondweed Have in Common?

March 2007

Mary Blickenderfer, University of Minnesota Extension, 888-241-0885

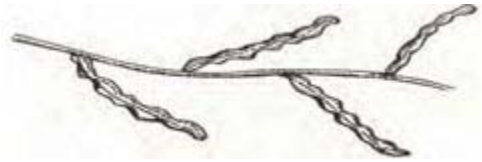
Answer: *Due to lack of snow cover, we anticipate a "bumper crop" of both this year!*

It's still winter 2007, but shoreland professionals are already anticipating a flood of phone calls this spring from shoreland property owners wanting to know what to do about the mountainous soil ridges ("ice ridges") along their shoreline and the dense mat of "weeds" floating on their lake. Let's take a closer look at both…

Ice ridges form when a moving ice sheet pushes up soil along a shoreline – much like a bulldozer. This can happen during a single, spring "ice-out" event or less noticeably as an ice sheet freezes and gradually expands throughout the winter. Anyone who has experienced frozen water pipes understands that water expands as it changes from a liquid to a solid. Similar forces may arise as our lakes freeze. In addition, a rise in air temperature during a typical winter day (or an approaching warm air mass) will cause the ice sheet to expand slightly, exerting a force outward. Then, as the air temperature cools at night (or with an approaching cold air mass) ice will contract, but it lacks the internal (tensile) strength to shrink back to its original size. Instead it cracks under tension, often producing a gap along the length of the crack into which lake water will seep. As this water freezes it expands, exerting an additional force outward. Under these forces, ice will sometimes buckle in the middle of the lake, but most often the force of the expanding ice is transmitted to the surrounding shores.

During a typical Minnesota winter, deep snow insulates the underlying ice sheet from temperature fluctuations and the ice sheet expands very little. However, during winters of little or no snow cover, ice exposed to daily and other periodic air temperature fluctuations will expand, exerting 8 tons per square foot of force on our shorelines. What happens to our shorelines as a result of this force depends upon many factors; several are related to the level of shoreline development. Undeveloped shorelines

often have small, natural ice ridges, but incur relatively little ice damage compared to that of developed shorelines where it is common to see overturned rip rap, retaining walls thrust into the air, whole slabs of lake sediment deposited onto lawns, and ice ridges two feet high (see the Ice Damage Photo Contest announcement in this issue). For information and resources on how to deal with ice ridges, see "It's Rough to Have Ridges – Living with Ice Ridges on Your Shoreline" in the *From Shore to Shore* March-April 2006 issue (http://shorelandmanagement.org/downloads/mar_apr06.pdf).



Curlyleaf pondweed is an aquatic invasive plant species that was introduced to the U.S. in the 1800s and has since spread to many bodies of water. It has a unique life cycle. Sprouting in autumn from dormant buds, called turions, which lie on the lake bottom, the young plants remain alive under the ice during the winter, giving them a jumpstart on the native plants that remain dormant until spring. Their competitive advantage over native aquatic plants tends to be even greater in years of little or no snow cover because their growth is more vigorous due to the additional light they receive through the ice. If you suspect curlyleaf pondweed is growing in your lake, you should consult with your local or regional Minnesota Department of Natural Resources fisheries office.

Posted in Plants, Care of Shoreland Property, Lakes | | No Comments »

Available Soon: A Guide for Identification of Minnesota Aquatic Plants

November 2006

Mary Blickenderfer, University of Minnesota Extension Service, 888-241-0885

Wondering if that large patch of aquatic plants in your lake is invasive Eurasian watermilfoil or curly-leaf pondweed or perhaps a native aquatic plant that occurs in healthy lakes? Or maybe you're interested in learning more about your lake or river and the plants that are in it?

This guide provides an easy-to-use approach to identifying aquatic plants — including aquatic invasive species. Use the information found in this guide and the references listed within it to answer questions you have about aquatic plants or attend a University of Minnesota Extension Aquatic Plant Identification workshop for instruction on use of the guide and experience in identifying live aquatic plants. Visit the Extension Services web site for a workshop schedule.

A Guide for Identification of Minnesota Aquatic Plants, item #08242, will be available in November 2006. For information or to place an order, contact the University of Minnesota Extension Store.

