



Exotic Aquatic Plant Watch

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MICHIGAN STATE
UNIVERSITY | **Extension**



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MICHIGAN STATE
U N I V E R S I T Y

The illustration is split horizontally. The top half shows a pond with a wooden dock and three people (two adults and one child) jumping in. The bottom half is an underwater view showing a dense 'forest' of green aquatic plants. Several goldfish-like fish are swimming among the plants. On the sandy bottom, there is a large crayfish, several clams, and a small snail. The text 'An Underwater Forest' is overlaid in the center, and three bullet points are listed below it.


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



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

f t in p @

"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



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!**

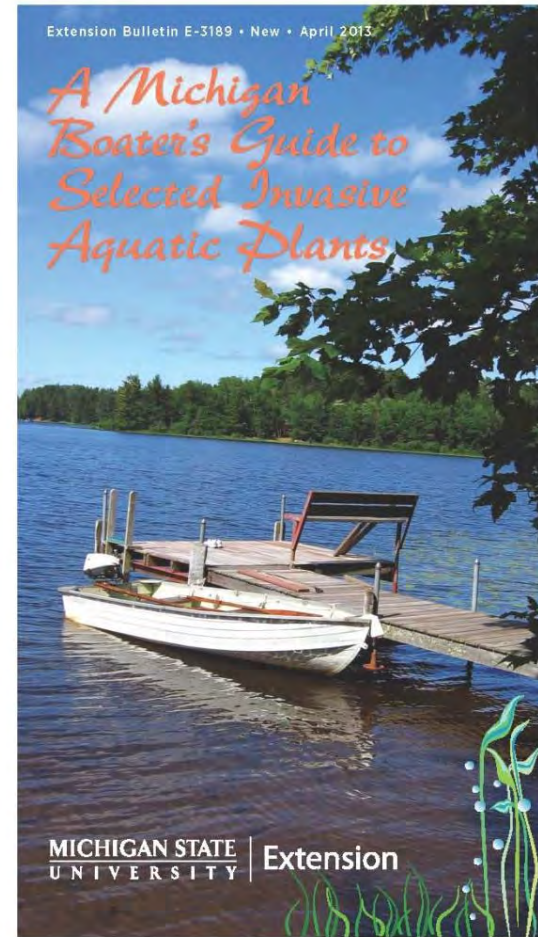
- Eurasian Watermilfoil
- Curly-leaf Pondweed
- Starry Stonewort
- Hydrilla
- European Frog-bit



Additional copies available for \$13.30
(or free download)
through the
MSU Extension Bookstore

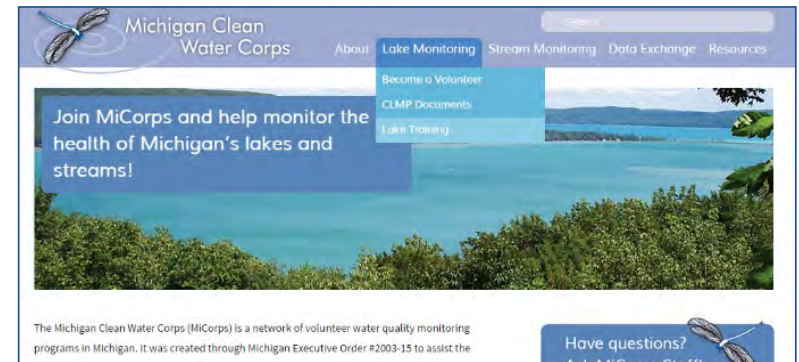
<http://shop.msu.edu>

Search for “E3189”



Exotic Aquatic Plant Watch Video

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



New identification cards

- Pick them up for free today
- Large quantities available for organizations



Coming soon...

- “Aquatic Invasive Plants: A Field Guide for Michigan Lakes, Streams, and Ponds” from MSU Extension
- Available now for free download
- In print later this year





