



Thursday, April 6 2017

Mindful Management of Aquatic Invasive Species

Control of Non-native *Phragmites* within the Great Lakes Basins: A Case Study in Invasive Species Strategic Planning and Implementation

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Phragmites australis in Wisconsin

- Wisconsin has native and non-native *Phragmites*.
 - Native *Phragmites* grows statewide
 - Non-native *Phragmites* arrived ~ 1980
- First non-native *Phragmites* found along Lake Michigan Shore & mining site
- *Phragmites* spreads inland, mostly along roads, then to waterways, and wetlands



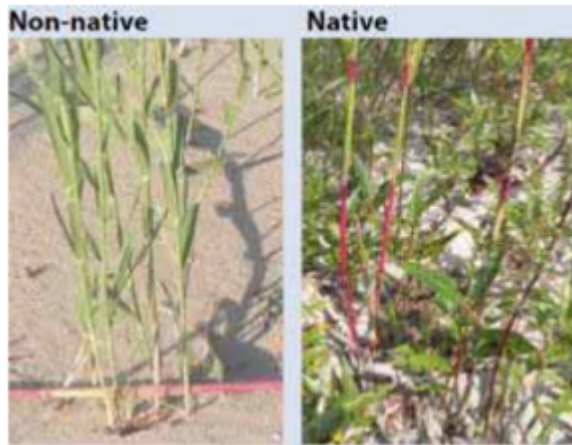
Phragmites Threatens Waters

- Tall, herbacious perennial grass that:
- Reduces shoreline use
- Changes aesthetics
- Reduces plant & animal diversity
- Reduces recreational uses
- Reduces wetland ecosystem services
- Reduces land values

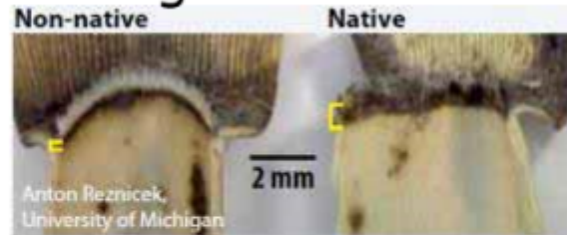


Native versus Non-Native *Phragmites* Identification

□ Stem color



□ Ligules



□ Leaf color



□ Stem Texture

- Native: Smooth & Shiny
- N-N: Dull & Ridged

□ Stem fungus

- Native: circle dots
- N-N: No circle dots

□ Glumes



□ Seed head



□ Other features

- In winter "Naked is Native" and leaf sheaths absent or pull away easily
- N-N: Leaf sheaths retained and hard to pull off.

Phragmites Spreading Inland

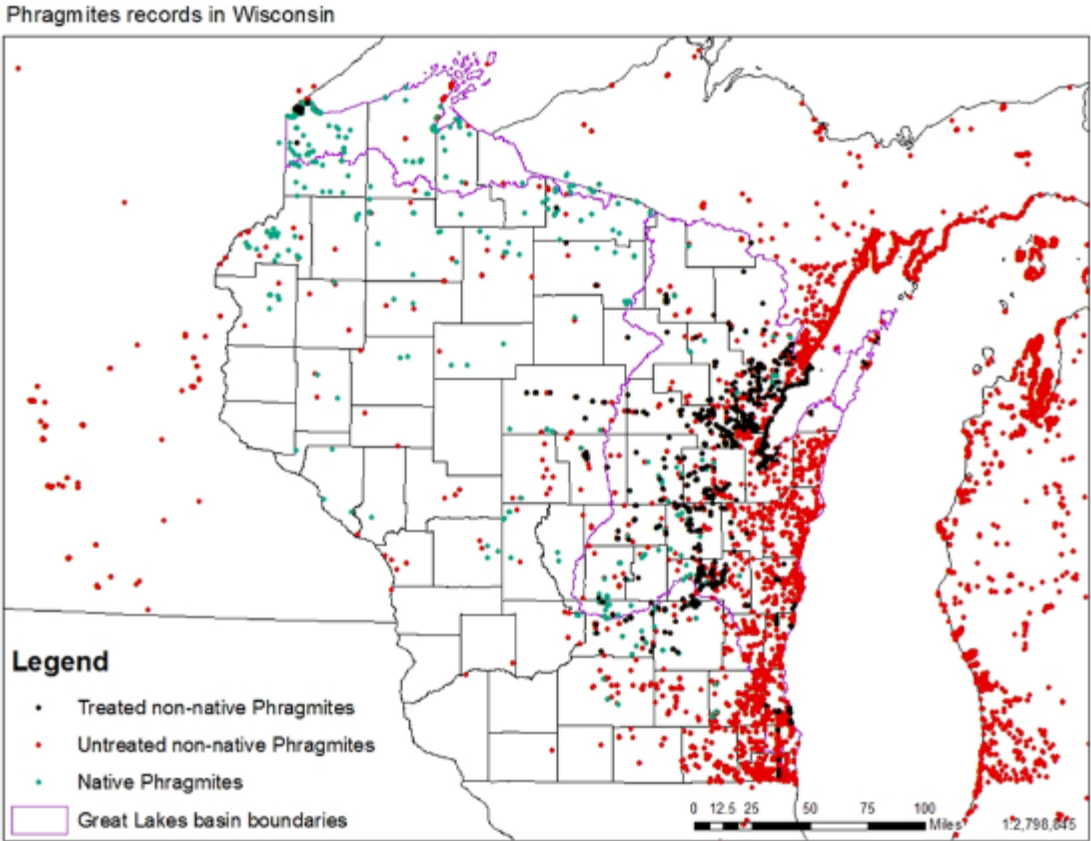
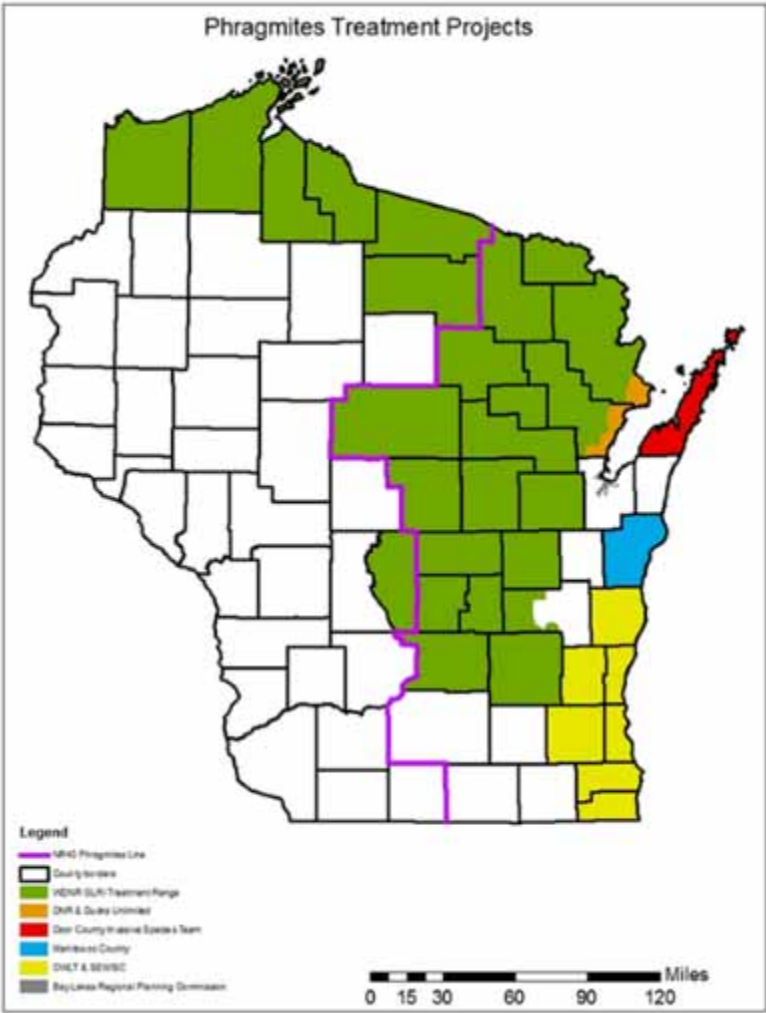
- Vehicles and mowers along roadways move seed & stem fragments
- Moving contaminated fill with rhizomes
- Human activities such as Wastewater Treatment Facilities, landscaping, hunter blinds
- Natural means: Birds, wind, flowing water, floodplains



History of Treating *Phragmites* in Wisconsin

- Before 2011, *Phragmites* was treated in smaller isolated projects.
- 2011, DNR began treating it along Lake Michigan (GLRI: ~\$1 million + ~\$2.5 million later: 8K acres).
- 2013, DNR began project on interior *Phragmites* populations funded by GLRI (\$220K).
- 2014, treated 280 sites.
- 2015, treated 1223 sites (including re-treatments)
- 2016, treated 1700 sites, ~ 1600 acres