Posted in Plants | | No Comments »

Fish and Aquatic Plants – What's the Connection?

July 2006

Jeff Gunderson, Minnesota Sea Grant Program, 218-726-8715

Musky fishermen on Lake Vermillion pine for the "weed" beds that used to hold muskies, now gone because of hoards of plant-eating rusty crayfish. Some fishermen sing the praises of bass fishing along the edges of dense aquatic plant beds. Others recognize that many lakes' fish populations have changed as aquatic plants have disappeared due to lakeshore development. What is the relationship between aquatic plants and fish populations? Sounds simple enough to answer until you sit down to consider the issue's scope. There are so many species of plants and fish and variations in how they interact that it is an oversimplification to state that all fish depend on healthy native aquatic plant populations. Some fish species need aquatic plants sometime during their lives while others don't.

I've spent most of my career focused on Great Lakes fishes. Many of those species don't ever see a rooted aquatic plant and they do just fine, such as lake whitefish, lake trout, coaster brook trout, lake herring, deepwater chubs and sculpins. Other fish like largemouth bass thrive with more aquatic vegetation and have increased dramatically in some areas of the Great Lakes. Take Lake Erie for example – prior to the 1990s, poor water clarity in that very productive lake limited plant growth. But when the invasive zebra mussels and quagga mussels populations grew in the lake, they filtered the water and improved clarity to the point that aquatic plants began growing in areas that hadn't seen them in close to 100 years. As a result, largemouth bass and sunfish increased in numbers and size in those areas where the plants began growing again.

What does this have to do with inland Minnesota? It reminds us that different fish species have different habitat requirements and that loss of critical habitat will result in loss of fish. As with Lake Erie, we may not know what we're missing because the habitat has been altered for so long that we've forgotten how it was. Or a gradual decline in aquatic plant communities results in an almost imperceptible change in the fish community that is difficult to detect during a single generation. Changes may only become clear when you look through old photo albums at your cabin and realize your grandfather caught more of a particular fish species than you do.

One thing is sure – many fish species and other animals depend on healthy native aquatic plant communities for food, habitat, cover, and spawning or nesting sites. What we don't know is how our individual actions add up to impact a lake. How many individual shoreland property owners (or rusty crayfish for that matter) each removing the aquatic plants on their shoreline does it take to change the lake's habitat enough to impact its fish?

Without careful consideration about how our individual choices add up to impact lakes, pretty soon we are going to sound like our grandfathers talking about the good old days. New fishery management tools and regulations and the catch and release practices of many anglers, combined with taking care of fish habitat could help ensure that the good old days of fishing in Minnesota are still ahead of us.

Posted in Fish and Wildlife, Plants | | No Comments »

Shoreland Plant Selection for Non-Botanists, Part 3 - Upland Plants

May 2006

Black-eyed Susan

Mary Blickenderfer, University of Minnesota Extension Service, 888-241-0885

Just in time for the planting season, shoreland specialists share their "short list" of native species for the upland area of your shoreland – plants that have performed the best in restorations statewide.

Before selecting plants for the upland area of your shoreline property, you will need to determine the general type of soil(s) you have: coarse, medium, or fine. For best plant survival it is recommended that you choose species that were part of the pre-disturbance native plant community. You can do this by identifying the plants growing on an undisturbed piece of shoreline with soil and sun exposure similar to your site (called a reference site). This may require assistance of a botanist.

You also need to consider your objectives for this portion of your shoreland: erosion control, showy garden, shade, wildlife habitat, etc. Use the table below to assist you in selecting plants that meet your objectives. Select the row in the table that corresponds to your soil type and use the groupings to help further narrow your species list. For erosion control, choose grasses that have a deep, fibrous network of roots (see Grasses column of the table). If on a slope, rapidly spreading shrubs and flowers will provide additional structure (see Rapid Colonizers column). If you're looking for a showy planting and erosion isn't an issue, flowers can provide color throughout the summer (see Accent Flowers column). For shade and additional wildlife habitat, select trees and shrubs (see Woody Plants column).

