

Invasive Reed Canary Grass

(Phalaris arundinacea subsp. arundinacea)

Best Management Practices in Ontario



ontario.ca/invasivespecies



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Foreword

These Best Management Practices (BMPs) are designed to provide guidance for managing the invasive species of Reed Canary Grass (*Phalaris arundinacea* subsp. *arundinacea*) in Ontario. Funding and leadership in the development of this document was provided by Environment Canada - Canadian Wildlife Service, and the Ontario Ministry of Natural Resources. The BMPs were developed by the Ontario Invasive Plant Council (OIPC) and partners. These guidelines were created to complement the invasive plant control initiatives of organizations and individuals concerned with the protection of biodiversity, species at risk, infrastructure, and natural lands.

These BMPs are based on the most effective and environmentally safe control practices known from research and experience. They reflect current provincial and federal legislation regarding pesticide usage, habitat disturbance and species at risk protection. These BMPs are subject to change as legislation is updated or new research findings emerge. They are not intended to provide legal advice, and interested parties are advised to refer to the applicable legislation to address specific circumstances. Check the website of the Ontario Invasive Plant Council (www.ontarioinvasiveplants.ca) or Ontario Ministry of Natural Resources (www.ontario.ca/invasivespecies) for updates.

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For more information on invasive plants in Ontario, visit www.ontario.ca/invasivespecies, www.ontarioinvasiveplants.ca, www.invadingspecies.com or www.invasivespeciescentre.ca

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Invasive Reed Canary Grass.

Photo courtesy of Richard Old.



The horticultural plant Ribbon Grass is a cultivar of Reed Canary Grass.

Photo courtesy of Richard Old, XID Services, Bugwood.org.

Introduction

In Ontario, there is an invasive Reed Canary Grass that is spreading rapidly and aggressively and is displacing our native species in some sensitive habitats. This document was developed to help guide the effective and consistent management of this invasive plant across Ontario.

The invasive Reed Canary Grass is a tenacious, rapidly growing, aggressive, perennial species in the *Poaceae* (Grass) family. The native Reed Canary Grass is *Phalaris arundinacea* and the invasive Reed Canary Grass is a subspecies, *Phalaris arundinacea* subsp. *arundinacea* (often shortened to *Phalaris arundinacea*). There are 22 species in the genus *Phalaris* with many different cultivars and subspecies (at least 115). Some cultivars are bred for agricultural use and are grown for forage and potential biomass crops. The modern cultivars used for forage are considered non-invasive (i.e. 'Palaton', 'Marathon', and 'Venture'). Ribbon Grass (*P. arundinacea* var. *Picta* or *P. arundinacea* var. *variegata*) is used in horticulture. It has white striped leaves and is bred to be sterile; it can become aggressive in some habitats but should not spread far from plantings.

These Best Management Practices (BMPs) emphasize targeting control efforts to areas where small populations of the invasive Reed Canary Grass are present, but have not yet become dominant, as smaller populations require less resources and time to control. Since it can be difficult to differentiate between various subspecies and cultivars of Reed Canary Grass, the invasive subspecies will likely be the one that is spreading rapidly and aggressively and is displacing native species within sensitive habitats (e.g. wetlands, savannahs, wet fields).

This document has been developed to help guide the effective and consistent management of this invasive plant across Ontario. These Best Management Practices (BMPs) emphasize targeting control efforts to areas where small populations of Reed Canary Grass are present, but have not yet become dominant, as smaller populations require less resources and time to control.



Reed Canary Grass can out-compete native grasses within 5 to 6 months of introduction.

Photo courtesy of Kerry Royer.



It is thought that the invasive subspecies of Reed Canary Grass is an escaped Eurasian cultivar.

Photo courtesy of Dave Featherstone.

Description

It is thought that the invasive subspecies of Reed Canary Grass in Ontario is an escaped Eurasian cultivar. Several Eurasian cultivars have been introduced to North America since the early 1800s as forage for livestock, and are also used in a variety of other activities. Reed Canary Grass cultivars and subspecies have repeatedly been introduced, and have either escaped cultivation or hybridized to become invasive in much of North America.

Since the 1970's, new varieties of agricultural Reed Canary Grass have been developed ('Marathon', 'Palaton', 'Venture' etc) that are now recommended for forage use. These low alkaloid varieties are different from older varieties. They are not as aggressive and robust, and not as tolerant to stress (frequent cutting, heavy grazing, susceptible to insects etc.) and therefore are not as likely to become invasive.



Reed Canary Grass is usually one of the first species to emerge in the spring.

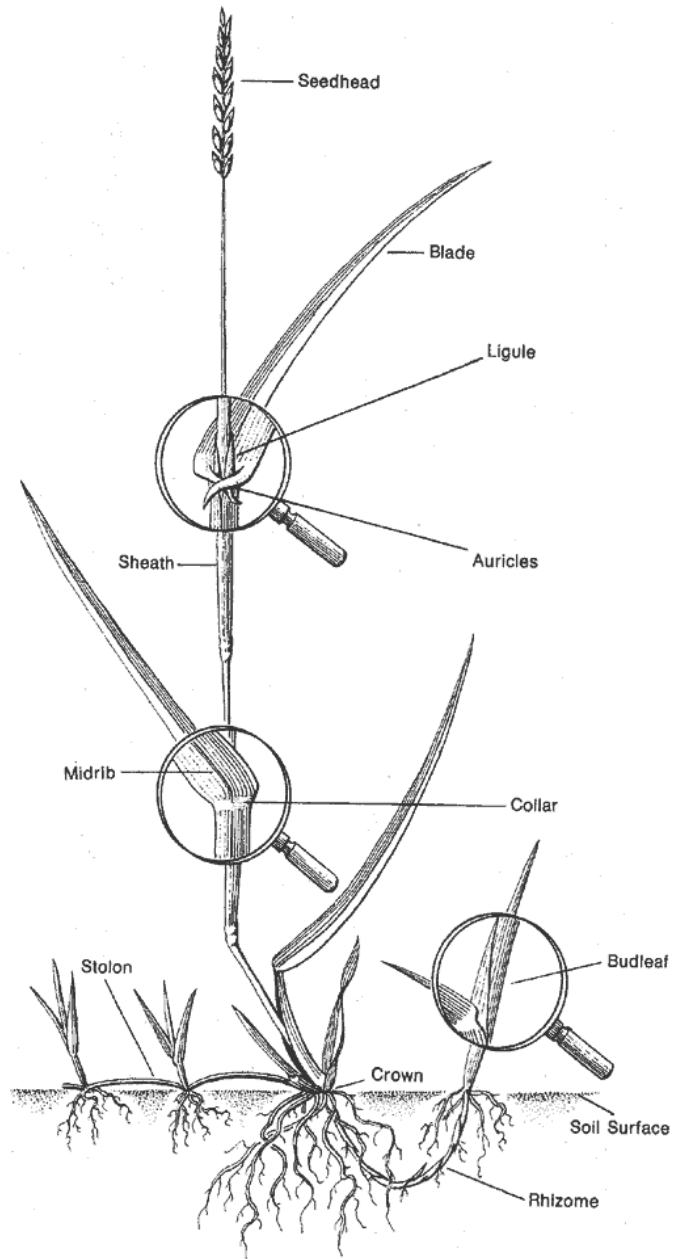
Photo courtesy of Chris Evans, River to River CWMA, Bugwood.org.

