Invasive *Phragmites* (European Common Reed)

(Phragmites australis)

Best Management Practices in Ontario

Ontario Invasive Plant Council

Invasive Species Centre

Ontario

Best Management Practices Webinars

The Best Management Practices Webinars have been developed for a technical audience to provide land managers with the proper tools for accurately identifying and effectively controlling invasive plants.

These training modules have been funded by the Ontario Ministry of Natural Resources and Forestry (OMNRF) and support the key actions of the Ontario Invasive Species Strategic Plan.

2016 Best Management Practices Webinars

The complete 2016 Webinar series includes:

- *Phragmites* Management in Lambton Shores
- *Phragmites* Management in Municipal Drains in the City of Kingsville
- Invasive *Phragmites:* Best Management Practices
- Clean Equipment Protocol: Inspecting and Cleaning Equipment for the Purposes of Invasive Species Prevention
- Grow Me Instead: Beautiful, Non-Invasive Plants for Your Garden
- Wild Parsnip: Best Management Practices
- Aquatic Invasive Plant Watch List for Ontario
- Japanese Knotweed: Best Management Practices

Ontario Invasive Plant Council (OIPC)

The OIPC was formed in 2007 to provide a coordinated provincial response to the growing threat of invasive plants.

The OIPC includes representatives from:

- All levels of government
- Non-government organizations
- Academia
- First Nations
- Industry

Phragmites – Best Management Practices In Ontario

Goal of this Webinar

To provide land managers with the tools for accurate identification and effective control of invasive *Phragmites*.

Photo by: Matt Smith

Topics Covered

- Background
- Description
- Distribution
- Identification and Lookalikes
- Biology & Lifecycle
- Pathways of Spread
- Habitat & Impacts
- Best Management Practices & Control Measures
- Resources & Reporting Tools

Background

- *Phragmites australis* (European Common Reed)
- Native to Eurasia
- Introduced to Atlantic coast in 1800s (as contaminant in packing materials?)
- Recorded in southwestern Nova Scotia in 1910
- By 1920s, in southern Nova Scotia, along the St. Lawrence River near Quebec City and at Montreal
- Recorded in southwestern Ontario in 1948
- Canada's "worst" invasive species (2005, Agriculture and Agri-food)

