

Welcome to MiCorps Cooperative Lakes Monitoring Program's Annual Training.

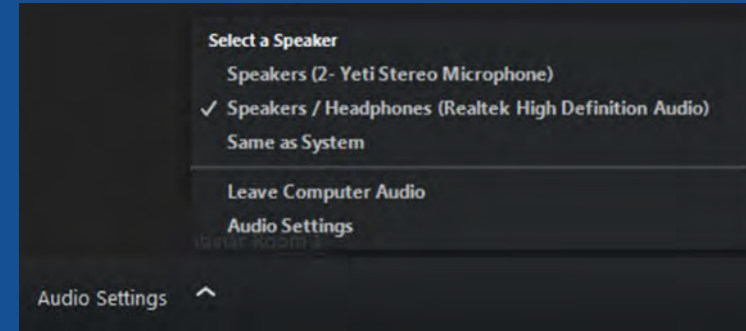
- For CLMP procedures and data forms please visit: micorps.net/lake-monitoring/clmp-documents/ and then click on the name of the parameter.

Today's Agenda:

9:00 AM – 9:15 AM	Welcome and CLMP Review
9:15 – 10:15 AM	Secchi Disk & Phosphorus
10:15 - 10:30 AM	BREAK
10:30 – 11:30 AM	Dissolved Oxygen & Temperature
11:30 AM – 1:00 PM	LUNCH BREAK
1:00 – 2:00 PM	Chlorophyll-a
2:00 – 3:00 PM	Score the Shore
3:00 – 3:15 PM	BREAK
3:15 PM – 4:30 PM	Exotic Aquatic Plant Watch

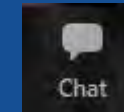
Getting Started

- Audio is through your computer speakers or headset: **You may not hear sound until training begins.**
- Use the **Audio Settings** option to do a sound check.
- During the webinar if you do not hear audio, make sure your sound is turned on then contact the **Help Desk**.



How to Ask Questions

1. Click on the Chat Icon to submit a question to the presenters.



Help Desk

Call the Distance Learning Help Desk (800) 500-1554 for technical support.



Exotic Aquatic Plant Watch

Erick Elgin and Jo Latimore

Training Agenda

9:00 AM – 9:15 AM	Welcome to CLMP
9:15 AM – 10:15 AM	Secchi Disk & Phosphorus
10:15 AM – 10:30 AM	BREAK
10:30 AM – 11:30 AM	Dissolved Oxygen & Temperature
11:30 AM – 1:00 PM	Lunch
1:00 PM – 2:00 PM	Chlorophyll-a
2:00 PM – 3:00 PM	Score the Shore
3:00 PM – 3:15 PM	BREAK
3:15 PM – 4:30 PM	Exotic Aquatic Plant Watch



Erick Elgin

Contact:

- 218-340-5731
- elgineri@msu.edu

MICHIGAN STATE
UNIVERSITY

Extension



Jo Latimore

Contact:

- 517-432-1491
- latimor1@msu.edu

MICHIGAN STATE

UNIVERSITY



An Underwater Forest

High diversity


Improves water quality

Valuable fish and wildlife habitat



AQUATIC INVASIVE PLANTS



- 
- Reduces diversity
 - Impacts fisheries
 - Reduces property values
 - Chemical control costs: \$200-2,000 per acre

Proactive Approach: Prevention



Mobile Boat Wash



Educational Materials and Resources



Clean Boats, Clean Waters Grants

**CLEAN BOATS
CLEAN WATERS**

About

HELP KEEP MICHIGAN'S WATER PURE



Prevention is not guaranteed

Popular lake closed due to infestation

Lake Manitou has been infested and closed to boating and fishing activities, possibly for years

Bud Fields Mar 1, 2007

Lake Manitou faces a costly solution for an invasive intruder

by Dave Kitchell Mar 4, 2007



"The sentiment around town is we should have just drained it and started over," Alex Long said of Lake Manitou Saturday at the Moose Lodge in Rochester.

MOST POPULAR

Articles

- Logan man caught half-mile from burglary residence



The next line of defense: Early Detection

Early Detection Goal: maximize the potential for eradication

The sooner you can detect the better



Lodge 2006 and Vander Zanden et al. 2010

Early Detection Programs

1. Focus on most probable invaders
2. Target high risk areas for new invasions
3. Require continuous monitoring



WATCH FOR THESE Aquatic Invaders!

HYDRILLA  <p>Leaves are whorled in groups of 4-8 Leaves are rough and have visible saw-toothed margins</p> <p><small>Photo: Robert D'Elia, Department of Biology, University of Michigan</small></p>	WATER CHESTNUT  <p>Green, floating leaves with sharply serrated edges Small, white, 4-petaled flowers</p> <p><small>Photo: LaShia J. Mahomed, University of Connecticut, BugBounty.org</small></p>
BRAZILIAN ELODEA  <p>Generally 4 leaves per whorl Submerged</p> <p><small>Photo: V. Morgan, FSU-CLR</small></p>	EUROPEAN FROGBIT  <p>Leathery, heart-shaped leaves Free-floating Leaf size: 1/2 - 2 1/4 in. across</p> <p><small>Photo: V. Morgan, FSU-CLR</small></p>
WATER HYACINTH  <p>Rounded, shiny green leaves with spongy stalks Lavender flowers with central yellow fleck Free-floating</p> <p><small>Photo: NDECO</small></p>	WATER SOLDIER  <p>Leaves are 1 1/2 in. long, sword-shaped, sharply serrated edges, bright green Leaves may be emergent or submerged</p> <p><small>Photo: Darrin Barber</small></p>
WATER LETTUCE  <p>Free-floating - forms a rosette of leaves that resembles an open head of lettuce Fuzzy light green leaves with long feathery roots</p> <p><small>Photo: NDECO</small></p>	PARROT FEATHER  <p>Spikes of stiff, leathery leaves grow in whorls of 4-6 Bright green upper stem emerges up to 1 foot above water</p> <p><small>Photo: NDECO</small></p>
EUROPEAN WATER CLOVER  <p>Resembles a four leaf clover Leaves are smooth and can be floating, submerged, or emergent Leaf size up to 1 in. across</p> <p><small>Photo: NDECO</small></p>	YELLOW FLOATING HEART  <p>Flowers are bright yellow with 5 petals Leaves are 2-6 in. across with scalloped edges</p> <p><small>Photo: NDECO</small></p>

These 8 species are legal for sale and possession. Please only report sightings outside of cultivation.

For more information and to report sightings, visit michigan.gov/invasives

Michigan's Early Detection Monitoring

MiCorps
Cooperative Lakes Monitoring Program

Exotic Aquatic Plant Watch

Visit MiCorps.net



Why get involved with the Exotic Aquatic Plant Watch?

Early Detection and Rapid Response Works!



The key to **Early Detection?**

Know the Exotics!

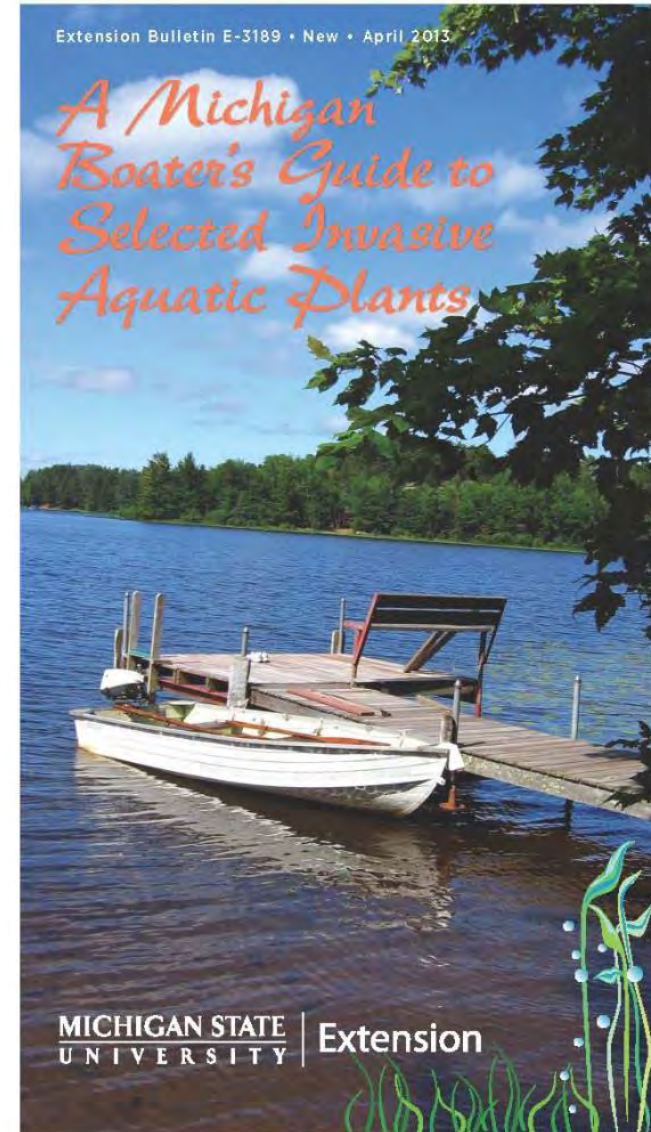
- Eurasian Watermilfoil
- Curly-leaf Pondweed
- Starry Stonewort
- Hydrilla
- European Frog-bit



Additional copies available for \$10
(or free download)
through the
MSU Extension Bookstore

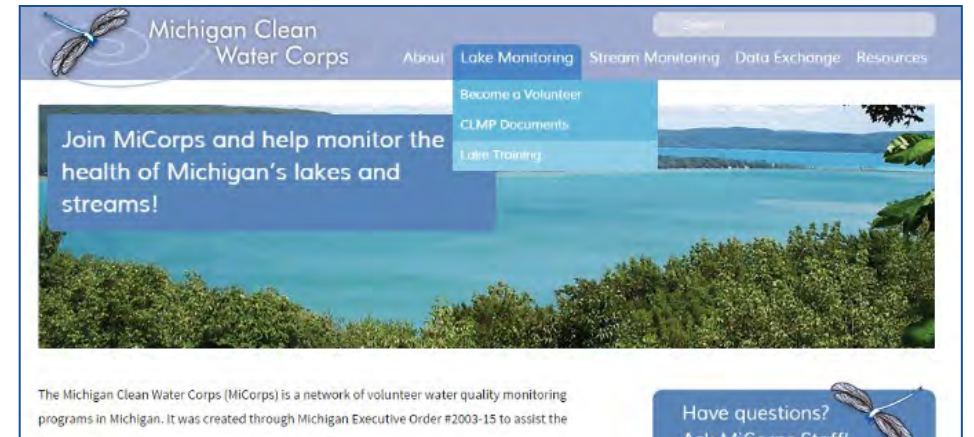
<http://shop.msu.edu>

Search for “E3189”



Video!

