

# Phragmites Management in Ontario

## Can we manage without herbicide?

Great Lakes Phragmites Collaborative  
Webinar Series  
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NO

Oda Hm Aan Ao Koko Ne Nope C'am Gila Gara  
Na Nda Te  
Ah ah Maley Dac Ti Inno  
Kai Yox Nee Ket Bobo Laa Ci Haw  
Oya Nde Laa Maan Atsa Ci Hawaa  
Indi K'amaj Tsaa Yok Gai





# Non-chemical Control Options

- Livestock grazing: cattle, sheep, goats
- Commonly used practice in Europe - most effective when combined with water level control
- Denmark- summer seasonal grazing by cattle will convert a reedbed to grass pasture in 3-4 yrs at relatively low density  $\sim 0.5/\text{ha}$
- In UK fairly new method for habitat management; experimenting with Highland cattle, Konik ponies, Water Buffalo and different water level manipulations



Freshkills Park, NY  
2.2 ac restoration  
Pilot Project



# Non-chemical Control Options

- Biological:
  - 140 herbivores in Europe; 40% feed only on *Phragmites*
  - 26 herbivores known to attack *Phragmites* in the U.S.
  - all but 5 introduced
  - 4 moths recently identified as potentially effective  
(Dr. Blossey, Cornell University)
- *Phragmites* (reedbed) decline observed in many European countries
- Causes being investigated and in some cases attributed to:
  - high production and accumulation of nutrient rich detritus and unnatural water regime (stagnant waters); (Cizkova *et al.*, 1996, *Phytotaxonomica*)
  - phytotoxins released during the decomposition of reed litter (van der Putten, 1997, *Aquatic Botany*)
- *Phragmites* can be a problem where it naturally occurs
- Overgrowth in shallow water ecosystems viewed as an issue





### **Distribution.**

The European part of Russia, the Caucasus and Ciscaucasia, Western Siberia, Eastern Siberia (except Arctic regions), all areas of the Far East (except Arctic regions), and Central Asia. Absent in deserts.

### **Ecology**

Hygrophilous plant. It is widely distributed in lands with close-standing, subsoil waters (2.0-2.5 m). Grows in coastal zone, along coasts of rivers and lakes, frequently in water, grassy marshes, boggy meadows, forest edges, bogs, crude meadows, and solonetz soils.

Frequently forms continuous thickets.

### **Economic significance.**

Malicious segetal weed. It is widely distributed on irrigated grounds, where it infests all agricultural crops, especially rice, cotton, and lucerne. Small parts of rhizomes take root easily; therefore, inter-row treatments promote vegetative reproduction of the Common Reed.

Main control measures include drainage, dehydration of soil surface after watering, deep and repeated treatments of ground, and crop rotation with alternation of rice and periodically watered cultivars.

# Managing Phragmites by cutting

## Research findings:

- ❑ Management of Phragmites in Swiss fen meadows by mowing in early summer (S. Gusewell, 2003. Wetlands Ecology and Management)
  - examined whether Phragmites abundance is reduced by mowing in June in addition to September, 1995-2001
  - only resulted in slight reduction
  - cutting in September alone increased above-ground biomass in 49 of 80 plots
- ❑ The effect of summer harvesting of *Phragmites australis* on growth characteristics and rhizome resource storage (T. Asaeda *et al.* 2006. Hydrobiologia)
  - compared June vs July cutting impacts on seasonal rhizome biomass
  - found substantial reduction in belowground biomass for the June harvested population and reduction of above ground biomass following growing season
  - July harvested population showed reduction in belowground biomass at end of July but this had recovered by the middle of November and there was no reduction in aboveground biomass the following growing season





- Managing Phragmites for long-term habitat quality; 1000+ ha
- Restoring aging reedbeds to earlier successional phase

Graham White, Royal Society for the Protection of Birds, England; [rspb.org.uk](http://rspb.org.uk)