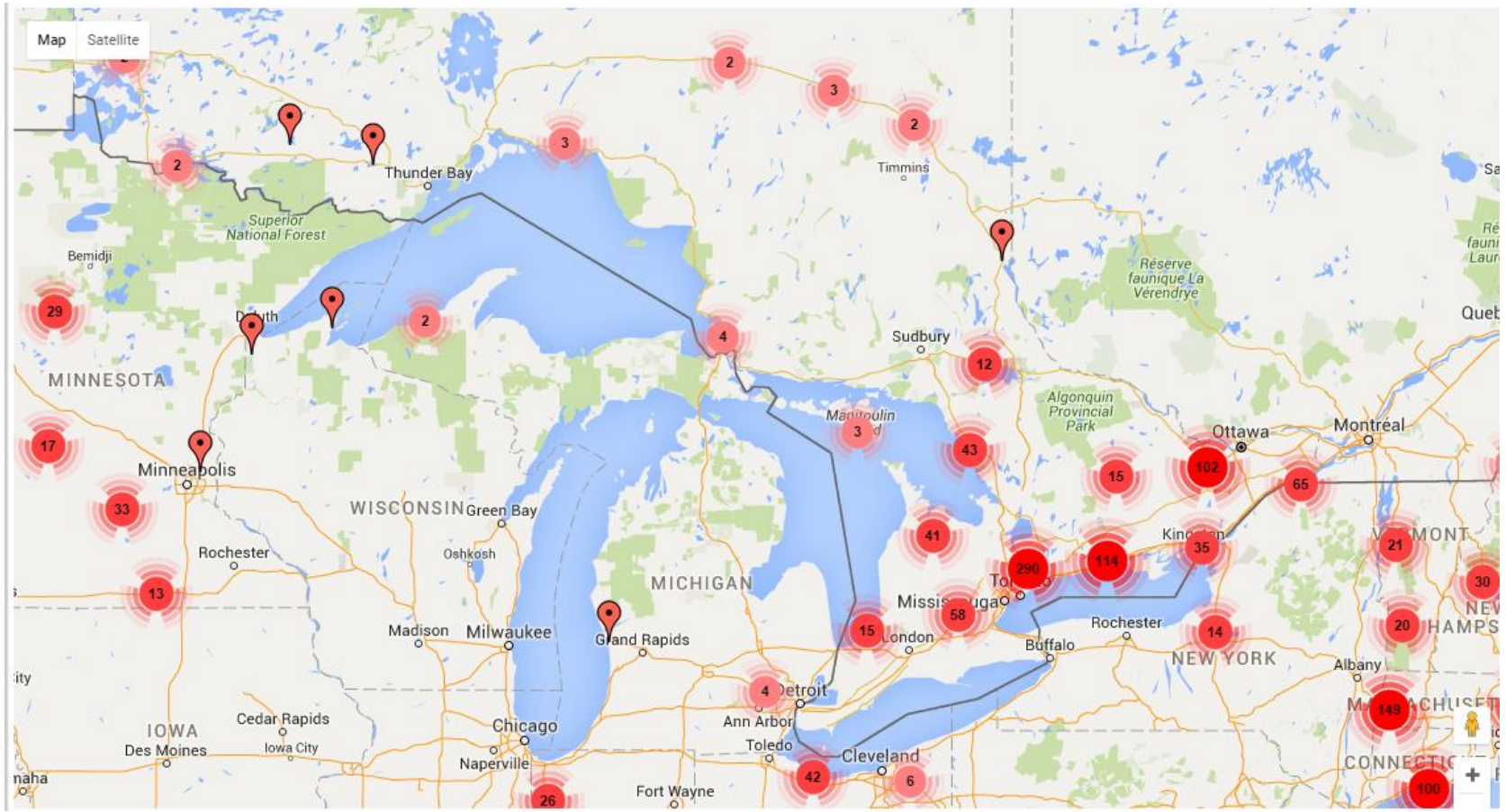
Photo by: David Featherstone

Description of *Phragmites*

- Invasive, perennial, wetland grass
- Poaceae (Grass) family
- More than 80% of annual biomass is below ground (rhizomes, roots)
- Wide habitat tolerance
- Allelopathic
- Aggressively invades coastal wetlands, beaches and disturbed ecosystems
- Similar to our native species *Phragmites australis* subsp. *americanus*; thought to be the same species until the 1980's

Photo by: Ron Reinholt

Distribution



North America:

- 48 states
- All provinces

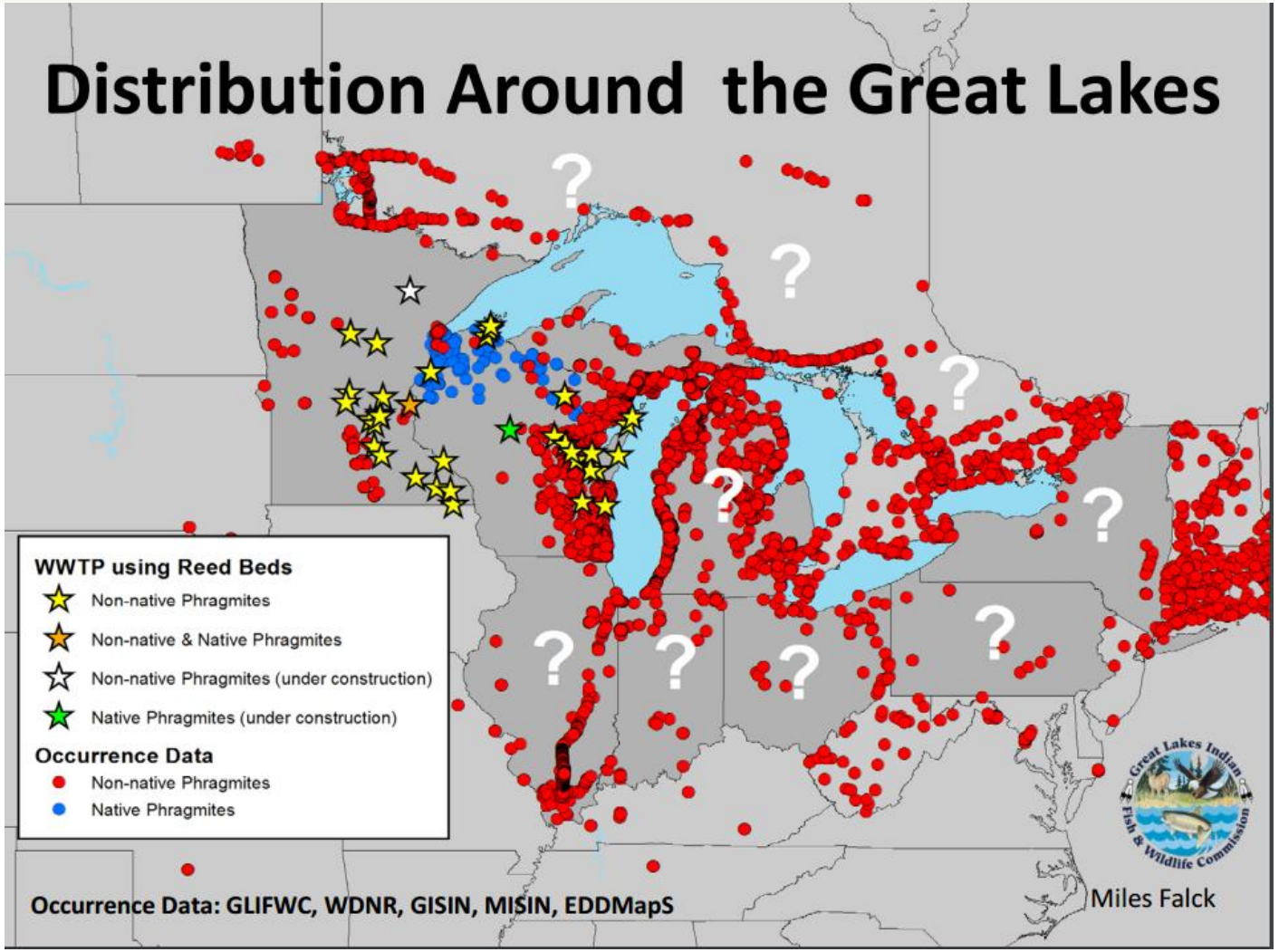
Ontario

- Across southern Ontario
- Scattered occurrences as far north as Hearst and Kenora

Map by: EDDMapS Ontario

Distribution

- Now established in most Lake Erie and Huron wetlands
- Rapidly expanding throughout Southern Ontario



Identification

- Very tall, can grow to over 6 m
- Dense monocultures, up to 100% *Phragmites*
- Rigid stem, beige or tan (under leaf sheath) green not covered by leaf sheath
- Internodes can be red
- Rough and dull stem texture
- Blue-green leaves at 45 degree angle to stem
- Leaf sheaths difficult to remove (key I.D. feature)
- Dense, large seedheads
- At early stages of establishment, can have same morphological characteristics as native species

Photo by: Matt Smith

Lookalikes: Native *Phragmites*

Invasive *Phragmites* (top leaf) and native *Phragmites* (lower leaf)

Native *Phragmites* seedhead (top) and invasive *Phragmites* seedhead (bottom)

- Typically less than 4 m in height
- Generally occurs in sparse stands
- Flexible, reddish-brown stems under leaf sheath (green where not covered by leaf sheath)
- Smooth and shiny stem
- Hairs on the surface of the leaf sheath; leaves fall off easily
- Yellow-green leaves 30 degree angle from the stem
- Sparse, small seedheads to dense and large