- Program description
- ID tips and tricks
- Sampling protocol
- On the “Lake Training” page on www.micorps.net, and our YouTube channel!



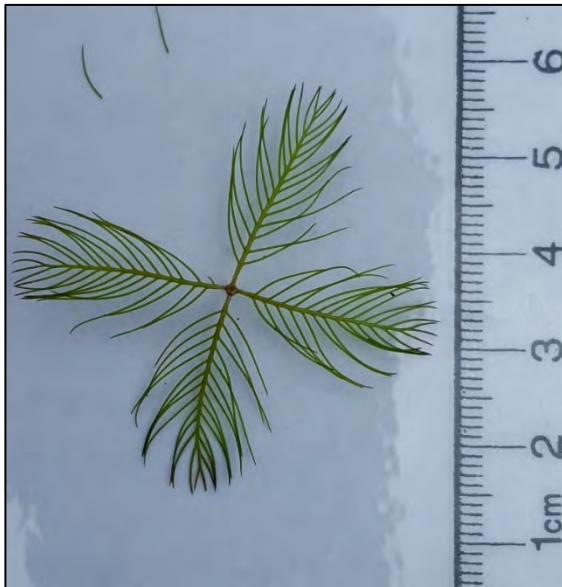


Let's Meet the Exotics!

Established Aquatic Invasive Plants in Michigan

Eurasian milfoil

Myriophyllum spicatum



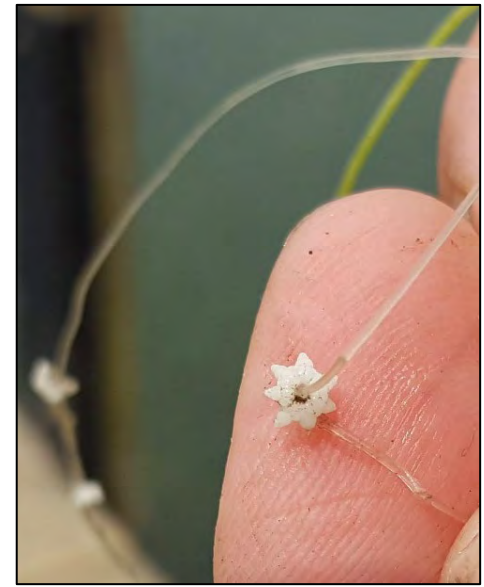
Curly-leaf pondweed

Potamogeton crispus



Starry stonewort

Nitellopsis obtusa



Not in Michigan and a recent invader

Hydrilla
Hydrilla verticillata

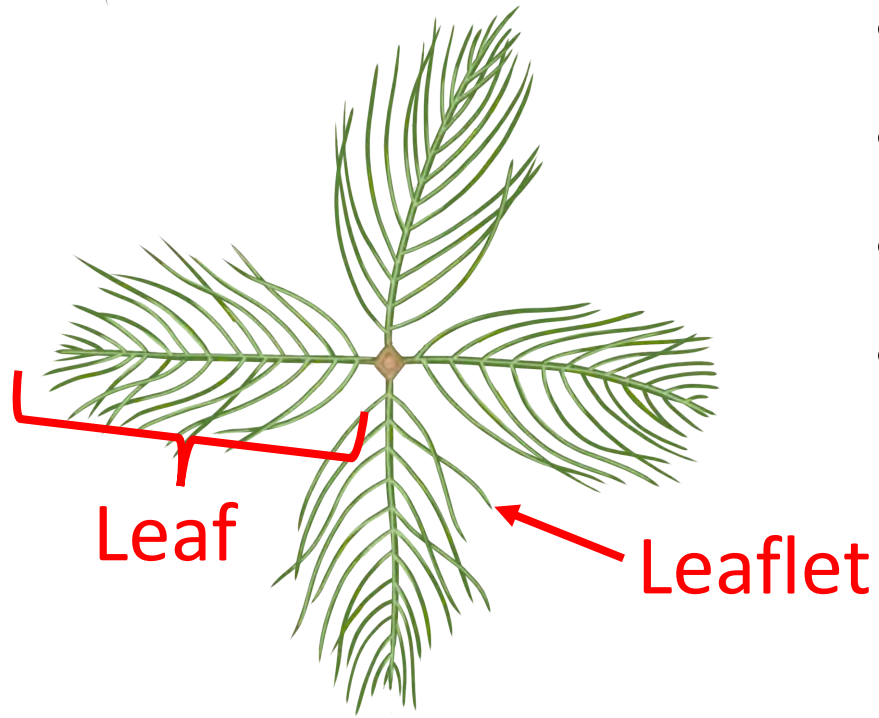
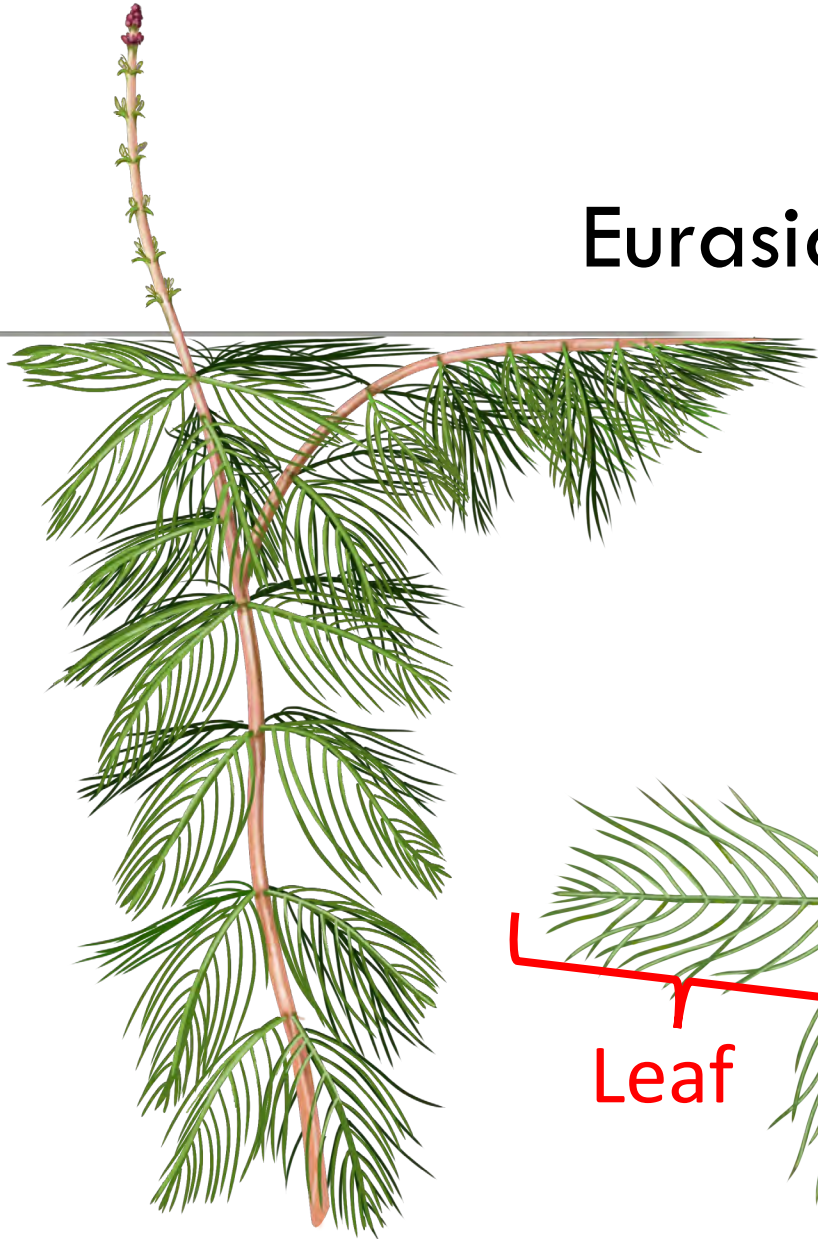


European Frog-bit
Hydrocharis morsus-ranae



EAPW Watch List Species

Eurasian Watermilfoil– *Myriophyllum spicatum*



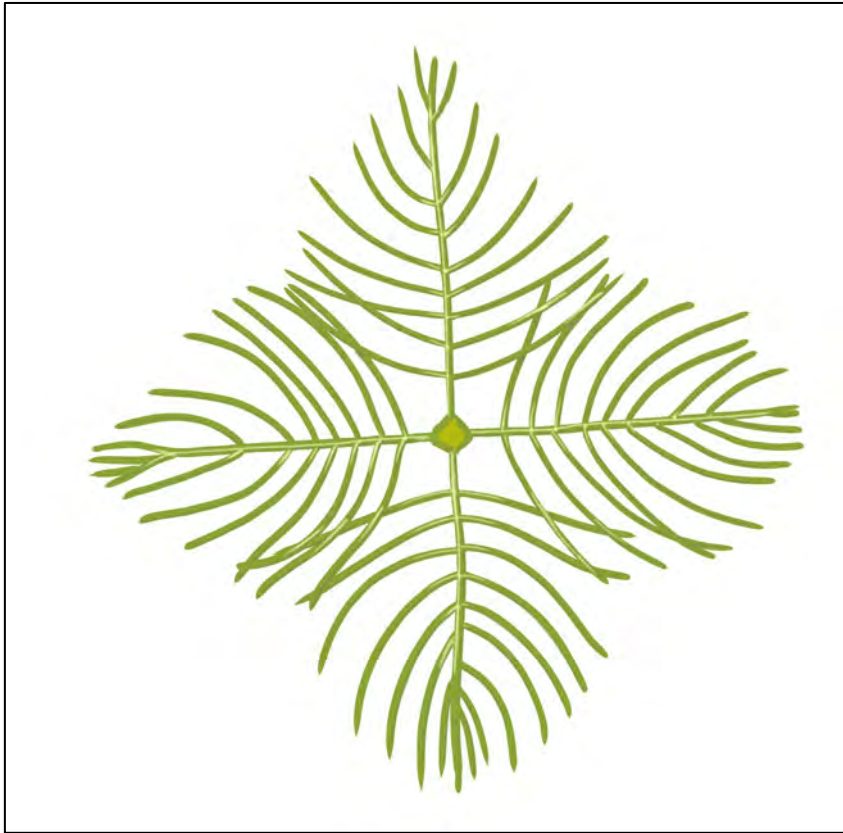
Key Characters:

- Feather-like leaves
- Whorled leaf arrangement
- Leaves with **12 – 21** pairs of leaflets
- Leaves limp out of water

