

## Emerging Issues Surrounding Invasion and Control of *Phragmites australis* in Wisconsin's Wetlands: A Survey of Wetland Professionals

### OBJECTIVE

*Phragmites australis*, a relatively new invader of Wisconsin's wetlands, is rapidly expanding its range in Wisconsin to the detriment of native wetland communities. Many wetland managers, restoration practitioners, researchers and other wetland professionals in Wisconsin and the Great Lakes region have knowledge about *Phragmites* invasion and control through on-the-ground experience. However, much of this knowledge has not been published, and thus far there has not been a means to make this collective *Phragmites* expertise available such that wetland professionals can build on the experience of others in the wetland community.



Wisconsin Wetlands Association has begun to address this need by surveying wetland professionals in Wisconsin. In 2004, WWA coordinated a written survey of wetland professionals about *Phragmites* invasion and control, and also coordinated a *Phragmites* working group at its January 2005 Wetland Science Forum. More than 35 wetland professionals participated in these discussions (click here for a [graph showing types of professionals](#) who participated). Discussions focused on *Phragmites* topics such as monitoring and mapping; prevention, early detection and rapid response; native versus non-native populations, competition with natives and other invasive plants, and control techniques.

This webpage is a compilation of contributions of *Phragmites* experience and informal insights made by wetland professionals through our written survey and working group discussion. Contributions are organized by topic and include observations, research needs, and opinions regarding priorities for dealing with *Phragmites* in Wisconsin's wetlands. WWA encourages wetland researchers, consultants, land managers and others working in wetlands to continue to share the results of new *Phragmites* work with us and the rest of the wetland community. The goal of this working document is to provide a means for *Phragmites* information exchange that allows wetland professionals to learn from and build upon one another's on-the-ground experience battling *Phragmites* in Wisconsin's wetlands.

**Acknowledgements:** Thanks to all of the wetland professionals who contributed to this effort (click here for a [list of participants](#)). Special thanks to Kelly Kearns for advising on the survey development and facilitating the working group discussion. Finally, thank you to Wisconsin Coastal Management Program and National Oceanic and Atmospheric Administration for grant funds that supported this project.



*Please note that the information submitted by wetland professionals and compiled below has not been confirmed by Wisconsin Wetlands Association. This is intended as a working document and will be continually updated with new Phragmites information as it is submitted by wetland professionals.*

## ***PHRAGMITES* TOPICS**

- >> [Invasion ecology](#)
  - >> [Monitoring and mapping](#)
  - >> [Native versus non-native populations](#)
  - >> [Competition with natives and other invasives in wetlands](#)
  - >> [Control techniques](#)
  - >> [Graphs of survey results](#)
  - >> [Wetland consultants with expertise in \*Phragmites\* control](#)
  - >> [Submit your \*Phragmites\* experience for inclusion on this webpage](#)
  - >> [\*Phragmites\* field guide](#)
  - >> [Links to additional online resources](#)
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## ***PHRAGMITES* INVASION ECOLOGY**

### **Observations - Invasion Ecology**

- In Wisconsin, *Phragmites* is most commonly found in disturbed areas with altered hydrology or sedimentation such as roadside ditches, wetlands downhill from active farm fields, and farmed wetlands that have been left fallow.
- *Phragmites* is now also being observed in interior wetlands in Wisconsin (not just roadside ditches, powerline cuts, etc.). It is not clear how it is spreading to sites that are not obviously disturbed.
- While *Phragmites* usually grows in sunny, open areas, it has been observed growing in the shade (e.g. Ridges Sanctuary).
- Low water levels in Lake Michigan have facilitated invasion along the shoreline of Green Bay.
- At Ridges Sanctuary, *Phragmites* has not spread rapidly into thick monotypic cattail stands. However, when water levels are down, *Phragmites* has slowly started to spread into areas where cattail organics have accumulated.
- *Phragmites* spreads rapidly on exposed, moist soils, but does not appear to spread readily on sites that have dense, established vegetation.
- *Phragmites* exhibits different growth patterns/forms in different areas (circular clumps of stems versus scattered stems).
- *Phragmites* is still intentionally planted for boat covers and wildlife cover (some nurseries still recommend it).
- In some areas, duck hunters transplant *Phragmites* for duck blinds (largely in September).
- In calcareous fens and sedge meadows of the Lower Minnesota River valley, *Phragmites* poses a greater threat than either reed canary grass or purple loosestrife. Unlike other invaders, *Phragmites* does not require soil disturbance to invade and dominate fen and sedge meadow communities. It spreads rapidly via rhizomes and chokes out 95 percent of fen and sedge meadow species over the course of a 5- to 10- year period. The loss of calcareous fen species includes threatened and special concern species such as white lady's slippers and common valerian. None of the MN-listed species persist once a canopy of *Phragmites* develops.