**Let's Meet
the Exotics!**

Established Aquatic Invasive Plants in Michigan

Eurasian watermilfoil

Myriophyllum spicatum



Curly-leaf pondweed

Potamogeton crispus



Starry stonewort

Nitellopsis obtusa



Recent invaders

Hydrilla

Hydrilla verticillata



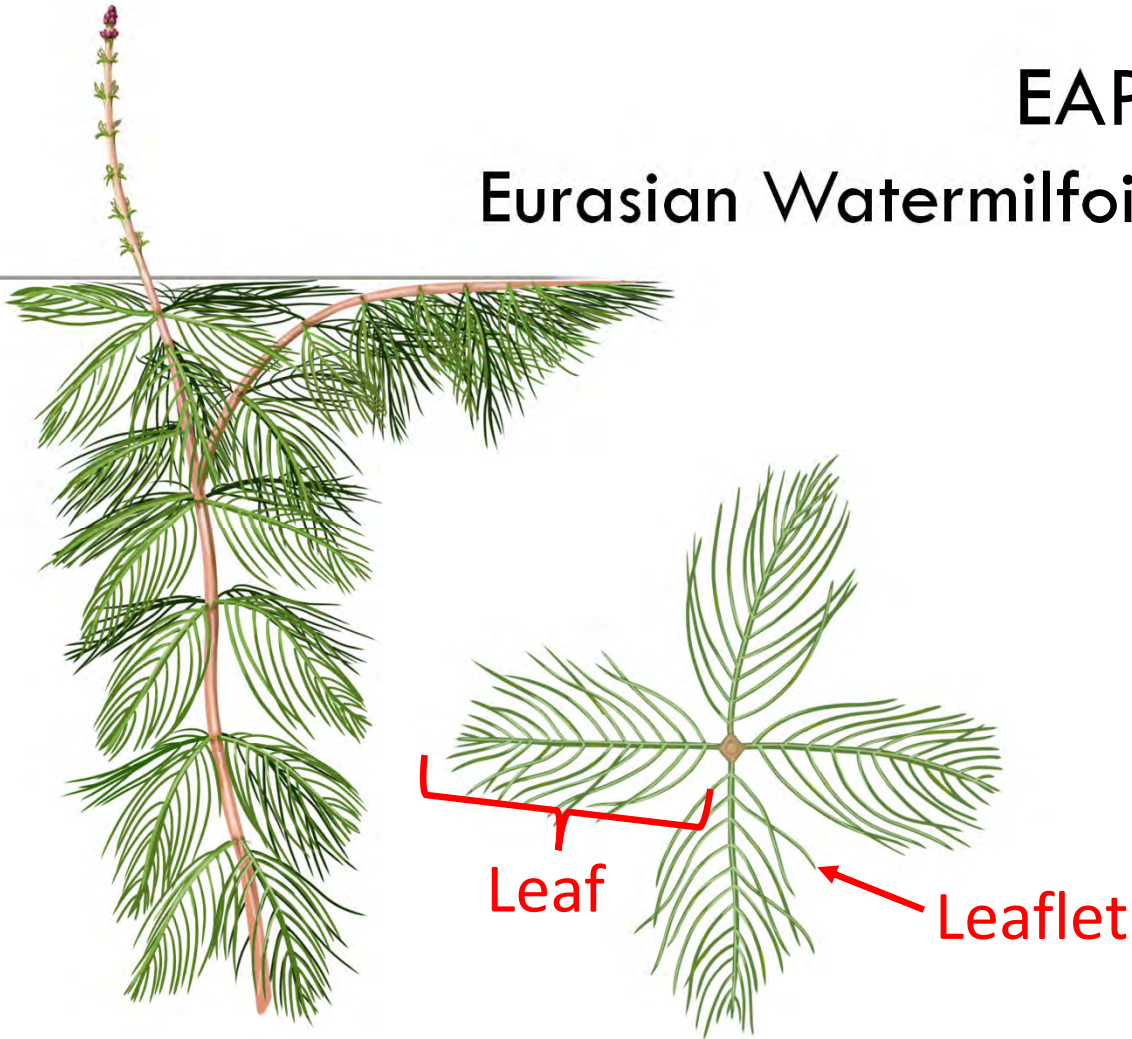
European Frog-bit

Hydrocharis morsus-ranae



EAPW Watch List Species

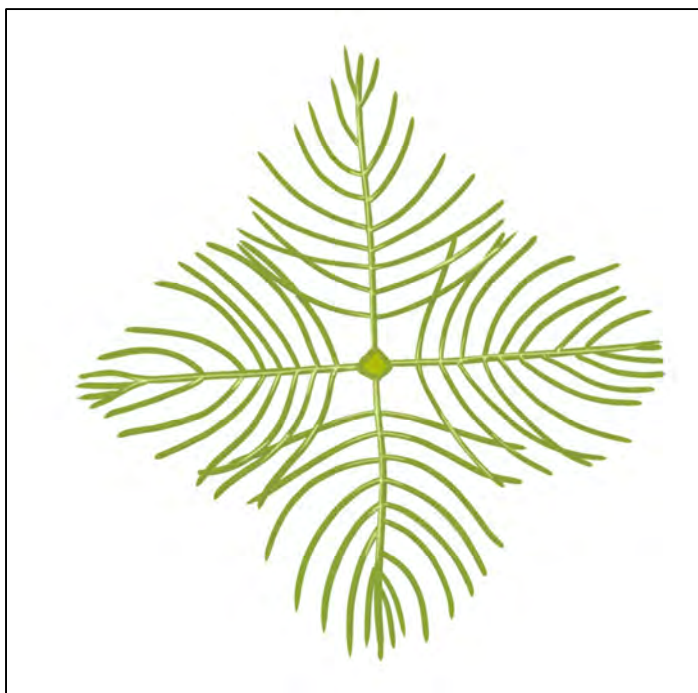
Eurasian Watermilfoil– *Myriophyllum spicatum*



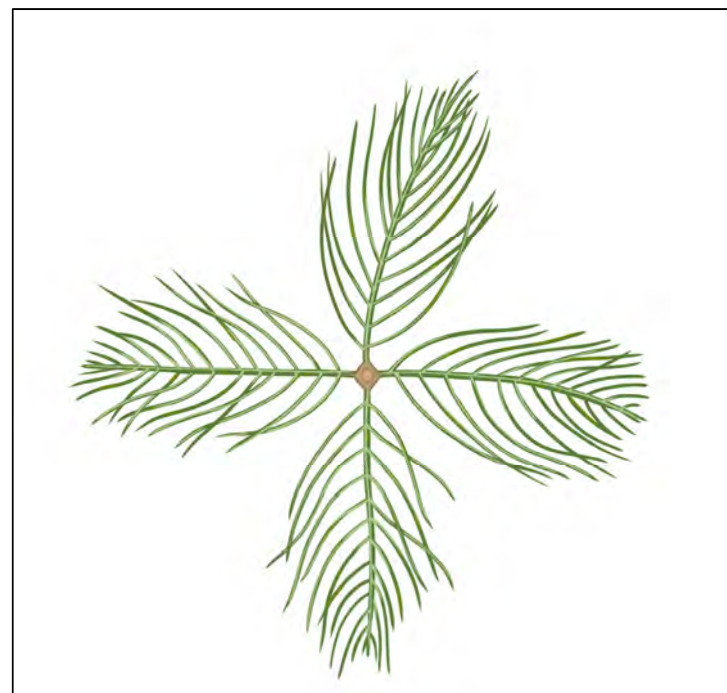
Key Characters:

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

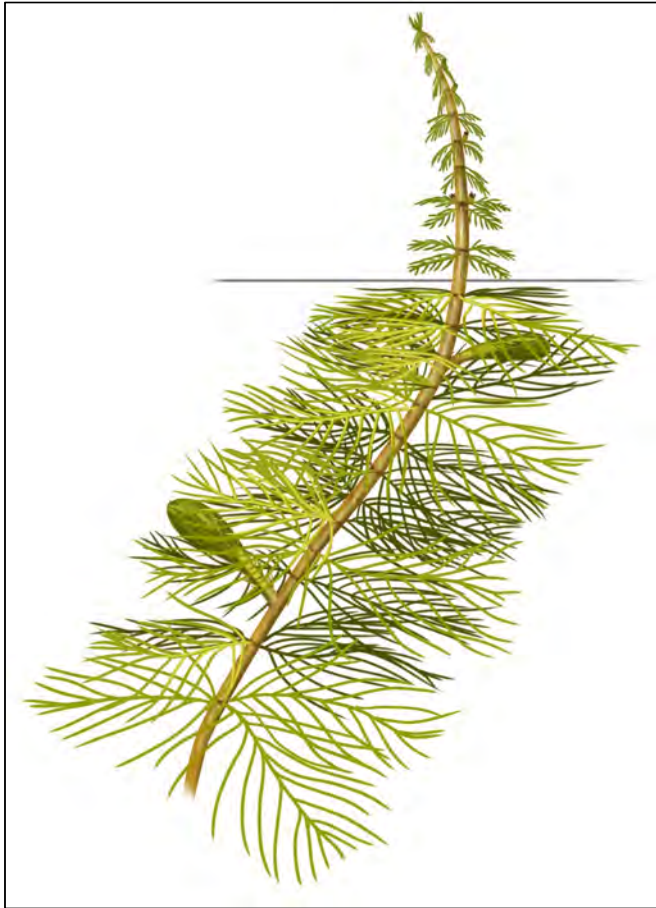
What about “Hybrid Milfoils”??