# Aquaclear 'Truxor'



- floating cutter works most efficiently in a water depth of 30-50 cm
- costs ~£90K (\$138.6K Ca)
- ~ £500-600/day (\$770-\$924/day Ca) to hire including operator
- can cut 1ha in ~40hrs for a price of £ 2-3k/ha (\$3.1k - \$4.6k/ha Ca)
- clearance of 5m wide ditches was calculated at £240 to £625/km (\$370-\$963/km Ca)

## 6-wheeled Seiga Harvester



- works best on flat, firm ground
- costs £600-800/ha (\$924-\$1232/ha Ca)
- unsuitable for reed stands over 4 yrs old due to issues with blade cutting and bundling mechanisms from litter accumulation



# Harvesting Phragmites, Holland



PNA-KINA83694 - (c) - Paul van Gaalen



PNA-KINA80459 - (c) - Paul van Gaalen

# Mechanical Control Options

## ➤ Drowning



Pilot Project #4 2007- 08: Investigation of a mechanical method for controlling Phragmites in wet habitats, Rondeau Provincial Park, Lake Erie



# Mechanical Control Options

## ➤ Cutting







# Mechanical Control Options

## ➤ Plowing, disking

Lake Huron, September, 2012



# Mechanical Control Options

## ➤ Covering, smothering

Lake Huron, August, 2012



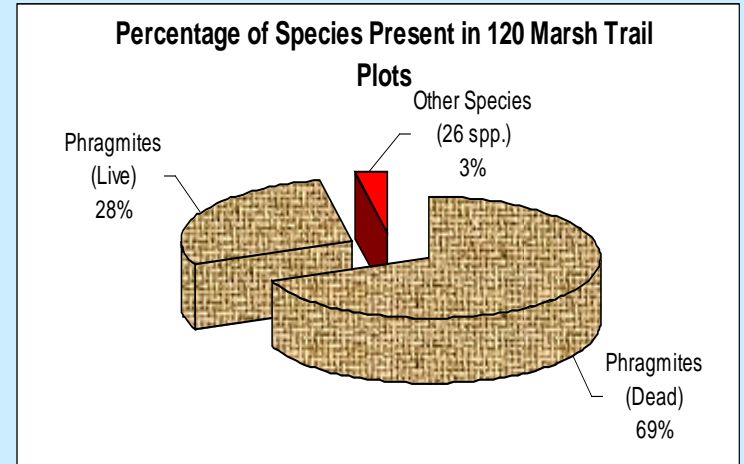
Pilot Project: Kettle Point, 2012





# Mechanical Control Options

## ➤ Burning



# Pilot Project #2 2007-08: Testing the efficacy of grass select herbicides and vinegar to control Phragmites

- 8 herbicides (including Roundup), vinegar (5% and 25% acetic acid)
- 2 methods: spray and injection
- 120 1x1m<sup>2</sup> plots
- 6 replicates per treatment-

Table 4. Phragmites mortality comparisons between the control and other injection treatments for 2007 and 2008.

Injection Treatment	P value *	
	2007	2008
Accent	0.06	0.59
Amitrol 240	0.01	0.28
Assure II	0.46	1.00
Control	1.00	1.00
Dual II Magnum	0.18	0.59
Liberty 200 SN	0.01	0.01
Post Ultra	0.18	1.00
Roundup Ultra	0.06	0.11
Venture L	1.00	1.00
Vinegar	0.003	0.01

\* Mann-Whitney U test for same medians (C.I. 95%)





# Chemical Control

## **Legal Chemical Options in Canada:**

- Weathermax and Vision (Monsanto products) - glyphosate, surfactant: polyethyloxylated tallowamine (POEA)
- Vision - aerial application, Canadian Forestry Sector
- No over water approval for either product
- Glyphosate one of 82 active ingredients banned for cosmetic use (Ontario Cosmetic Pesticides Ban Act, April 22, 2009)
- Require a written opinion from the Ministry of Natural Resources that the use is an appropriate means to protect or manage natural resources