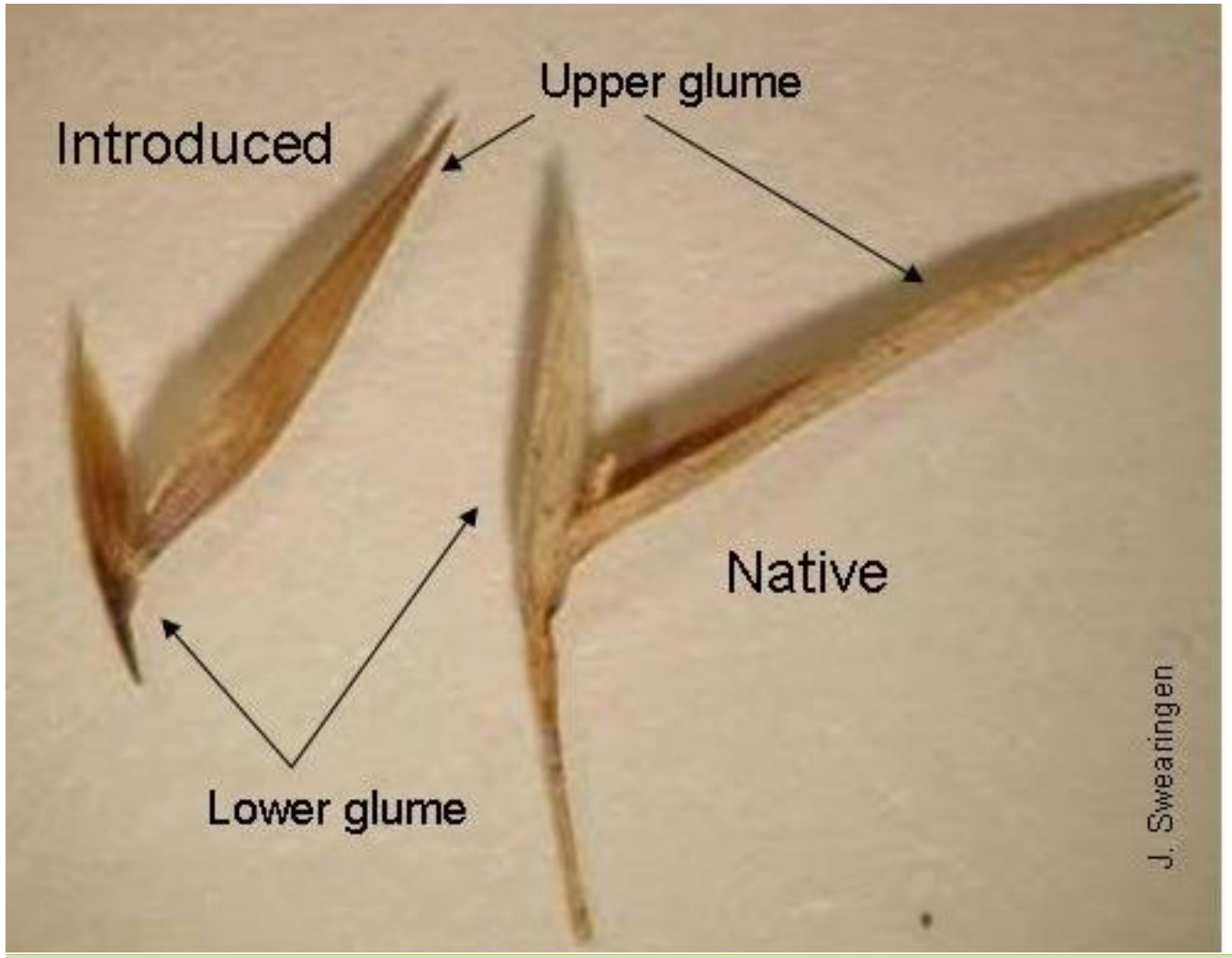
Native *Phragmites* (left) and Invasive *Phragmites* (right)

Photos by: Erin Sanders and Janice Gilbert

Native *Phragmites*

Native Phragmites, Rondeau Provincial Park, October 2012

Native vs. Introduced *Phragmites:* Glume Length



Introduced

Lower glume: 2.5 – 5.0 mm (most <4.0)
Upper glume: 4.5 – 7.5 mm (most < 6.0)

Native

Lower glume: 3.5 – 6.5 mm (most > 4.0)
Upper glume: 5.5 – 11.0 mm (most > 6.0)

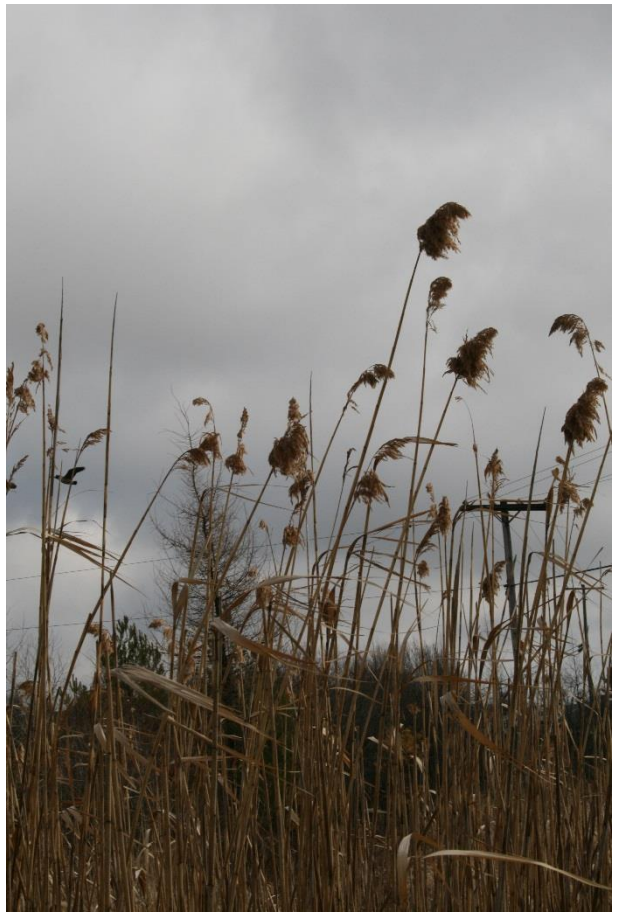
Note:

Measure from the base of the glume to its tip. Take measurements for at least 5 glumes (upper and lower) and then average.