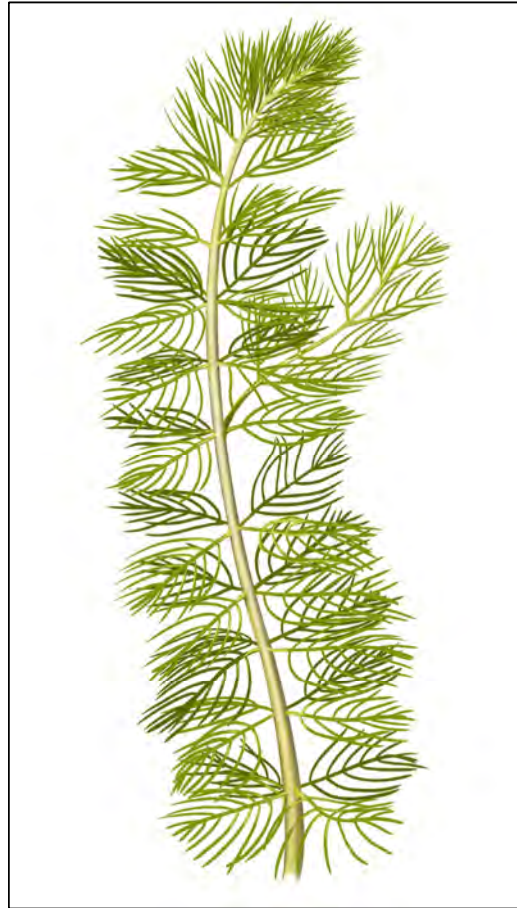
Native northern watermilfoil



Invasive Eurasian watermilfoil



Tight whorls



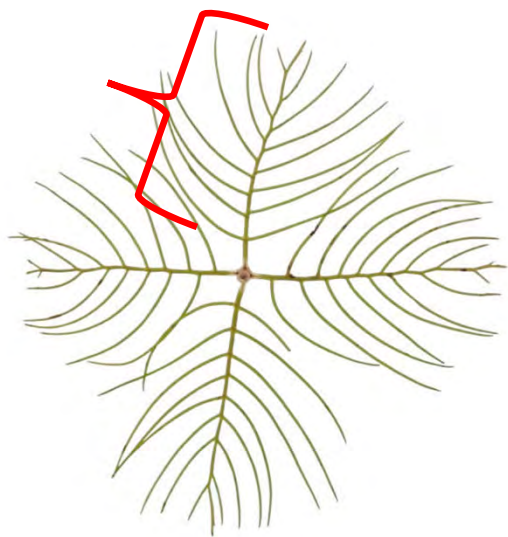
Under 12 leaflets



Some leaves not whorled

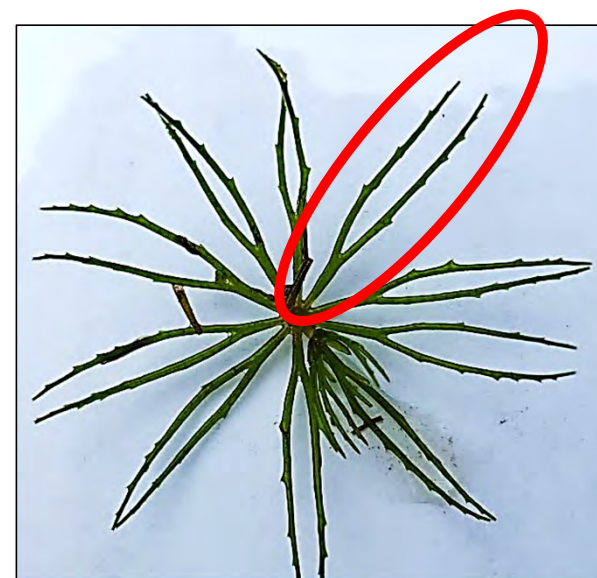
These are not Eurasian Watermilfoil

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



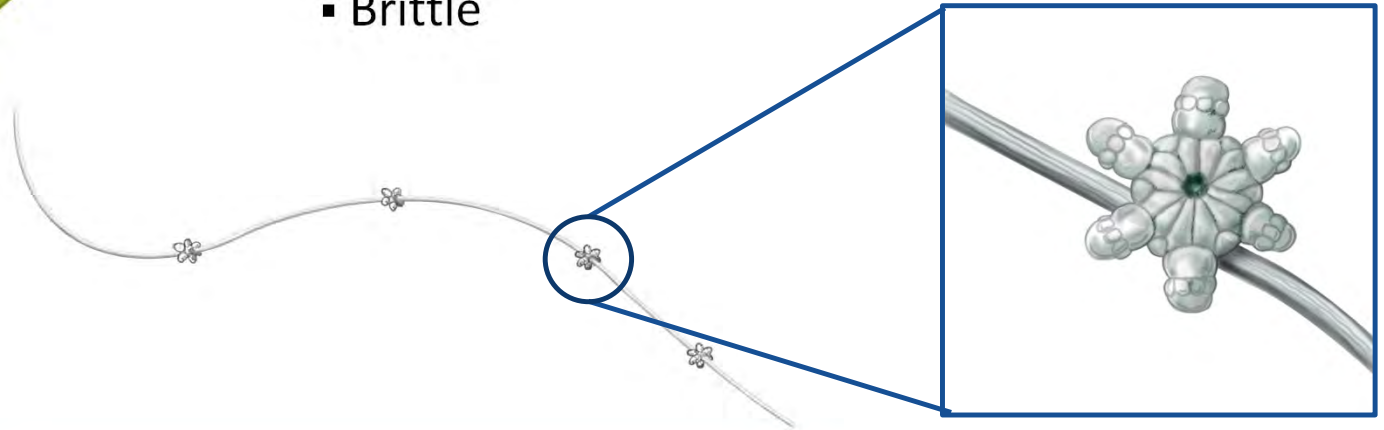
B

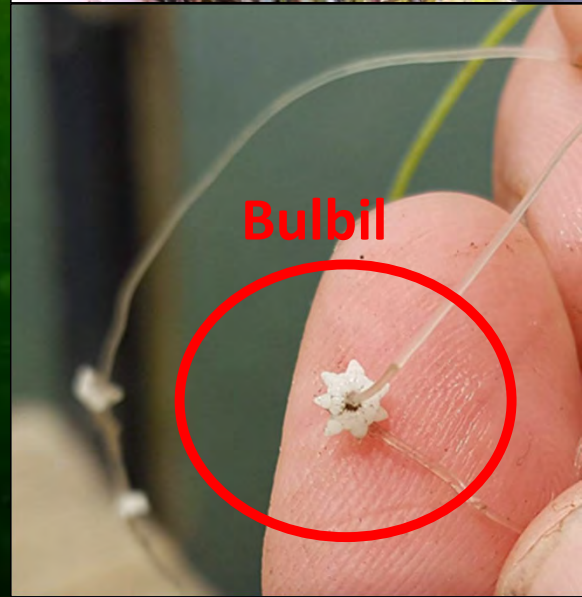


EAPW Watch List Species

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*

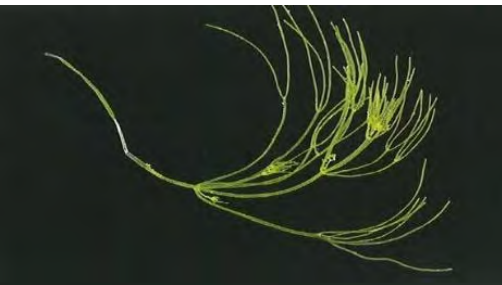
- Macroalgae
- No star bulbils
- Even branching
- Shorter 'branching' (i.e. reach) of the plant compared to Starry