# The Chemical: Glyphosate

- white, crystalline organophosphate salt ( $\text{C}_3\text{H}_8\text{NO}_5\text{P}$ )
- readily absorbed into the treated plants from the leaves to the roots and shoot apices where the meristematic growth cells are located
- the chemical inhibits 5-enolpyruvylshikimate-3-phosphate synthase (EPSPS) which is a key enzyme in the shikimate biosynthetic pathway
- enzyme is essential in the production of aromatic amino acids, auxin, phytoalexins, folic acid, lignin, plastoquinones and numerous secondary products required by plants
- particular chemical is relatively harmless to animals since they lack the shikimate pathway
- $\text{LD}_{50}$ : rat 4320 mg/kg (oral), >7900 mg/kg dermal; Mallard >4640 ppm (8 day); Bluegill ~78 ppm (96hrs); Rainbow Trout 38 ppm (96hrs); Daphnia magna 930 ppm (48 hrs); Honeybee >100ug/bee

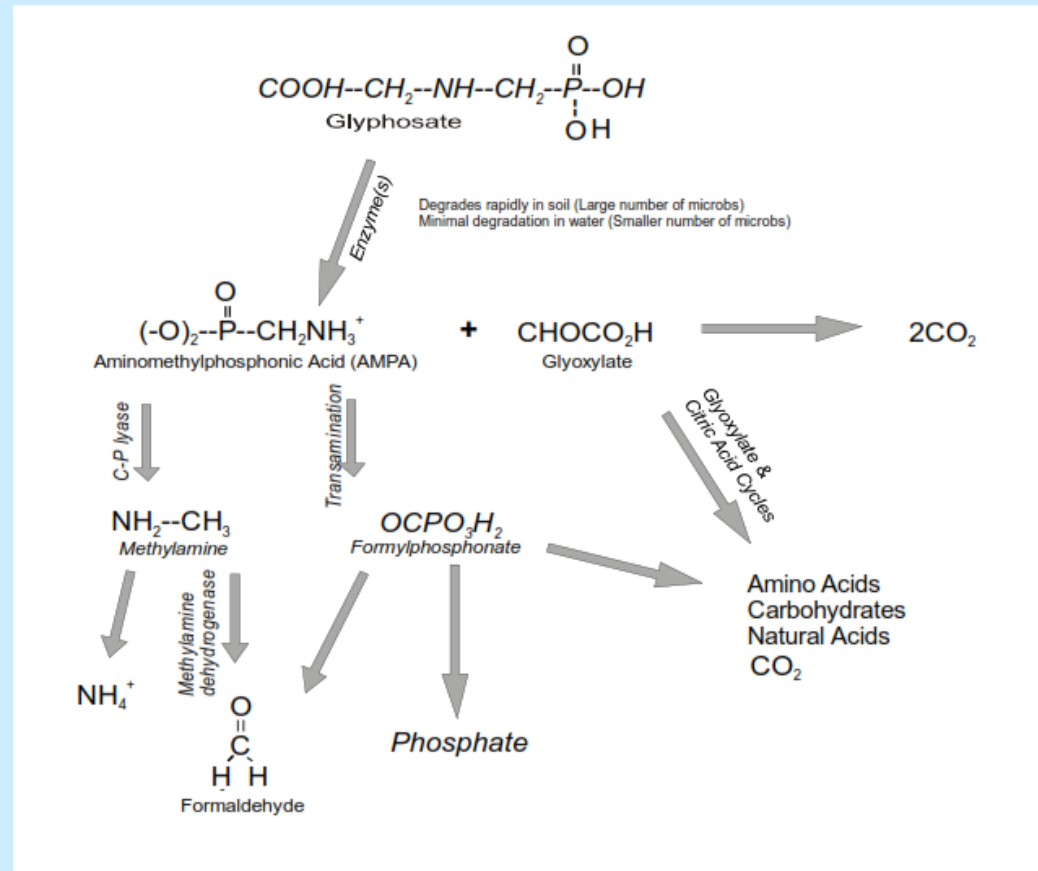


# Glyphosate in the Environment

- readily adsorbs to soil
- low mobility
- microbial degradation-  
aerobic and anaerobic  
half life 3 – 130 days
- Lake Erie emergent marsh  
no residue in either dense or  
sparse stand
- Lake Huron meadow marsh  
residue in sparse stand  
(3700 ug/l) dropped below  
detection limit in <57 days