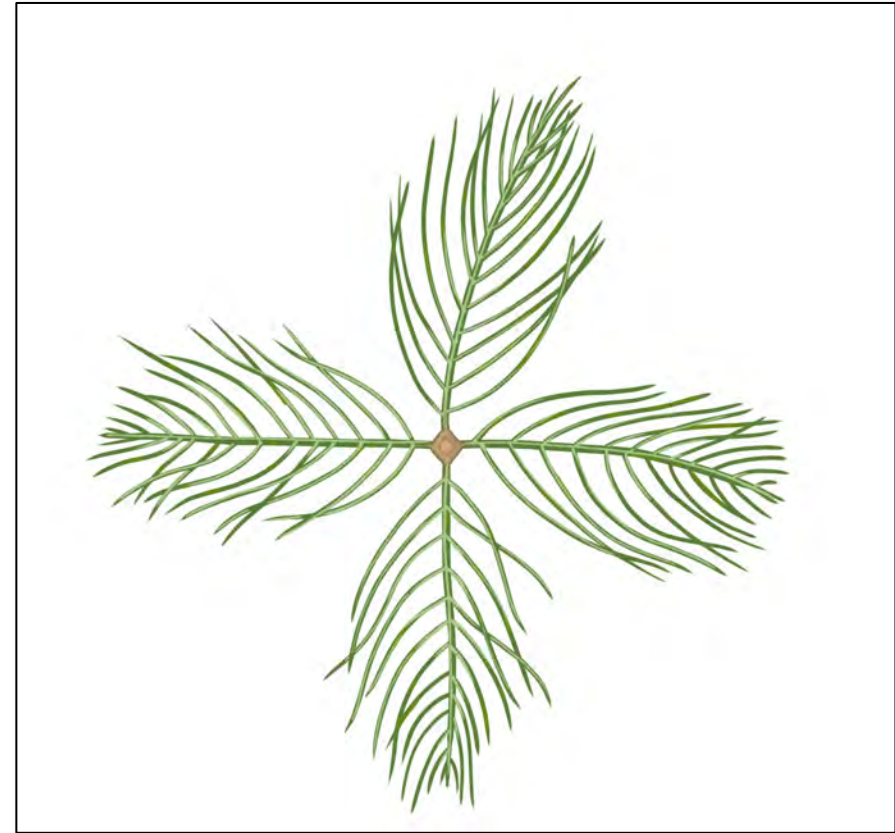
Photo by:
Richard Old
www.xidservices.com



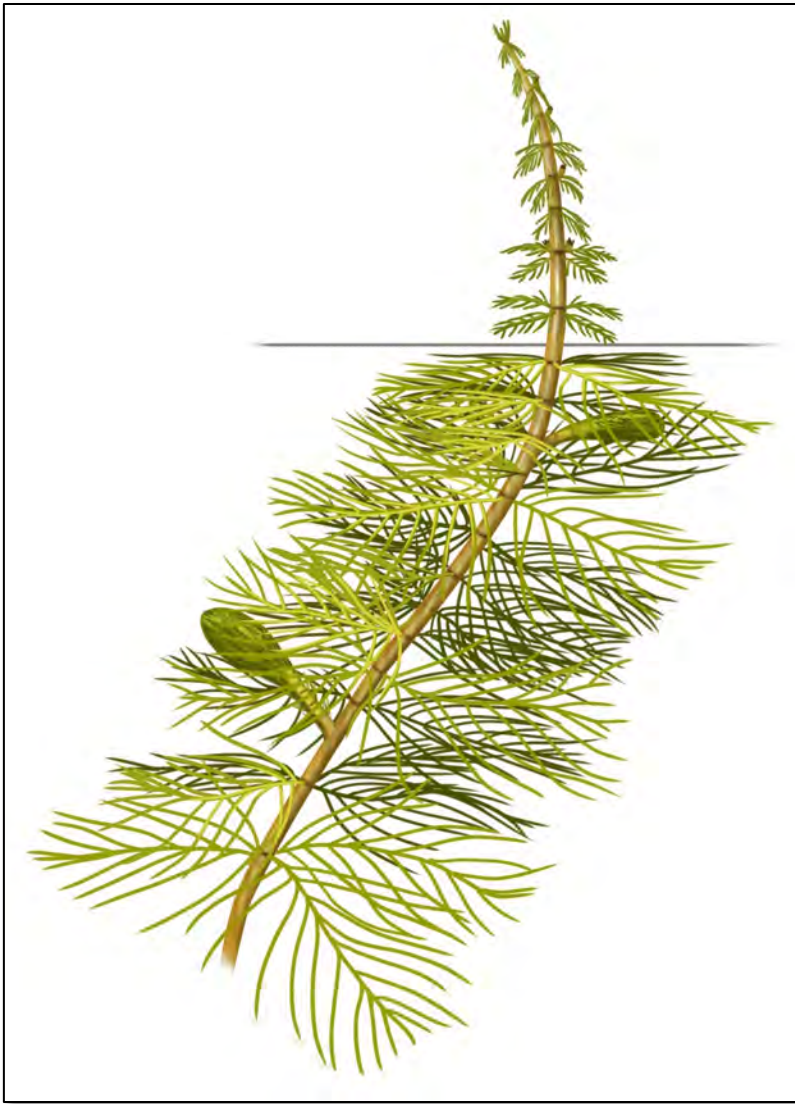
What about “Hybrid Milfoils”??



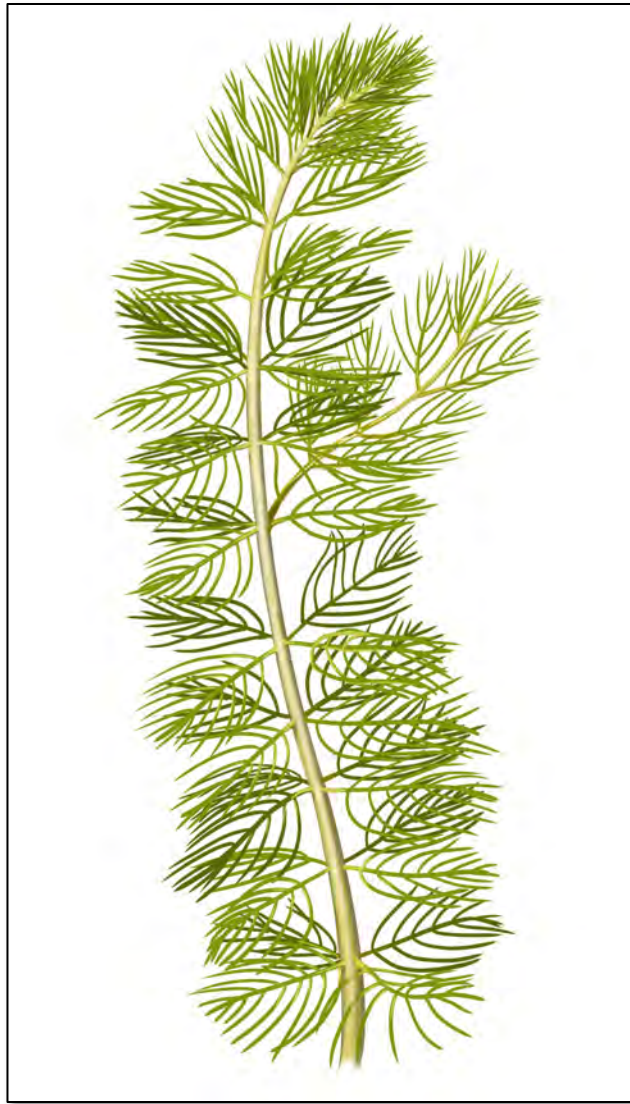
Native Northern Milfoil



Invasive Eurasian watermilfoil



Tight whorls



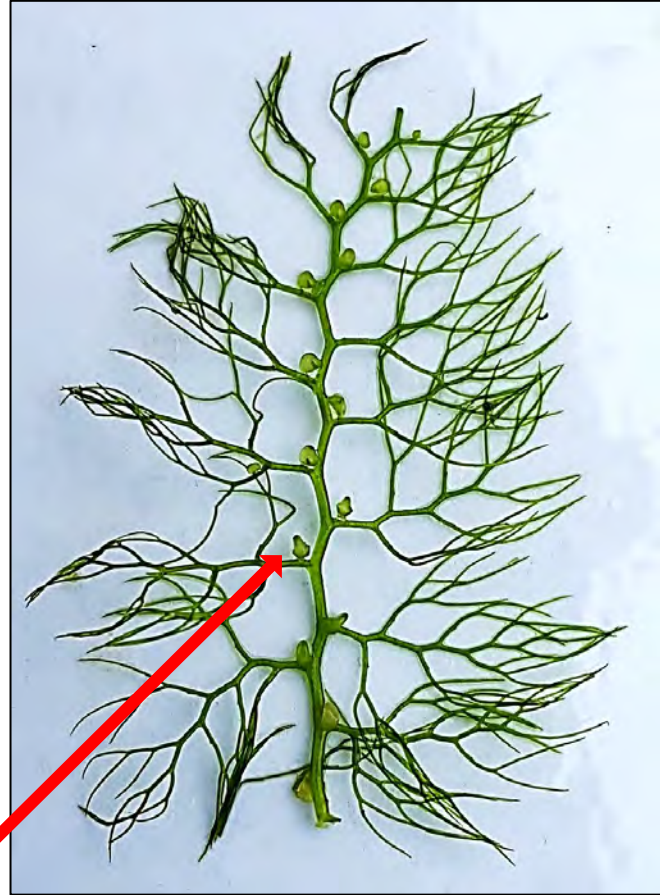
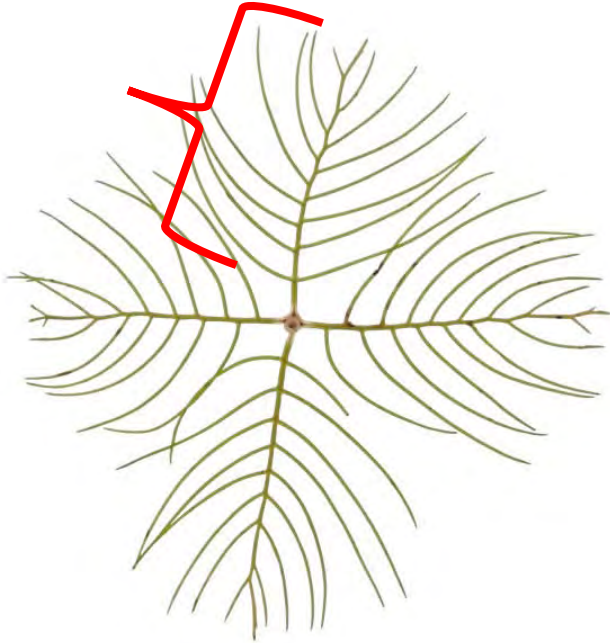
Under 12 leaflets