Source: Phragmites Field Guide 2010, Jil Swearingen and Kristen Saltonsall

Biology & Life Cycle

- Dormant: November to March
- Germination: April to May
- Primary vegetative growth: May to September
- Flowering: August to September
- Translocation of nutrients (to prepare for winter): September to October
- Reproduces via seeds, spreads via underground rhizomes and above ground stolons
- Exponential growth



Photos by: OFAH, Michigan Sea Grant and Janice Gilbert

Pathways of Spread

Pictures by: J. Gilbert

- Seeds, stolons and rhizomes picked up in mud on boots, pets, tires, or equipment and carried to new areas
- Can spread from contaminated soil, in municipal mulch or compost
- Wind disperses seeds up to 10 km

Pathways of Spread

- Most important spread vector is heavy equipment (i.e. road construction)
- Roads have increased the level of landscape connectivity, resulting in increased transport of seeds and plant fragments
- Once established along water courses, VERY difficult to control spread

Catling, Paul M., and Gisèle Mitrow. 2011. The recent spread and potential distribution of *Phragmites australis* subsp. *australis* in Canada. Canadian Field-Naturalist 125: 95–104.

Invasive *Phragmites*
Habitat & Impacts

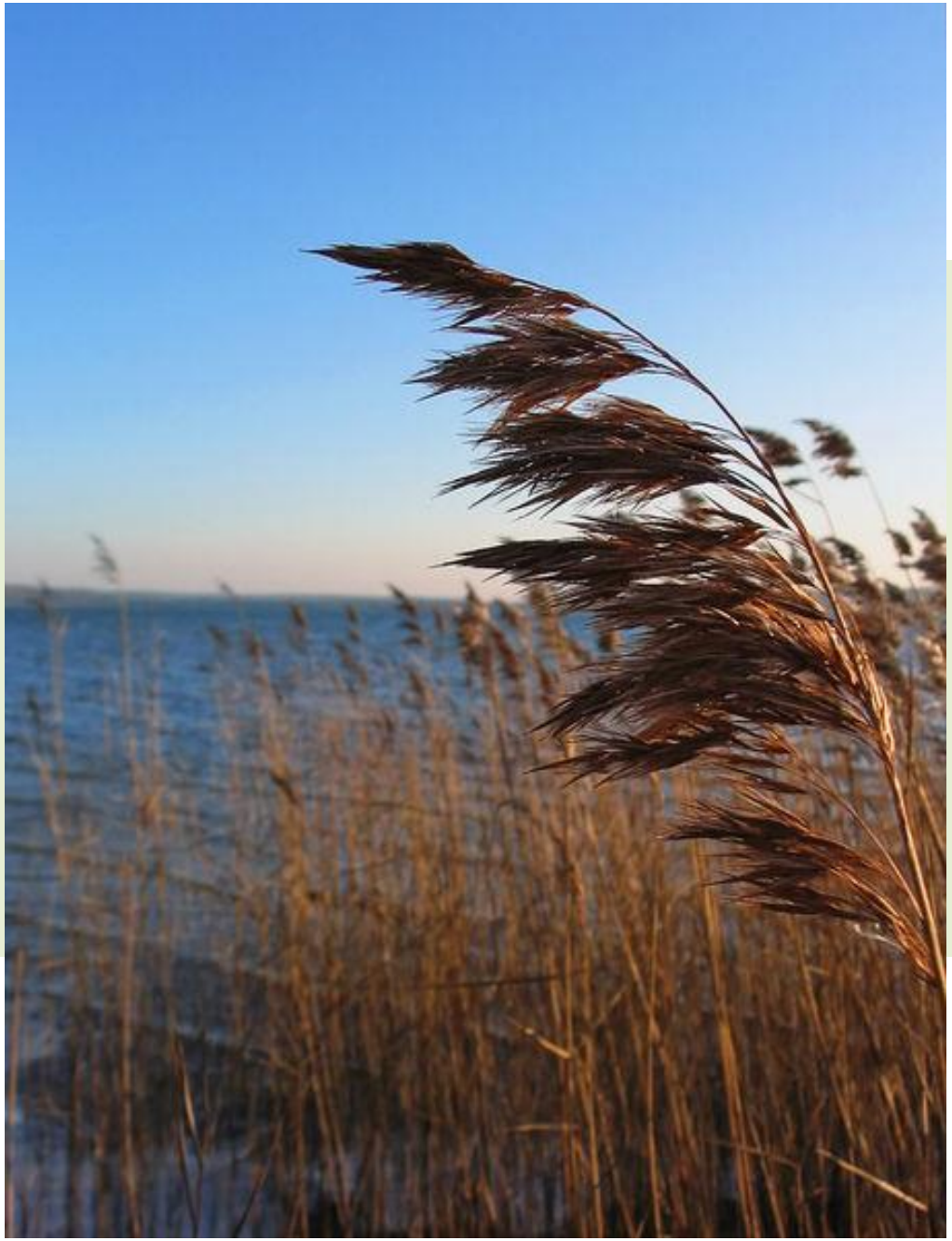


Photo by: Wikimedia Commons

Habitat

- Found in wetlands, stream banks, lake shores, wet fields, ditches, roadsides
- Can survive in brackish (salt and freshwater mix) and freshwater habitats
- Prefers to grow in areas of standing water, but the roots can grow underground to extreme depths to allow it to survive in low water areas
- Thrives in disturbed habitats

Photo by: Francine MacDonald

Photo by: Wikimedia Commons

Impacts on Biodiversity

- Aggressive growth outcompetes native species for water and nutrients
- Toxins from roots impedes growth, can kill neighbouring plants
- High biomass blocks light to other plants and occupies growing space of low-growing plant communities
- Tough, rigid stalks reduce habitat and impacts food supplies and shelter sites for various wildlife
- Contributes to 25% of species at risk in ON

Photo by: John M. Randall, The Nature Conservancy, Bugwood.org

Impacts on Hydrology

- Ecosystem engineer
- Monoculture stands can lower water levels in small, isolated, ephemeral wetlands (critical habitat for some amphibians)
- Rapid growth and slow decomposition = large amount of above ground biomass leading to sediment depositions which can affect drainage

Picture by: J. Gilbert

Impacts on Agriculture, Economy and Society

Agriculture

- Easily colonizes ditches and roadsides; move into fields and impacts crop yields and obstruct drainage channels

Economy and Society