## Glyphosate Degradation Pathway

Jeff Schuette, Environmental Monitoring and Pest  
Management Department of Pesticide Regulation  
Sacramento, CA, 1998



# Control Options: factors to consider

- timing and design of a Phragmites control project is site specific
- edges of dense Phragmites cells will have wildlife habitat value (staging, mating, nesting, brood rearing, foraging)





# Control Options: factors to consider

## ➤ water levels





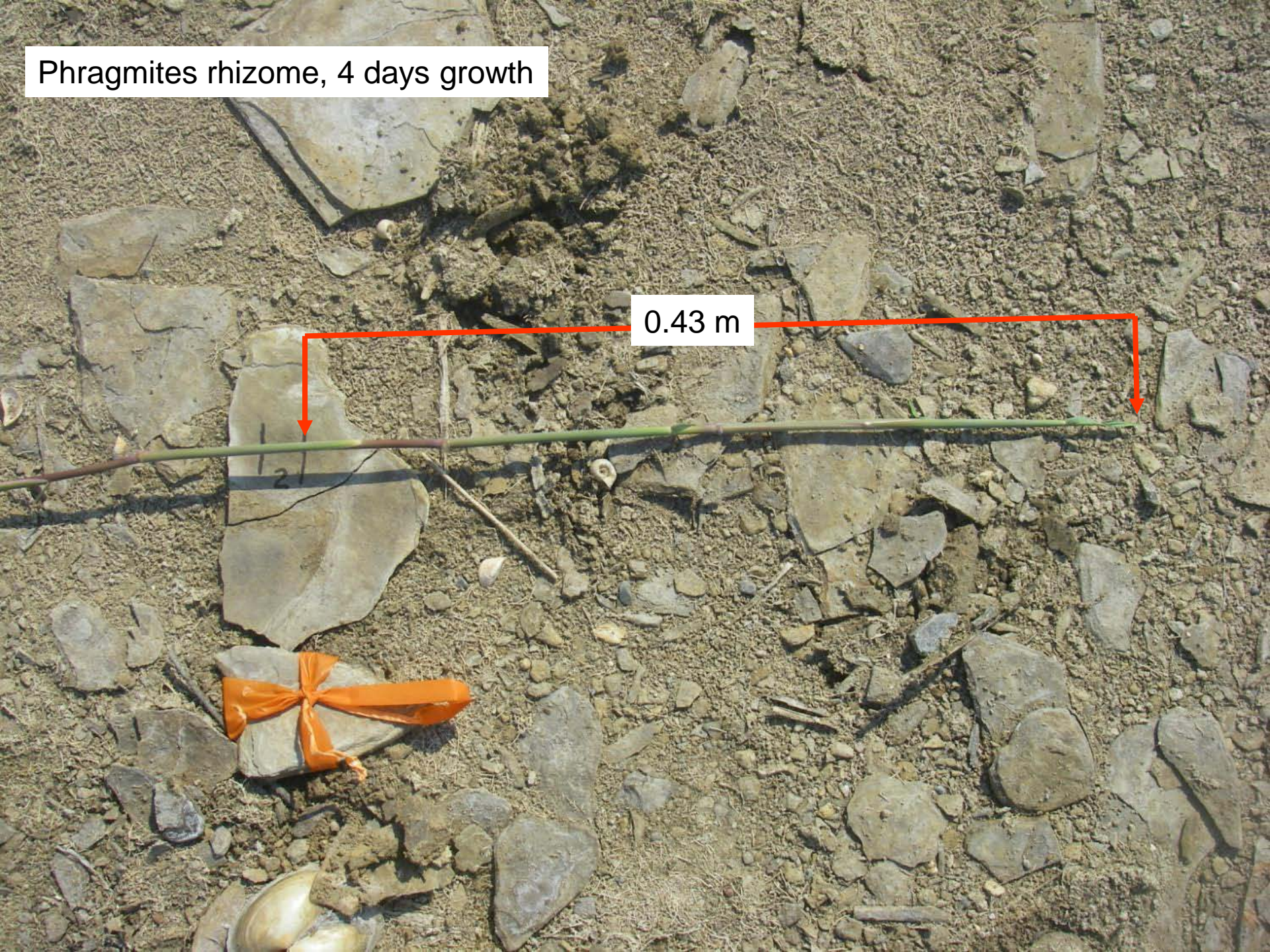


Kettle Point, Lake Huron, August 2012



Phragmites rhizome, 4 days growth

0.43 m





# Control Options: factors to consider

- method of application: injection, handwicking

Sauble Beach, Lake Huron, 2007





# Control Options: factors to consider

- method of application: backpack, all terrain equipment





Pilot Project #3 2007-10: Controlling invasive Phragmites in a Lake Erie coastal wetland, Rondeau Provincial Park, Lake Erie











# Complimentary Control Activities

- rolling Phragmites after it has senesced:
  - reduces seed dispersal
  - reduces herbicide use
  - improves follow-up control efforts