Current Maps

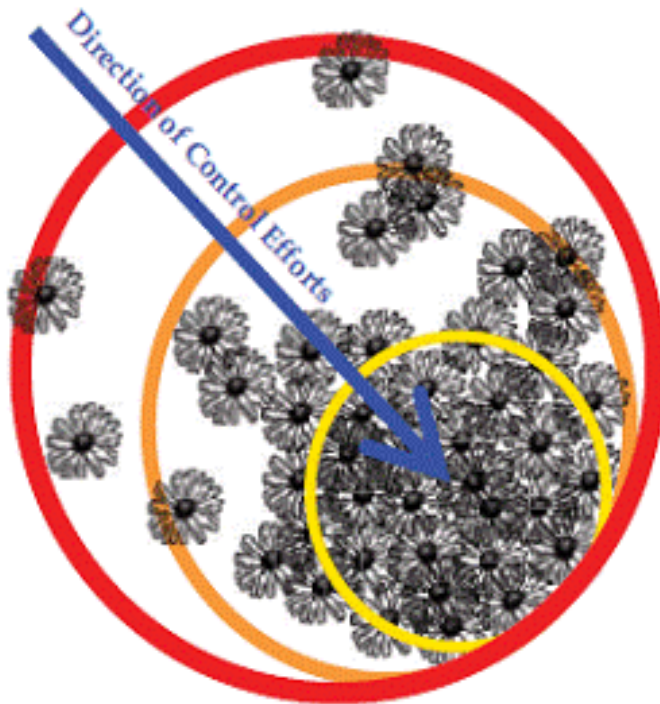


Dealing with Phragmites in Wisconsin

- Devise a systematic plan to treat non-native Phragmites statewide
- Lake Michigan work had begun, but too big & expensive for doubtful long-term results
- Prioritize treatment for maximum effect & long-term success at least cost: Early Detection/Rapid Response
- Incomplete information about where the Phragmites was located, but envisioned its invasion.
- Work from invasion front east, & mop up the West
- Strategic plan has remained as envisioned, but problem escalates in eastern counties & remains uncertain.

Prioritizing Control Efforts for *Phragmites*: Distribution & Density

Prioritizing Control Efforts for a Single Species by Density of Infestation



Note: Effective control may require the use of multiple control methods. Control efforts must be followed up by monitoring for new plants, regrowth, and flowering, generally within the same growing season. Monitoring should be done annually.

Outliers – Highest priority

- Lowest density of infestation
- Goal = eliminate small, isolated infestations
- Prevent the reproduction and survival of outliers
- Monitor annually beyond the known infestation for new outliers
- Lowest level of commitment, resources and effort needed

Advancing Front

- Goal = control the advancing front and perimeter of core infestations
- Prevent the expansion of the core infestation

Core – Lower priority

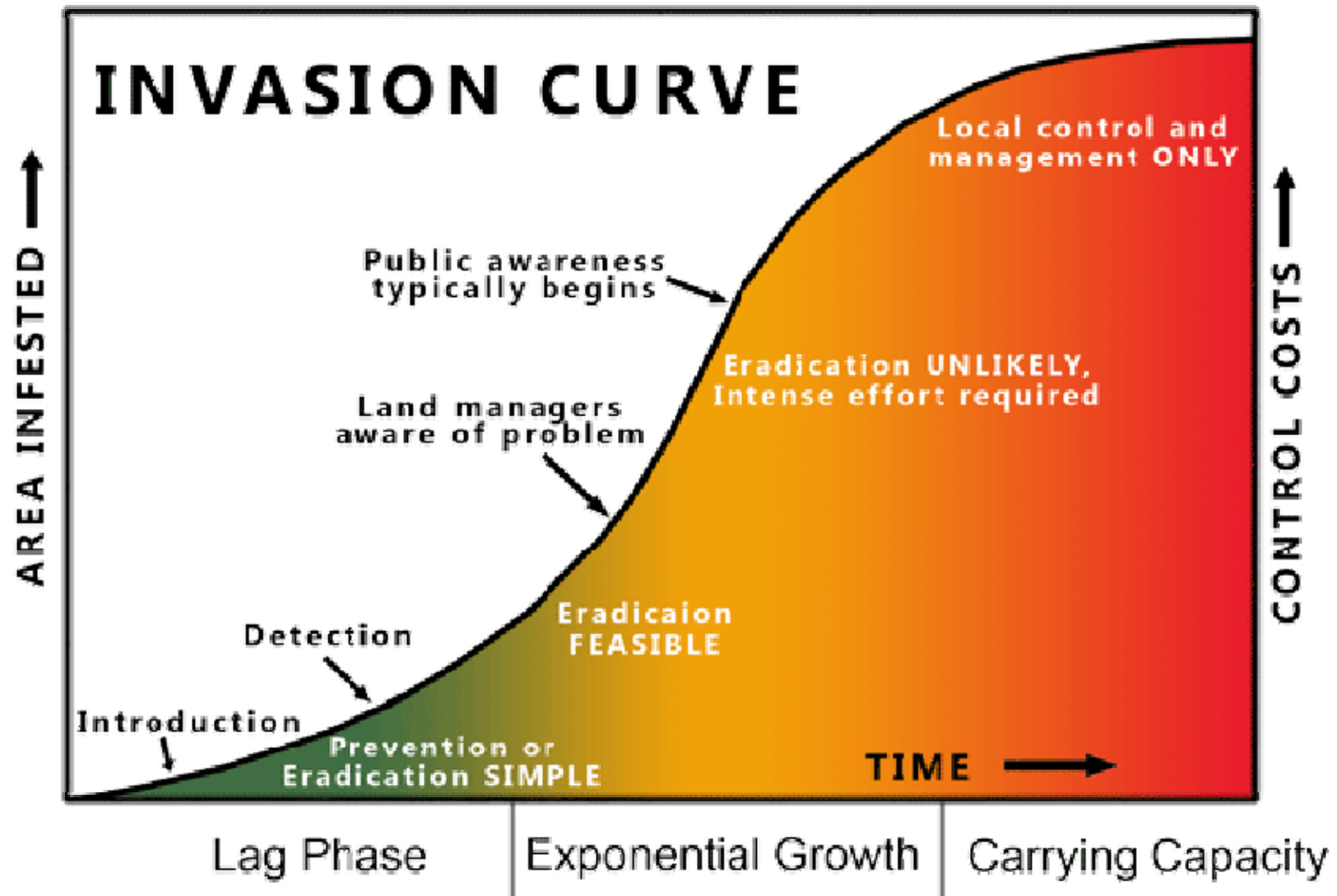
- Highest density of infestation
- Goal = suppress the interior of core infestations
- Highest level of commitment, resources and effort needed

NR40 Prohibited Counties, Lake Superior Basin & western counties within Lake Michigan Basin.