Reed Canary Grass invasions can harm biodiversity, the economy and society in a number of ways. It aggressively displaces native wetland species and can lead to increased flooding risk by clogging wetlands and waterways with plant biomass. This can lead to a build-up of sediment and can change the hydrology of the wetland. Invasive Reed Canary Grass can out-compete native grasses within 5 to 6 months of introduction, which leads to a reduction in plant diversity. This can lead to changes in wildlife populations, which may rely on a variety of native wetland plant species throughout the year for food and shelter.

Invasive Reed Canary Grass can grow in a range of habitats where there are cool and moist conditions. It spreads quickly within wetlands, marshes, wet prairies, stream banks, and ditches, especially where there are high nutrient levels. It can spread through seed or rhizome. Other species of Reed Canary Grass are used for soil/water restoration (removal of contaminants), shoreline stabilization, wastewater treatment, as a bio-energy crop, food and forage for livestock, in grass seed and bird seed mixes, and in pulp, paper and fibre production and as a garden plant. Invasive Reed Canary Grass is usually one of the first species to emerge in the spring in wetlands, and may be easiest to find at this time when everything else is still dormant.

Biology and Life Cycle

Reed Canary Grass is a cool-season, long-lived, grass species, which reproduces through seed and rhizomes (tillers).



This graphic illustrates the anatomy used to identify grasses.

Photo courtesy of Purdue University – Turf Science/Agronomy

Stems:

Stems are smooth, sturdy, and usually hollow. They grow to 1 to 2 metres in height. Reed Canary Grass leaves have an open sheath (area at the bottom of the leaf where it wraps around the stem), clasping auricles (outgrowths from the leaf base where it joins the sheath) and transparent ligules (ligule is the area between the sheath and the leaf).



Reed Canary Grass leaves have an open sheath where they attach to the stem.

Photo courtesy of Richard Old, XID Services, Bugwood.org.

Leaves:

The leaf blades of Reed Canary Grass are 0.5cm to 2cm wide, and are flat, long and tapered. They are held at a 45 degree angle from the stem. The leaves have a rough texture but are hairless.



Leaves are held at a 45 degree angle from the stem.

Photo courtesy of Richard Old, XID Services, Bugwood.org.

Roots:

Reed Canary Grass roots are dense and grow vigorously. They are shallow (usually in the top 5 cm of soil) and produce vegetative shoots (called rhizomes / tillers) which produce new plants. Each rhizome can grow horizontally by more than 3 metres per year. There are also dormant buds on the rhizomes, which will sprout when the aboveground plants are removed or damaged.



Reed Canary Grass spreads by rhizomes/tillers from the roots.

Photo courtesy of Les Mehrhoff.

Flowers/Fruit:

Panicles (seed heads) are produced in the early summer, usually in the second year of growth. They are dense, spiky and narrow when they are immature and open more widely as they prepare for pollination. As they grow, they change colour from green to dark purple-brown. Once the seeds are developed and dropped, the panicles dry out and turn straw coloured. Each panicle can produce upwards of 500 seeds, and the seeds can be viable for up to 4 years in the soil, though most germinate within 2 years. Seeds are buoyant, so they will float when they are dropped in water.

There are many different subspecies and cultivars of Reed Canary Grass. They have been cultivated to adapt to a variety of conditions. The size, shape and height of the plants may differ because there are many different species/cultivars. The distinctive trademark of all strains of Reed Canary Grass is a transparent ligule.



Panicles are green, dense, spiky and narrow when they are immature.

Photo courtesy of James Lindsey.



The distinctive trademark of all strains of Reed Canary Grass is a transparent ligule.

Photo courtesy of Malcolm Storey.



Panicles open more widely as they prepare for pollination.

Photo courtesy of Wikimedia Commons.



Once the seeds are dropped, the panicles dry out and turn straw coloured.

Photo courtesy of Chris Evans, River to River CWMA, Bugwood.org.

Habitat

Invasive Reed Canary Grass can grow in a wide variety of conditions. It prefers moist to wet soil, and is most often found growing in wetlands, along riverbanks, or in wet ditches/grasslands. It can also be found growing in lowland pastures and other wet areas. It is a serious threat to sensitive or at-risk ecosystems, which in Ontario may include wetlands, marshes, fens, floodplains, or wet prairies. It can also grow along roadsides, ditches, riverbanks and lakeshores. It can be found in old fields with moist soil (i.e. non-meadow marsh). It has also been found in upland oak savannas, where it grows more slowly but can still form monocultures. It can tolerate growing on sites that are submerged in spring and completely dry and hard-packed in summer.



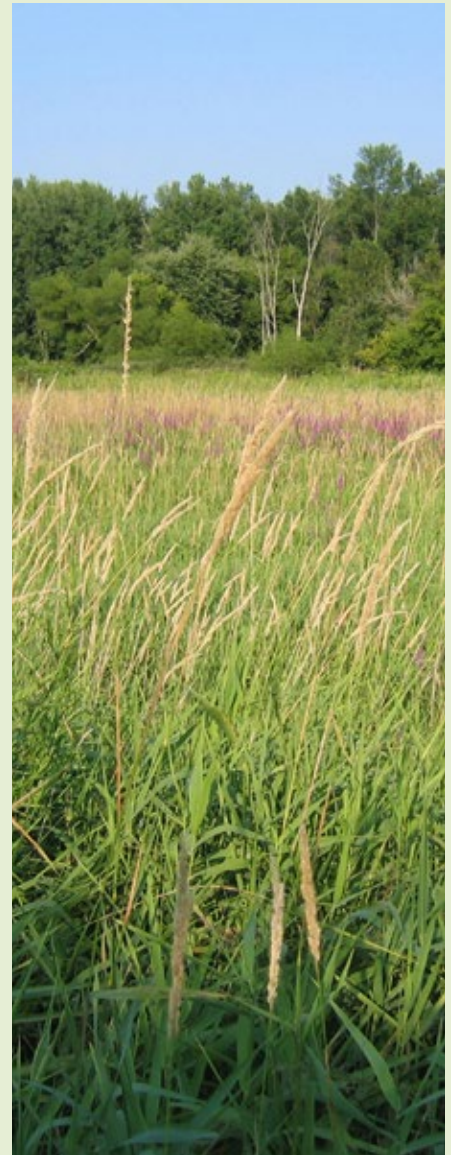
Reed Canary Grass can tolerate growing on sites that are submerged in water.

Photo courtesy of Dave Featherstone.



Reed Canary Grass can be found along riverbanks.

Photo courtesy of Dave Featherstone.