Some leaves not whorled

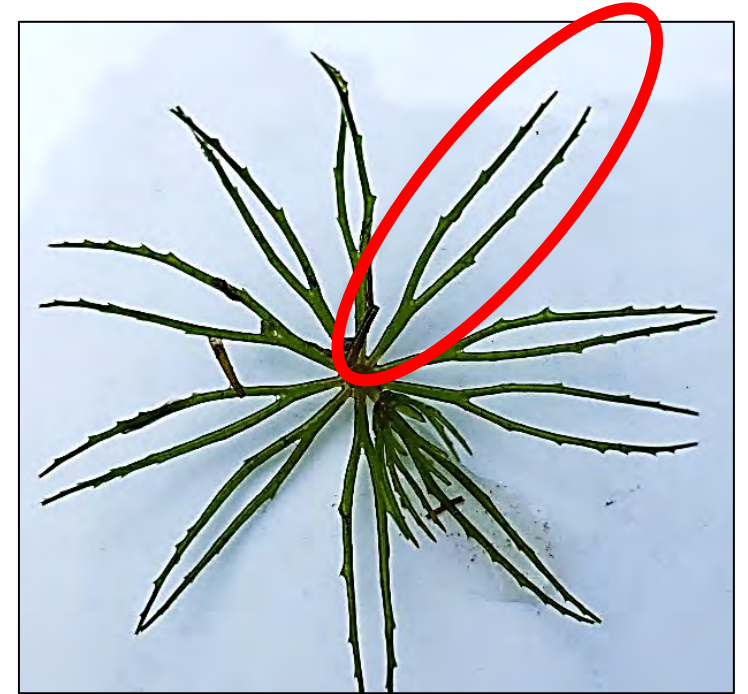
These are not Eurasian Watermilfoil

Only 8 leaflets



Bladders

Also, too much branching to look like a feather



Leaf looks like a wishbone

Which plant is Eurasian watermilfoil?

A



B



EAPW Watch List Species

Curly-leaf Pondweed – *Potamogeton crispus*



Key Characters:

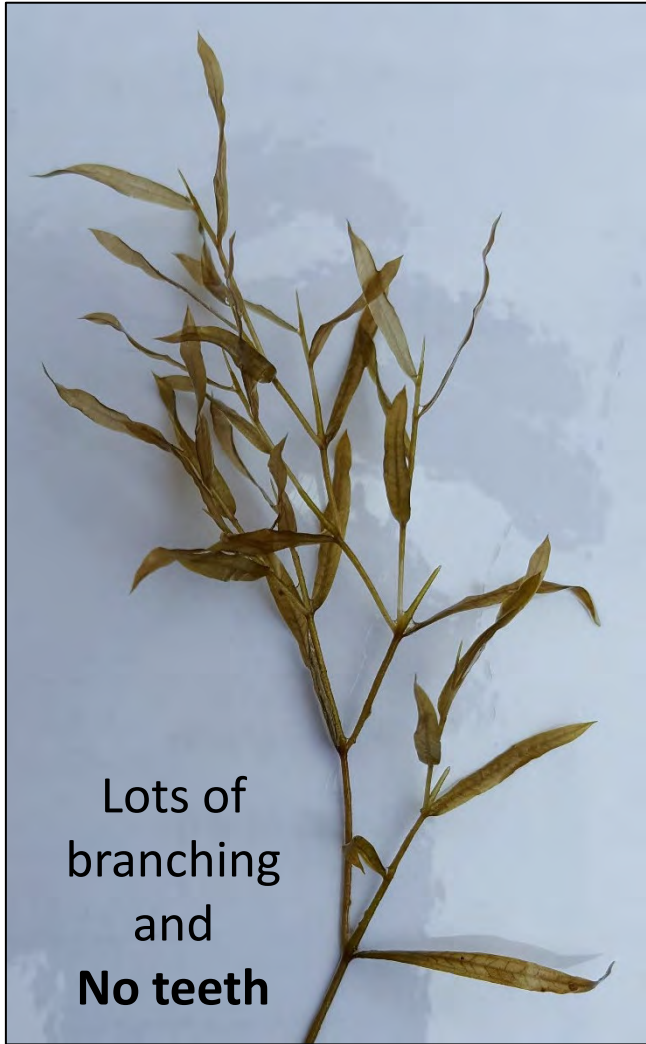
- Leaves 2-3 inches long and ¼ to 3/8 inch wide
- Prominent midvein
- Alternate leaf arrangement
- **Serrated leaf margin**



Turion



These are not Curly-leaf pondweed



No obvious midvein



Which plant is Curly-leaf Pondweed?

A



B

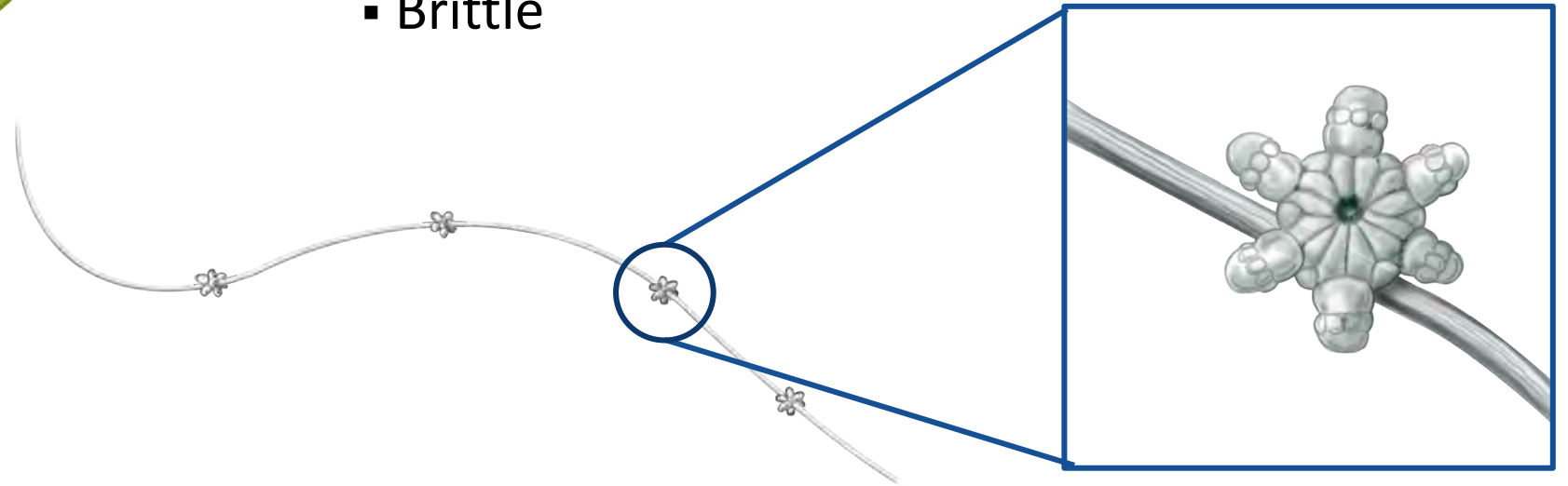


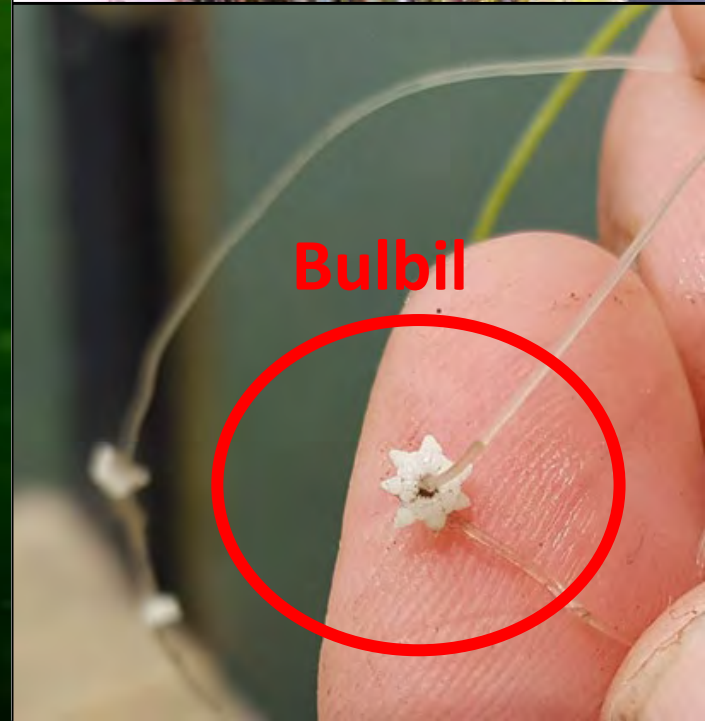
EAPW Watch List Species

Starry stonewort – *Nitellopsis obtusa*



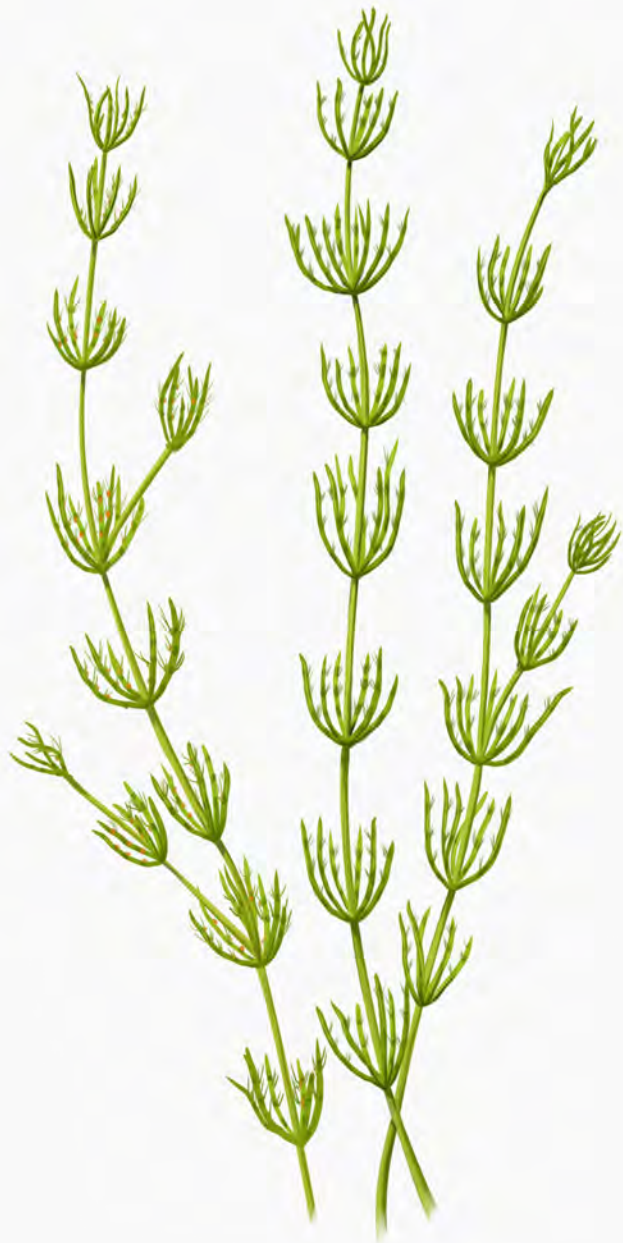
- Tiny star-shaped, tan or white **bulbils** produced on rhizoids (clear filaments)
- Long, **uneven** length branchlets
- Smooth stem
- Brittle