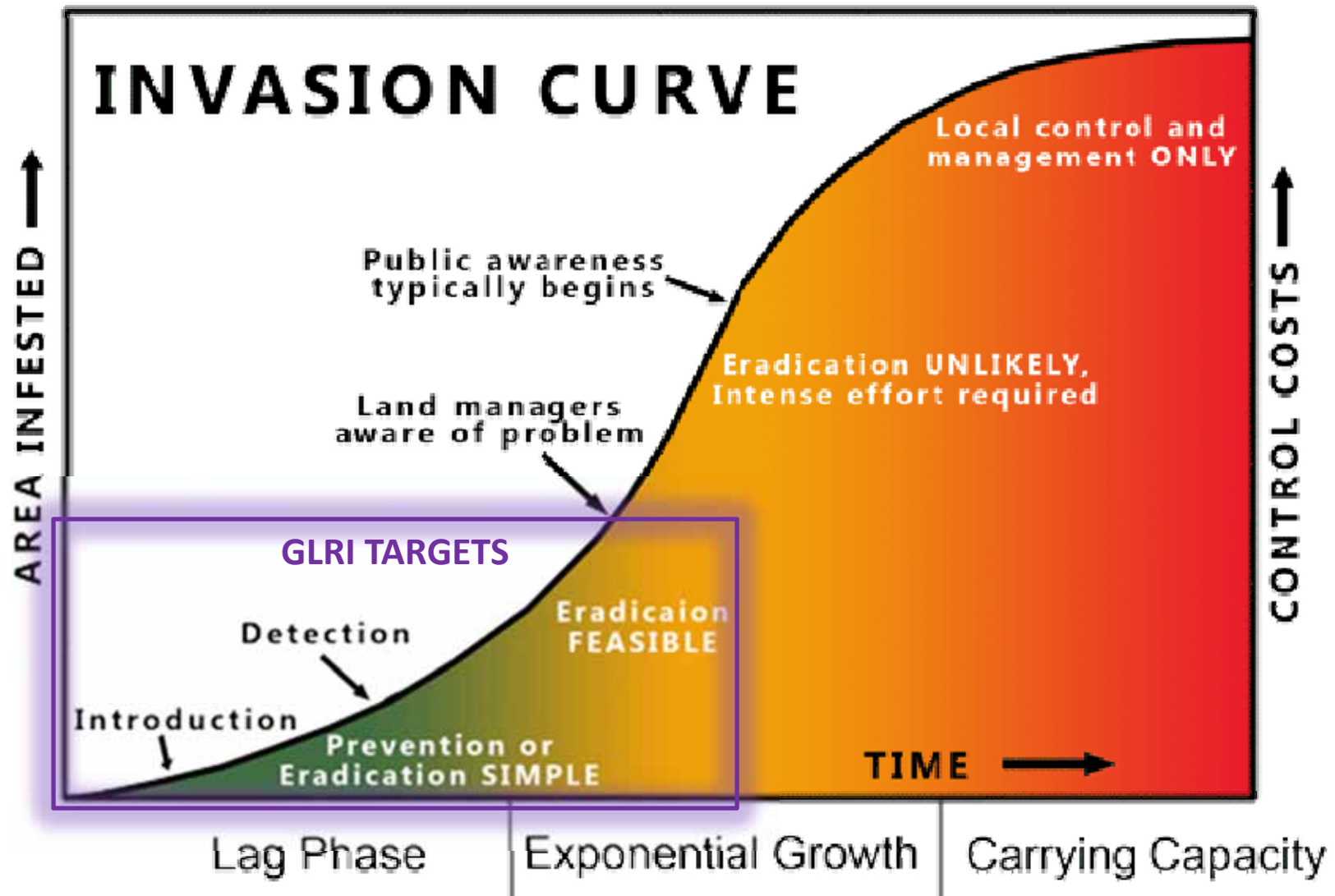
East-Central counties

Lake Michigan shoreline counties

Prioritizing Control Efforts for *Phragmites*: Distribution & Density



Prioritizing Control Efforts for *Phragmites*: Distribution & Density



Approach to treating *Phragmites* (*or any invasive species...*)

How do we accomplish control after prioritizing?

- Acquire funding: GLRI in GL basins
- Build partnerships: *Who knows sites/working on Phrag?*
- Reconnaissance & data exchange: *What's known?*
- Mapping: *Where & how much?*
- Form a strategic plan: *Where to spend funding?*
- File permits
- Outreach to landowners & gaining permission
- Hire contractors

Partnership development: *Who's working on Phragmites?*

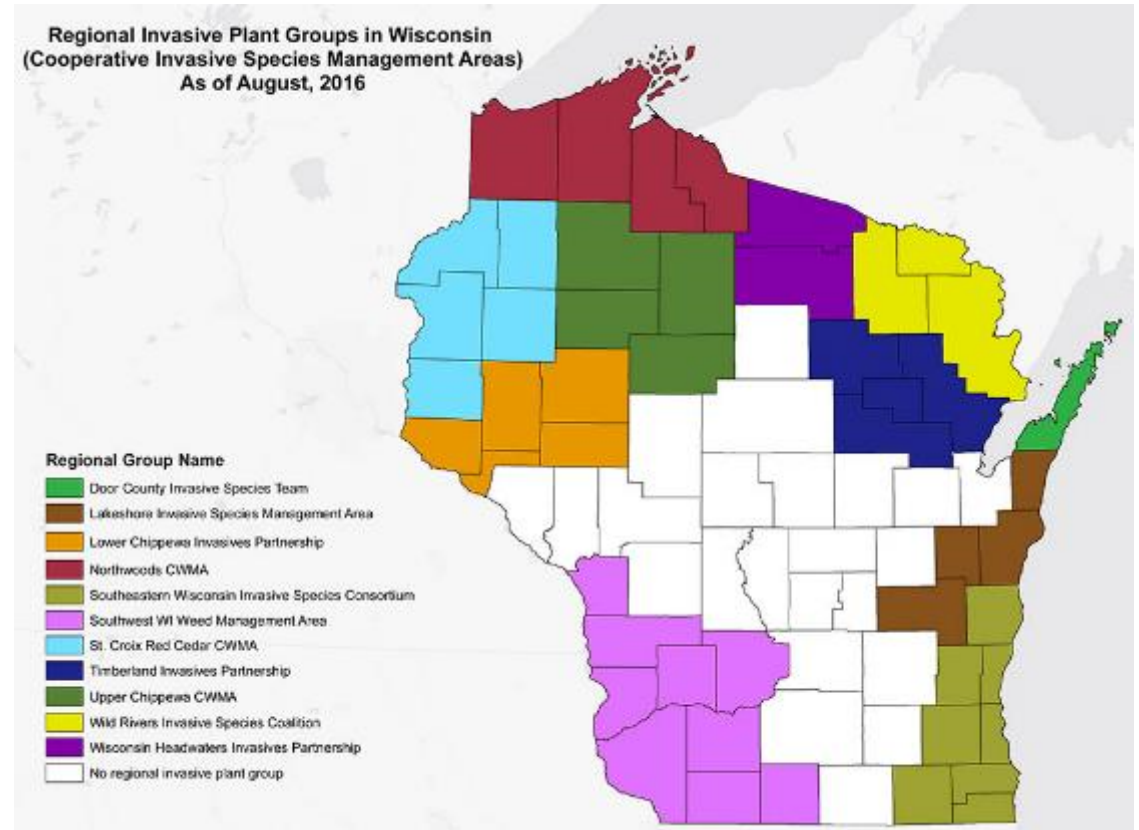
We worked with 3 major groups:

- Cooperative Invasive Species Management Areas (CISMAs)
- Great Lakes Indian Fish and Wildlife Commission (GLIFWC)
- IPAW



Cooperative Invasive Species Management Areas (CISMAs)

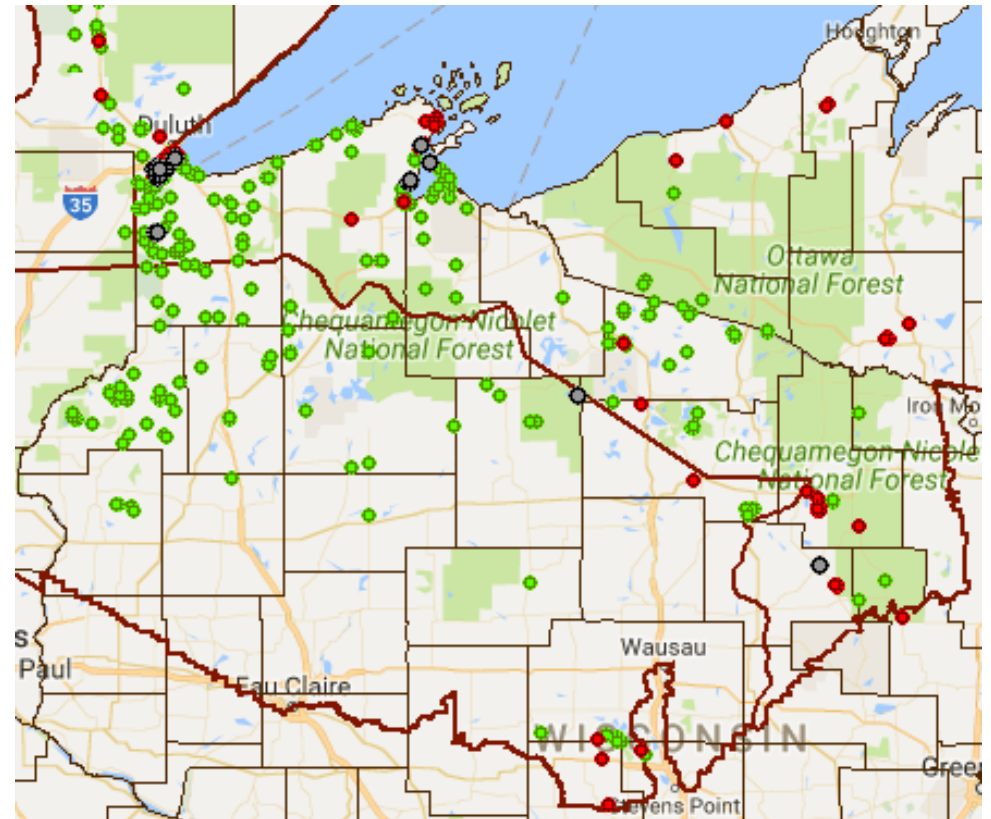
- CISMAs are non-profit organizations that are dedicated to invasive species issues.
- They often collaborate with the WDNR and citizens. Conducting outreach, reconnaissance, and control invasive species.
- CISMAs tend to cover multiple counties.