- Some municipal reed bed systems in Wisconsin still use non-native *Phragmites* to dewater sewage sludge. Permits for these facilities require monitoring and safeguards to minimize the chance of spread. WDNR would like to get native ecotype rootstock propagated for use in these beds, but currently native stock is not available in sufficient quantities to require its use. The DNR staff who permit these systems and the company that installs them are open to ideas on ways to safeguard against *Phragmites* spread from municipal reed bed sites.
- Survey Result: Only 3/4 of survey participants were aware of the fact that *Phragmites* is being used by municipal water treatment facilities to dewater sewage sludge.

### Research Needs - Invasion Ecology

- What are the most common vectors for the spread of *Phragmites*?
- How does *Phragmites* spread to interior wetlands where there is no obvious disturbance such as roads, powerline cuts, etc.?
- Under what conditions does *Phragmites* invade most aggressively? Under what conditions is it not as successful?
- Does road salt runoff facilitate the spread of *Phragmites* along roadside corridors?
- Does roadside mowing exacerbate the spread of *Phragmites*?
- What conditions determine the growth pattern/form that *Phragmites* will take (e.g. circular clumps of stems versus scattered stems) at a given infestation site?
- How long do *Phragmites* seeds remain viable in the seed bank?
- Under what conditions does *Phragmites* reproduce vegetatively versus through seed germination?




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## MONITORING AND MAPPING

### Resources - Monitoring and Mapping

- Great Lakes Indian Fish and Wildlife Commission (GLIFWC) maintains an [online GIS-database](#) of all invasive plant species in the region. GLIFWC is willing to receive and post submissions of monitoring data for *Phragmites* or other invasives. Submission of invasives monitoring data should include location, size of stand (acres), density of stems (optional) and information about ownership of the land.
- *Phragmites* voucher specimens may be sent to the herbarium at UW-Madison or UW-Stevens Point.

### Observations - Monitoring and Mapping

- Click here for a [graph of the types of monitoring data](#) that wetland professionals are collecting.
- In Door County, *Phragmites* has been observed growing in a variety of wetland types including bedrock beaches, swales at the Ridges Sanctuary, sand beaches, sedge meadows, exposed lake bed when Lake Michigan water levels dropped, bog communities, shallow marshes, roadsides, and stream banks. Some *Phragmites* mapping work for Door County has been completed by Gary Fewless and colleagues at UW-Green Bay.

- Steve Eggers (U.S. Army Corps of Engineers) has monitored the rate of *Phragmites* invasion into a calcareous fen plant community in MN (Savage Fen Scientific and Natural Area, Dakota County) using both on-the-ground surveys and interpretation of aerial photography from the 1930s to present day. The ground survey consisted of a baseline established in 1992 at the edge of a *Phragmites* colony and calcareous fen community. On an annual basis, he has monitored the rate (distance) and number of new *Phragmites* plants that have spread into the calcareous fen community.
- Wisconsin Wetlands Association involved citizen volunteers in surveying invasive plants in wetlands in 2002 & 2003. While many volunteers conducted purple loosestrife surveys (data are posted on the GLIFWC website mentioned above), few collected *Phragmites* survey data for reasons unknown.
- Jim Meeker (Edgewood College) is monitoring *Phragmites* populations in Bark Bay Slough, Lake Superior.
- Other reported *Phragmites* monitoring locations include: Bay Beach Wildlife Sanctuary (Brown Co.), Merrimac Preserve (Sauk Co), southwest portion of Green Bay shoreline, Savage Fen Scientific and Natural Area (Dakota Co., MN), mitigation sites in northeast Chicago and northwest Indiana, and aerial surveys of Lake Co., IL.