  - improves native plant response and habitat quality



Darren Jacobs

rolled cell 1st growing season post control



unrolled cell 1st growing season post control





# Complimentary Control Activities cont'd.

- Removal of biomass improves native plant species response and allows for easier follow-up Phragmites control



McLean Marsh, Rondeau Bay, 2007



# Complimentary Control Activities cont'd.

- Rolling standing dead Phragmites stalks prior to burning is safer, reduces seed residue, promotes drowning



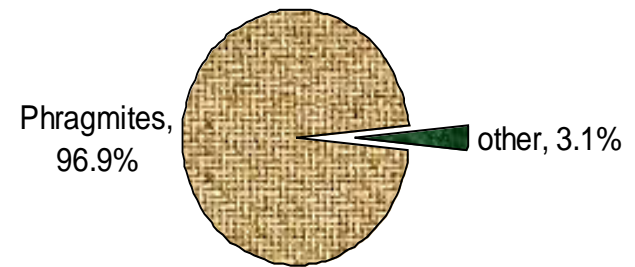
McLean Marsh, Rondeau Bay, 2007



## Pilot Project #1: McLean Marsh Invasive Phragmites Control Pilot Project

> 5m in height

### Diversity in Phragmites Communities McLean Marsh



McLean Marsh, Rondeau Bay, 2007



## Pilot Project #1: McLean Marsh Invasive Phragmites Control Pilot Project

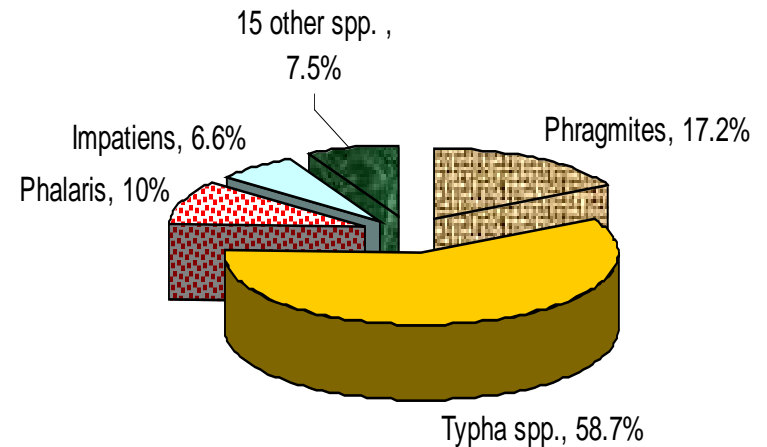




- total eradication of Phragmites very difficult to achieve
- controlling Phragmites with glyphosate does not adversely affect native plant species recovery
- habitat recovery is relatively quick