Starry Look-a-like: Native Muskgrass (*Chara*)

- Macroalgae
- **No star bulbils**
- “Smells skunky”
- **Shorter ‘branching’** (i.e. reach) of the plant compared to Starry
- Rough feel



STARRY LOOK-A-LIKE: NATIVE *NITELLA*

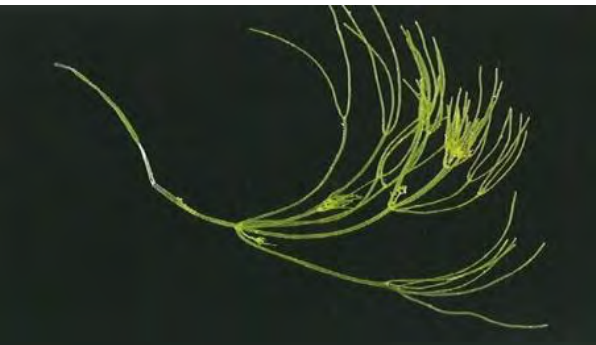
- Macroalgae
- **No star bulbils**
- **Even branching**
- Shorter 'branching' (i.e. reach) of the plant compared to Starry



Nitella furcata stem section. J. M. DiTOMASO



Nitella clavata stem section. J. M. DiTOMASO



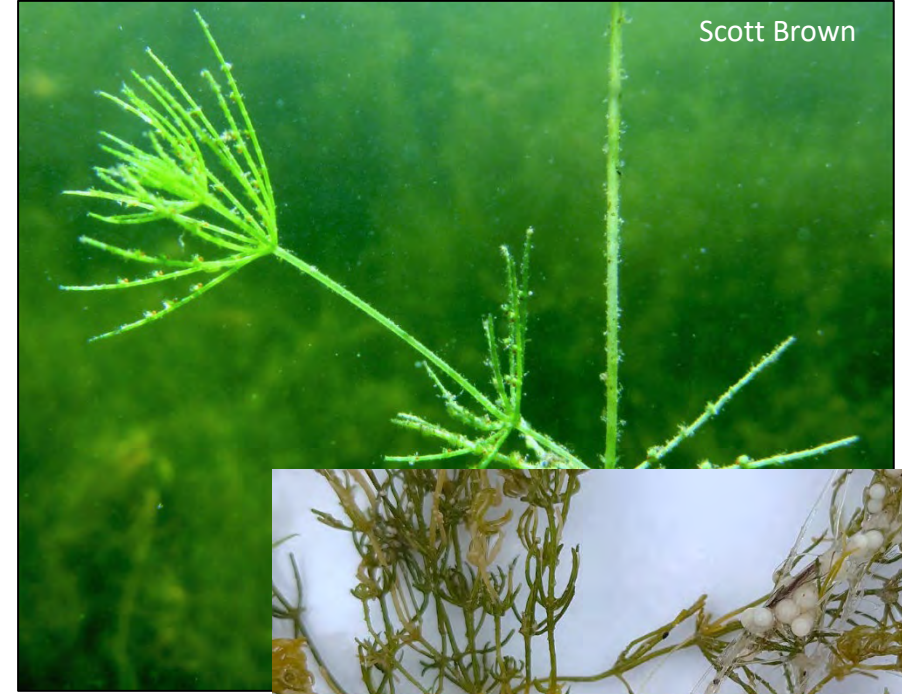
Nitella mucronata

Which one is Starry stonewort?

A



B



EAPW Watch List Species

Hydrilla (*Hydrilla verticillate*)

- **Whorls of 4-8 leaves** around the stem
- **Serrated** leaf edge
- **Teeth are also produced underneath the leaf**, along the midvein

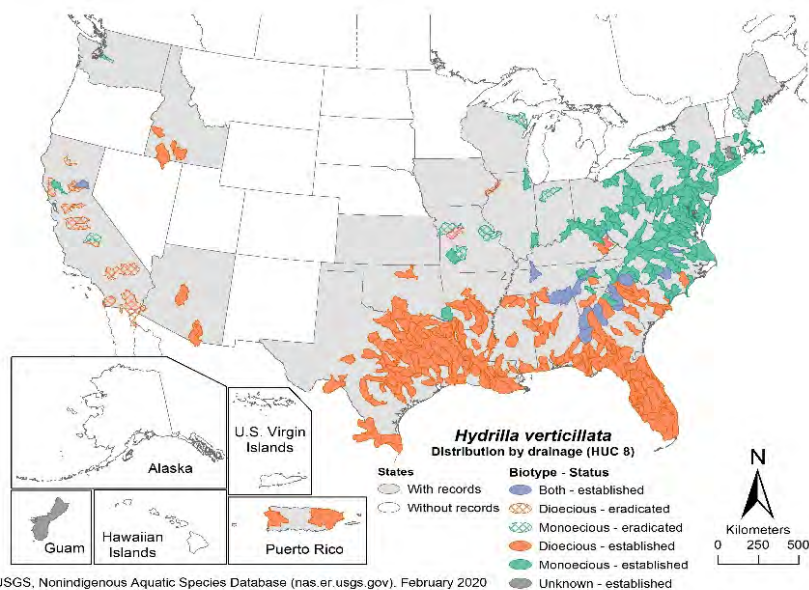


Illustration by Bruce Kerr



Four or more leaves at each node.

Leaves margins clearly toothed and spines on mid vein.

Hydrilla (exotic)



Elodea (native)



Three leaves at each node.

Leaves margins not clearly toothed and no spines on mid vein.

THIS IS NOT HYDRILLA



Only 3 leaves per whorl



Which plant is Hydrilla?

A

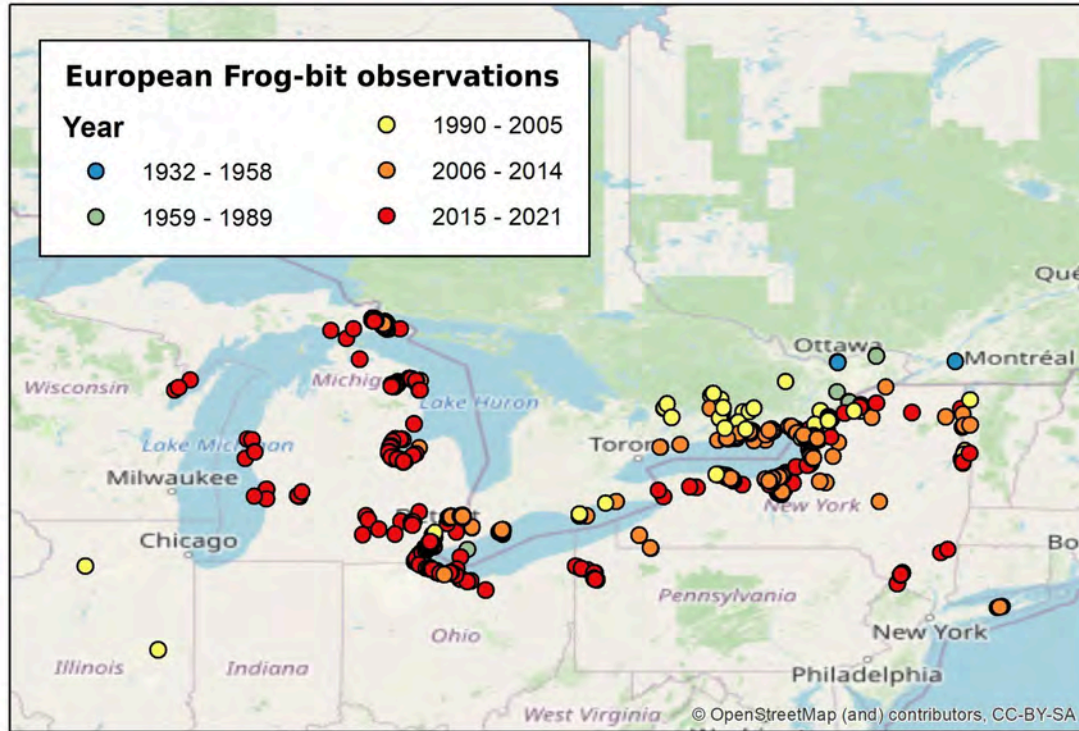


B



New Threat: European Frog-bit

Hydrocharis morsus-ranae



- First discovered in 1996 in Southeast Michigan
- Currently predominantly in Great Lakes wetlands
- High threat to our inland waters

EAPW Watch List Species: European Frog-bit

Hydrocharis morsus-ranae

- **Free-floating rosette**, roots hang below
- Small, heart-shaped leaves (**2-3"**)
- Small, white flower, 3 petals

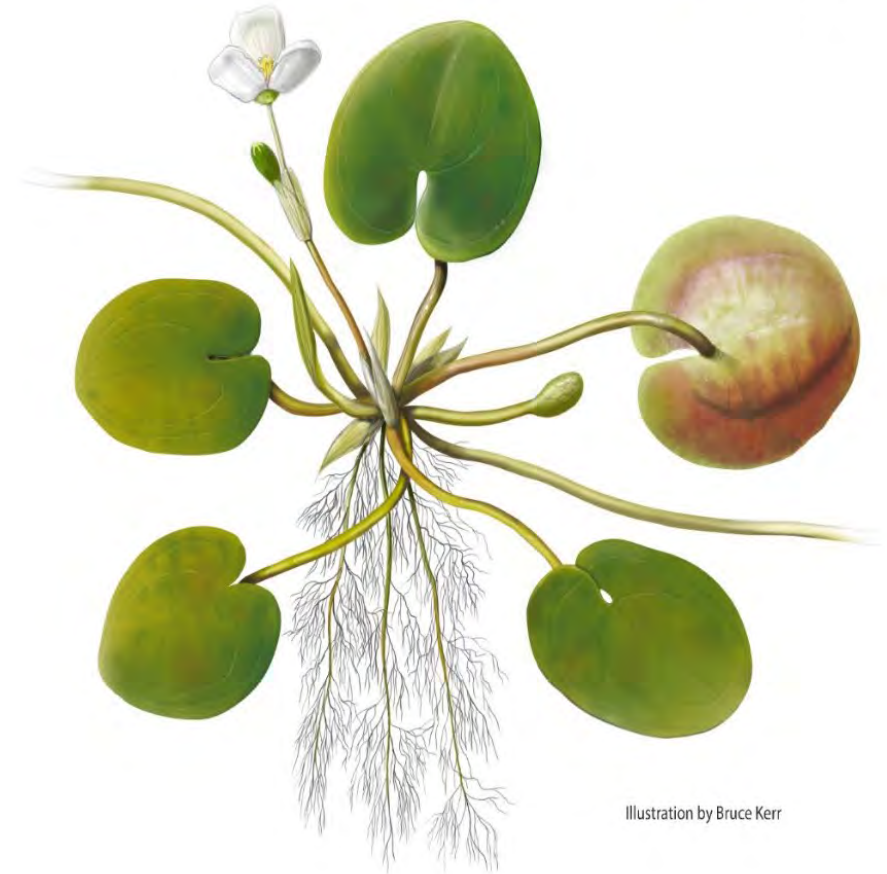
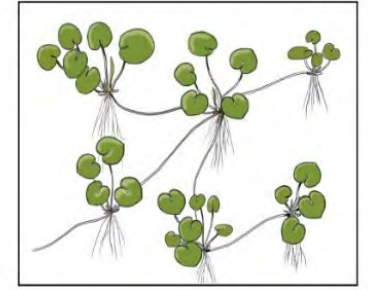


Illustration by Bruce Kerr



European Frog-bit Identification

Narrow-leaf cattail

European Frog-bit

White Water Lily

Which plant is European frog-bit?