- estimated cost of *Phragmites* control projects for in Ontario $865 and $1,112 per ha
- Dense stands of dry, dead stalks are fire risks
- Tall, dense stands difficult to walk through impacting recreation
- Monoculture stands affects property values and raise aesthetic concerns

Photo by: Matt Smith

Invasive *Phragmites*
Best Management Practices

Picture by: J. Gilbert

Integrated Pest Management (IPM): Definition

Integrated Pest Management (IPM): The practice of preventing or reducing damage caused by pests by using the best available information, along with a variety of ecologically and economically sustainable approaches and control methods.

An IPM approach to *Phragmites* control will depend on:

- Life cycle & biology of the plant
- Time of year
- Location of plants – presence of other sensitive species (i.e. species at risk)
- Size of infestation
- Skill level

Successful eradication may require several years and a variety of tools & approaches.

Integrated Pest Management: *Phragmites*

Controlling *Phragmites* **before it becomes established** will reduce its impacts on biodiversity, economy and society.

Develop a feasible, long-term strategy with the following considerations:

1. Remove outlying populations first (isolated plants or satellite populations) to prevent further spread.
2. Concentrate on high-priority areas (i.e. most productive, sensitive part of ecosystem, favourite natural area).
3. Dedicate time each year to control and make joint effort with neighbouring landowners/land managers.
4. Regeneration of native plants from the residual seed bank should be seen in the growing seasons following control, but some sites may require seeding.

Inventory

It is imperative that a stand be identified as invasive *Phragmites* before implementing a management plan! *Phragmites* can be identified and mapped all year

- Germination April/May
- Primary vegetative growth May to September
- Flowering August to September

- Monitoring for early signs of *Phragmites* will enable you to understand the size of the infestation
- Once invasive *Phragmites* is confirmed, a detailed inventory is strongly recommended before initiating control efforts to minimize negative impacts to the ecosystem

Timing

Timing of control is site-specific and the following questions should be considered:

- When will control efforts have the least impact on
  a. Non-target plant species?
  b. Recreational use?
  c. Birds and wildlife?
- Can control efforts be done before seeding, to minimize seed dispersal?
- At what life stage will control efforts be most effective?

Photo courtesy of Gisela Back

Control Measures – Chemical

All regulations including the Ontario Pesticides Act and Ontario Regulation 63/09 must be followed!!