McLean Marsh  
Post-treatment, June 2008







McLean Marsh, Rondeau Bay, 2010



# Lake St. Clair Wetlands

Invasive Phragmites not controlled



Tremblay Beach Wetland, June 2011

Invasive Phragmites controlled, 2009

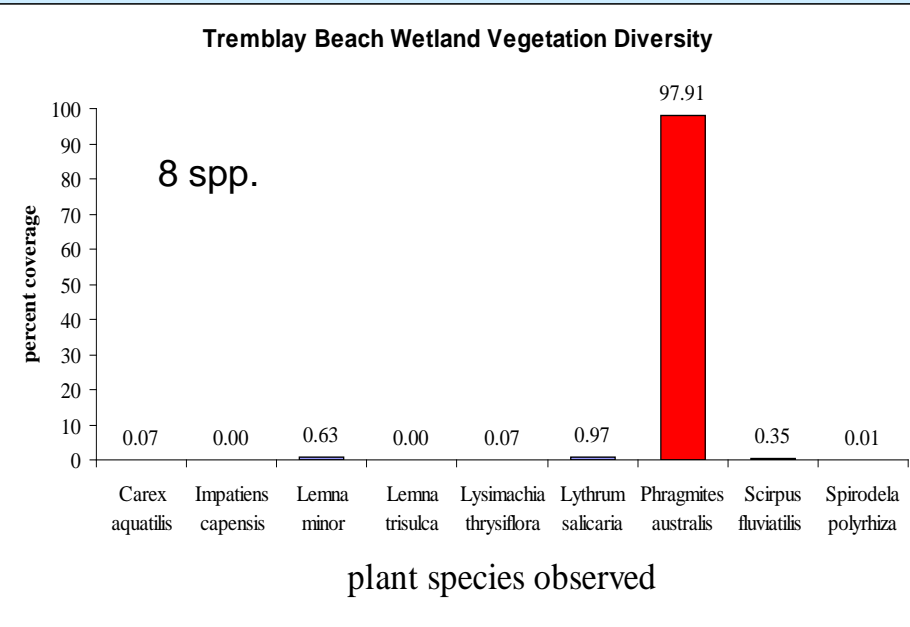


Ruscom Shores Wetland, June 2011

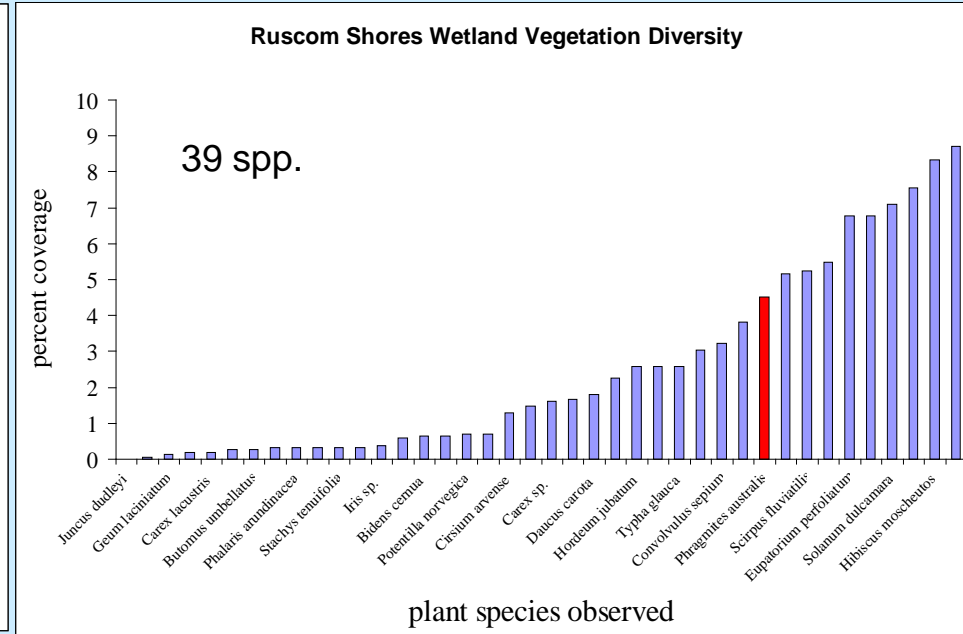


# Comparison of plant diversity within two Lake St. Clair Wetlands

## Phragmites Not Controlled



## Phragmites Controlled





# Kettle