For flowers and grasses plan to sow seed at the rate of 8 oz. and 2 oz., respectively, for each 1,000 square feet of planting area. Small containerized plants (plugs) spaced 1-2 feet apart also work well, or use a combination of seeds and plants. For shrubs and trees use bare-root or larger containerized plants spaced 3-20 feet apart, as recommended.

Upland: ***soil type***	**Coarse:** ***sand to loamy sand***	**Medium:** ***sandy loam, loam, silty loam***	**Fine:** ***silt, clay***
Grasses	Little bluestem	Big bluestem *Andropogon gerardii*	Canada bluejoint

	Schizachyrium scoparium Blue gramma *Bouteloua gracilis* Big bluestem *Andropogon gerardii* Canada wildrye *Elymus canadensis*	Indiangrass *Sorghastrum nutans* Switchgrass *Panicum virgatum* Little bluestem *Schizachyrium scoparium* Canada wildrye *Elymus canadensis*	*Calamagrostis canadensis* Cord grass *Spartina pectinata* Canada wildrye *Elymus canadensis*
Rapid Colonizers (flowers and shrubs)	Wild bergamot *Monarda fistulosa* Asters *Aster laevis, A. ericoides* Maximilian sunflower *Helianthus maximiliani* Common yarrow *Achillea millefolium* Pin cherry *Prunus pensylvanica* Smooth sumac *Rhus glabra*	Wild bergamot *Monarda fistulosa* Asters *Aster lateriflorus, Aster laevis, A. ericoides* Goldenrods *Solidago speciosa, S. missouriensis* Stiff sunflower *Helianthus rigidus*	Common yarrow *Achillea millefolium* Wild bergamot *Monarda fistulosa* Canada anemone *Anemone canadensis* Red-osier dogwood *Cornus stolonifera* Smooth sumac *Rhus glabra*
Accent Flowers	Goldenrods *Solidago nemoralis, S. rigida* Black-eyed susan *Rudbeckia hirta* Rough blazing star *Liatris aspera* Butterfly weed *Asclepias tuberosa* Purple prairie clover *Dalea purpurea*	Black-eyed susan *Rudbeckia hirta* Giant hyssop *Agastache foeniculum* Tall blazing star *Liatris pycnostaschya* Golden alexander *Zizia aurea* Common ox-eye *Heliopsis helianthoides*	Ox-eye *Heliopsis helianthoides* Swamp milkweed *Asclepias incarnata* Boneset *Eupatorium perfoliatum* Prairie blazing star *Liatris pychnostachya* Culiver's root *Veronicastrum virginicum*
Woody Plants (trees and shrubs)	Bur oak *Quercus macrocarpa*	Sugar maple *Acer saccharum* White spruce	Red maple *Acer rubrum* Paper birch

Jack pine *Pinus banksiana*	*Picea glauca*	*Betula papyrifera*
Red pine *Pinus resinosa*	White pine *Pinus strobus*	Tamarack *Larix laricina*
Smooth Juneberry *Amelanchier laevis*	Smooth Juneberry *Amelanchier laevis*	Highbush-cranberry *Viburnum trilobum*
Bush honeysuckle *Diervilla lonicera*	Common elderberry *Sambucus canadensis*	Meadowsweet *Spiraea alba*

Shoreland specialists who contributed to the "short list":
Gregg Thompson- Asso. of Metropolitan Soil and Water Conservation Districts
Bonnie Hiniker- Sunshine Gardens
Mary Blickenderfer, Eleanor Burkett- U of MN Extension

References:

- Ownbey, G. and T. Morley. 1991. *Vascular Plants of Minnesota – A Checklist and Atlas*. Minneapolis: University of Minnesota Press. 306 pp.
- Gleason, H. and A. Cronquist. 1991. *Manual of Vascular Plants of Northeast United States and Adjacent Canada, 2nd edition*. NY: The New York Botanical Garden. 910 pp.

Posted in Plants | | No Comments »

Shoreland Plant Selection for Non-Botanists, Part 2 - Wet Transition Plants

March 2006

Mary Blickenderfer, University of Minnesota Extension Service, 888-241-0885

Once again shoreland specialists share their "short list" of native species – plants that have performed the best in restorations statewide – this time for wet areas of your shoreline.