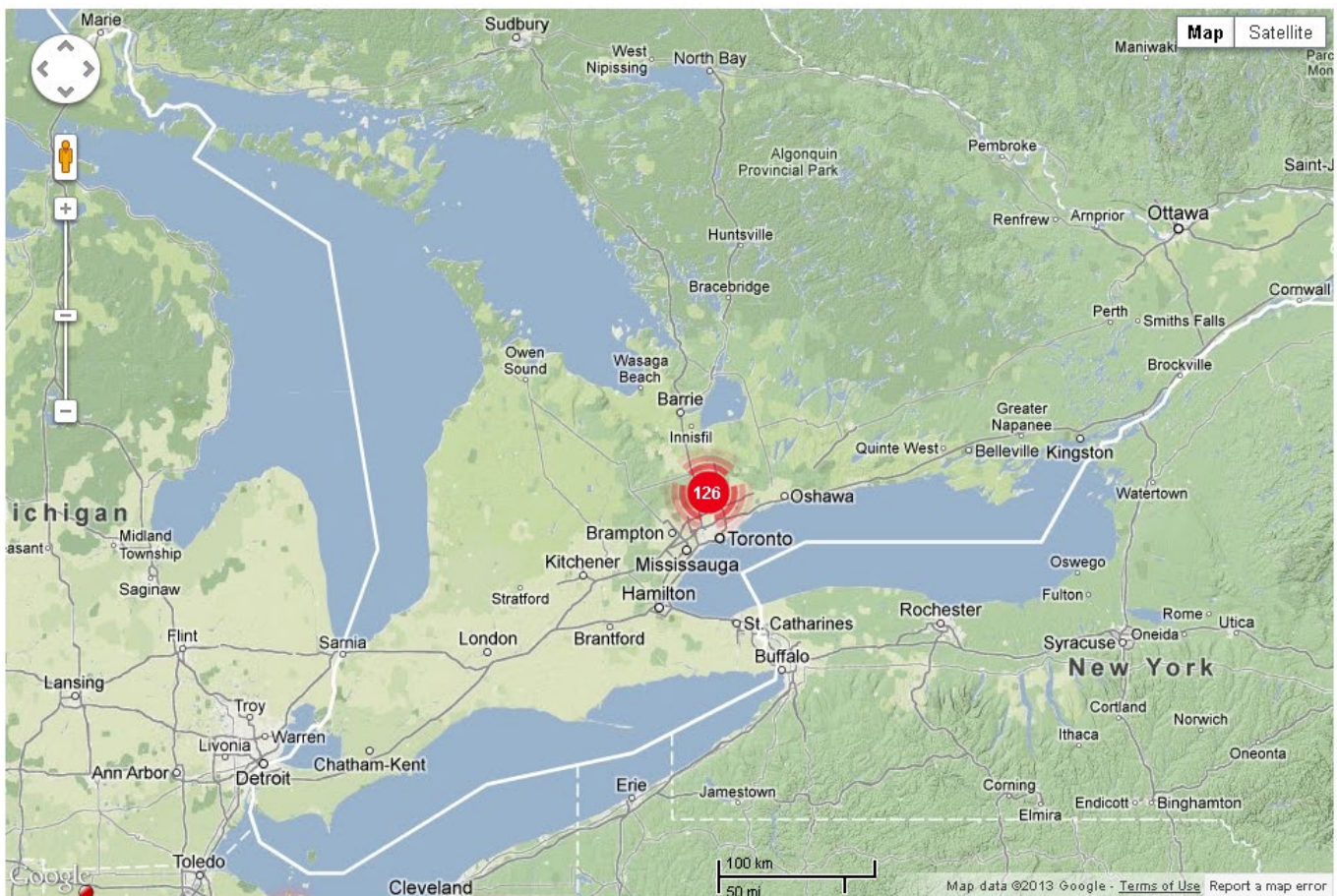


Reed Canary Grass also grows in wet ditches/wetlands.

Photo courtesy of Dave Featherstone.

Distribution

In Ontario, Invasive Reed Canary Grass populations are not well documented; it is widespread in the Province, especially in southern Ontario, due to its multiple uses and historical introductions. It is found less in Canadian Shield wetlands, where Canada Bluejoint grass (*Calamagrostis canadensis*) is more widespread and outcompetes it. It is found throughout Canada (in all provinces except Nunavut) as well as the United States, where it has been confirmed in 43 states. It has been described as circumboreal, meaning it occurs throughout the boreal regions of North America and Eurasia. It has been introduced to many other countries, where it has been used as a forage crop and is designated a weedy/invasive species in Afghanistan, Argentina, Australia, Belgium, China, Colombia, England, Finland, Germany, India, Japan, Korea, New Zealand, Poland, Puerto Rico, South Africa, Sweden, Turkey, and other countries.



Reed Canary Grass populations are not well documented in Ontario despite being widespread throughout the province.

Photo courtesy of EDDMaps.org/Ontario.

Look-alikes

Invasive vs. Native Reed Canary Grass

There is no reliable method other than genetic analysis to tell the difference between native Reed Canary Grass and the invasive species. However, there are a few clues from the habitat and growth patterns that can assist you in determining which it may be:

Native Reed Canary Grass (*Phalaris arundinacea*):

The native Reed Canary Grass species is found in shallow water among rocks along lake shores and large river shorelines from Lake Superior east to the Bruce Peninsula and the French and Ottawa Rivers. It also occurs farther north along rivers of the James Bay drainage. It is smaller, often with small purple tinged seed heads and with practically all stems flowering. It tends to form sparse stands.