A



B



WATCH FOR THESE Aquatic Invaders!

HYDRILLA



Leaves are whorled in groups of 4-8
Leaves are rough and have visible saw-toothed margins

Photo: Robert Vazão, Dominican UP, Bugwood.org

WATER CHESTNUT



Green, floating leaves with sharply serrated edges
Small, white 4-petaled flowers

Photo: Leslie J. Maharoff, University of Connecticut, Bugwood.org

BRAZILIAN ELODEA



Generally 4 leaves per whorl
Submerged

Photo: V. Morgan, PSU-CLF

EUROPEAN FROGBIT



Leathery, heart-shaped leaves
Free-floating
Leaf size: 1/2 - 2 1/4 in. across

Photo: V. Morgan, PSU-CLF

WATER HYACINTH



Rounded, shiny green leaves with spongy stalks
Lavender flowers with central yellow fleck
Free-floating

Photo: MDNR

WATER SOLDIER



Leaves are 16 in. long, sword-shaped, sharply serrated edges, bright green
Leaves may be emergent or submerged

Photo: B. B. B. B. B.

WATER LETTUCE



Free-floating – forms a rosette of leaves that resembles an open head of lettuce
Fuzzy light green leaves with long feathery roots

Photo: MDEQ

PARROT FEATHER



Spikes of stiff, feathery leaves grow in whorls of 4-6
Bright green upper stem emerges up to 1 foot above water

Photo: MDEQ

EUROPEAN WATER CLOVER



Resembles a four leaf clover
Leaves are smooth and can be floating, submerged, or emergent
Leaf size up to 1 in. across

Photo: MDNR

YELLOW FLOATING HEART



Flowers are bright yellow with 5 petals
Leaves are 2-6 in. across with scalloped edges

Photo: MDNR

These 3 species are legal for sale and possession. Please only report sightings outside of cultivation.

For more information and to report sightings, visit michigan.gov/invasives

MICHIGAN WATCH LIST SPECIES

- Never detected in the wild or
- Limited distribution
- High potential for negative impacts
- Early detection and response

EAPW Protocol: Mapping Exotic Plants in Your Lake

Exotic Watch Packet

All paperwork needed can be found at

www.micorps.net under Lakes > CLMP Documents

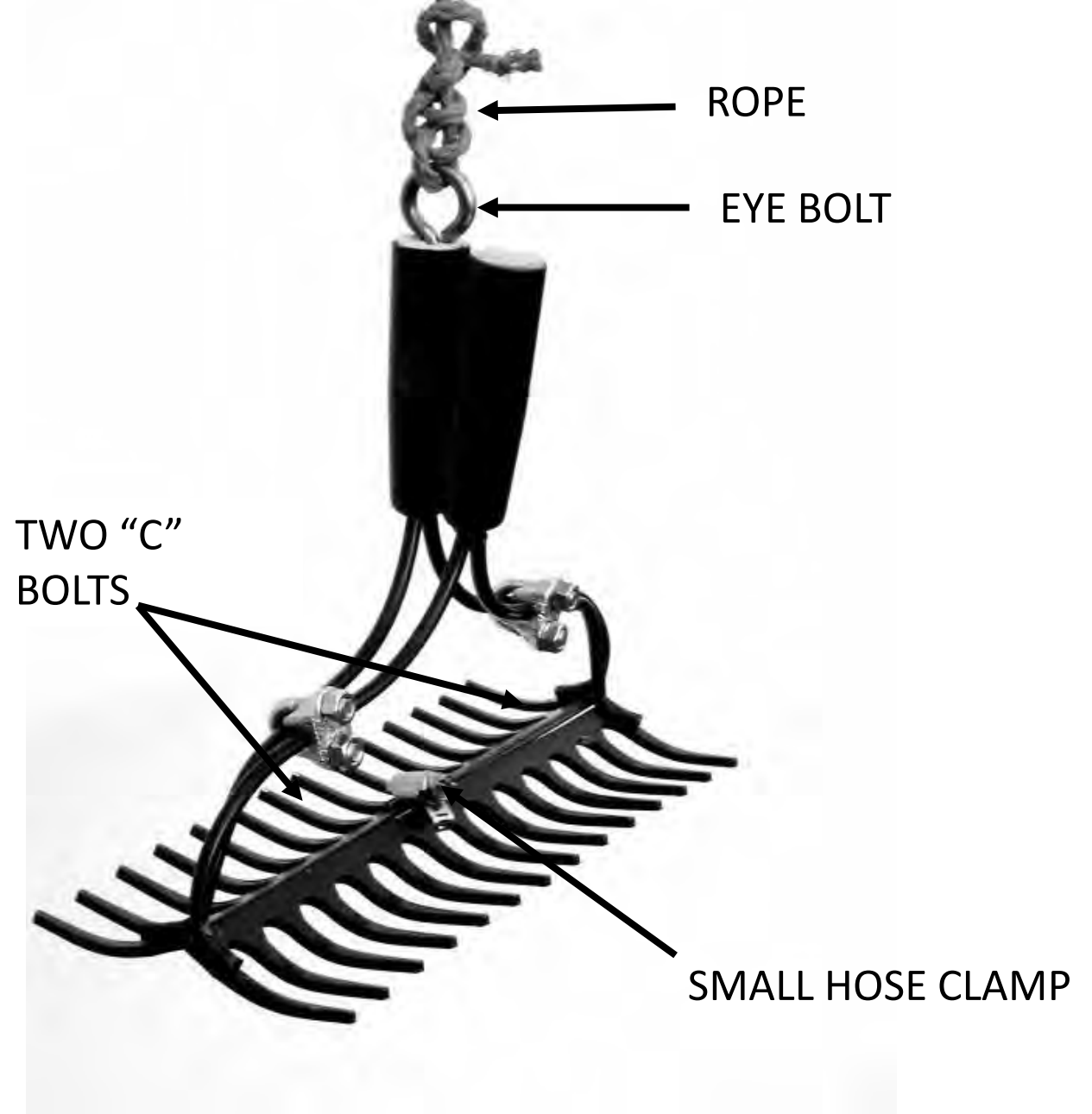
- Data Form
- Rake building instructions
- A Michigan Boater's Guide to Selected Aquatic Invasive Plants
- Plant photography card (to laminate)
- Michigan's Aquatic Invasive Plant Watch List
- EAPW brochure

Additional Equipment Checklist

- Boating safety equipment and anchor
- Plant ID guide(s)
- Depth map of lake
- GPS unit (optional)
- Camera
- Weighted sounding line
- Rake and retrieving line
- Zip-lock bags, and marker for labeling
- Trash bags
- Clipboard
 - Data forms/note paper
 - Monitoring procedures
- Pencil or indelible ink pen

AQUATIC PLANT SAMPLING RAKE

Cut the handles off of two garden rakes and bolt the rakes back to back with two “C” bolts. Use a small hose clamp between the rake tines to prevent side to side slipping. Drill a hole in the remaining wooden handle core and twist into the hole a moderately large eye bolt. The rope should be about 20 feet long. File off any sharp edges. Wear gloves when using the rake to protect the hands from cuts.



When to sample?

- Mid-June to August
 - Northern lakes can begin later
- Additional surveys can be done later in the summer

June

Sunday	Monday	Tuesday	Wednesday
30	31	1	
6	7	8	
13	14	15	16
20	21	22	23
Father's Day			
27	28	29	30

July

Sunday	Monday	Tuesday	Wednesday
27	28	29	
4	5	6	
Independence Day	Independence Day Holiday		
11	12	13	
18	19	20	
25	26	27	