### Research Needs - Monitoring and Mapping

- Can *Phragmites* be identified and mapped using remote sensing techniques (aerial photos or satellite imagery)?

### Opinions/Priorities - Monitoring and Mapping

- Click here for a [graph of monitoring priorities](#) suggested by survey participants.
- In Door County and Green Bay, *Phragmites* invasion is so extensive that resources should be focused on control efforts rather than monitoring and mapping.
- The wetland community is on the cusp of public understanding and support for *Phragmites* prevention and control. Shoreline landowners are having such difficulty with *Phragmites* infestations on their properties that they are starting to seek help with their control efforts. The wetland community needs to continue to inform landowners and prepare them to watch for new infestations.

## NATIVE VERSUS NON-NATIVE POPULATIONS

### Resources - Native vs. Non-native Populations

>> [Online Morphological Key](#): Use this key to distinguish native from non-native *Phragmites* (provided by the Ecology and Management of Invasive Plants Program, Cornell University)

>> [Phragmites Diagnostic Service](#): Submit your specimen for identification as native or non-native (provided by the Ecology and Management of Invasive Plants Program, Cornell University)

### Observations - Native vs. Non-native Populations

- Native *Phragmites* stands don't expand as quickly as non-native stands.



Exotic *Phragmites* stems are tough and dull with ridges (top). Native *Phragmites* stems are smooth and shiny and have dark spots (bottom).

- Native *Phragmites* stands are typically less dense than non-native stands and have been observed growing mixed with sedge meadow species.
- Native *Phragmites* grows in drier conditions than non-native.
- Native stands and non-native stands of *Phragmites* can grow side by side. Some wetland professionals have observed *Phragmites* populations with native characteristics on the invasion front and non-native characteristics in the interior of the stand.
- Non-native *Phragmites* has greater seed germination rates than native *Phragmites*.
- Non-native *Phragmites* is harder to control with herbicide than native *Phragmites*, possibly because it has longer rhizomes.
- Ridges Sanctuary is working to eliminate both native and non-native *Phragmites*.

### Research Needs - Native vs. Non-native Populations

- Do native and non-native *Phragmites* exhibit different allelopathic effects?
- What is the most accurate yet straightforward field indicator test to distinguish native from non-native *Phragmites* (for use by both conservation professionals and the general public)?

### Opinions/Priorities - Native vs. Non-native Populations

- Wetland professionals have experienced mixed success using the morphologic key to distinguish native and non-native *Phragmites*. Because of the potential for hybridization, some wetland professionals question whether morphologic characters can provide accurate identification.
- Wetland managers should eliminate both non-native and native *Phragmites* stands if enough resources are available. When resources are limiting, control efforts should focus on non-native stands.
- The state should identify and maintain stocks of native *Phragmites* genotypes for research purposes.
- The state should locate native *Phragmites* populations that can be used as a reed source for municipal reed bed systems for dewatering sewage sludge (current stock is non-native and is brought to Wisconsin from the east coast).



The stems of exotic *Phragmites* are green or tan (top) while native stems turn reddish-brown (bottom).

## COMPETITION WITH NATIVES AND OTHER INVASIVES

### Observations - Competition

- *Phragmites* can outcompete purple loosestrife when water levels change.
- *Phragmites* has outcompeted purple loosestrife in roadsides around Green Bay. Tower Bridge Drive was formerly surrounded by purple loosestrife, but this area is now infested with dense stands of *Phragmites*.



Jewelweed  
(photo by Molly Fifield Murray)



*Phragmites* stems invading native white lady's slipper orchids.