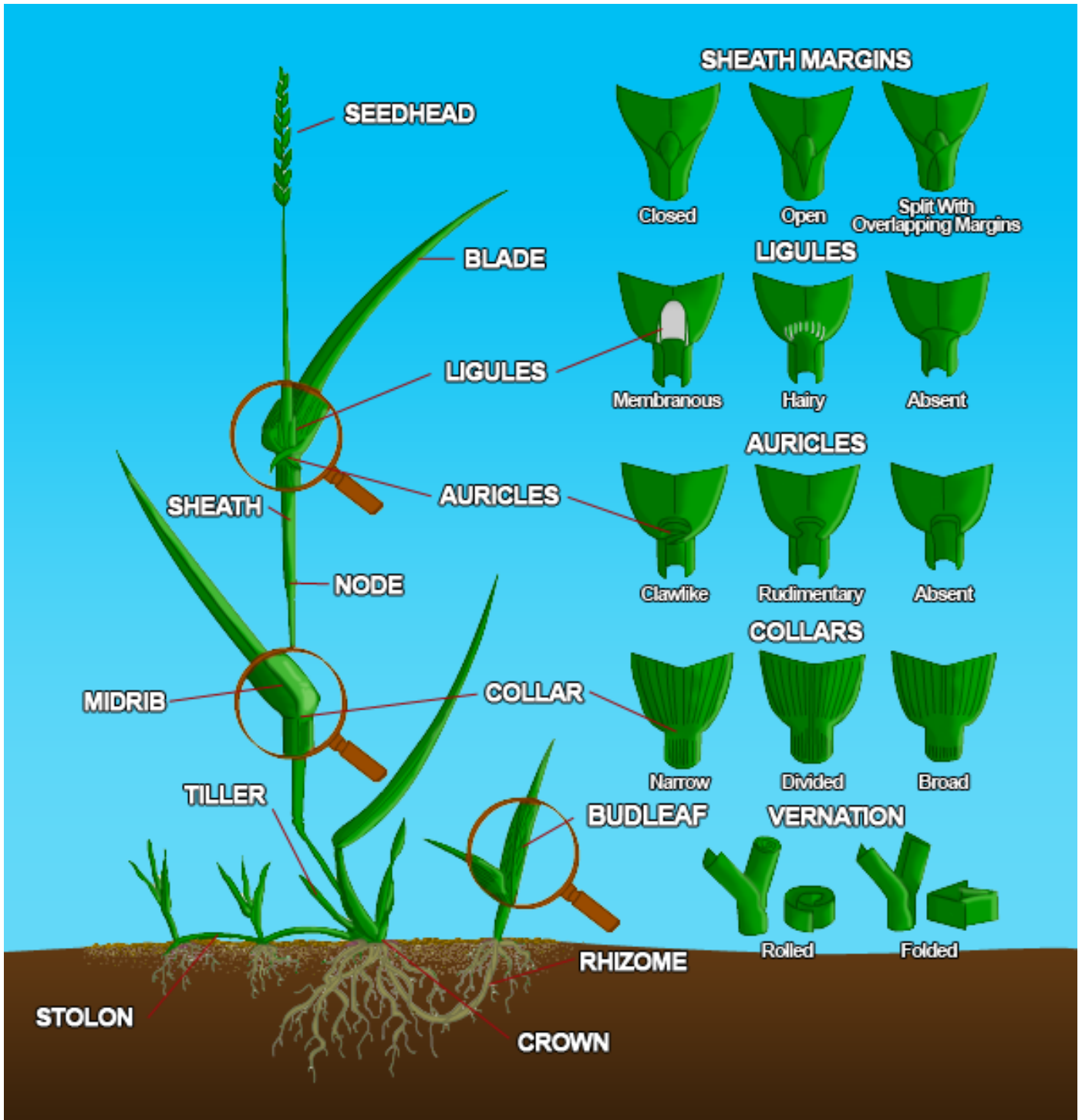
Invasive Reed Canary Grass (*Phalaris arundinacea* subsp. *arundinacea*):

The invasive species is more often found in marshes, ditches, and along slow-moving streams in areas inland from the lower Great Lakes, and along large rivers in Southern Ontario such as the Thames, Ottawa and St. Lawrence. In comparison, the invasive species has larger seed heads which have a greenish tinge and can out-compete native plants to form dense monocultures.



The invasive reed canary grass has larger seed heads and forms dense monocultures.

Photo courtesy of Michael Shepherd, USDA, bugwood.org



This diagram can help to assist in identifying grass characteristics.

Photo courtesy of Purdue University – Turf Science/Agronomy.

Common Reed and Reed Canary Grass

Occasionally, Reed Canary Grass is mistaken for Common Reed (also known as Phragmites). Common Reed also has an invasive and native subspecies, both of which are present in Ontario. The following table will help to distinguish Reed Canary Grass from Common Reed.

Invasive Common Reed (*Phragmites australis* subsp. *australis*):

An aggressive, invasive perennial grass that is widely distributed in Southern Ontario. It forms dense monocultures and has large seedheads.

Native Common Reed (*Phragmites australis* subsp. *americanus*):

A native species to North America. It forms sparse stands that are intermixed with other native vegetation and has smaller seedheads. It also does not grow as tall as its invasive counterpart.



Native common reed (top) vs. Invasive common reed (bottom).

Photo courtesy of Erin Sanders, MNR.

Invasive Reed Canary Grass



Photo courtesy of Malcolm Storey.

Invasive Common Reed (*Phragmites australis* subsp. *australis*)



Photo courtesy of Janice Gilbert.

Native Common Reed (*Phragmites australis* subsp. *americanus*)



Photo courtesy of Erin Sanders, MNR

Height	1 to 2 m in height	Up to 15 m	Up to 2 m
Stem	Smooth, sturdy, erect, usually hollow, not branched Reddish colour near the top	Rough, dull, rigid, hollow Beige/tan in colour	Smooth, shiny, flexible hollow Reddish brown in colour
Leaves	<ul style="list-style-type: none"> • Distinctive transparent ligule • Bright green • Rough textured, no hairs 	<ul style="list-style-type: none"> • Narrow ligule • Blue Green 	<ul style="list-style-type: none"> • Wider ligule, likely to shred by fall • Yellow green • Lower leaves fall off easily to expose reddish stems
Flower	<ul style="list-style-type: none"> • Greenish tinge, turning purplish-brownish • Grow high above the leaves • Narrow, branched clusters, often dense, spreading during pollination and then returning to a tight position around the stem 	<ul style="list-style-type: none"> • Dense, large • Also spreads by stolons (runners) which are bright red in colour 	<ul style="list-style-type: none"> • Sparse, small
Fruit	Spikelets, 5 mm long	Spikelets, 2-4mm long	Spikelets, 4-7mm long

Additional Look-alikes

Bluejoint Reed Grass (*Calamagrostis canadensis*):

Native to much of North America, it is very widely distributed and can be found in many different habitats, including forests and the arctic tundra.

Harding Grass (*Phalaris aquatica*):

Native to the Mediterranean and has been introduced widely as a forage species. Can hybridize with Reed Canary Grass, and can become invasive in some habitats.

Orchard Grass (*Dactylis glomerata*):

Native to Europe, Asia and Africa and has been introduced to North America, New Zealand and Australia. It can also become invasive in some habitats, such as savannahs and woodlands. It is sold commercially as “cat grass”.



Bluejoint Reed Grass is often mistaken for Reed Canary Grass

Photo courtesy of Dave Powell, USDA Forest Service, Bugwood.org

Invasive Reed Canary Grass
(Phalaris arundinacea)
 *Non-native, invasive



Photo courtesy of Malcolm Storey.

Bluejoint Reed Grass
(Calamagrostis canadensis)
 *Native



Photo courtesy of Robert H. Mohlenbrock, USDA.

Harding Grass
(Phalaris aquatica)
 *Non-native



Photo courtesy of NRSC Plant Materials Center.

Orchard Grass
(Phalaris arundinacea)
 *Non-native, invasive



Photo courtesy of John Haslam.

Height	1-2 m in height	1-2 m in height	1-1.5 m in height	10 cm-1.5 m in height
Stem	Smooth, sturdy, erect, usually hollow, not branched Reddish colour near the top	Slender, erect, not branched	Sturdy and erect	Stem is flattened at the base Grows in dense bunches
Leaves	<ul style="list-style-type: none"> • 5-20 mm wide • 5-20 cm long • Flat • Distinctive transparent ligule • Bright green • Rough textured, no hairs 	<ul style="list-style-type: none"> • 4-10 mm wide • Long, narrow leaves • Densely leaved • Bluish-green in colour • Distinct darker purplish joints • Rough textured with small hairs 	<ul style="list-style-type: none"> • 6-18 mm wide • 10-40 cm long • Grayish to bluish green leaves 	<ul style="list-style-type: none"> • Up to 1.5 cm wide • 20-50 cm long • Greyish-greenish leaves

Invasive Reed Canary Grass
(*Phalaris arundinacea*)
*Non-native, invasive



Photo courtesy of Malcolm Storey.