August

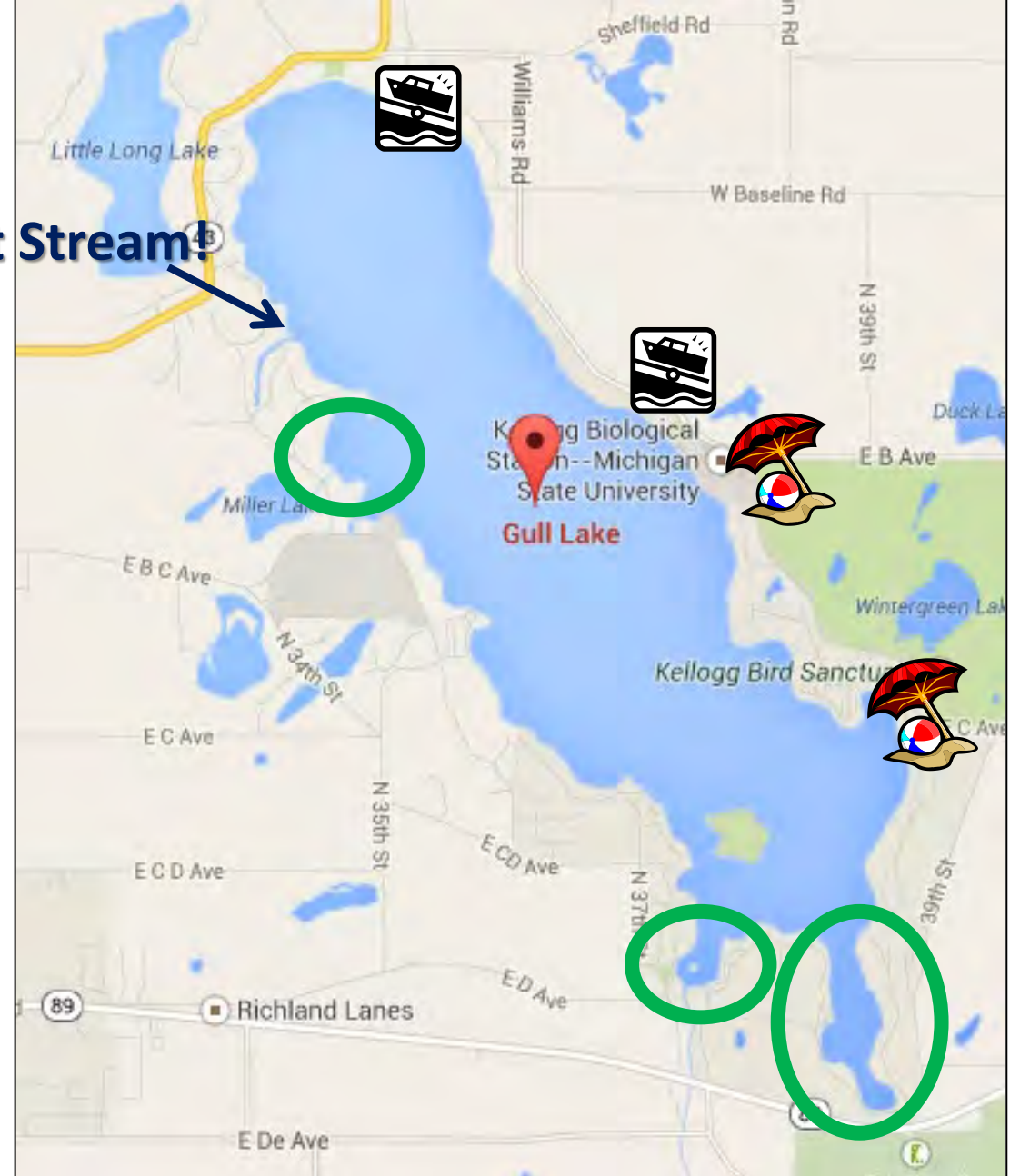
Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31	1	2	3	4

Where to sample?

How do I start?

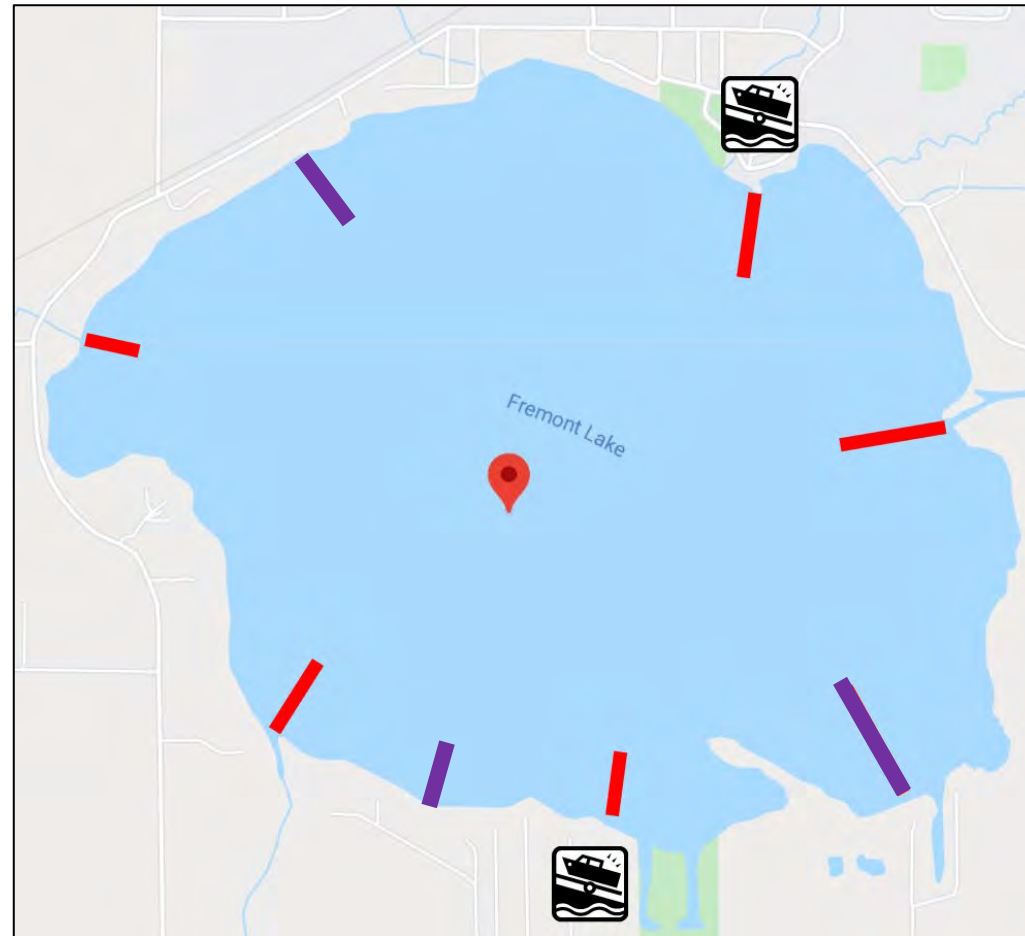
1. Get a map!
2. Locate:
 - 1) Boat Ramps
 - 2) Public Beaches / Parks
 - 3) Attached inlets (streams, creeks, canals)
 - 4) Quiet Bays and Coves
 - 5) In between transects

Inlet Stream!



Focus on high-risk areas

REMEMBER: Even some data is useful; it's ok if you can't cover the entire lake



How to sample

- How to sample a transect?
- How many tosses?
- How far do I throw it?
- How do I dispose of the plants?

Sample different depths along a
transect
(line perpendicular to the shore)





EXOTIC AQUATIC PLANT WATCH



Lake Name: _____ County: _____

Township: _____

Lake Sampling Site (Field ID) Number: _____

Volunteer Monitor Name(s): _____

Date(s) of Survey : _____ Time: _____

Comments (unusual conditions, recent weed treatments, etc.): _____

.....

❖ If *no exotic aquatic plants were found* during the survey, check here: Use Page 2 to document the locations you surveyed on your lake.



❖ If exotic plants were found, check the species found below:

- | | |
|--|---|
| <input type="checkbox"/> Eurasian milfoil | <input type="checkbox"/> Starry Stonewort |
| <input type="checkbox"/> Curly-leaf pondweed | <input type="checkbox"/> European frog-bit (*new) |
| <input type="checkbox"/> Hydrilla | <input type="checkbox"/> Other _____ |

Include the following items in your report:

- This completed data form (Pages 1 and 2)
- Lake map with numbered site locations
- Any photographs taken of collected plants

**Send your complete report to the CLMP contact listed in the project procedures.
Keep a copy of the report for your records.**

Use this table to document the results of your survey. You may also create your own table; just be sure to include a copy in your Survey Report.



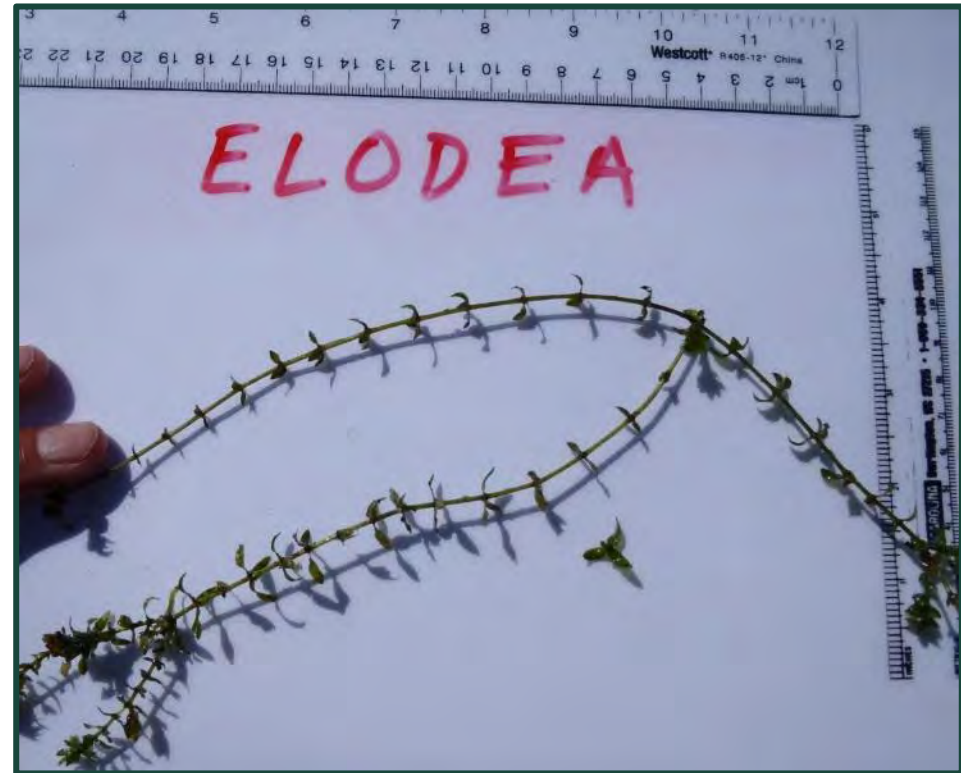
Site / Transect # (match to sites on your map)	Latitude (or location description)	Longitude	List any exotics found in this transect (or "None")	Any photos taken at this site?	Notes
1	43°40'16.34N	89 15'48.24W	CLP, EWM	Yes (2)	Sparse
2	43°40'21.38N	89 15'47.02W	None	No	

Plant Identification Photography

- **Required Photographs:**
 - At minimum, **one** representative photo of each invasive species found in your lake
- Label photos
- Make sure the photos are clear
 - ***Need to show identifying characters***
- Great for ID verification and documentation



Use photography card



Volunteer photos:

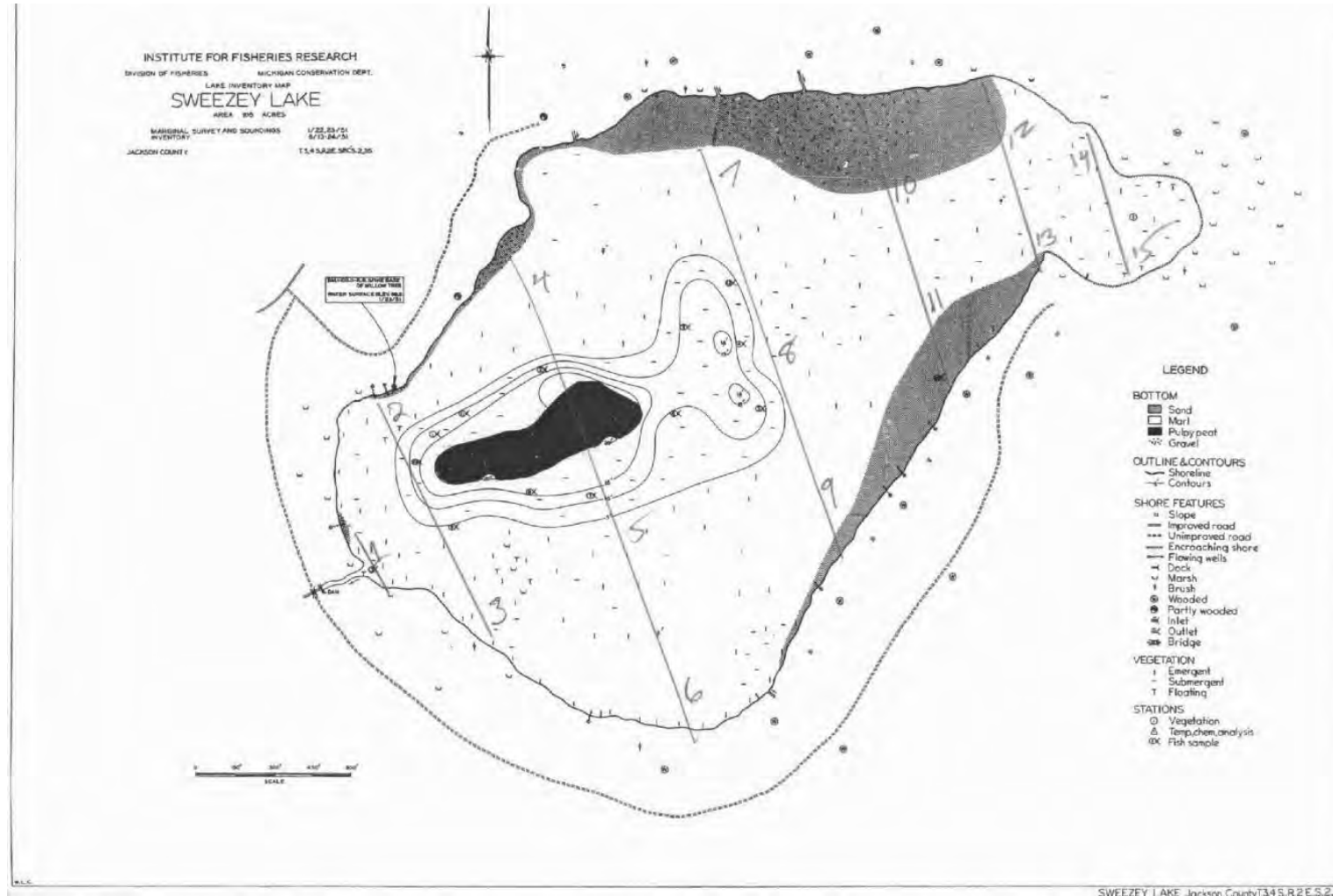
(Left) Lotus & Maceday Lake in Oakland Co.

(Top) Bristol Lake in Barry Co.

No ruler? A hand will do!



Mapping Options: By Hand



Mapping Options: Google Maps

Google maps Search Maps [Show search options](#)
Find businesses, addresses and places of interest.

[Get Directions](#) [My Maps](#) [RSS](#) [View in Google Earth](#) [Print](#) [Send](#) [Link](#)

Traffic More... Map Satellite Terrain

By [Julie](#) - 2 Collaborators
[Rate this map](#) - [Write a comment](#)

- [Log cabin dock](#)
4823240 / 0541753 CLPW (lots) June 25
- [Green Point Bayou](#)
4823479/ 0542093 EWMF June 25, CLPW July 3 8
- [Public Beach](#)
4823051 / 0540658 EWMF & CLPW June 25; EWM
- [East Lagoon Inlet](#)
N43.33.791 W086.28.133 CLPW abundant July 3
- [East End Marsh](#)
43.33.761 / 86.28.069 CLPW (lots) July 3
- [Southeast end marsh](#)
43.33.723 / 86.28.077 CLPW abundant July 3
- [Public Boat Access](#)
- [Bauers Dock](#)
4822942 / 0542070 CLPW July 16
- [Airplane Dock](#)
4822883 / 0541821 CLPW July 16; Aug. 13 N43.33
- [Larmores Bay](#)
4822778 / 0541608 CLPW & EWMF July 16; Aug.
- [Point of Excess east side](#)
4823343 / 0542232 CLPW & EWMF July 19
- [Merrywood](#)
4822736/ 0541147 CLPW July 21; Aug. 13 N43.33.
- [Robinwood](#)
4823019/ 0540660 EWMF abundant Aug. 13

[Report a problem](#)

1000 ft
200 m

©2010 Google - Map data ©2010 Google - [Terms of Use](#) [Report a problem](#)

Mapping Options: Google Earth



Submitting Your Data

1. Make copies of your data for your records.
2. Enter your data into the online MiCorps Data Exchange (www.micorps.net) by October 31.
3. Send complete report to MiCorps
 - a. Completed data form (pages 1 and 2)
 - b. Lake map with numbered locations
 - c. Any photographs

Value of Teamwork









- Many volunteers struggle when attempting EAPW alone
- Volunteer teams are more likely to complete sampling, submit data and continue in the program
- **Fun = The more the merrier!**



Materials to help recruit volunteers



WATCH FOR THESE Aquatic Invaders!

<p>HYDRILLA</p>  <p>Leaves are whorled in groups of 4-8 Leaves are rough and have visible saw-toothed margins</p> <p><small>Photo: Robert Tinkley, Cooperative Lakes Monitoring Program</small></p>	<p>WATER CHESTNUT</p>  <p>Green, floating leaves with sharply serrated edges Small, white 4-petaled flowers</p> <p><small>Photo: Leslie J. Mahanoff, University of Connecticut, Storrs, CT</small></p>
<p>BRAZILIAN ELODEA</p>  <p>Generally 4 leaves per whorl Submerged</p> <p><small>Photo: V. Moberg, PISCUS</small></p>	<p>EUROPEAN FROGBIT</p>  <p>Leathery, heart-shaped leaves Free-floating Leaf size: 1/2 - 2 1/4 in. across</p> <p><small>Photo: V. Moberg, PISCUS</small></p>
<p>WATER HYACINTH</p>  <p>Rounded, shiny green leaves with spongy stalks Lavender flowers with central yellow fleck Free-floating</p> <p><small>Photo: MOJIB</small></p>	<p>WATER SOLDIER</p>  <p>Leaves are 16 in. long, sword-shaped, sharply serrated edges, bright green Leaves may be emergent or submerged</p> <p><small>Photo: Deanna Dwyer</small></p>
<p>WATER LETTUCE</p>  <p>Free-floating - forms a rosette of leaves that resembles an open head of lettuce Fuzzy light green leaves with long feathery roots</p> <p><small>Photo: MDEC</small></p>	<p>PARROT FEATHER</p>  <p>Spikes of stiff, feathery leaves grow in whorls of 4-6 Bright green upper stem emerges up to 1 foot above water</p> <p><small>Photo: MDEC</small></p>
<p>EUROPEAN WATER CLOVER</p>  <p>Resembles a four leaf clover Leaves are smooth and can be floating, submerged, or emergent Leaf size up to 1 in. across</p> <p><small>Photo: MDEC</small></p>	<p>YELLOW FLOATING HEART</p>  <p>Flowers are brightly yellow with 5 petals Leaves are 2-6 in. across with scalloped edges</p> <p><small>Photo: MDEC</small></p>

These 3 species are legal for sale and possession. Please only report sightings outside of cultivation.

For more information and to report sightings, visit michigan.gov/invasive

Fact Sheet Exotic Aquatic Plant Watch

Are invasive plants threatening your lake?

Aren't plants good for a lake?
Routed aquatic plants are a natural and essential part of the lake, just as grasses, shrubs and trees are a natural part of the land. However, sometimes a lake is invaded by an aquatic plant species that is not native to Michigan. Some of these exotic plants, like Curly-leaf pondweed, Eurasian milfoil, Starry stonewort, and European frog-bit can be extremely disruptive to a lake's ecosystem and recreational activities.

These exotic plants can take over a lake by crowding out beneficial native plant species. An overabundance of exotic species can also negatively affect fish populations and human recreation.

What steps are needed to prevent exotic plants from taking over?
To avoid having a lake invaded and overrun with exotic plants, the Exotic Aquatic Plant Watch of the Cooperative Lakes Monitoring Program (CLMP) teaches volunteers how to use the five integrated Pest Management (IPM) strategies:

- 1. Monitoring**
The critical step in slowing the spread of exotic plants is to find them before they spread out across the lake. Through the Exotic Aquatic Plant Watch, a plant expert from MiCorps teaches volunteers how to sample their lake for exotic plants and how to identify them. Participants also have the opportunity to email pictures of unknown plant samples to MiCorps for identification.
- 2. Early Detection**
Finding the first colonies of an exotic plant invasion will allow for a rapid response to control the plant in small areas before it can spread. If the invasion goes undetected, it may spread throughout the lake. Annual monitoring of your lake for exotic plants helps find any threats before they become an issue.
- 3. Rapid Response**
Responding rapidly to a new invasion of an invasive plant will increase the probability of keeping the plant under control, possibly even eradicating it. Treating small, infested areas will be less expensive and more effective than treating large areas after the plant has spread.
- 4. Maintenance Control**
Annual monitoring and treatment of the exotic plant is time consuming and requires persistence and low, manageable levels.
- 5. Preventive Management**
Even if the monitoring does not reveal the presence of exotic plants, the lake community should still continue their monitoring efforts. Remember, the key to preventing abundant exotic plant growth is to find them before they take over the lake.

The lake community should take actions to prevent introductions by educating residents about the threat of exotic species and how to identify them.

For more information about the MiCorps Cooperative Lakes Monitoring Program, visit www.MiCorps.net

MiCorps is funded by the Michigan Department of Environment, Great Lakes, and Energy and administered in partnership with Michigan State University Extension, Michigan Lakes and Streams Association, and the Huron River Watershed Council.



Staff Field Visits

- We may visit your lake to:
 - Help kick off your survey
 - Assist with plant identification
 - Answer questions and get your feedback
- Will be arranged in early summer
 - **Not all lakes can be visited**
 - **New lakes are top priority**



Questions?

To learn more about the Cooperative Lakes Monitoring Program, visit:

MiCorps.net



MICHIGAN DEPARTMENT OF
ENVIRONMENT, GREAT LAKES, AND ENERGY



Huron
River
Watershed
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Working Together to Protect Lakes