Nitella furcata stem section. J. M. DiTOMASO



Nitella clavata stem section. J. M. DiTOMASO



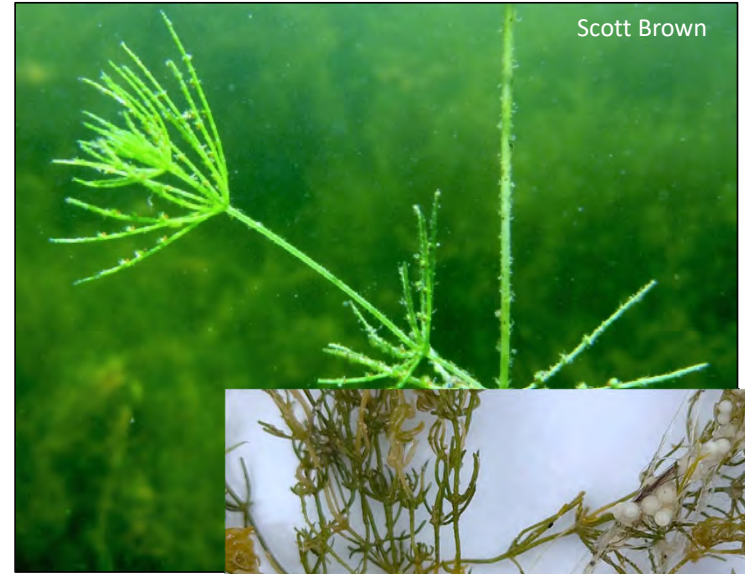
Nitella mucronata

Which one is Starry stonewort?

A



B



EAPW Watch List Species

Hydrilla (*Hydrilla verticillata*)

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

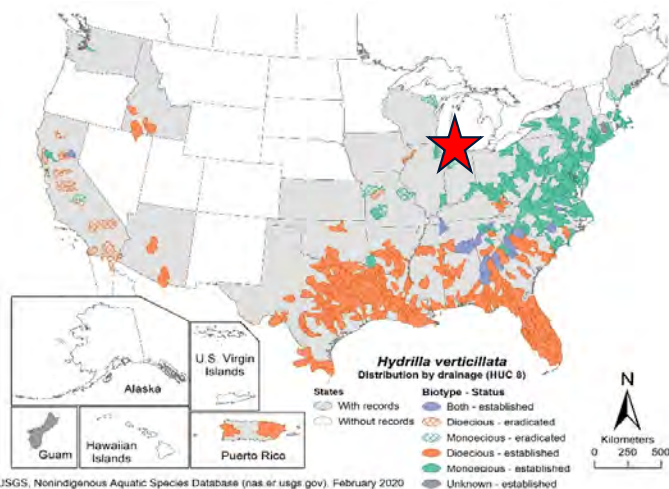


Illustration by Bruce Kerr



**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

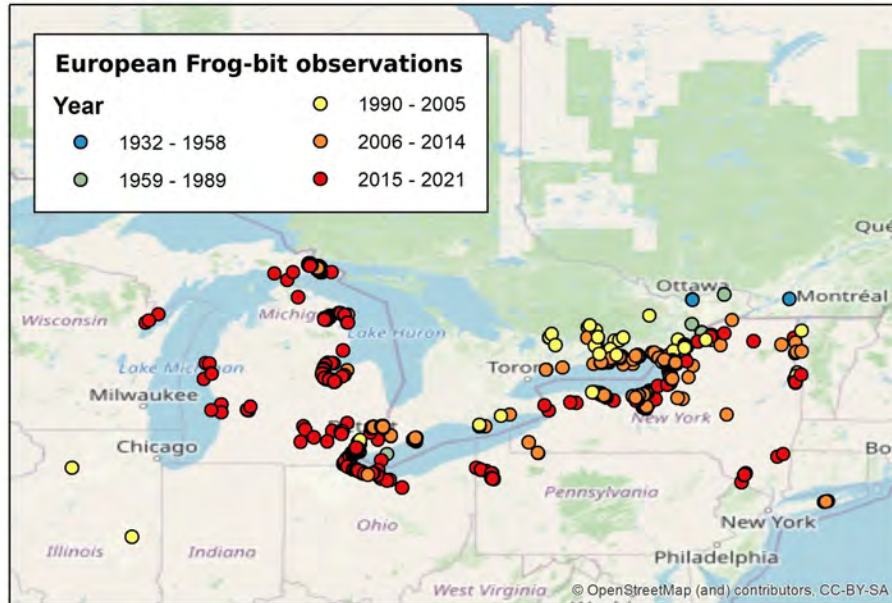


B



European Frog-bit

Hydrocharis morsus-ranae

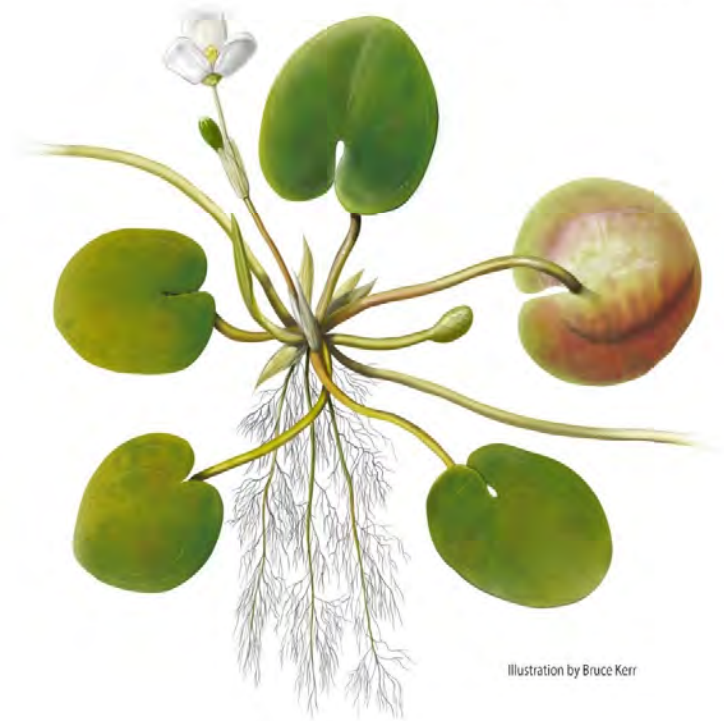
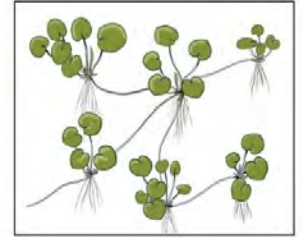