Bluejoint Reed Grass
(*Calamagrostis canadensis*)
*Native



Photo courtesy of Robert H. Mohlenbrock, USDA.

Harding Grass
(*Phalaris aquatica*)
*Non-native



Photo courtesy of NRSC Plant Materials Center.

Orchard Grass
(*Phalaris arundinacea*)
*Non-native, invasive



Photo courtesy of John Haslam.

Flower

- 7-40 cm in length
- Greenish tinge, turning purplish-brownish
- Grow high above the leaves
- Narrow, branched clusters, often dense, spreading during pollination and then returning to a tight position around the stem

- Up to 25 cm in length
- Purplish to brownish in colour
- May be dense or loosely packed with spikelets, each containing 1 seed

- 5-12 cm in length
- Green to white in colour
- Densely packed
- Does not widen as the seeds mature
- Spiky and cylindrical

- Triangular and tufted flower head
- Reddish to grayish in colour

Fruit

Spikelets, 5 mm long

Brown, smooth, oval, 1 – 1.5 mm long

Look like spikelets

Spikelets, 5-9 mm long

*additional lookalikes include Stout Wood Reed Grass (*Cinna arundinacea*), and Slender Wedgescale (*Sphenopholis intermedia*)

Impacts

Biodiversity

The dense stands produced by invasive Reed Canary Grass are highly aggressive and competitive. These plants begin growing early in the spring, and grow quickly and in dense stands/colonies. Invasive Reed Canary Grass quickly out-competes native species for space and nutrients. Areas with established Invasive Reed Canary Grass stands have been found to have little to no native species in the seedbank due to competition.

Invasive Reed Canary Grass provides very little value for native wildlife. Few species will eat it, the dense stands in rivers may impede salmon spawning, and it grows too thickly for mammals and waterfowl to use for cover/nesting.

The invasive species of Reed Canary Grass is also a threat to the native species of Reed Canary Grass, because it can hybridize with the native species, which causes a loss of genetic diversity for the native species.

Species at Risk

Invasive Reed Canary Grass can have a negative impact on some species which are already considered threatened or at-risk in Ontario and Canada. Controlling Invasive Reed Canary Grass in the habitats where these species may be present can help them to recover (provided the methods used to control it do not also impact these species).

Birds



Least Bittern
(*Ixobrychus exilis*)

Photo courtesy of R. Bennetts.



Black Tern
(*Chlidonias niger*)

Photo courtesy of Omar Runolfsson, Wikimedia Commons.



King Rail
(*Rallus elegans*)

Photo courtesy of Jim Rathert, MO Conservation.



Henslow's Sparrow
(*Ammodramus henslowii*)

Photo courtesy of Dominic Sherony Wikimedia Commons.



Short Eared Owl
(*Asio flammeus*)

Photo courtesy of Dario Sanches.



Yellow Rail
(*Coturnicops noveboracensis*)

Photo courtesy of Dominic Sherony.

Least Bittern (*Ixobrychus exilis*): Least Bittern is a species of special concern in Canada and Ontario. It requires large marshes with open water for nesting and habitat. The invasion of Reed Canary Grass degrades these marsh habitats and can displace Least Bitterns.

Black Tern (*Chlidonias niger*): Black Tern is a species of special concern in Ontario. This species nests and feeds primarily in shallow marsh habitats and may be threatened by the invasion of Reed Canary Grass through the reduction of nesting sites and habitat for prey species.

King Rail (*Rallus elegans*): King Rail is endangered in Canada and Ontario. This bird requires marshes for nesting and hunting. The invasion of species such as Reed Canary Grass, which change the hydrology of marshes and reduce habitat for prey, can displace the King Rail.

Henslow's Sparrow (*Ammodramus henslowii*): Henslow's Sparrow is endangered in Canada and Ontario. It nests on the ground, and requires old/wet fields or tallgrass prairies for nesting, and could be displaced by the invasion of dense stands of Reed Canary Grass in these habitats.

Short Eared Owl (*Asio flammeus*): The Short Eared Owl is a species of special concern in Canada and Ontario. Short Eared Owls nest on the ground, in wet fields and marshes, and could be displaced by the invasion of dense stands of Reed Canary Grass in these habitats.

Yellow Rail (*Coturnicops noveboracensis*): Yellow Rail is a species of special concern in Canada and Ontario. It requires wet fields or wetlands for nesting and breeding, and could be displaced by the invasion of dense stands of Reed Canary Grass in these habitats.

Reptiles and Amphibians



Blanding's Turtles
(*Emydoidea blandingi*)

Photo courtesy of Wikimedia Commons.



Snapping Turtles
(*Chelydra serpentina*)

Photo courtesy of Dakota L.



Western Chorus Frog's
(*Pseudacris triseriata*)

Photo courtesy of Benny Mazur.

Some species of reptiles and amphibians require a mixture of wetland vegetation and open water areas for their life cycles. The invasion of Reed Canary Grass in to wetlands and the subsequent reduction in open water areas and dense stands of plants may negatively impact species-at-risk such as, Blanding's Turtles (*Emydoidea blandingi*), Snapping Turtles (*Chelydra serpentina*), Eastern Musk Turtles (*Sternotherus odoratus*), and Northern Map Turtles (*Graptemys geographica*), as well as the Western Chorus Frog's (*Pseudacris triseriata*) Great Lakes/St. Lawrence – Canadian Shield population which is listed as threatened in Canada under the Species at Risk Act (SARA).

Plants



American Water Willow
(*Justicia americana*)

Photo courtesy of Mike Cline.



Riddell's Goldenrod
(*Solidago riddellii*)

Photo courtesy of
www.MinnesotaWildflowers.info



Green Dragon
(*Arisaema dracontium*)

Photo courtesy of Bob Gutowski, Morris Arboretum of the University of Pennsylvania.



False Hop Sedge
(*Carex lupuliformis*)

Photo courtesy of CNW Group, Committee on the Status of Endangered Wildlife in Canada.



Hill's Pondweed
(*Potamogeton hillii*)

Photo courtesy of Gary Fewless.



Eastern Prairie Fringed Orchid
(*Platanthera leucophaea*)

Photo courtesy of Mike Redmer, US FWS.

American Water Willow (*Justicia americana*): American Water Willow is a threatened plant in Ontario and Canada. Reed Canary Grass presents a direct threat to American Water Willow; it grows in the same habitat and can aggressively out-compete it. It has been determined that American Water Willow will not grow where Reed Canary Grass is established due to competition for habitat and resources.

Riddell's Goldenrod (*Solidago riddellii*): Riddell's Goldenrod is an herbaceous perennial plant which grows in prairies and fens. It is listed as a species of special concern in Ontario and Canada. Reed Canary Grass can threaten this plant through competition for habitat and resources.

Green Dragon (*Arisaema dracontium*): Green Dragon is an herbaceous perennial plant which grows only in damp woods. It is a species of special concern in Ontario and Canada. Reed Canary Grass can threaten this plant through competition for habitat and resources.