We've received hundreds of Phragmites reports from our CISMA partners!

Great Lakes Indian Fish and Wildlife Commission

- GLIFWC represents 11 Ojibwe tribes across Minnesota, Wisconsin, and Michigan. Preserving hunting, fishing, and gathering rights.
- GLIFWC has an online database of native and non-native Phragmites populations.
- Also coordinated treatment activities within Reservations.



Green = Native Phragmites

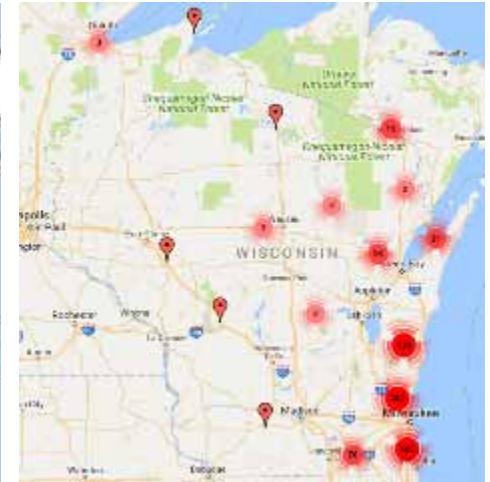
Red = Non-native Phragmites

Mapping: Collect all known *Phragmites* records

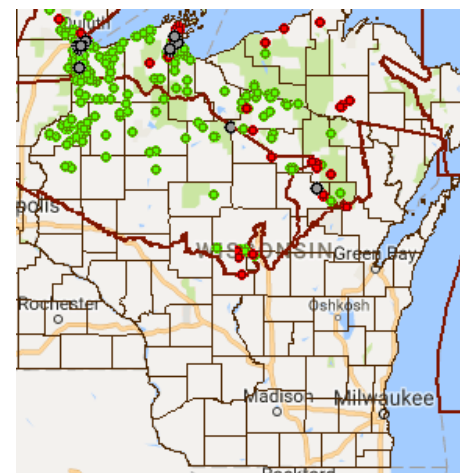
- Combined data from all sources
 - WDNR SWIMS, partner records, online databases
 - Spreadsheets & emails
- Data collection for *Phragmites* started the first efforts towards the Invasive Species Archive
- Once together, it showed survey gaps and helped build tools for further assessment.



SWIMS



EDDMapS



GLIFWC

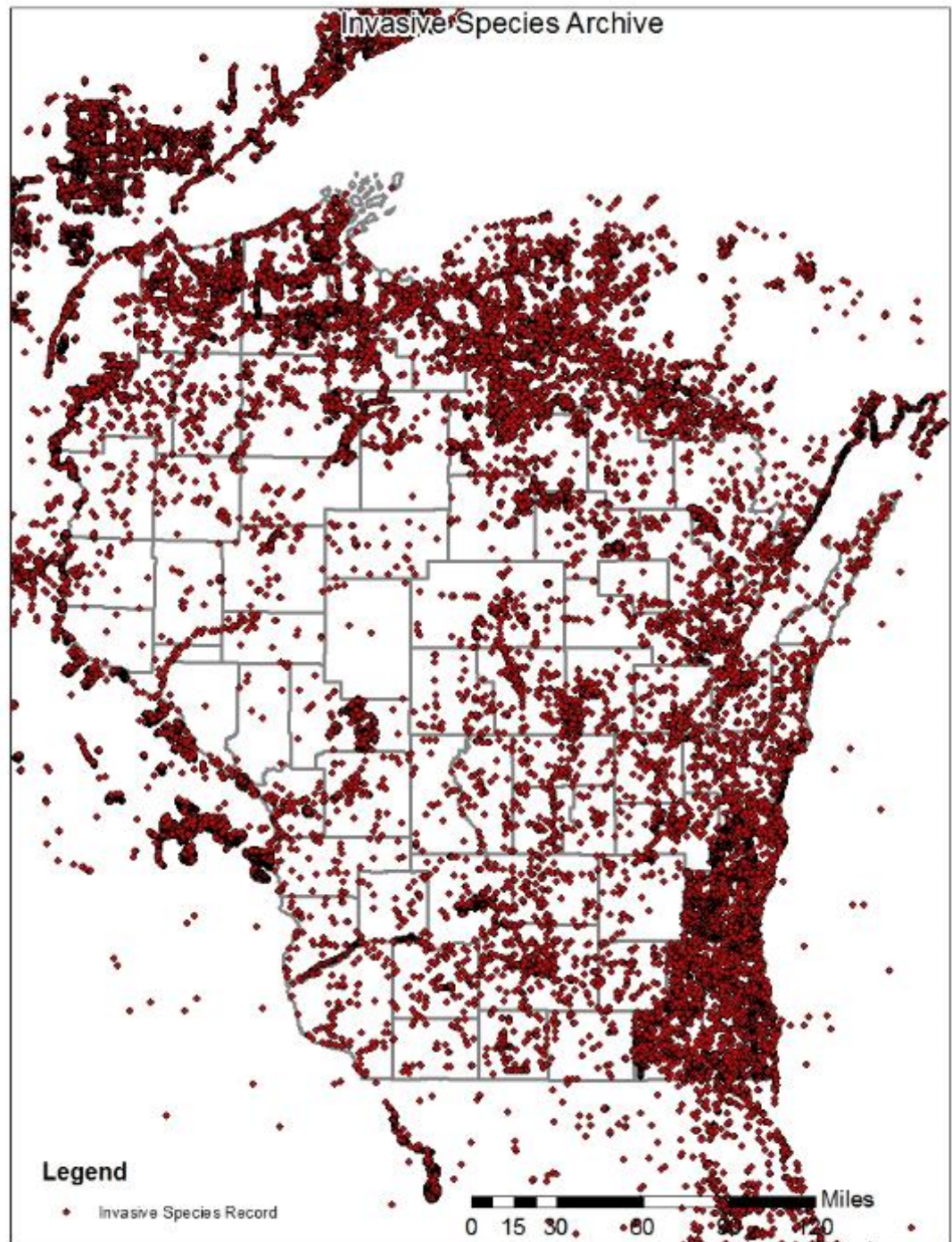


Other records

Mapping tool: Invasive Species Archive

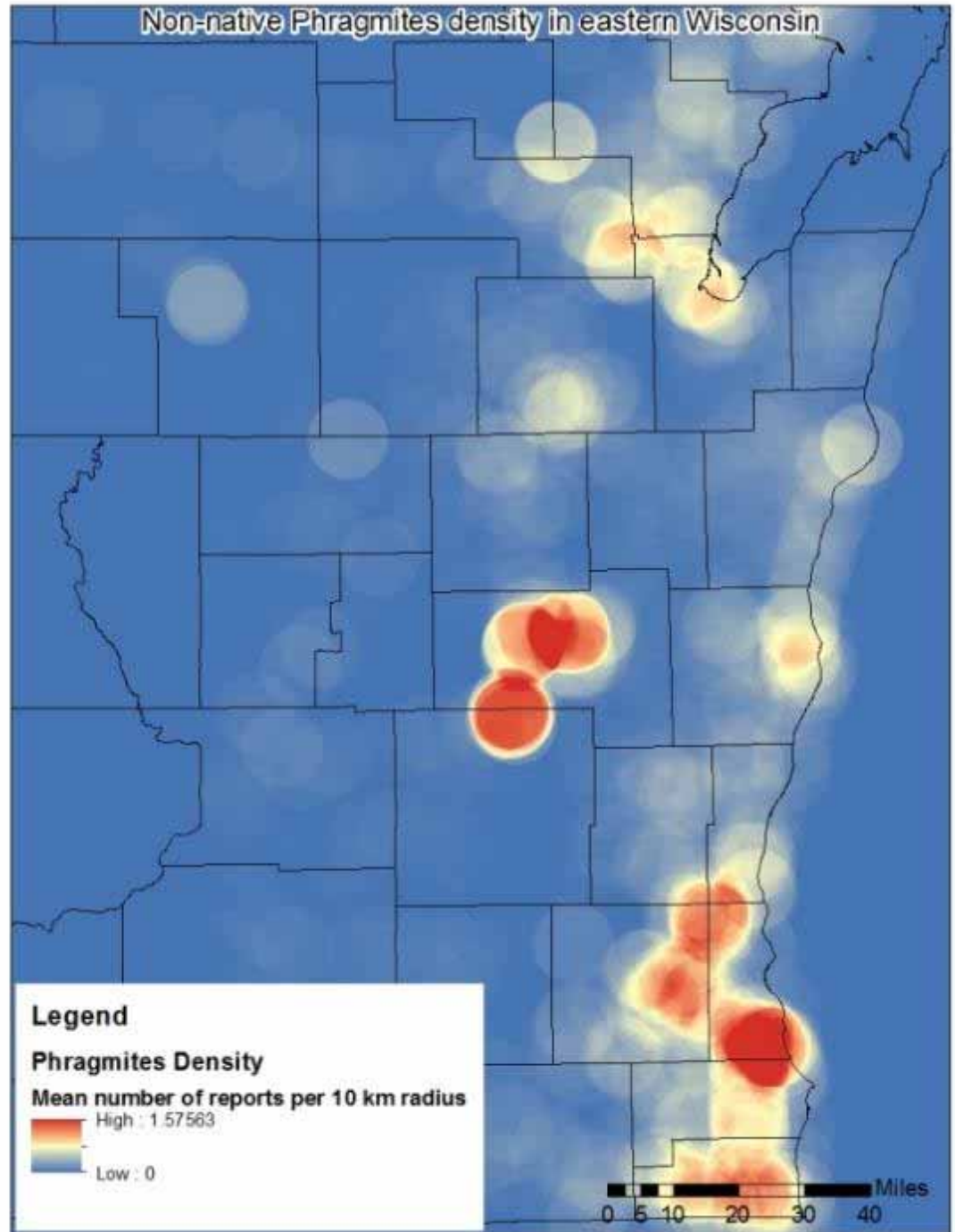
- Currently at 114,000 records
 - Multiple species within counties or defined areas
 - ALL species records, not just *Phragmites*
 - Can be used by everyone! GoogleEarth or ArcGIS compatible