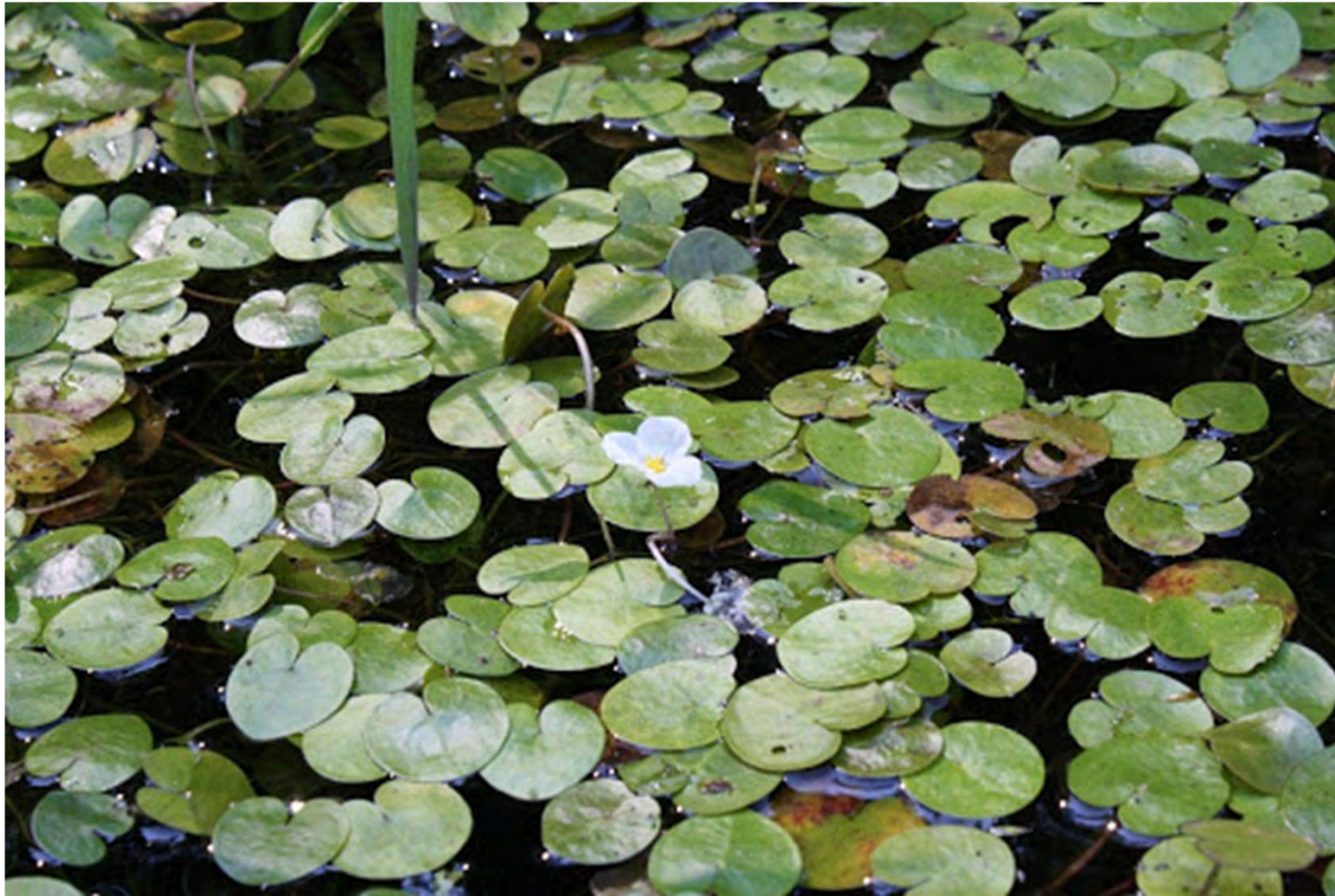
- First discovered in 1996 in Southeast Michigan
- Currently predominantly in Great Lakes wetlands
- High threat to our inland waters

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





European Frog-bit Identification

Narrow-leaf cattail

European Frog-bit

White Water Lily

Michigan Department of Natural Resources Wildlife Division

Cooperative Lakes
Monitoring Program



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 Spaldy, Connecticut AFD, Bugwood.org