False Hop Sedge (*Carex lupuliformis*): False hop sedge is endangered in Ontario and Canada. It is a perennial plant which grows in wet areas in Southern Ontario. Reed Canary Grass can threaten this plant through competition for habitat and resources.

Hill's Pondweed (*Potamogeton hillii*): Hill's Pondweed is a submerged aquatic plant, found in only a few locations in Ontario. It is classified as a species of special concern in Ontario and Canada. Reed Canary Grass affects Hill's Pondweed by altering the hydrology of the marshes where it is present, making the habitat unsuitable for this species to grow.

Eastern Prairie Fringed Orchid (*Platanthera leucophaea*): Eastern Prairie Fringed Orchid is a beautiful flowering plant which grows in swamps and tallgrass prairies. Reed Canary Grass can threaten this plant through competition for habitat and resources.

Infrastructure

The dense stands and rhizomes of invasive Reed Canary Grass collect sediment which can clog drains and ditches. Invasive Reed Canary Grass may also increase the risk of flooding by changing the hydrology of wetlands and affecting the ability of the wetland to hold water during heavy rains.

Recreation

The dense stands of Invasive Reed Canary Grass can block or interfere with access to water for activities such as canoeing, boating, angling and swimming. It has been noted that the pollen from Reed Canary Grass can also cause an allergic reaction (hay fever) in some people.

Regulatory tools

Federally

Reed Canary Grass is not a federally regulated plant species.

Provincially

Reed Canary Grass is not a regulated species in Ontario. The newer non-invasive cultivars are promoted for use as a forage crop and mixture in hay fields.

Best Management Practices

Controlling Invasive Reed Canary Grass before it becomes locally established will reduce its impacts on biodiversity, species at risk, infrastructure and recreation.

Once Invasive Reed Canary Grass has been confirmed at a sensitive location, or somewhere it has not been intentionally planted, a control plan should be developed based on infestation size, site accessibility, potential for spread and the risk of environmental, economic and recreational impacts. When action is taken early it can significantly reduce the cost of control and increase the chance of successful eradication. The following best practices can be used as a guide to develop a control plan. A number of natural resource considerations, such as species at risk and habitat disruption, should be assessed before implementing a control plan.

Natural Resource Considerations

You are responsible for ensuring that your project follows provincial, federal and municipal laws, including the provincial Endangered Species Act, 2007 (ESA) and federal Species at Risk Act. If protected species are present, an assessment of the potential effects of the control project could be required. Consult with your local MNR district office early in your control plans for advice.

Setting Priorities

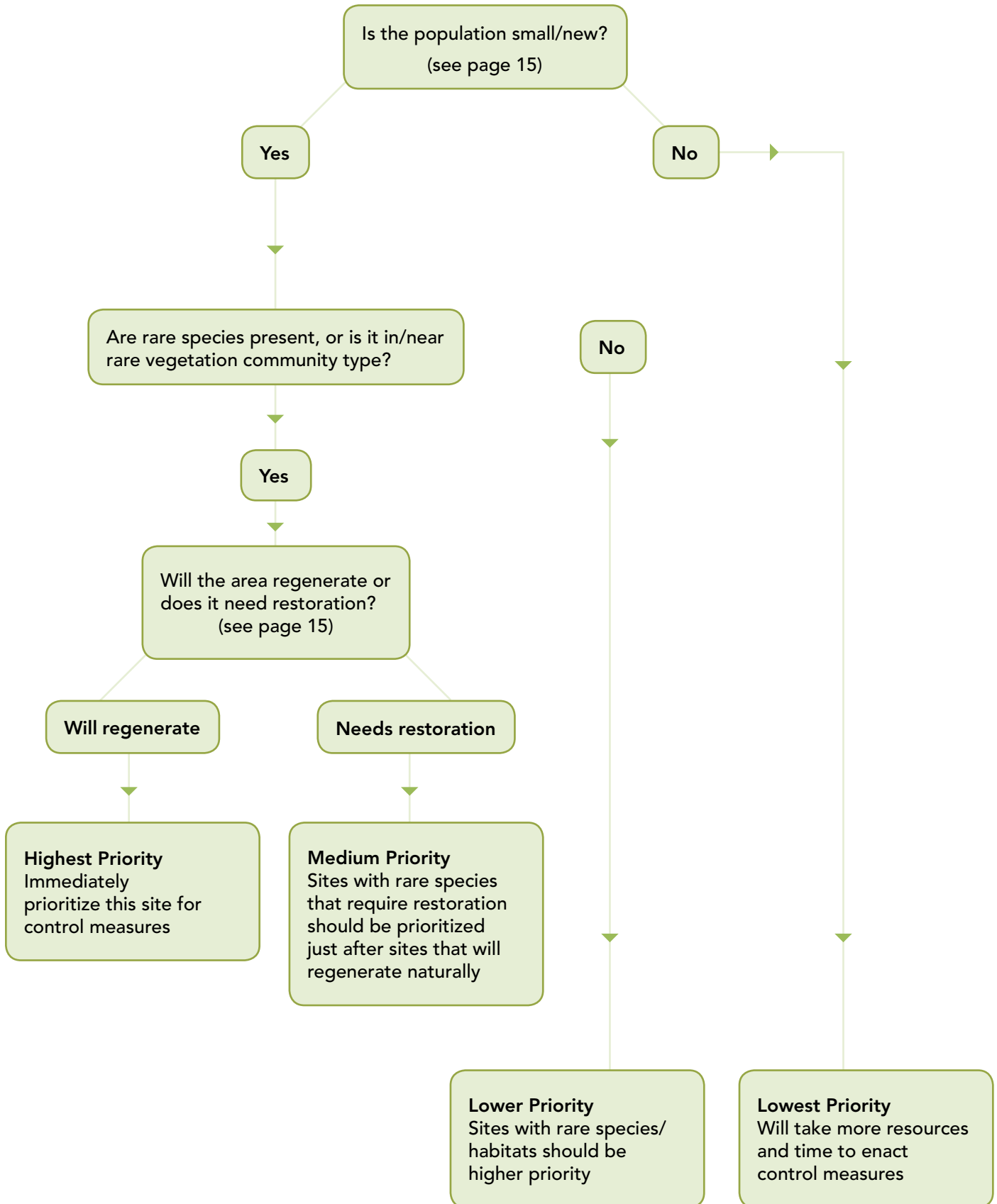
This is a general section on setting priorities for invasive plant management, for species including Reed Canary Grass. When creating management plans, it is important to make the most of resources by prioritizing invasive species control. The following will help you to prioritize sites and areas within sites for control.

Site Prioritization

(This section modified from "The Landowners Guide to Managing and Controlling Invasive Plants, published by Credit Valley Conservation)

1. Protect areas where invasive species are absent or just appearing.
2. Protect rare species. These include those listed federal, provincial, and regionally.
3. Protect rare community types such as fens, alvars and prairies.
4. Cost and effort: Will the area require restoration or can it be left to regenerate naturally?

This flow chart can help land managers choose which site to first focus control efforts:



What is a Small/New Population?