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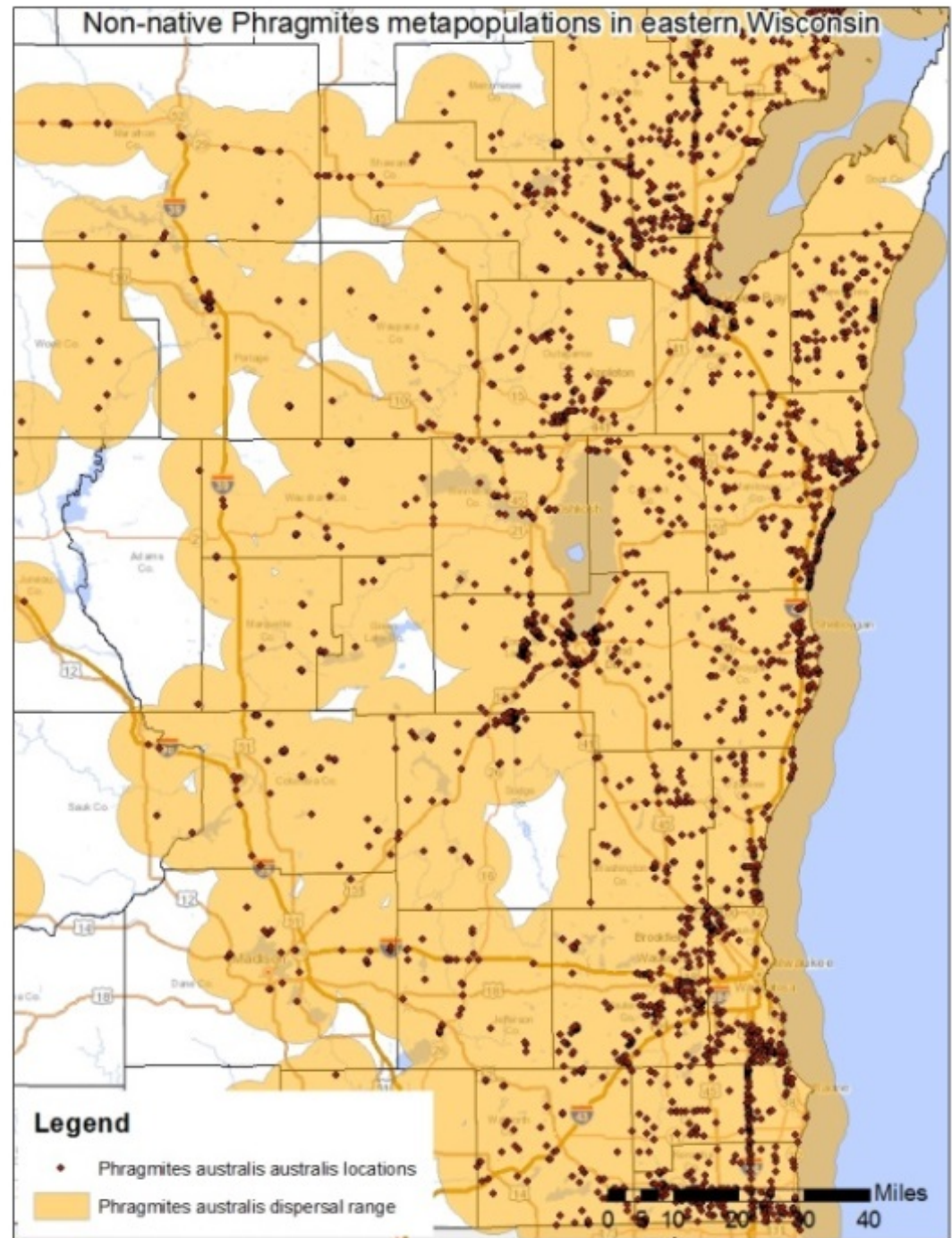
Mapping tool: Population density

- Areas with regional high density and few reports suggests additional reconnaissance & potential limitations for treating the landscape.



Mapping tool: Invasion fronts

- When combined with dispersal distance, potential survey areas can be defined.
- Isolated populations are high priority targets.



Mapping tool: Aerial imagery

- Using verified records from an search area, we used it to interpret aerial imagery and find suspected sites.
- Teal circles are *Phragmites* populations.



Strategic plan: Constraints

- Project had certain limitations from the Great Lakes Restoration Initiative (GLRI)
 - Operate within any counties that touch or are within the Great Lakes Basins.
 - Limited funding.
- WDNR NR40 Rule
 - State's Invasive Species Law
 - Prohibited areas provide mechanism to ensure control



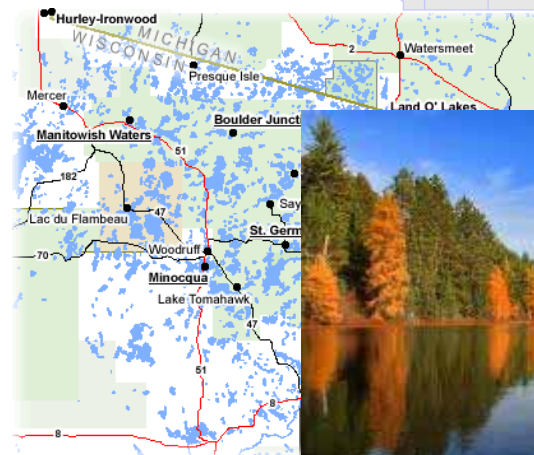
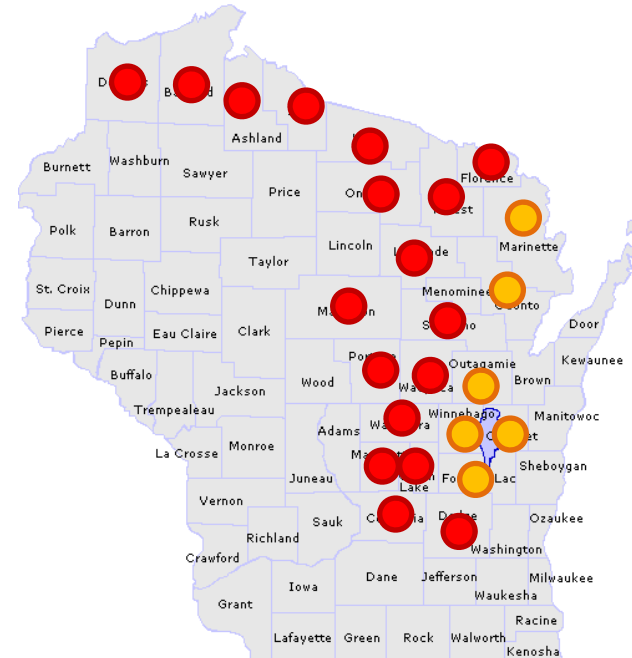
Great Lakes Basins



NR 40: Red Prohibited /
Orange is Restricted

Strategic plan: How to get the most from available funds?