WATER CHESTNUT



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

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

BRAZILIAN ELODEA



Generally 4 leaves per whorl
Submerged

Photo: N. Morgan, PSL/USDA

EUROPEAN FROGBIT



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

Photo: V. Krasov, PSL/USDA

WATER HYACINTH



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

Photo: BRENK

WATER SOLDIER



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

Photo: Stephen Blumenthal

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: MDEQ

YELLOW FLOATING HEART



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

Photo: MDEQ

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

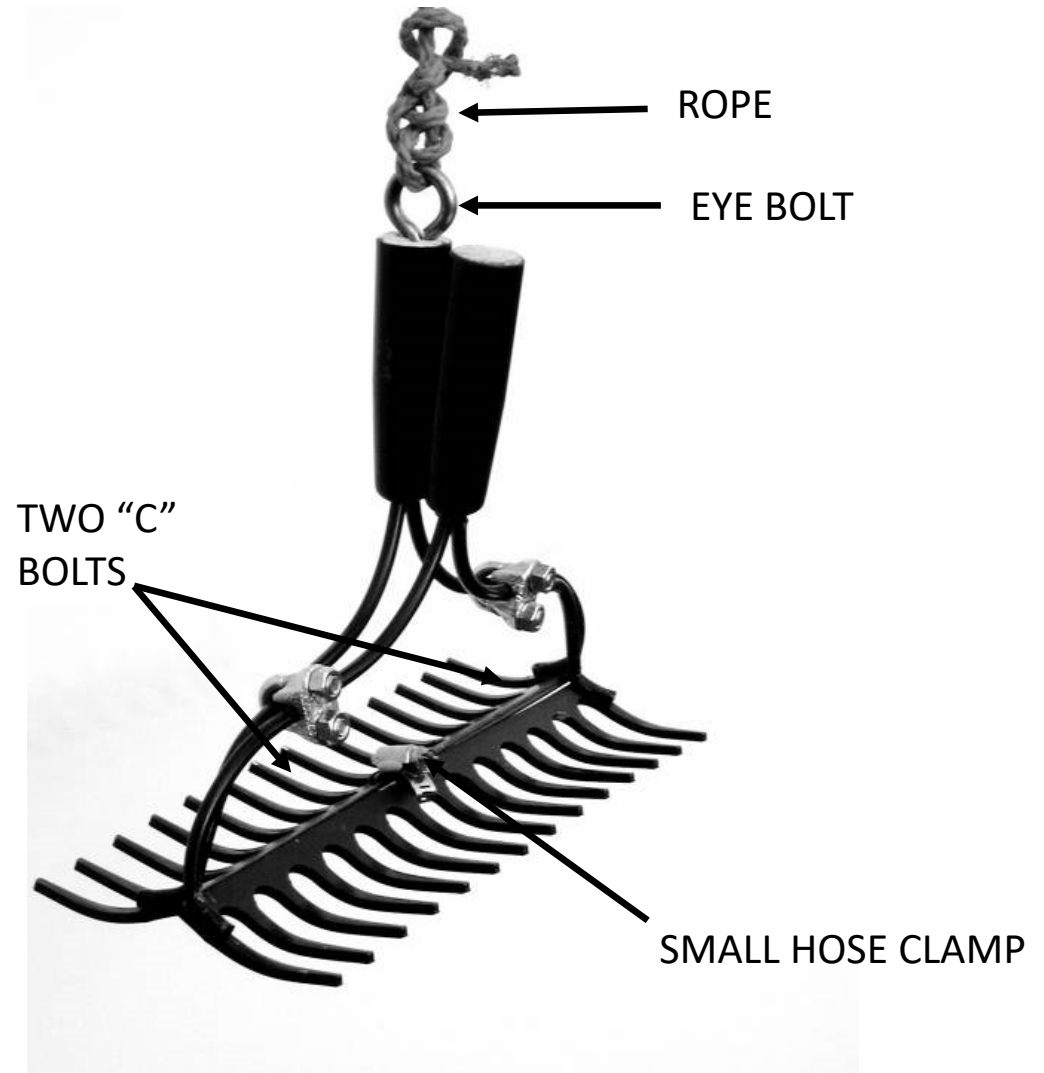
- Data Form
- Rake building instructions
- A Michigan Boater's Guide to Selected Aquatic Invasive Plants
- Plant photography card (to laminate)
- Michigan's Aquatic Invasive Plant Watch List
- EAPW brochure

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	
20 Father's Day	21	22	
27	28	29	

July

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

August

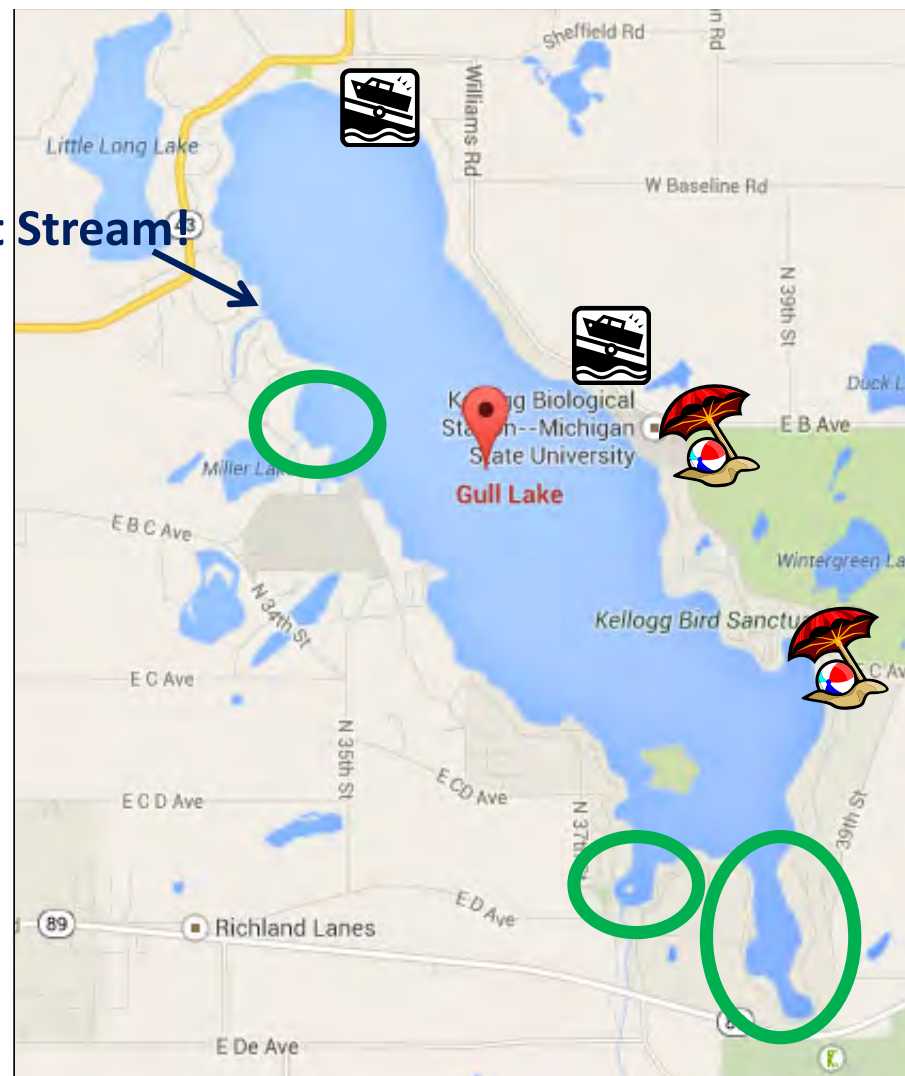
Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31	1	2	3	4

Where to sample?

How do I start?

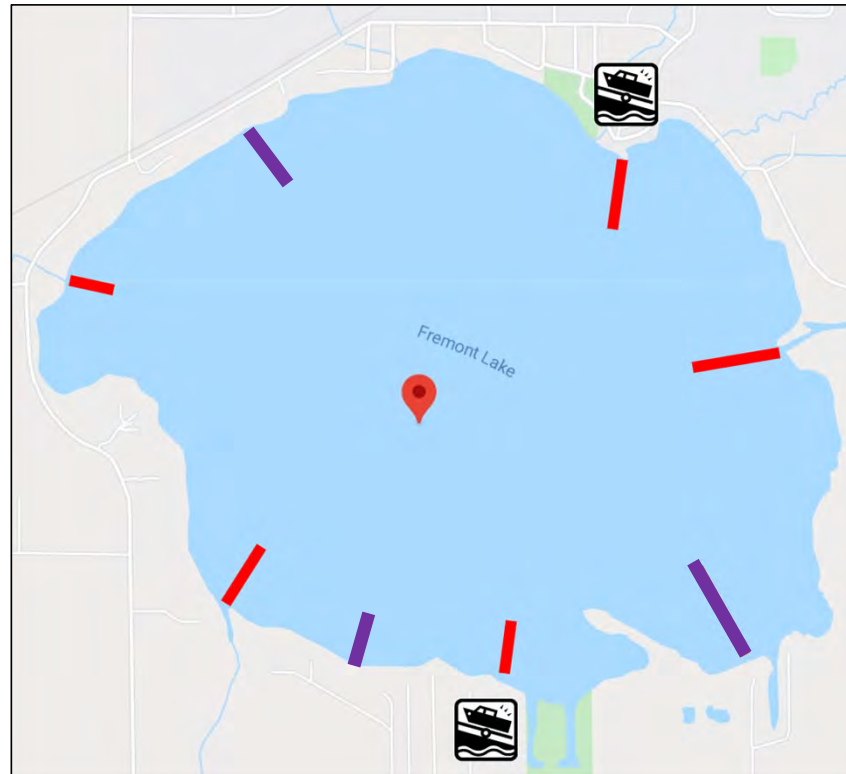
1. Get a map!
2. Locate:
 - 1) Boat Ramps
 - 2) Public Beaches / Parks
 - 3) Attached inlets (streams, creeks, canals)
 - 4) Quiet Bays and Coves
 - 5) In between transects