Assessing this will depend on the resources available for control programs and is largely based on the opinion/capacity of the land manager. However, it is usually used to describe those populations that are not well established. For example, a first year population which has not been documented previously, or those which have not yet established a seed bank or large rhizome mass. This may also describe a satellite population which is an offshoot of a larger infestation and in which Reed Canary Grass has not yet become the dominant vegetation.

Assessing Regeneration vs. Restoration

Consider the following factors:

- **Level of disturbance at the site**

What is the level of disturbance at site? Was it a heavily invaded site? (i.e. a lot of disturbance was caused when things were removed) Will it continue to be disturbed? (i.e. through trail use and management)

- **Invasive Species Biology**

What is the biology of the invasive species removed and is there a seed bank to consider?

- **Re-invasion Risk**

Are there invasive species in the area that could re-invade the site from certain pathways of introduction, such as nearby trails or watercourses?

- **Existing native vegetation**

What native vegetation is left? How long before it regenerates by itself? Does it need help?

Prioritizing within a Control Area

1. Focus on large blocks of un-invaded areas and keep them free of invaders
2. Control small, younger, outlier (satellite) populations first
3. "Unfragment" the boundaries of invaded areas by removing outlying plants
4. Reverse the invasion, expand the un-invaded area outward

It is crucial to find and eradicate satellite populations before they join larger populations.

Control Measures

For any control measure, there may be concerns around causing injury or damage to species at risk. Potential damage must be weighed against the concerns for Reed Canary Grass out-competing and potentially locally extirpating these species. Whenever possible, plan your control activities to cause the least harm to locally sensitive flora and fauna.

Mechanical Control

Pulling:

Pulling can be effective for small populations. If considering pulling as a control method, it must be done at least 2 or 3 times a year for up to 5 years.

Mowing/Cutting:

If the stems are not underwater, early (prior to April 1st) and repeated mowing will prevent seed head production or remove panicles before they produce seed. It is not likely to eradicate Reed Canary Grass; however, mowing also exposes the ground to light which will promote growth of native species in the seedbank. Mowing at least twice a year (in early spring and late fall) has been shown to increase the number of native species present and will reduce the density of Reed Canary Grass. Mowing up to 5 times per year may provide better control of Reed Canary Grass. Always avoid mowing near wetlands during the spring and summer (i.e. between April 1st and July 31st), as wildlife is breeding at this time and may be adversely affected.

Digging:

If the populations are small or have just moved in to an area, digging may eradicate Reed Canary Grass. Care must be taken to ensure that the entire root mass and rhizomes are removed, or it will re-sprout. Take care to clean equipment after digging out Reed Canary Grass, and bag all plant material for removal and disposal (see disposal section).

Grazing:

Some older cultivars of Reed Canary Grass are high in alkaloids (chemicals which make plants poisonous or unpalatable for grazing). Newer varieties of Reed Canary Grass have been developed which are lower in alkaloids. Dependent on the species which is being controlled, grazing is an option to reduce the density and weaken stands of Reed Canary Grass (similarly to mowing) which will allow native species to grow amongst it. Grazing is not suggested in wetland habitats.

Tarping:

Tarping refers to covering an invasive plant population with a dark material to block sunlight and “cook” the root system. Tarping is not recommended in low light areas. Tarping is most effective when started in late spring and continued through the growing season and is a viable control method for medium to larger infestations. To tarp an area, first cut Reed Canary Grass stems, taking care not to spread any plant pieces to new areas. Next, cover the infested area with a dark coloured tarp or heavy material. Leave some room to allow for growth as the stems may break through the tarp if it is too tight. Weed barriers used by landscapers or heavy tarps are good options. Take care to weigh down the tarp material so it doesn’t blow away, but be sure it is still receiving adequate sun exposure. Tent pegs work well as long as the ground isn’t too rocky. The tarp may need to be left in place for more than one growing season to ensure effective control. Monitor for plants growing out from under the edges of the tarp (or through the tarp). As with many of the control measures listed in this document, re-planting the area with native vegetation will help to suppress re-sprouting and assist in preventing new invaders from establishing. Since tarping essentially “cooks” the soil, mycorrhizae (beneficial soil fungi) may need to be added when re-planting. Tarping will have an impact on any native species that are present, so it is best used in areas where Reed Canary Grass has created a dense monoculture.



A tarped reed canary grass infestation.

Photo courtesy of Niagara Peninsula Conservation Authority.

Cultural Control

Shading:

Reed Canary Grass cannot grow in full shade. Planting native tree and shrub cuttings (called live-staking) in infested areas can provide enough canopy cover in the second growing season to suppress Reed Canary Grass. Another option is to plant conifers or other native trees and shrubs which will provide full shade. While the canopy is becoming established, other control measures should be implemented to prevent Reed Canary Grass from competing with the newly planted trees. The additional benefit of restoring native tree/shrub cover is that it will in turn lead to a healthier wetland which will be more resilient to future invasion.

Burning:

Where appropriate, prescribed burns can be effective. Especially in locations where there is an existing native species seedbank or native species nearby which can seed in to the burnt area. Burning should not be conducted too early in the Reed Canary Grass growing season, as it may stimulate growth. Burning Reed Canary Grass in Ontario should be done in April, June, or August/September. If you are considering burning as a control option, remember to always follow safe burning practices and municipal bylaws.

Create uneven ground surface:

Reed Canary Grass dominates more easily on flat sites. Create furrows and humps to diversify the substrate and native plant species will have a better chance of finding conditions that they can compete in.

Sawdust:

Application of sawdust mulch around desirable native wetland plants can create conditions that suppress Reed Canary Grass by removing excess nitrogen from the soil, favouring native plants that can survive on lower soil nitrogen levels. The effect is temporary but may allow native plants to mature and resist further invasion by Reed Canary Grass.

Chemical Control

The Ontario Pesticides Act and Ontario Regulation 63/09 provide natural resources, forestry and agricultural exceptions which may enable chemical control of invasive plants on your property. Other exceptions under the Act include golf courses, and for the promotion of public health and safety.

Natural Resources Exception:

A 'natural resources' exception exists for the use of prohibited pesticides to manage, protect, establish or restore a natural resource. This exception allows the use of prohibited herbicides for control of invasive plants on your property provided your project meets specific conditions and you obtain the necessary approvals.

If your project meets the natural resources criteria specified in section 33 of the Ontario Cosmetic Pesticide Act (Ontario Regulation 63/09) and includes the use of pesticides in accordance with Integrated Pest Management principles outlined in this BMP guide you will need to contact the Ontario Ministry of Natural Resources (www.ontario.ca) to obtain a written letter of opinion from the MNR Regional or Branch Director.

Forestry Exception:

If Reed Canary Grass is within a forest*, chemical control may fall under the exception for forest management, and a letter of opinion may not be required. Class 9 pesticides can be used under the forestry* exception to protect trees from pests and to control competing vegetation.

*O. Reg. 63/09 defines "forestry" and "forest" as:

Forestry means activities relating to any of the following: harvesting, renewing, maintaining or establishing a forest, protecting forest resources derived from a forest, and accessing a forest for these purposes.

Forest means a treed area of land that is one hectare in size or larger and is not used for producing an agricultural crop as part of an agricultural operation.