- We targeted counties found along the northern to central areas of the Lake Michigan basin (2014). Then Lake Superior Basin (2015)
 - Red: 1st Priority
 - Orange: 2nd Priority
 - Push east as funding allows!
- Areas also targeted to
 - Protect valuable tourism in the northern lake country.
 - Prevent spread to western counties.



Preparation: Permits

- Natural Heritage Inventory Analysis
 - Are there any rare, threatened, or endangered species or sensitive ecosystems which may be impacted by herbicides? If so how to minimize impacts?
- NR107 Analysis & permit
 - Needed for all Aquatic Plant Management applications.
 - Helps protect the waters of the State.
 - Needs a public notice in newspapers.
- WDOT Analysis & permit
 - Needed when working on Interstates & State highways.

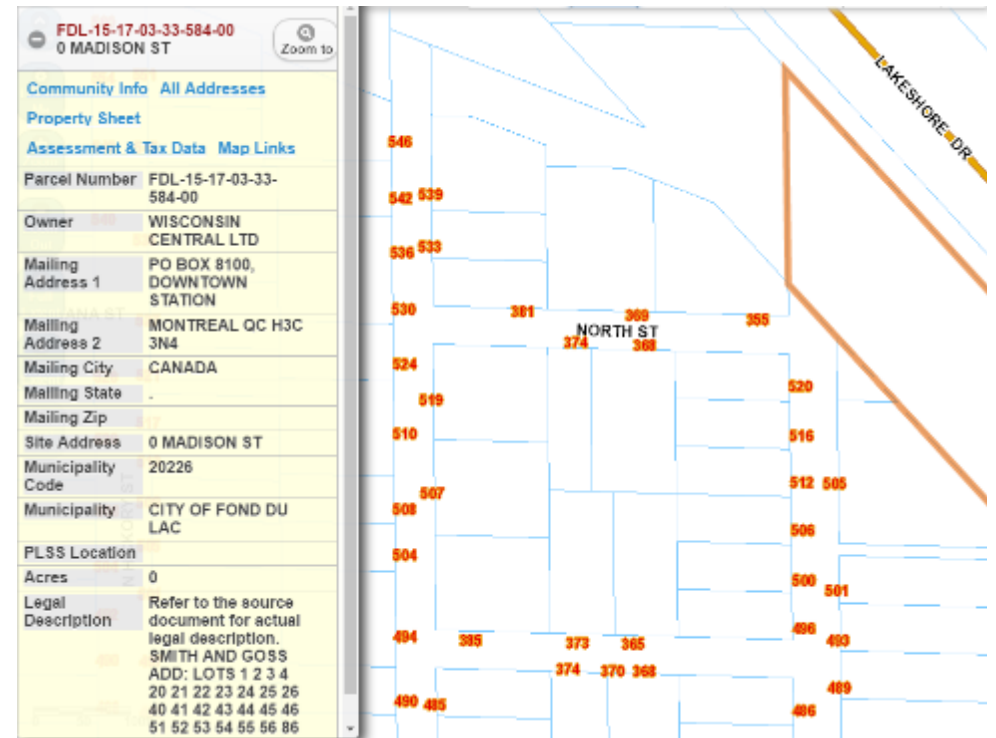
Preparing analyses takes longer than you think, start early!

Landowner Permission

- Landowner permission is vital for wetland invasive species control
- The vast majority of wetlands occur on private lands
- Searching through landowner databases is time consuming, so identify landowner when population is found.
- Contact landowners far in advance of herbicide application, at least 2 months.

Finding Landowners

- Once you have the coordinates, cross reference to get parcel numbers
- From the parcel numbers, search for the owners using the data from the local Land Information Office (LIO).
- Search for “Wisconsin Local Government Web Mapping Sites” from University of Wisconsin Sea Grant Institute.



ArcGIS can automate finding parcels!

Landowner Permission

- Important items to have in landowner packet
 - Informational letter. Give them a phone number to call if they have questions.
 - Any outreach materials. First contacts are critical.
 - Map of proposed treatment areas.
 - Aquatic chemical fact sheet (needed by NR107)
 - Prepaid return envelope.
 - Permission form.
 - Signature line
 - Owner's phone number
 - Additional instructions from landowner

Landowner Permission: Maps

- Map of proposed treatment site, ideally with landowner parcel lines and numbers.
- Coordinates of site, let them know exactly where you intend treatment or suspect a population
- Background aerial imagery
 - Close enough detail for them to pick out their property & their neighbors

Proposed treatment map example



Contractors: Hiring

- With any large project, you may need post a Request-for-Bids (RFB)
 - Post RFB with acreage & number of sites available per county.
 - Contractors will scale their prices based on these factors, and your funding may go further.
 - Provide them with maps if possible.
- Check references
- Require a project schedule & delivery date

Contractors: Assignments

- Provide contractors with:
 - Project list of all sites with landowner information & phone numbers.
 - County maps showing all sites.
 - Individual site maps.
 - Copies of contract, NR107 permit, & DOT permit.

Make it easy for them to find everything in one place. We gave a binder to each contractor with all info sorted by county, then site number.

Contractors: Tracking progress

- Contractors required to provide daily progress reports.
 - Which sites did they visit? 42, 1138, 1701, 2814
- Allows tracking progress and scheduling.
- Have the contractors take Geocoded photographs of each treatment site.

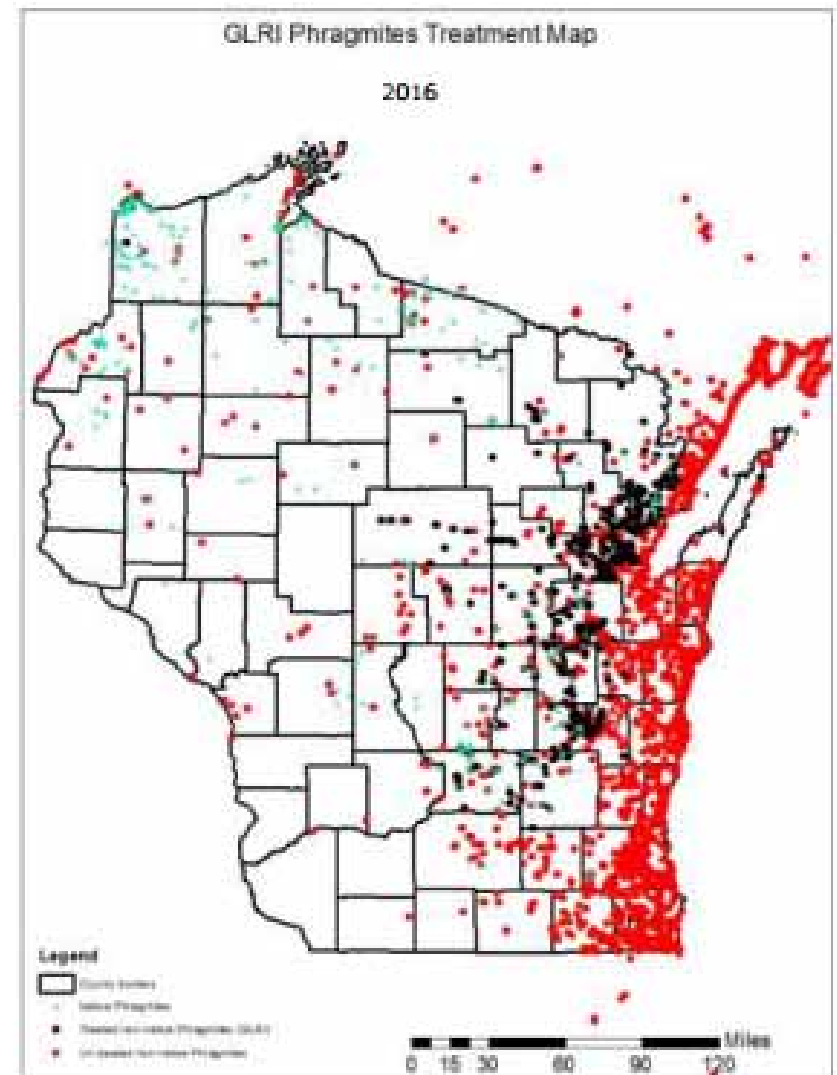
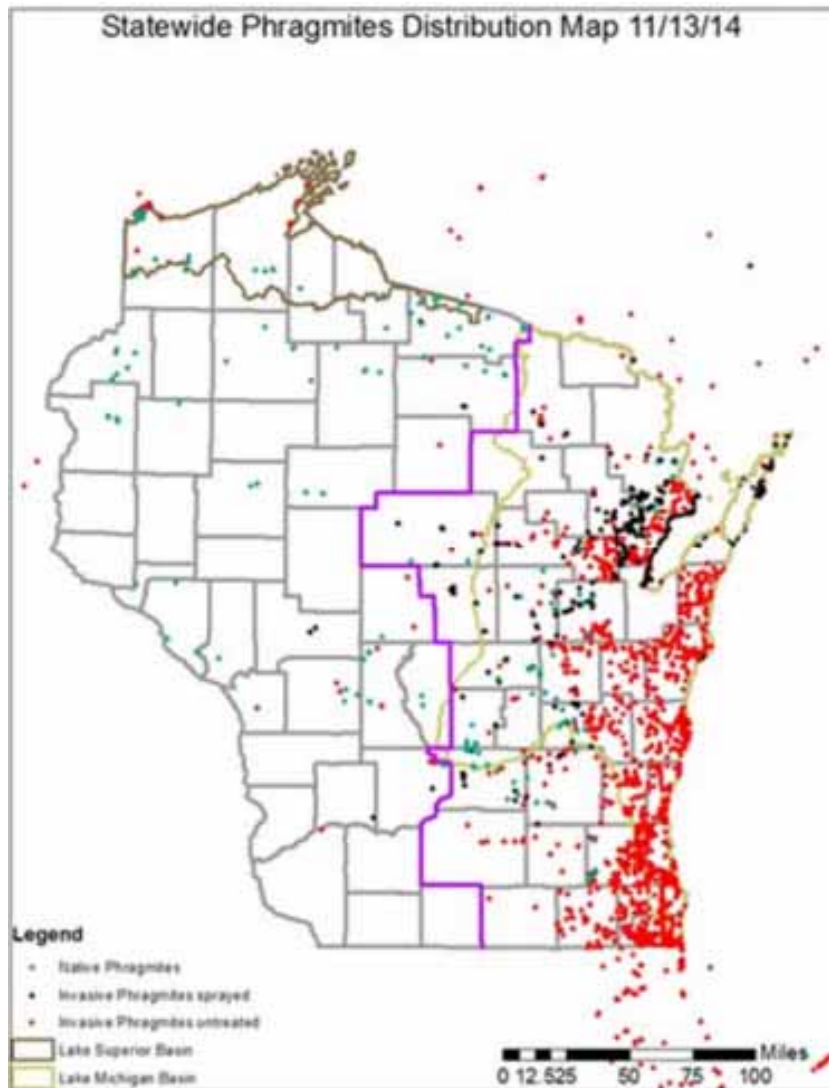
Contractors: Geocoded Photographs