- Native *Phragmites* may outcompete reed canary grass in drier conditions.
- *Phragmites* has been observed spreading into infestations of reed canary grass.
- At Ridges Sanctuary in Door County, *Phragmites* has not spread rapidly into areas with thick monotypic cattail stands.
- At some sites where *Phragmites* control measures have been successful, jewelweed has replaced *Phragmites*.

### Research Needs - Competition

- How does *Phragmites* alter its environment and what are the effects of such alterations on native plants?

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## CONTROL TECHNIQUES

### Observations on Effectiveness of Herbicides

**NOTE:** *Chemical control of aquatic plants requires a permit from WDNR. To learn more about Wisconsin's Aquatic Plant Management and Protection Program and permit requirements, visit [WDNR's website](#).*

- Click here for a [graph of herbicides](#) employed by survey participants.
- In general, late summer application of herbicides is most effective at killing *Phragmites* plants because this is when fluids flow down plant stems to their roots.
- HABITAT: The new herbicide Habitat seems expensive at about \$700 for 2.5 gallons, but it is highly concentrated (2.5 gal is about 1000 gal once mixed). Mark Martin (WDNR) conducted test sprays of Habitat at Pickerel Pond in 2004 and will assess the results in 2005 in acre-sized test plots.
- RODEO-Cut Stem Treatment: Rodeo has been very effective in *Phragmites* control at some sites when applied as a cut stem herbicide. Mark Martin (WDNR) has had success controlling *Phragmites* by treating stems with Rodeo in August (bundle, cut, and dab stems with herbicide). This technique was about 98% effective in the first year and remaining stems were eliminated in the second year.
- RODEO-Foliar Treatment: Rodeo wicked on leaves was 99% effective at one control site. Additional treatment was necessary after several years when *Phragmites* began to recover.
- VANTAGE: Some wetland professionals report little success with the herbicide Vantage as a *Phragmites* control treatment.

### Observations on Effectiveness of Other Control Techniques

- Click here for a [graph of control methods](#) employed by survey participants.

- **PLASTIC COVERING:** *Phragmites* control on a small scale was achieved at Ridges Sanctuary by covering a stand with black plastic. The plastic had to be weighted down and thick so that *Phragmites* shoots would not lift up or poke through the plastic.
- **BURNING:** Andy Nelson (Northern Environmental) has had success with burning *Phragmites* in part because the native plant community was stimulated at control sites.
- **BURNING:** Wetland professionals report that burning as a *Phragmites* control technique is generally ineffective unless combined with other control techniques. For example, herbicide application in the fall followed by burning in the spring has been effective at some sites.
- **MOWING:** Frequent mowing of the beach at Baileys Harbor in Door County successfully eliminated *Phragmites*, but this control technique also adversely affects many other wetland species.
- **EXCAVATION:** Art Kitchen (USFWS) has successfully used excavation as a control technique. *Phragmites* root systems were excavated to a depth of at least 1 ft and buried in a ditch 4 ft deep. Though this technique was successful, it is also expensive.
- **COMBO:** A combination of multiple mowings and Round Up sprayings was successful at Ridges Sanctuary only when the area was quickly tilled and resown with replacement species (cover crop of annual rye and prairie mix).
- **COMBO:** A combination of herbicide spraying (late summer), burning (mid to late fall), and spraying again and overseeding with native species (the following growing season) was reported as successful at one *Phragmites* control site.
- **COMBO:** Cut stem herbicide application followed by burning has been reported as successful in the first 1-2 years of treatment.

### Research Needs/Future Research - Control Techniques

- Under what conditions (water level, season, etc.) are various control techniques and combinations of techniques effective? How does one select control technique(s) given particular site-specific conditions?
- What combinations of control techniques are effective?
- Can flooding be effective as a control measure? The Nature Conservancy plans to experiment with flooding as a control technique in Carlsville (Door County).
- Can burning be used as an effective management technique?
- Can consistent mowing be used as an effective management technique?
- Could altering ditch mowing/cleaning techniques help control and prevent the spread of roadside *Phragmites* populations?
- Is there a safe and effective and safe biocontrol agent for *Phragmites*?
- What is the relative effectiveness of different herbicides that do not impact sedges and forbs (grass-specific herbicides)?