Refer also to the Ministry of Environment's factsheet titled "Pesticides Act and Ontario Regulation 63/09 Private Land and Woodlot Owners April 2011" http://www.ene.gov.on.ca/stdprodconsume/groups/lr/@ene/@resources/documents/resource/stdprod_085367.pdf

Agriculture Exception:

There is an exception for the use of Class 9 pesticides for uses related to agriculture by a farmer. This exception may apply to the control of Reed Canary Grass in agricultural fields or near farm operations.

A farmer is an individual who owns or operates an agricultural operation.

An agricultural operation is an agricultural, aquacultural or horticultural operation and includes:

- Growing, producing or raising farm animals;
- Production of crops, including greenhouse crops, maple syrup, mushrooms, nursery stock, tobacco, trees and turf grass, and any additional agricultural crops;
- Activities that are part of an agricultural operation such as maintenance of a shelterbelt for the purposes of the agricultural operation; and,
- The production of wood from a farm woodlot, if at least one of the activities described earlier is carried out on the property where the farm woodlot is located.

Refer also to the Ministry of the Environment's factsheet titled "Pesticides Act and Ontario Regulation 63/09 Agriculture May 2011" http://www.ene.gov.on.ca/stdprodconsume/groups/lr/@ene/@resources/documents/resource/stdprod_080128.pdf

Herbicide Application:

Anyone using a pesticide is responsible for complying with all federal and provincial legislation. Most non-domestic (i.e. commercial, restricted etc.) herbicides can only be applied by licensed exterminators. For more information, refer to the Ontario Pesticides Act and Ontario Regulation 63/09 (available on <http://www.elaws.gov.on.ca>), or contact the Ontario Ministry of the Environment (<http://www.ene.gov.on.ca/environment>).

If chemical control is undertaken for Reed Canary Grass, application of herbicide early in the growing season may increase its effectiveness.

Disposal

Do Not Compost. Any plant materials should be placed in black plastic bags. Seal the bags tightly and leave them in direct sunlight for about a week. Allow stems and rhizomes/roots to dry out thoroughly before disposing of them. The best disposal for Reed Canary Grass plant pieces after drying is to burn them, or send them to the landfill.

Restoration

Restoration is a critical aspect of invasive species management to allow the site to become a healthier ecosystem, which in return will be more resilient to future invasions. Preventing the degradation of wetland habitats, or restoring degraded sites, will make these areas much more difficult for Reed Canary Grass to invade.

Restoration for Wetlands with Reed Canary Grass

Nutrient Reduction:

It has been shown that Reed Canary Grass can better outcompete native species in wetlands with high nitrogen content and excess nutrient run-off. Reducing the nitrogen entering the wetland system may better allow native species (like Sedges (*Carex* spp.)) to compete with Reed Canary Grass. This can be done through the addition of carbon or sawdust mulch, reducing run-off, or changing farm practices/timing of fertilization. Avoid using fertilizer within 30 metres of wetlands.

Fencing Livestock:

Livestock can quickly degrade wetlands/ponds and create nutrient enrichment that promotes Reed Canary Grass invasions. Fencing livestock off from wetlands and providing alternative water sources can help to protect wetlands from degradation.

Buffers/Planting Native Species:

Establishing a buffer of native trees and shrubs (recommended size is at least 20 metres in width) around wetlands will help to shade out the shade-intolerant Reed Canary Grass, and promote the growth of additional native species. Some species which have been shown to shade out Reed Canary Grass include: willow species and coniferous trees

like Eastern White Cedar (*Thuja occidentalis*). Look nearby for species that occur naturally, or research what has grown in the area historically and could be re-planted. Species such as Willow and Red Osier Dogwood (*Cornus stolonifera*) can be live-staked and have had success in shading out Reed Canary Grass by their second growing season. Re-planting after Reed Canary Grass control should be a high priority in areas where there is no native species seedbank or there are nearby seed source populations of Reed Canary Grass. When planting willows, be aware that there are some species of willow that can be invasive (i.e. weeping willow, crack willow). When determining what type of species to plant, look at historical records or similar sites to see what types of wetlands/swamps these habitats used to be i.e. Cedar Swamp (with groundwater) or Silver Maple Swamp (clay plains) to determine what species should be planted.



This area was re-planted with native species after Reed Canary Grass control.

Photo courtesy of Niagara Peninsula Conservation Authority.

Preventing the Spread

Everyone can help prevent the spread of Reed Canary Grass by following these tips:

Report it.

If you think you see Reed Canary Grass (not in an agricultural setting) take a picture, record the location and contact the Invading Species Hotline to report it. For more information and guidance call the Invading Species Hotline at **1-800-563-7711** or visit www.invadingspecies.com or www.ontarioinvasiveplants.ca.

Watch for it.

Learn what Reed Canary Grass looks like and then monitor property boundaries, riparian areas, fence lines and trails. Early detection of invasive plants can make it easier and cheaper to remove or control them.

Reduce nutrient run-off.

Nutrients and excess run-off in wetlands provide prime habitat for Reed Canary Grass establishment.

Stay on trails.

Avoid traveling off-trail and in areas known to have Reed Canary Grass or other invasive species.

Stop the spread.

Inspect, clean and remove mud, seeds and plant parts from clothing, pets (and horses), vehicles (including bicycles), and equipment such as mowers and tools. Clean vehicles and equipment in an area where plant seeds or parts aren't likely to spread (e.g., wash vehicles in a driveway or at a car wash) before travelling to a new area. For more information on when/where to clean gear and vehicles, check the Clean Equipment Protocol available at www.ontarioinvasiveplants.ca.

Keep it natural.

Try to avoid disturbing soil and never remove native plants from natural areas. This leaves the soil bare and vulnerable to invasive species.

Tracking the Spread of Reed Canary Grass

Several reporting tools have been developed to assist the public and resource professionals to report sightings, track the spread, detect it early, and respond quickly. These include:

1) EDDMaps is an on-line reporting tool where users can view existing sightings of Reed Canary Grass and other invasive species in Ontario, and document their sightings.

This tool, at www.eddmaps.org/ontario is free to use.

2) The toll-free Invading Species Hotline (1-800-563-7711) and website (www.invadingspecies.com), which individuals can use to report sightings verbally or on-line.

If you think you have Reed Canary Grass on your property or if you see it in your community (not in an agricultural setting) please report it. You will be asked to send in photos of the leaf, stem and flower for identification.

Best Management Practices Documents Series:

Common Buckthorn Best Management Practices for Ontario

Dog-strangling Vine Best Management Practices for Ontario

Giant Hogweed Best Management Practices for Ontario

Japanese Knotweed Best Management Practices for Ontario

Phragmites (Common Reed) Best Management Practices for Ontario

Garlic Mustard Best Management Practices for Ontario

Additional Publications from the Ontario Invasive Plant Council:

Clean Equipment Protocol for Industry

Compendium of Invasive Plant Management

Grow Me Instead! Beautiful Non-Invasive Plants for Your Garden, a guide for Southern Ontario

Grow Me Instead! Beautiful Non-Invasive Plants for Your Garden, a guide for Northern Ontario

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