Wetland, wetland edge, wet transition, wet fringe and wet meadow are all names for ground that is at or near the water table and may experience seasonal flooding. This may include a narrow band along a lake or river shoreline, the low area behind an ice ridge, or a low area that captures rain and melt-water to form ephemeral shallow pools elsewhere on your property. Plants growing in these wet soils are adapted to having "wet feet" or roots in saturated or moist soil.

Most native plants along high-energy shorelines are also resistant to erosion due to their deep fibrous root systems (e.g., grasses and sedges) or stout woody roots (e.g., trees and shrubs). Diverse shoreland plant communities made up of a variety of these plants minimize shoreland erosion caused by wave and ice action, river currents, or upland run-off. If a shoreline is disturbed, many shoreland plants will readily reestablish from root and stem fragments to revegetate and stabilize the exposed soil.

To create a plant list for your site, it is best to identify the plants growing on an undisturbed piece of shoreline with soil and water regime similar to your site (called a reference site). This may require the

assistance of a botanist. Select plants from the reference list that are also on the "short list" below, or use the list below as a general guide. Additional plants can be added for diversity, if desired.

Due to the likelihood of flooding, plants, rather than seeds, are usually used in these wet areas. For flowers and grasses, small containerized plants (plugs) spaced 1-2 feet apart work well. For shrubs, use bare-root or larger containerized plants spaced 3-6 feet apart. Dormant branches of willow and red -osier dogwood driven into the ground (live stakes) will also root to produce shrubs.

If your restoration site is along a lake or river, consult with the Minnesota DNR. It is likely that the area you will be planting is below the ordinary high water level and will require a no-fee permit to plant (application for this permit is available at: www.dnr.state.mn.us/shorelandmgmt/apg/permits.html). If restoring a wetland area, consult with your local Soil and Water Conservation District.

Plant Type	Plant name– Common *Scientific* *(synonyms)*	Comments
Shrubs	Red-osier dogwood *Cornus sericea* *(C. stolonifera)*	6-12 feet tall; bright red stems; can be established from cut branches
	Sandbar willow *Salix exigua*	6-20 feet tall; an aggressive colonizer; can be established from cut branches
	Meadowsweet *Spiraea alba*	3-6 feet tall; showy white flowers
	Highbush-cranberry *Viburnum trilobum*	6-12 feet tall; showy white flowers and bright red berries
Grasses and grass-like	Sedges *Carex retrorsa, C. comosa, C. vulpinoidea*	2-3 feet tall; fibrous roots that resist erosion; interesting seed heads
	Canada blue-joint grass *Calamagrostis canadensis*	2-4 feet tall; fibrous roots that resist erosion
	Bulrushes *Scirpus atrovirens, S. cyperinus*	3-5 feet tall; good soil stabilizer

	Marsh milkweed *Asclepias*	3-4 feet tall; showy pink flowers; attracts monarch butterflies
	Boneset *Eupatorium perfoliatum*	2-3 feet tall; showy white flowers
Flowers	Joe-pye-weed *Eupatorium macalatum*	3-5 feet tall; showy rose-pink flowers
	Blue vervain *Verbena hastata*	2-4 feet tall; showy purple flowers; readily reseeds
	Asters *Aster puniceus, A. lucidulus*	1-5 feet tall; showy lavender flowers; aggressive ground cover

Shoreland specialists who contributed to the "short list":
Gregg Thompson- Asso. of Metropolitan Soil and Water Conservation Districts
Bonnie Hiniker- Sunshine Gardens
Mary Blickenderfer, Eleanor Burkett- U of MN Extension

References:

- Shaw,D. and R. Schmidt. 2003. *Plants for Stormwater Design – Species Selection for the Upper Midwest*. Minnesota Pollution Control Agency.
- Eggers, S. and D. Reed. 1997.*Wetland Plant Communities of Minnesota and Wisconsin.* US Army Corps of Engineers.

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Shoreland Plant Selection for Non-Botanists - Aquatic Plants

January 2006

Mary Blickenderfer, University of Minnesota Extension Service, 888-241-0885

Are you overwhelmed by the long list of native plants to choose from when planning your shoreland revegetation project? In this article, shoreland specialists share their "short list" of native aquatic plant species - plants that have performed the best in restorations statewide. In upcoming newsletters look for the "short lists" of wet transition and upland plant species.