Point, Lake Huron Phragmites Control Demonstration Site

Pre-control September 2011



Post-control July 2012



4.6 acre coastal meadow marsh

# Ontario Invasive Phragmites Control Projects 2007-2013

## Lake Huron:

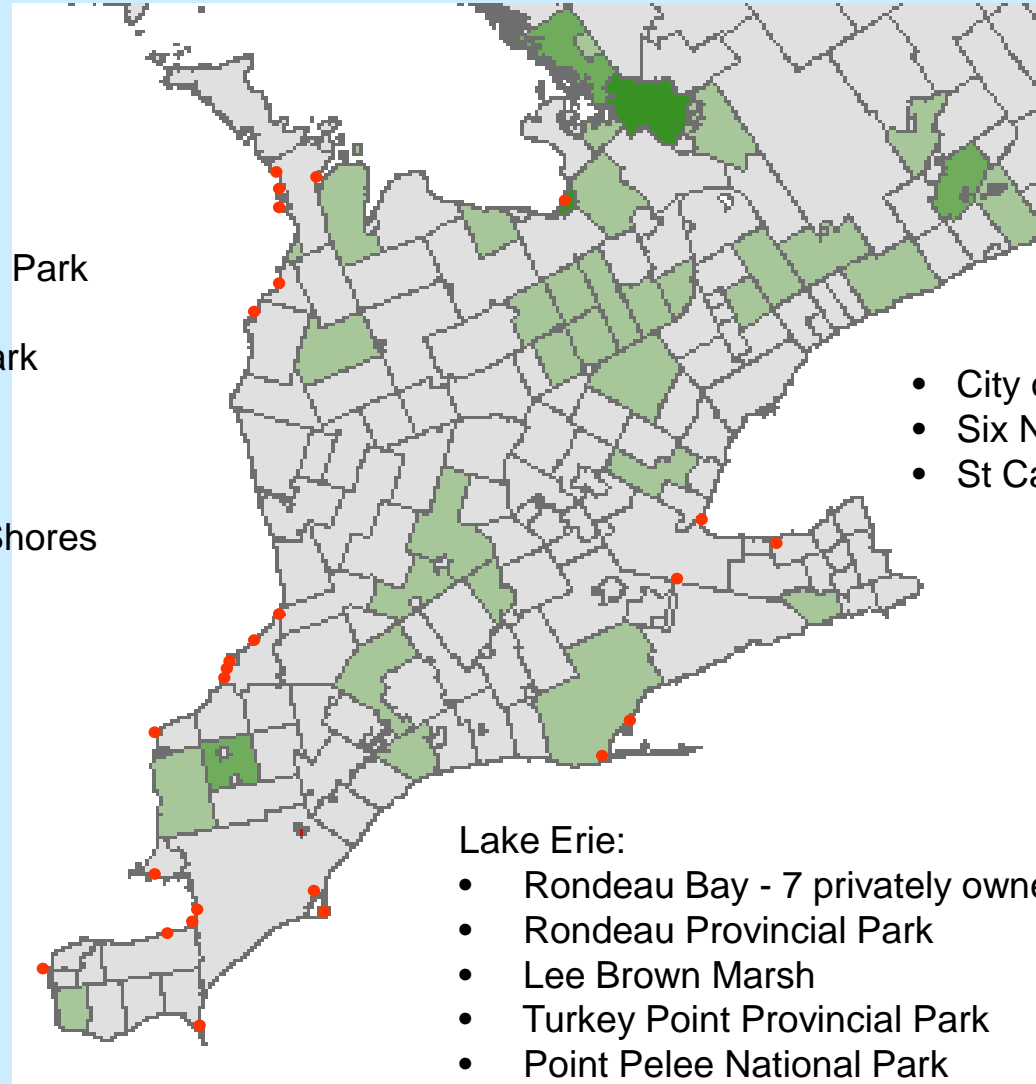
- Saugeen 1st Nations
- Oliphant
- Saugeen Shores
- Sauble Beach
- Wasaga Beach Provincial Park
- Wiarton
- Point Farms Provincial Park
- Port Franks
- Grand Bend
- Kettle Point
- Municipality of Lambton Shores
- Kincardine