- Targeting only a portion of an invasive *Phragmites* cell with herbicide is ineffective, wastes funds and will increase the required use of herbicide.
- Efficacy highest when leaf surface available to intercept spray (usually when plant is 1-1.5 m in height)
- Use herbicide that translocates down to roots (best in latter part of growing season)
- Roundup Weathermax and Vision Max are both registered for *Phragmites* control; these can only be applied to stands of invasive *Phragmites* **when surface water is not present**

Control Measures – Chemical

Choose method of application based on characteristics of site and weather conditions for day e.g. wildlife presence/wind

- **Spraying**: Backpack spraying allows for targeted spraying, boom spraying mounted on an ATV or tractor is effective for large, dense stands
- **Wicking**: Effective for small stands and more labour intensive, but allows for avoiding native plants
- Do not spray if the plants are wet with dew or rain
- Do not spray when temperatures are either too cold or too hot (see herbicide product label) - will reduce adsorption of the herbicide

Permitting and Other Requirements

It is your responsibility to ensure that your project follows all relevant laws including municipal by-laws and provincial / federal legislation!

- Permits, other requirements may be necessary for your control project, depending on the work involved and the location
- If your project meets the criteria for the natural resources exception, contact the MNRF office to obtain an application for a letter of opinion to use a Class 9 pesticides
- Projects in partnership with a Conservation Authority may not require a letter of opinion from the MNR

Permitting and Other Requirements

Some key items to consider with chemical control:

- In Ontario herbicide storage, disposal, use, transport and sale are regulated under the *Pesticides Act* and Regulation 63/09
- There are exceptions under the *Pesticides Act* which may allow chemical control of invasive plants on your property (e.g. public works, forestry, agriculture, natural resources)
- If you think your project falls under any of the exceptions, contact the Ministry of Environment and Climate Change (MOECC) to ensure your project meets the requirements of the exception.
- Any pesticide application must be done by a licenced exterminator or you must hold the appropriate certificate

Control Measures – Manual/Mechanical

Hand Removal / Digging

- Labour intensive
- Used on site-specific basis
- When it is the only option, hand pulling can be done on plants less than 2 years old, found in dry, sandy soils
- Use straight edge shovel to cut stems below sediment surface
- All portions of rhizome must be removed!!

Wymbolwood Beach Phragmites Removal Project

Pictures by: Lynn Short

- Identify Phragmites
- Use leg muscles on spade
- Cut below soil surface
- Remove plant stalk
- Leave soil undisturbed


Before
L. Short


After
L. Short


L. Short


L. Short

Control Measures – Manual/Mechanical

Mowing and/or Cutting

Cons

- Will not kill root system - will re-establish after cutting program ceases
- Cutting plants after they have developed viable seed heads increases spread
- Conventional riding mowers must cut in spring before height prohibits mowing
- Frequent cutting throughout the growing season required

Pros

- Curtails stand density and plant rigour
- Removes dead, standing stalks
- Allows native growth after herbicide treatment
- Increases success of herbicide application by ensuring the herbicide reaches new growth
- Allows site manager to easily evaluate and spot treat any regrowth

Use in combination with herbicide for best results!!

Control Measures – Manual/Mechanical

Pre-Chemical Mowing

- If possible, cut in the winter to allow new invasive growth
- Avoid spring (March-July) mowing to minimize impacts to nesting wildlife
- Mow a minimum of **four weeks prior** to herbicide applications to allow for re-growth of seed heads and leaves
- Reduce stalks to 10 to 30 cm in height

Post-Chemical Control Mowing

- Mow a minimum of **three weeks after** herbicide treatment, to allow for translocation of herbicide to the roots
- Mow between early fall and late spring to remove dead, dry stalks after herbicide application
- Remove cut material from the site to allow sunlight to reach the soil surface to increase native plant regeneration

Control Measures – Manual/Mechanical

Rolling / Compressing

- Rolling or cutting post chemical treatment allows safer, more effective prescribed burn
- Removal of dense biomass greatly enhances native plant response
- Very similar to mowing, conduct a minimum of **three weeks after** herbicide application
- This is also not effective as a standalone method

Photo by: Janice Gilbert

Control Measures – Cultural

Tarping / Tenting

- Tarping refers to covering an invasive plant population with a dark material to block sunlight and “cook” the root system
- Works best in *Phragmites* populations which are found in areas of direct sunlight – sun causes high temperatures to develop under the plastic, which kills the plants
- Before tarping, cut plants back and remove biomass – black plastic tarp can then be placed over those infestations and staked in place
- Tenting is similar to tarping but used in areas of standing water with a tarp over a frame; site-specific
- Tarp/tent must stay in place for at least 6 months, and monitored regularly (shoots can grow out from under the tarp/tent)