Before attempting an aquatic planting, it's important to gain a historical perspective by inspecting your shoreline, viewing early aerial photos, or consulting with people who grew up on the lake or river to determine if aquatic plants once grew along your shore. If not, there is probably a reason (e.g.,

high wave energy) and an aquatic planting is not likely to succeed. If aquatic plants were present, determine which species they likely were by identifying aquatic plants growing near your property or reviewing the aquatic plant survey of your lake or river (contact your Minnesota Department of Natural Resources Area Fisheries Office).

Plan to reestablish only emergent aquatic plants, such as bulrush and arrowhead. Floating-leaf and submergent plants (e.g., water lilies and pondweeds) are more difficult to establish, but tend to colonize on their own once the emergent plants are in place. Your initial planting should include those species listed in the table below for your site conditions (firm or soft lake bottom) that also occur naturally in your lake or river. Additional emergent species can be planted once these have become established.

The type of plant product you choose will depend upon wave energy along your shore and availability.You can purchase larger containerized plants (1 gallon containers) for shores receiving moderate wave energy and pre-vegetated plant mats for shores with low wave energy (i.e., on smaller lakes or in protected bays). Or you can use in-lake transplants for shores receiving low to moderate wave energy. Determine the quantity of plants you will need based upon 3 feet staggered spacing of plants in 1-3 rows along the shore. No more than one third of the plant should be underwater when planted. Installation of a temporary wave break is recommended for most sites to protect your aquatic planting until it can become securely rooted. Consult with a shoreland specialist to determine the appropriate plant product and wave break for your site.

Finally, obtain a no-fee permit from the Minnesota Department of Natural Resources (MN DNR) before planting by sending in your completed "Application to Transplant/ Collect Aquatic Plants" at least 6-8 weeks prior to planting.

Type of lake bottom	**Plant name– Common** ***Scientific (synonyms)***	**Comments**
Firm: sandy	Hard-stem bulrush *Schoenoplectus acutus (Scirpus acutus)*	3-12 feet tall; it will naturally spread to deeper water (5+ ft. deep)
	Lake sedge *Carex lacustris*	1.5-4 feet tall; usually grows in soft sediments, but is also a strong colonizer in sandy soils
	River bulrush *Scirpus fluviatilis*	6 feet tall; an aggressive colonizer for erosion control
Soft: silt and clay with organics, "mucky"	Soft-stem bulrush *Schoenoplectus tabernaemontani (Scirpus validus)*	3-9 feet tall; it will naturally spread to deeper water

Giant bur-reed *Sparganium eurycarpum*	1.5-4.5 feet tall; a strong colonizer; showy white flowers
Common arrowhead *Sagittaria latifolia*	.5-4 feet tall; showy white flowers

Shoreland specialists who contributed to the "short list":
Bill Bartodziej - Ramsey Washington Metro Watershed District
Lindy Ekola and Leilani Peterson - MN DNR
Mary Blickenderfer - U of MN Extension

References:

- Borman, S. et al. Through the Looking Glass.
- Diekelmann, J. and R. Schuster. Natural Landscaping.
- Nichols,S. Distribution and Habitat Descriptions of Wisconsin Lake Plants.
- Voss, E. Michigan Flora.

Posted in Plants | | No Comments »

Controlling Reed Canary Grass (Phalaris arundinacea) in Wetland Restorations

September 2005

Submitted by: Carrie Reinhardt Adams, Landscape and Restoration Ecology, University of Florida, 352-392-1831 ext. 223

What is reed canary grass?

Reed canary grass is a sod-forming perennial grass that produces tall (2 to 8 ft) shoots, and reproduces by seed, underground spread, and from fragments. This plant forms thick creeping underground stems called rhizomes (Figure 1). Reed canary grass is considered native to the temperate regions of all five continents.