- Contractors were required to take a photo at each treatment site.
- Provides great information for future monitoring.
- Also serves as a proof that contractors had visited the site, marking date, time, and coordinates.
- Geocoding (EXIF data) allows for the photographs to be placed on a map.
 - Google “Jeffrey Friedl Image Metadata Viewer” for a free tool.



Landmarks in the background help orient the picture.

Phragmites treatment progress 2014 to 2016



Green = Native Phragmites **Black** = Treated Phragmites **Red** = Untreated Phragmites

Re-sprouting *Phragmites*

- Landowners monitor sprayed sites?
- Need your help too...
- Contractors briefly surveyed sites for control
 - Some sites still had small re-sprouts that weren't immediately visible.
- Let Brock and Jason know if you are interested in monitoring.



Resprouts can be tiny and hide easily in the tall dead stems.

Resprouting Phragmites

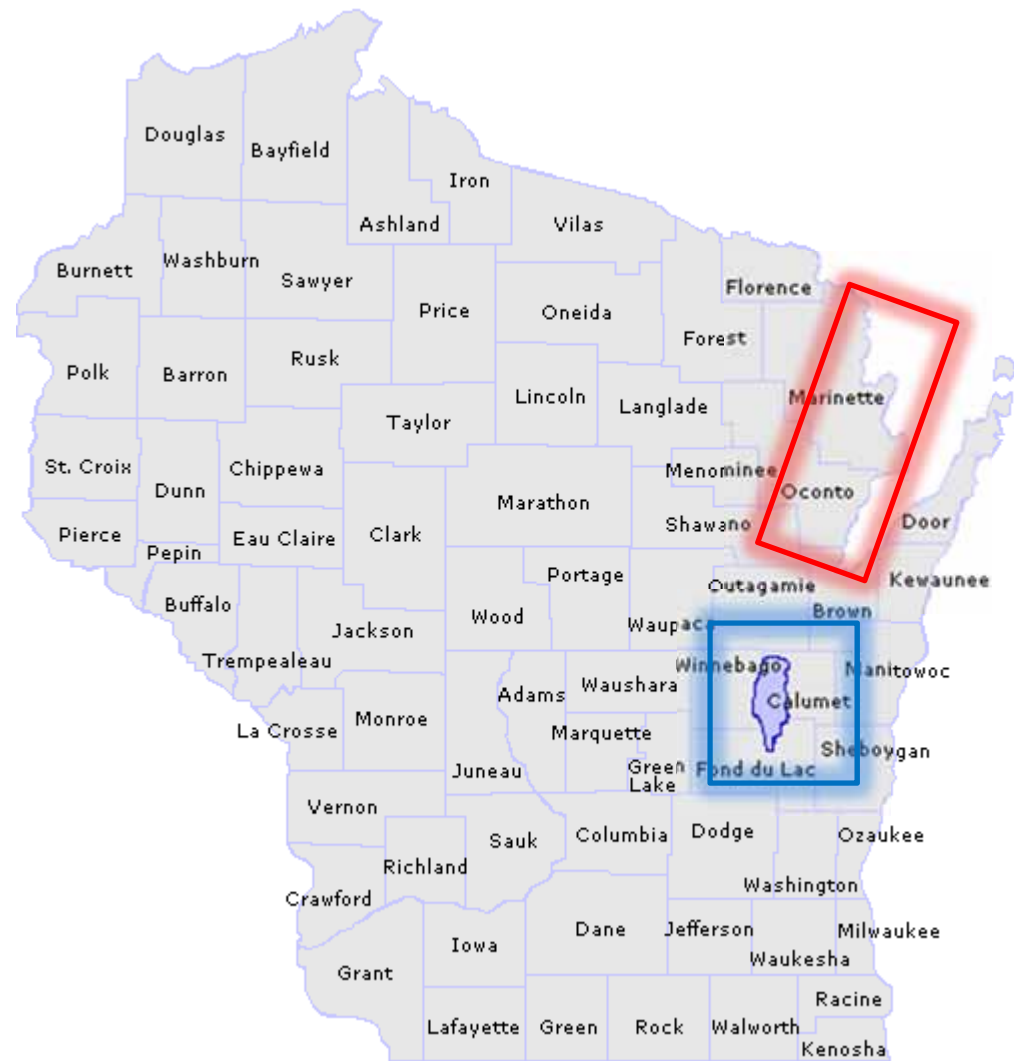


Resprouting Phragmites



Future *Phragmites* treatment areas

- Treat within **Marinette** and **Oconto** counties to compliment efforts from Michigan. May be more difficult due to older populations.
- Treat within areas near the **Lake Winnebago** drainage. Compliments Bay Lakes Regional Planning Commission treatment zone.
- Both plans fill in gaps.



Restoring treated Phragmites sites: “Nurture the Natives!”



Help us restore former
Phragmites sites into
diverse landscapes!

Restoring treated Phragmites sites: “Nurture the Natives”



Help us restore former
Phragmites sites into
diverse landscapes!

Nurture the Natives: Why, Where, & How?

- WDNR has 100s of eliminated Phrag sites to plant to:
 1. Keep invasives (same or different) from coming back
 2. Provide pollinator-friendly plant species
 3. Beautify sites! (Helps attract tourist dollars.)
- DNR-reduced Phragmites sites are mostly in ROWs
- Most are located in Great Lakes basin counties
- Sites require removing old Phragmites biomass (cut/burn)
- DNR offers FREE native plant seed in 2017 for replacing Phragmites where eliminated in all the GL counties!
- Contact Brock.Woods@wi.gov or Jason.Granberg@wi.gov

Nurture the Natives:

Site Prep & Seed Planting Details

- -Remove old dead Phragmites material (stems & litter)
- -Monitor site for any re-sprouting & report to DNR ASAP
- -Burn/bury cut material
- -Get FREE seed from DNR, or use local seed
- -Scatter seeds in appropriate locations & rake into top inch of soil. (Alternative: plant seed in flats, transplant in late summer.)

- -Optional: Monitor sites through fall & hand treat or cut any Phrag re-sprouts (DNR may do this if notified early enough of any re-sprouting!)
- -Report efforts and success/failure to improve the program!