Control Measures – Cultural

Flooding

- Where there is open water, cut stalks as close to sediment as possible
- Remove all cut material to avoid contamination and spread
- The rhizomes underwater need standing stalks to obtain oxygen in order to continue growing; by cutting stalks below the water, the water will prevent oxygen from getting to the rhizomes and kill the plant
- This method has been tried in parts of southern Ontario in 2014 and results will be monitored for effectiveness in 2015
- Requires water levels to be high enough to cover broken stalks and rhizomes (0.4 m) for several weeks

Control Measures – Cultural

Photo by: Lambton Shores *Phragmites* Community Group

Prescribed Burning

- Removes excess biomass, promotes native plant growth
- Allows increased visibility to perform spot treatments with herbicides of new growth
- Should be done a minimum of **3 weeks after** herbicide treatment, following cutting of dead stalks
- Planned and deliberate use by authorized personnel

- Not effective as a stand alone method, may encourage rhizome growth if not done in conjunction with other methods
- Burning should NOT be done on dead, standing *Phragmites* stands due to increased safety concerns and reduced biomass ignition

Control Measures – Disposal

- Depending on the amount of plant material removed, disposal can vary
- Compost only on contained, dry sites i.e. covered with tarps
- Place small amounts of plant materials in brown bags, seal bags tightly and leave in direct sunlight for at least 7 days
- Can be dried and burned, or sent to landfill
- For large amounts of material, contact your local municipality regarding composting and landfill capabilities

Photo by: Jim Stapleton

Control Measures – Biological

Biological control: The use of an herbivore, predator, pathogen or other natural enemy to reduce established populations of invasive species.

- *Stenodiplosis phragmicola*, the common reed midge, is the first reported insect that specifically attacks and parasitizes (lives inside them as a parasite) common reed seeds; however, it also attacks the native *Phragmites*
- Other insect biological controls have been identified and as of spring 2015 all host-specificity testing has been completed. Petitions for releases will be filed with the appropriate authorities with potential releases expected (if approved) in the next few years
- Not a stand alone option
- Greatest benefit to areas where phrag is just getting established

Restoration & Monitoring

- Restoration is site-dependent
- Recently disturbed sites, sites disturbed before *Phragmites* invasion and sites disturbed through control techniques will need restoration
- Re-seed after control where a strong seedbank is not present (if present, most plants will return naturally once *Phragmites* is removed)

As with many invasive plants, continued control and monitoring is required over subsequent years.

Preventing the Spread

✓ Report it!

If you think you see *Phragmites*, take a picture, record the location and contact the Invading Species Hotline to report it. 1-800-563-7711 or visit www.invadingspecies.com.

✓ Watch for it!

Monitor hedges, property lines, fence lines and trails. Early detection of invasive plants can increase the success of control and removal efforts.

✓ Stay on trails!

Avoid travelling off-trail, especially with ATVs and in areas known to have *Phragmites* or other invasive species (dogs, too!).

✓ Stop the spread!

Inspect, clean and remove mud, seeds and plant parts from clothing, pets (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.

✓ 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.

✓ Use native species!

Try to use local native species in your garden. Never use *Phragmites* in your garden or hedgerows. Encourage your local garden centre to sell non-invasive or native plants.

Help Track the Spread of *Phragmites*

You can help track the spread of *Phragmites* in a couple of ways:

You can call the Invading Species Hotline:

1-800-563-7711

Or report sightings online to Ontario's new mapping system (requires a photo & location)

www.eddmaps.org/ontario

We Gratefully Acknowledge the Contributions of:

Ontario Phragmites Working Group
http://www.opwg.ca/
Ontario Ministry of Natural Resources
www.mnr.gov.on.ca
Ontario Ministry of the Environment
www.ene.gov.on.ca
Environment Canada
www.ec.gc.ca
Government of Canada Invasive Species
www.invasivespecies.gc.ca
Ontario Federation of Anglers and Hunters
www.invadingspecies.com
Ontario Parks
www.ontarioparks.com
Turkey Point Provincial Park
www.ontarioparks.com/english/turk.html
Janice Gilbert, Wetland Ecologist
www.opwg.ca
Nature Conservancy of Canada
http://www.natureconservancy.ca
Wasaga Beach Provincial Park
www.wasagabeachpark.com
Rondeau Provincial Park
www.rondeauprovincialpark.ca
Parks Canada
www.pc.gc.ca
Ontario Stewardship
www.ontariostewardship.org
Conservation Ontario
www.conservation-ontario.on.ca
Canadian Wildlife Service
www.cws-scf.ec.gc.ca
Lake Huron Centre for Coastal Conservation
http://lakehuron.ca

For More Information

www.ontarioinvasiveplants.ca

www.ontario.ca/biodiversity

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