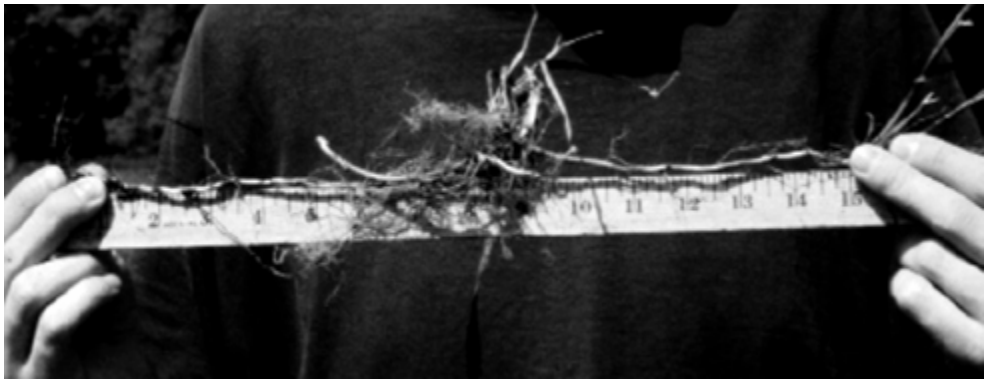

Figure 1. Thick creeping underground stems, called rhizomes, contribute to reed canary grass persistence.

This species was bred to be an important cultivated forage grass for nearly two centuries, and has also been planted to stabilize slopes and drainage ways. Although reed canary grass had conservation value in the past, it is now considered an invasive species. The invasive character of some Phalaris populations may be the result of agronomic breeding for vigorous growth and drought tolerance. Most often, you will find reed canary grass growing in moist habitats, like wetlands, streamsides, lakeshores, and road ditches, but reed canary grass also grows well in upland habitats.

Be careful not to confuse reed canary grass with native bluejoint grass (Calamagrostis canadensis). Bluejoint grass and reed canary grass seedlings are particularly difficult to distinguish. Look for the prominent transparent ligule (collar-like flap where the leaf attaches to the stem) on reed canary grass to positively identify this species (Figure 2).

Why is reed canary grass a problem?

Wetland restoration projects in Minnesota (and across temperate North America) are often invaded by reed canary grass before native plants can establish. Reed canary grass also invades natural wetlands, forming vast monotypic stands and displacing native vegetation. Development and urbanization alter the landscape, creating habitat for which reed canary grass is especially suited; it thrives in high nutrient, fluctuating hydrology conditions that are typical of sites that receive stormwater inputs. Reed canary grass also spreads through underground connections, allowing it to move into otherwise unsuitable conditions. This species is a problem for wetlands across the northern United States.Washington state lists reed canary grass as a noxious weed.

Controlling reed canary grass: what works?

Herbicide treatments reduce reed canary grass when applied at the right time. Glyphosate-based herbicides are most commonly used to control reed canary grass because they are relatively non-toxic and they are known to be effective for this species. Because of glyphosate’s mode of action, later season herbicide applications (late August or later in Minnesota) are more effective than spring herbicide applications (April and May in Minnesota) (Figure 3). Glyphosate moves with carbohydrates in the plant. A herbicide application in spring, when the plant uses carbohydrates to produce shoots, will kill the shoots of the plant but rhizomes will survive and resprout. But glyphosate herbicide applied in the later season, when the plant is storing carbohydrates in the rhizomes, will translocate directly to rhizomes, killing both the above and belowground parts of the plant.

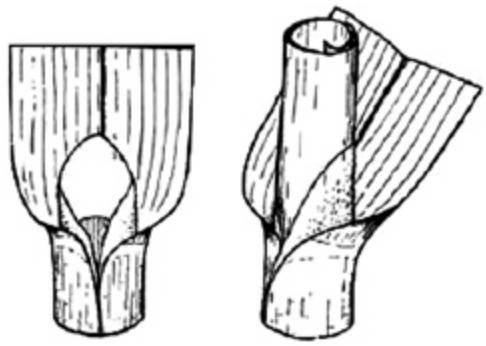

Figure 2. Reed canary grass has a prominent ligule.

Reed canary grass is less likely to invade a site that has a dense cover of native plant species (Figure 4). If managers can quickly establish native plants, by seeding and planting, they will spend less effort controlling reed canary grass. While the native species are establishing, however, managers will probably need to selectively remove new reed canary grass juveniles, especially if it is easy for reed canary grass seed to get to the site from other nearby populations.