### Opinions/Priorities - Control Techniques

- Along coastal shorelines, efforts to eliminate *Phragmites* should include plans for replacing the erosion control function that *Phragmites* stands currently provide.
- At sites where the native seed bank is lacking, efforts to eliminate *Phragmites* should include plans for reestablishment of native plant communities to prevent other invasive plant species from taking over.

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## WETLAND CONSULTANTS WITH *PHRAGMITES* EXPERTISE

Looking to hire a professional to assist with a *Phragmites* control project? Below is a list of firms that offer invasive plant control services with expertise in *Phragmites* control. ***Please note that these listings do not equate to WWA endorsements of particular firms. We recommend that you ask for references and information on Phragmites projects completed by firms under your consideration.***

>> [Northern Environmental](#)

>> [Hey & Associates](#)

Does your firm offer invasive plant control services with expertise in *Phragmites* control techniques? WWA will maintain a list of consultant contacts here to connect those in need of such services with experienced professionals. To have your firm listed, [email WWA](#).

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## NEW SUBMISSIONS OF *PHRAGMITES* INFORMATION

Are you conducting research on *Phragmites*? Experimenting with different *Phragmites* control techniques on your property? Conducting wetland restoration on a site infested with *Phragmites*? If you have gained on-the-ground experience with *Phragmites*, please consider sharing what you have learned with the wetland community by submitting information for inclusion on this webpage. Simply complete the form below and [email it to WWA](#) .

>> [Phragmites info submission form](#)

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## *PHRAGMITES* FIELD GUIDE

Do you need assistance with identifying *Phragmites* in the field and with distinguishing native from non-native strains? Wisconsin Wetlands Association has produced a *Phragmites* field guide brochure that includes photos and descriptions of key identification characters. Order copies of Wisconsin Wetlands Association's *Phragmites* field guide brochure by [emailing](#) or calling WWA (608-250-9971).

>> [Coming soon: Phragmites field guide brochure in PDF format for download](#)



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## ONLINE *PHRAGMITES* RESOURCES

>> [Ecology and Management of Invasive Plants Program](#), Cornell University (includes a

morphological key for distinguishing native vs. non-native *Phragmites*)

>> [Recent Research on \*Phragmites australis\* in North America: Implications for Management](#). Proceedings of the Aquatic Invaders of the Delaware Estuary Symposium, Malvern, Pennsylvania, May 20, 2003, pp. 12-15.

>> [Bibliography of \*Phragmites\* References](#) by the Cooperative Wildlife Research Laboratory of Southern Illinois University

>> [Global Invasive Species Database](#)

>> [The Nature Conservancy's Invasive Species Initiative](#)

>> [Natural Resources Conservation Service's Invasive Plants Profile](#)

>> [UW Green Bay Herbarium](#)

>> [Cryptic invasion by a non-native genotype of the common reed, \*Phragmites australis\*, into North America \(PDF download\)](#). 2002. Kristin Saltonstall. Proceedings of the National Academy of Sciences: 99(4): 2445-2449