Inlet Stream!



Focus on high-risk areas

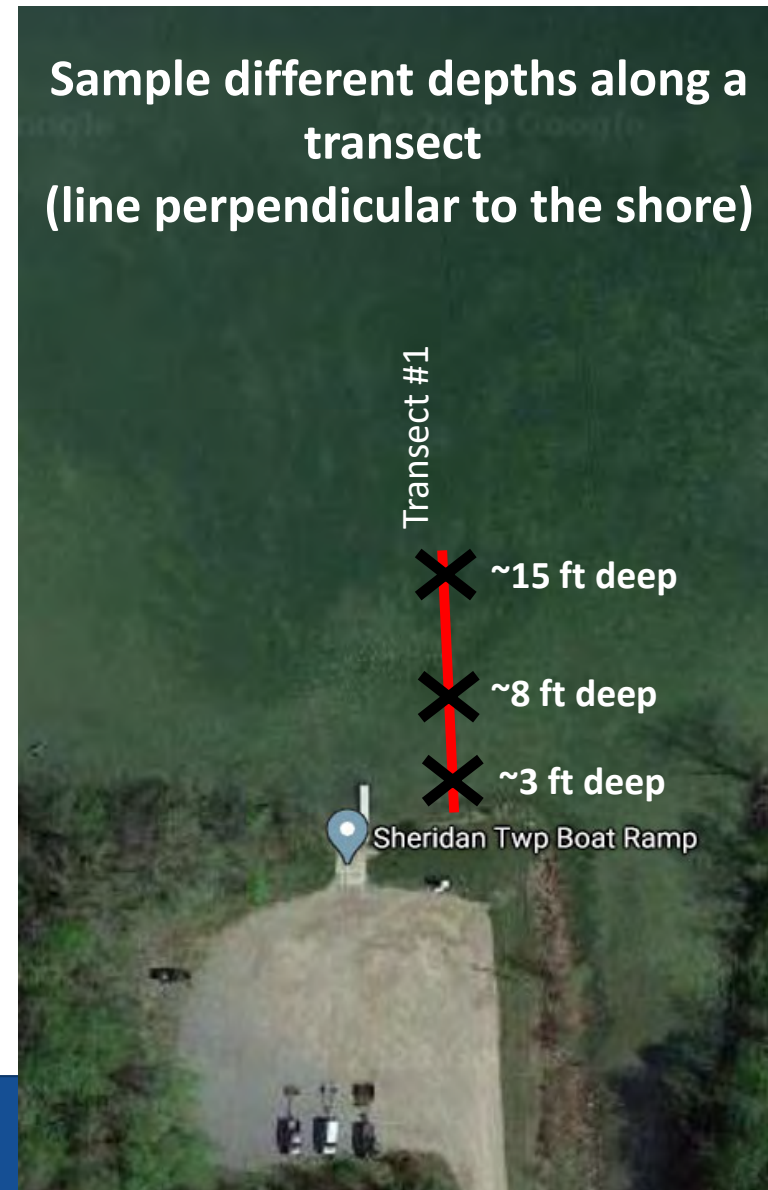
REMEMBER: Even some data is useful; it's ok if you can't cover the entire lake



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)



Visual meander





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

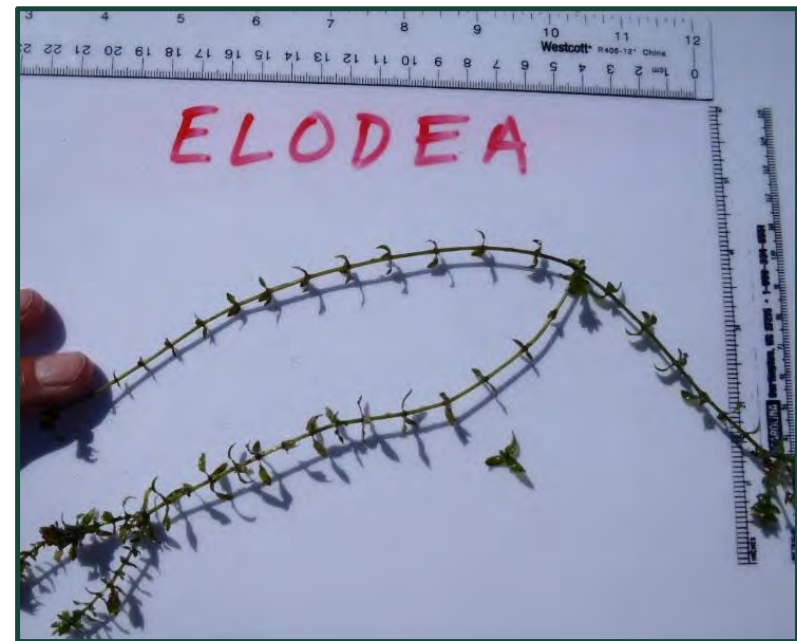
- Make sure the photos are clear

- ***Need to show identifying characters***

- Great for ID verification and documentation



Use photography card



Volunteer photos:

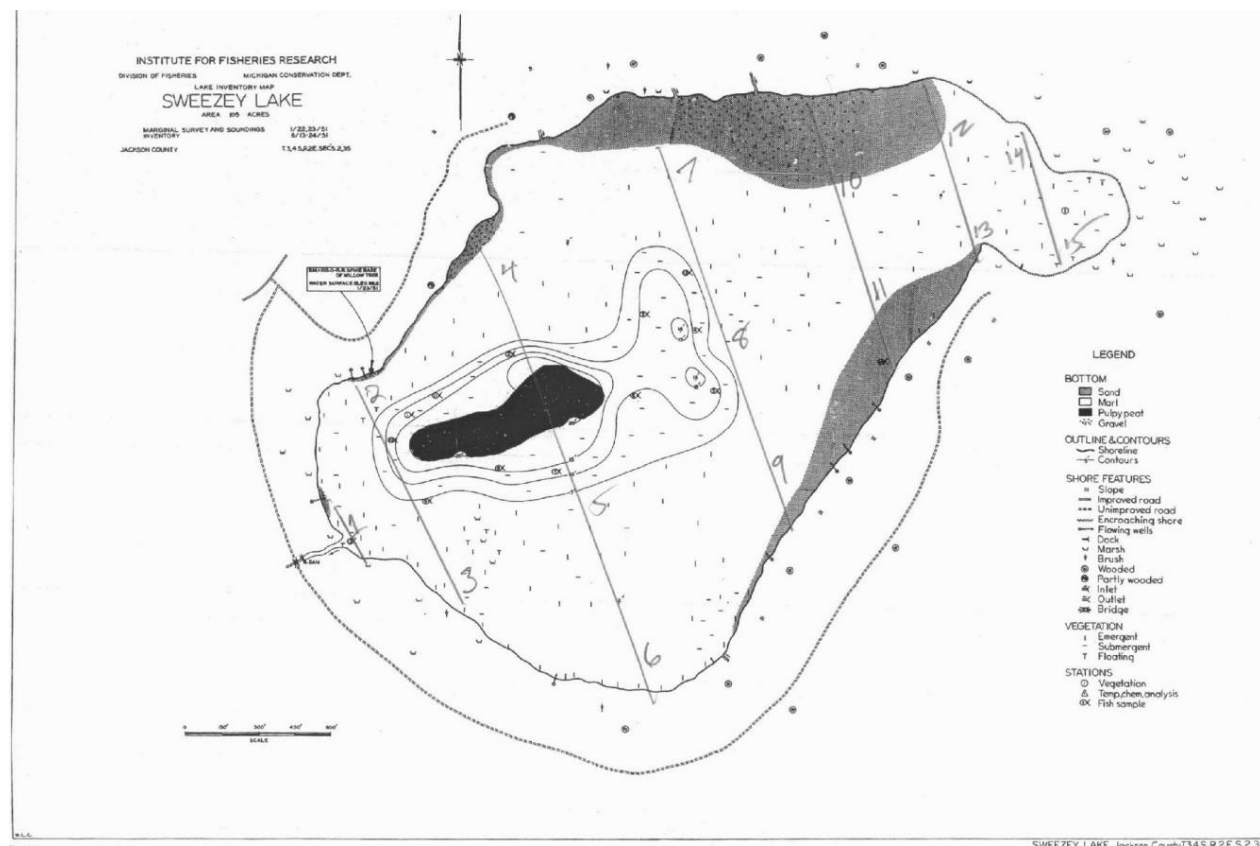
(Left) Lotus & Maceday Lake in Oakland Co.

(Top) Bristol Lake in Barry Co.

No ruler? A hand will do!



Mapping Options: By Hand



Mapping Options: Google Maps

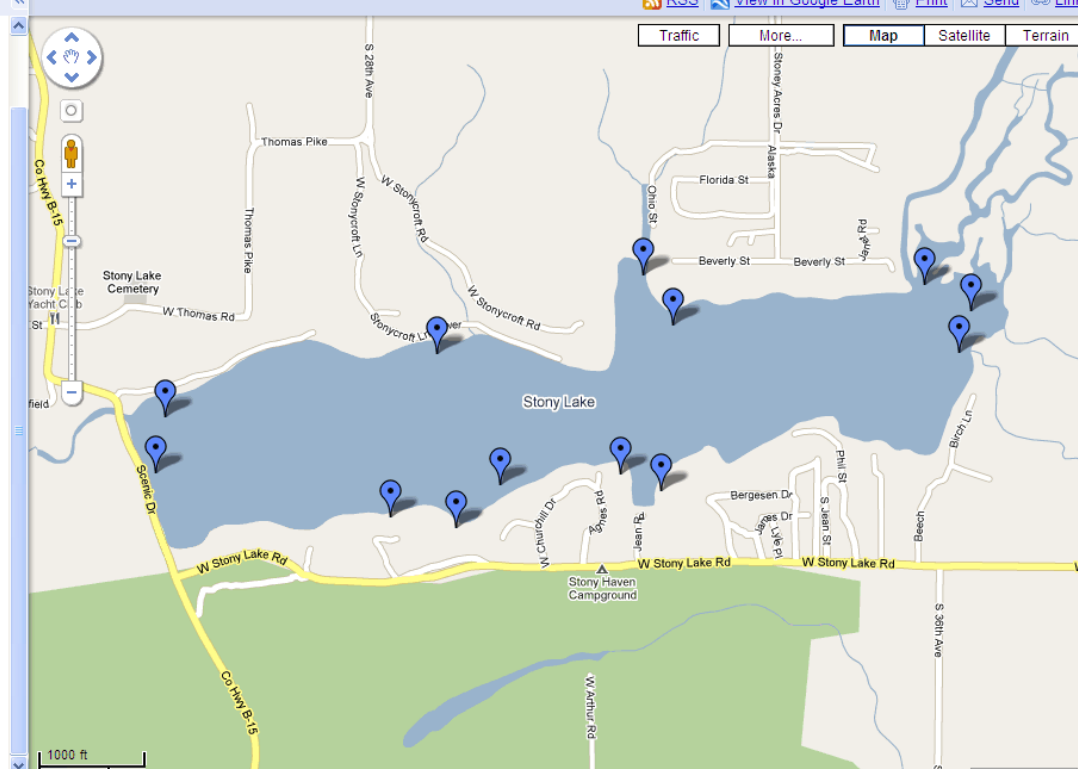
Google maps Search Maps [Show search options](#)
Find businesses, addresses and places of interest.

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

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](#)



©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!**



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**



Additional Support

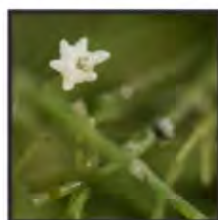
- **Cass, Berrien, and Van Buren** counties
 - Free enrollment in 2025 to promote monitoring for hydrilla
- Any new lakes in the **Upper Peninsula**
 - Enrollment fees covered, and rakes and support provided through a DNR initiative to increase invasive plant monitoring in the UP
- Any new lakes in **Benzie, Leelanau, Manistee, and Grand Traverse** counties
 - Enrollment fee refund and support from the Benzie Conservation District





June 28th-July 6th 2025

Help Track Aquatic Invasive Species Across Michigan- Your Observations Make a Difference!



MiCorps AIS Detection Blitz

A statewide community science effort inviting volunteers of all experience levels to help track aquatic invasive species in Michigan's lakes, rivers, and streams by snapping photos with the iNaturalist app.



Questions?

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

MiCorps.net



Working Together to Protect Lakes