Controlling reed canary grass: what doesn't work?

Figure 3. This photo was taken one year after these plots had been treated with herbicide in Minnesota. The late August and late September applications were more effective than the spring herbicide application.

Mechanical control (mowing, grazing, tilling) alone does not reduce established reed canary grass populations. Mowing and grazing removes top growth and stimulates more shoot production. Tilling splices rhizomes into pieces and triggers dormant buds to produce new shoots, producing a more dense reed canary grass stand than if nothing had been done in the first place.

Burning alone also doesn't work. In fact burning increases reed canary grass shoot density as new shoots sprout from rhizomes rapidly following a burn. And implementing a controlled burn prior to a glyphosate herbicide application does not increase the effectiveness of the herbicide. Just partial contact with live tissue is enough for absorption of glyphosate herbicide, it isn't necessary to burn to get a flush of new green shoots.

Figure 4. A dense cover of native species can really slow down reed canary grass invasion.

Although mechanical removal methods are not successful for established stands of reed canary grass, if other hardy native species are mixed with the reed canary grass, burns or mechanical removal may be more effective. If reed canary grass can be set back, the area might be readily occupied by species that could potentially outcompete reed canary grass.

Is one year of control enough?

Following control, reed canary grass can rapidly recolonize, possibly from rhizomes, from seeds on site, or from dispersal of seeds to the site. If reed canary grass has dominated a site for many years, managers will definitely need to control reed canary grass for more than one year, and maybe more than 2 years. Although the effort required to keep reed canary grass out of the site diminishes over time, hand weeding might be necessary indefinitely. At the Spring Peeper Meadow wetland restoration demonstration at the University of Minnesota Landscape Arboretum, effort to keep the wetland reed canary grass-free was substantial at first, but declined over time (Figure 5).

Figure 5. Effort required to keep a wetland restoration reed canary-grass free declined over time

The devil is in the seed bank.

For sites that have had reed canary grass for more than 20 years, many reed canary grass seeds (Figure 6) are stored in the soil, forming a reed canary grass seed bank. After clearing away the existing reed canary grass, seeds in the seed bank have enough light exposure to germinate and grow, and the site is recolonized with reed canary grass. How do you diminish the reed canary grass seed bank? There are several options:

1. Spray the reed canary grass, till the seed bank to encourage germination of a new generation of reed canary grass plants. Kill that generation of plants, and repeat.
2. Excavate and remove the top 4-6 inches of soil.
3. Turn and till under the layer of soil containing reed canary grass.

Figure 6. Reed canary grass produces many seeds.

For more information:

The Nature Conservancy Wildland Invasives Team

Wisconsin Department of Natural Resources

Recommendations are based on studies in the published literature and research performed at the University of Minnesota, in partnership with Minnesota DNR, Minnesota DOT, and Ramsey-Washington Metro Watershed District: C.H. Reinhardt and S.M. Galatowitsch. 2004. Best Management Practices for Reed Canary Grass: Final Technical Document for the Department of Transportation.

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Plant Identification CD Available for PC

May 2005

A new interactive plant identification CD-ROM for all Minnesota plants is available. Bruce Barnes, who developed the Expert Identification System (XID) for Minnesota sedges, has now completed the XID for all Minnesota plants. This is an ingenious key that allows the user to identify a plant using almost any plant characteristic. It includes color photos of 99.5 percent of the plants of Minnesota, including native, introduced, and naturalized species. Detailed descriptions, geographic range, and line drawings for each species are included. A description and demo can be found on the web. This product (PC format only) is available for purchase through the Minnesota Native Plant Society (MNNPS) for $70, a substantial discount (regularly $100). A portion of the proceeds will support MNNPS. For purchase information, contact Jason Husveth.

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Minnesota Tree Handbook

May 2005

The MN Forestry Association of SWCDs has prepared the "Minnesota Tree Handbook," available on the MASWCD Web site, click on "partner links." The 52-page document explains how to plant and care for tree seedlings. It also provides information on the general characteristics and requirements of the tree and shrub species commonly planted for conservation.

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