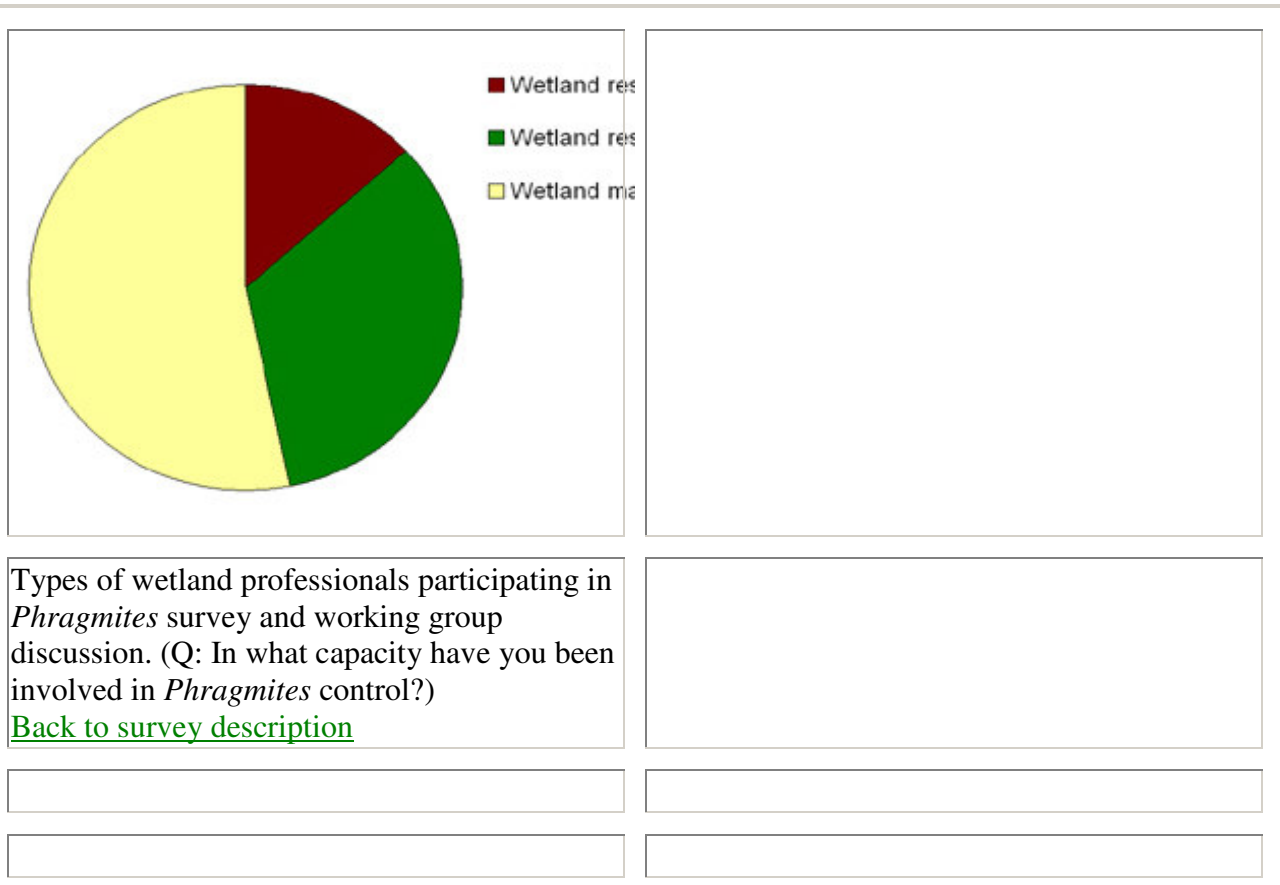
>> [WIDNR's Non-native plants webpages](#)

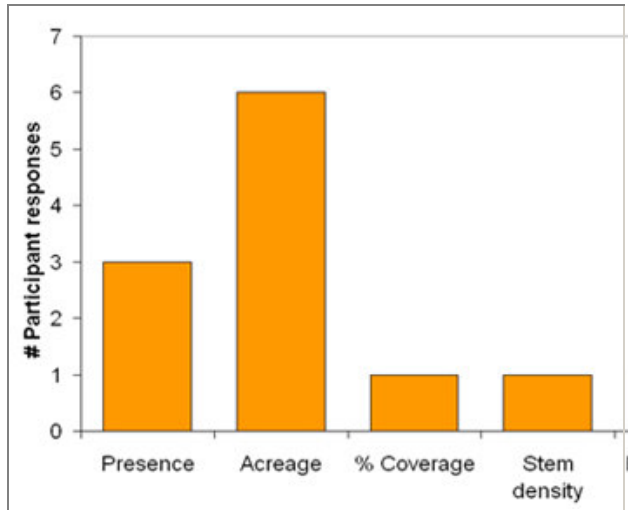
>> [Research at University of Delaware on \*Phragmites\* control by genetically engineering native species to be "\*Phragmites\* blockers"](#)