## Lake St. Clair/Detroit River

- Ruscom Shores
- Fighting Island
- Light House Cove
- Canterbury Park, Sarnia
- Bear Creek, CWS

## Lake Erie:

- Rondeau Bay - 7 privately owned wetlands
- Rondeau Provincial Park
- Lee Brown Marsh
- Turkey Point Provincial Park
- Point Pelee National Park





# Achieving the goal of an effective, efficient and environmentally responsible control program

## ➤ Locally driven

### Management Plan:

- 1) Scope of current invasion: habitat type, ditches, acreage
- 2) Control options (water, timing, habitat, recreational activity...)
- 3) Dealing with complications of different land ownership (Federal, Provincial, Conservation Authorities, Municipal, Private, NGOs)
- 4) Associated costs; funding options
- 5) Prioritizing target sites
- 6) Building short and long-term capacity/infrastructure

# Required Next Steps:

- Essential to obtain legal approvals for over water and aerial herbicide control options in Canada
- Establish Phragmites Management Centre
  - provide guidance, information
  - funding to support on the ground control efforts
  - facilitate effective education campaign



Sauble Beach, Lake Huron  
October, 2008



Lake Huron Centre for Coastal Conservation



Toronto Zoo website for:  
Adopt a Pond News  
Protecting and Celebrating  
Wetland Biodiversity



- Initiate Province wide campaign to control Phragmites in ditches to dampen this major spread vector
- Highest priority sites: northern Ontario, cells near water courses, wetlands



# Ontario Phragmites Working Group

Est. Dec. 2011

- MNR/MOE
- Ontario Parks
- National Parks (Point Pelee)
- Ontario Invasive Plant Council
- Lake Huron Centre for Coastal Conservation
- First Nations
- Municipality of Chatham/Kent
- Township of Huron-Kinloss
- Hamilton Phragmites Working Group
- Lambton Shores Phragmites Working Group
- Nature Conservancy of Canada
- Ducks Unlimited
- Long Point Waterfowl and Wetland Research
- Master Gardeners of Ontario
- Ontario Horticultural Association
- Lambton Community in Bloom
- Grand Bend and Area Horticultural Society
- Conservation Ontario
- Carolinian Canada
- Researchers



# Ontario Phragmites Working Group

## Goals and Objectives:

- Promote effective management of invasive *Phragmites* – Training Workshop for Municipalities
- Raise public awareness, collect information on spread, share knowledge about control projects, provide references to *Phragmites* related research and up to date information
- Provide a step by step guide for private landowners, cottage associations, municipalities and other interested parties interested in undertaking a *Phragmites* control program- Invasive *Phragmites* Management Tool Kits
- Facilitate obtaining overwater chemical control options (Rodeo, Habitat)



SPECIAL THANKS TO:



Frank Letourneau  
Dover Agri-serve

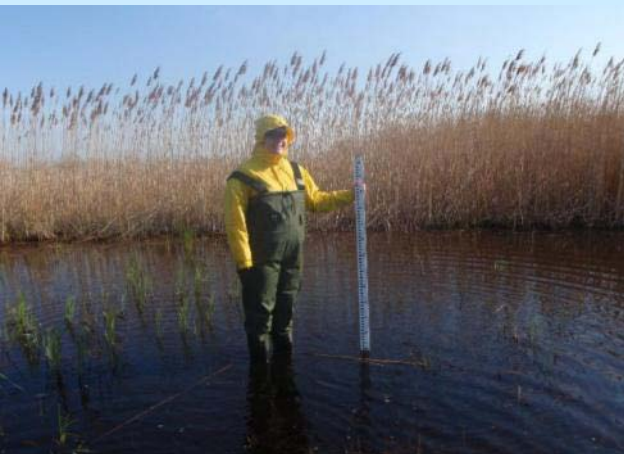


Darren Jacobs  
Moravian Town  
First Nation





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Is this the next problematic invasive?





# Recommended References

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