Nurture the Natives: Preparing a site



Before biomass removal



After biomass removal

Nurture the Natives!:

Use “Healthy Lakes” Information!

- Check DNR’s “Healthy Lakes” web site (<http://healthylakeswi.com/best-practices/#350>) for how to plant a site. Scroll down to “350 Sq. Ft. Native Plantings”:
- This program was for restoring lake edge sites, but offers great , easy steps for planting diverse native stands in any location! Funding to help may be available for lake edge sites!

The image shows the cover of a guide titled "Healthy Lakes 350 ft² Native Planting Companion Guide". The logo features a tree, a fish, and a person. The text reads: "Healthy Lakes 350 ft² Native Planting Companion Guide". Below the title, it says "Improve wildlife habitat, natural beauty and privacy, and decrease runoff." The bottom half of the cover features a line drawing of a lakeshore with various native plants and a silhouette of a person walking.

The image shows the first page of the guide, titled "Step 1: Map it out. Where and what shape do you want your native planting?". It includes a "Healthy Lakes Tip" box and a list of requirements for the planting area.

Step 1: Map it out.
Where and what shape do you want your native planting?

Mark the area(s) you want your native plantings to be placed with spray paint, flagging, old garden hose, or stakes and twine. Leave the marking there a few days or weeks and try to envision what it will look like.

Keep in mind that the native plantings:

- Must total 350 contiguous square feet,
- Must be at least 10 feet wide in any direction,
- Must be adjacent to the lakeshore, and
- Can augment an existing area of vegetation.

Healthy Lakes Tip
Take advantage of areas you don't regularly use – places on the side of your yard or out of the way of foot traffic.

The orientation to the lakeshore is up to you. In other words, your native planting could be 35 feet parallel to the lakeshore and 10 feet landward, or 10 feet parallel to the lakeshore and 35 feet landward. Each of the 350 ft.² native planting options that follow showcases a different native garden shape to give you sense of the flexibility and possible look of the planting for your site over time.

Step 2: Determine sun exposure and soil type.
How much sun will your planting get, and how wet is your soil?

 FULL SUN At least 6 hours of direct, unfiltered sunshine daily	 PARTIAL SUN 4-6 hours of direct sunlight OR Filtered	 SHADE Less than 4 hours of direct sunlight and heavily shaded	 DRY-MEDIUM SOIL Drains well and has no standing water	 MOIST-WET SOIL Regularly damp with standing water in the spring
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Most of the options include tree native plant lists.

Nurture the Natives:

Helpful program details

- The program offers a variety of situations for planting natives species. A combination may be best:
- Most cleared Phragmites sites will have bare soil . The program offers visions of what created stands may look like:

CHOOSE 1 OPTION

Step 3: Select a planting option.

What do you want your native planting to do?
Choose the option that best fits your goals, sun exposure and soil type.

Lakeshore Edge	Bird/Butterfly	Bare Soil	Low-growing	Deer Resistant	Woodland
Restore Vegetation at the Water's Edge	Attract Birds and Butterflies	Stabilize Areas of Bare Dirt	Maintain a View of the Lake (Ideal for Access Corridor)	Deter Deer and Other Critter Browsing	Re-vegetate a Shady Area
Go to page 8	Go to page 10	Go to page 12	Go to page 14	Go to page 16	Go to page 18

Healthy Lakes Tip
In general, the more closely

Step 4: Order your plants and schedule a planting day.

Find a local native plant supplier or nursery.

Bare Soil

Stabilize areas of bare dirt.

FULL SUN PARTIAL SUN

L A K E

STIFF GOLDENROD
YELLOW CONEFLOWER
SWITCH GRASS
YELLOW CONEFLOWER
BLUE VERVAIN
LITTLE BLUESTEM
RED OSIER DOGWOOD
WILD RYE
INDIAN GRASS
LITTLE BLUESTEM
BLUE VERVAIN
JOE PYE WEED
SWITCH GRASS
RIVER BIRCH
WILD RYE
GOLDEN ALEXANDER
WILD BERGAMOT
INDIAN GRASS
NEW ENGLAND ASTER
STIFF GOLDENROD
NEW ENGLAND ASTER
FALSE SUNFLOWER
SWITCH GRASS
BLUE VERVAIN
INDIAN GRASS
BLUE STEM
BIRD BATH

30 ft
40 ft
16 ft

Nurture the Natives: Helpful program details:

The web site suggests appropriate native species for different habitat types.

It also offers detailed planting ideas for best success...though tailored to seedlings!

Golden Alexanders (*Zizia aurea*) 10/10/16 May-July 2-4 feet 6/spot x 2 spots = 12 total 84 WILDFLOWERS

MOIST-WET SOIL

	PLANT TYPE	FLOWER COLOR	BLOOM TIME	HEIGHT RANGE	TOTAL PLANTS
Woody	River birch (<i>Betula nigra</i>)	Pink/red	May-June	70-80 feet	1 tree
	Red river dogwood (<i>Cornus amomifera</i>)	White	June-Sept.	8-10 feet	4 shrubs
	Speckled alder (<i>Alnus incana</i>)	Reddish-brown	March-May	12-24 feet	1 shrub
1 TREE AND 4 SHRUBS					
Grasses	Little bluestem (<i>Schizachyrium scoparium</i>)	Green leaves	June-Aug.	3-6 feet	6/spot x 3 spots = 18 total
	Sand bracted sedge (<i>Carex muskdenbergii</i>)	Green leaves	July-Aug.	3-5 feet	6/spot x 3 spots = 18 total
	June grass (<i>Sorghastrum nutans</i>)	Green leaves	Aug.-Sept.	4-6 feet	6/spot x 3 spots = 18 total
	Prairie dropseed (<i>Panicum virgatum</i>)	Green leaves	May-Sept.	4-6 feet	6/spot x 3 spots = 18 total
72 GRASSES, RUSHES, & SEDGES					
Wildflowers	Blue vervain (<i>Verbena hastata</i>)	Blue	July-Sept.	3-5 feet	6/spot x 2 spots = 12 total
	Calico aster (<i>Aster lateriflorus</i>)	White	Aug.-Sept.	1-2 feet	6/spot x 3 spots = 18 total
	Grass-leaved goldenrod (<i>Euthamia graminifolia</i>)	Yellow	July-Aug.	1-3 feet	6/spot x 3 spots = 18 total
	Spotted Joe-pye-weed (<i>Eupatorium maculatum</i>)	Pink	July-Sept.	4-6 feet	6/spot x 2 spots = 12 total
	Marsh/red milkweed (<i>Asclepias incarnata</i>)	Red	June-Aug.	3-5 feet	6/spot x 2 spots = 12 total
	Golden Alexanders (<i>Zizia aurea</i>)	Yellow	May-July	2-4 feet	6/spot x 2 spots = 12 total
84 WILDFLOWERS					

13

Step 6: Plant your native garden.

The nursery where you purchase your material can provide detailed instructions for planting your native plants correctly. Here are a few general tips:

PREPARATION

- Plant within openings cut into erosion control fabric, or cover the area with shredded mulch and create small pockets within the mulch to plant the plugs, trees or shrubs.
- It is best to plant in spring or fall during cooler weather, but summer plantings can be successful if regularly watered.
- Use plugs and containerized plants.
- Keep plants watered and in the shade until planted.
- Soak thoroughly before removing from the container to plant. Tap the container upside down to remove the plant, and then gently pry the roots apart, and straighten and trim them, if necessary.

PLANTING DEPTH

- Dig a wide, shallow hole and make it a little shallower than the root ball so it rests about a half inch above the soil when planted. **Planting too deep can kill your precious native plants.**


WATERING

- Deep soaking is necessary to reach the root system. During the first year, water upland plants a minimum of one inch per week (unless there is rain). An empty tuna can set in the soil can help you gauge an inch of water. A good soaking (sprinkler for an hour) is better than frequent watering for briefer times. One of the great things about planting in the fall is that it rains frequently.

LABELING/STAKING

Healthy Lakes Tip

When planting large areas, a cordless drill equipped with a bulb auger can make the job easier and quicker. It works well to have one person do the drilling and others follow along and plant the plugs. Bulb augers can be purchased at your local nursery supply or home supply store. The cordless drill must be at least 12 volts. For those less inclined to go the power tool route, a hand trowel works well too.



Questions?

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Presentation Notes

- Non-native Phragmites is an invasive species that can be found throughout the eastern half of Wisconsin. This presentation will discuss topics such as statewide reconnaissance, mapping, strategic planning, developing partnerships at various governmental levels, permit coordination, and landowner interaction and outreach. We will also discuss contracting, aspects that lead to successful control, restoration paths, and the next steps in maintaining controlled populations. This presentation will be of interest to those considering large scale invasive plant control projects.