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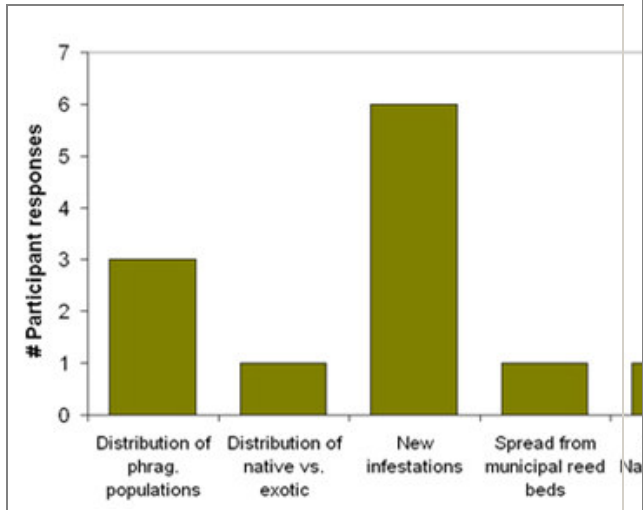
## GRAPHS OF SURVEY RESULTS

View tallied results from a subset of the *Phragmites* survey questions below.

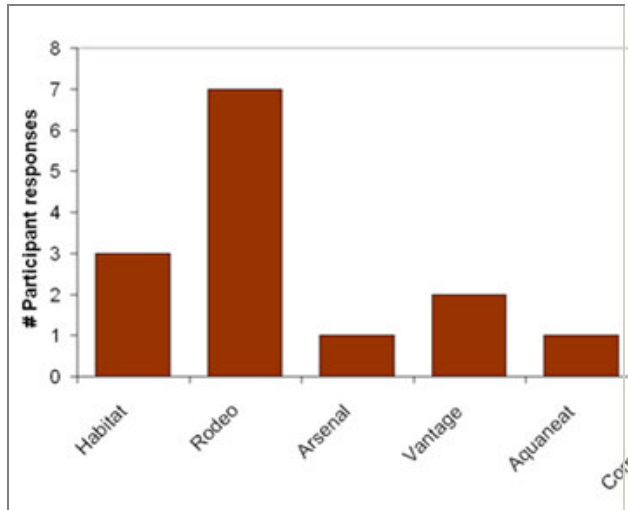




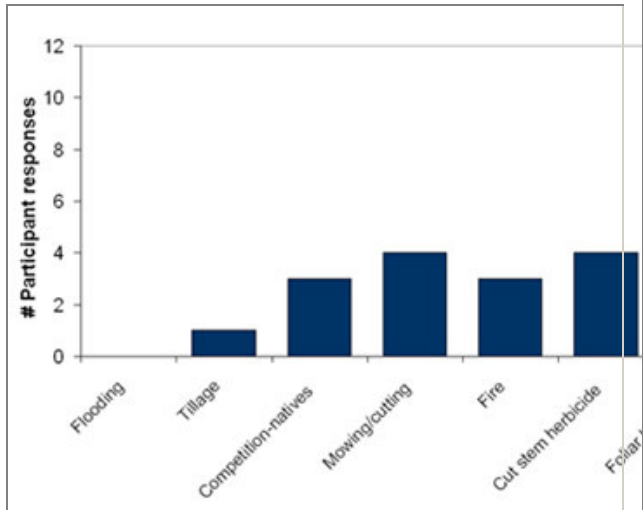
Q: What types of data do you collect when monitoring *Phragmites* populations?  
[Back to section on \*Phragmites\* monitoring](#)

Q: In your opinion, what are the greatest needs related to *Phragmites* monitoring?  
[Back to section on \*Phragmites\* monitoring](#)

Q: What herbicides have you employed to control *Phragmites*?  
[Back to section on \*Phragmites\* control](#)



Q: What methods have you employed to control *Phragmites*?  
[Back to section on \*Phragmites\* control](#)

For more information, please contact Laura England, Outreach Programs Director, at 608-250-9971 or [programs@wiscwetlands.org](mailto:programs@wiscwetlands.org)