

Wisconsin Lakes Partnership

Starry stonewort

Public Informational Meeting

Four Slide Presentations

1. Biology and Management
2. Status and Monitoring
3. Identification
4. Clean Boats Clean Waters/Citizen Lake Monitoring Network
5. AIS Grants

Starry Stonewort (*Nitellopsis obtusa*)

Biology and Management



Scott Van Egeren
Wisconsin DNR
July 29, 2015



What is starry stonewort?

- Starry stonewort (*Nitellopsis obtusa*) is a member of the Characeae family.
- Characeae are green algal macrophytes that can range in size from centimeters to meters
- Chara and Nitella species are found around the world.



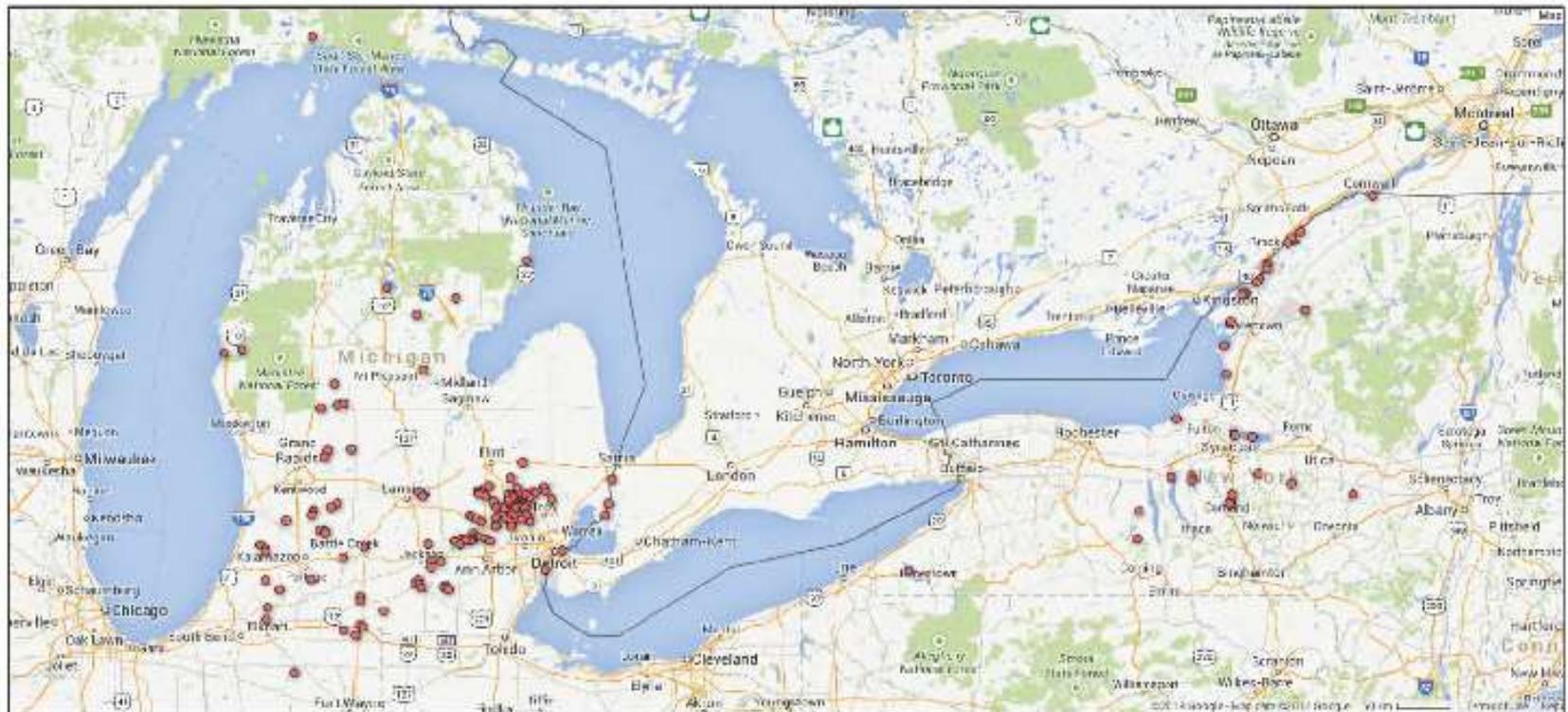
Where did it come from?

Starry Stonewort Distribution

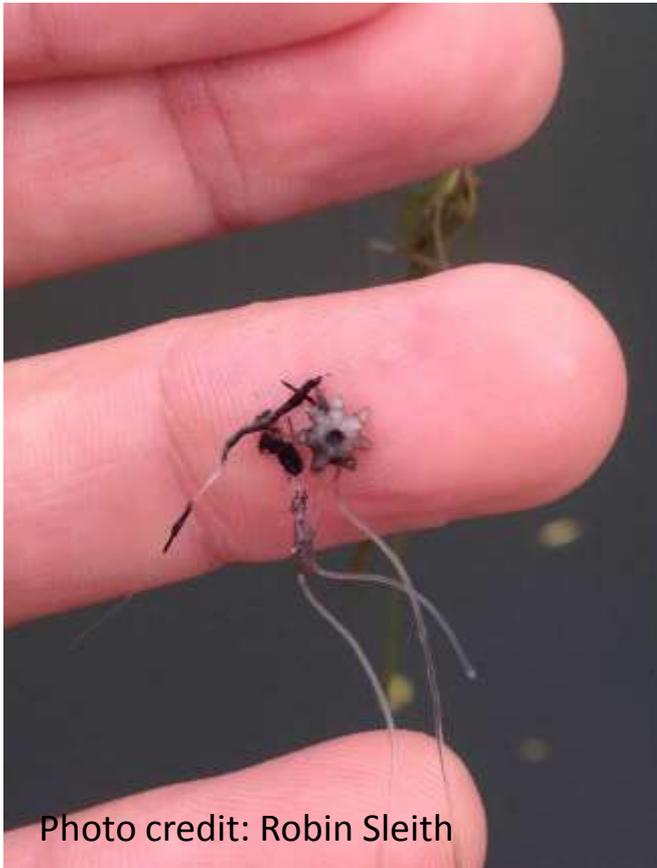


Where is it within the US?

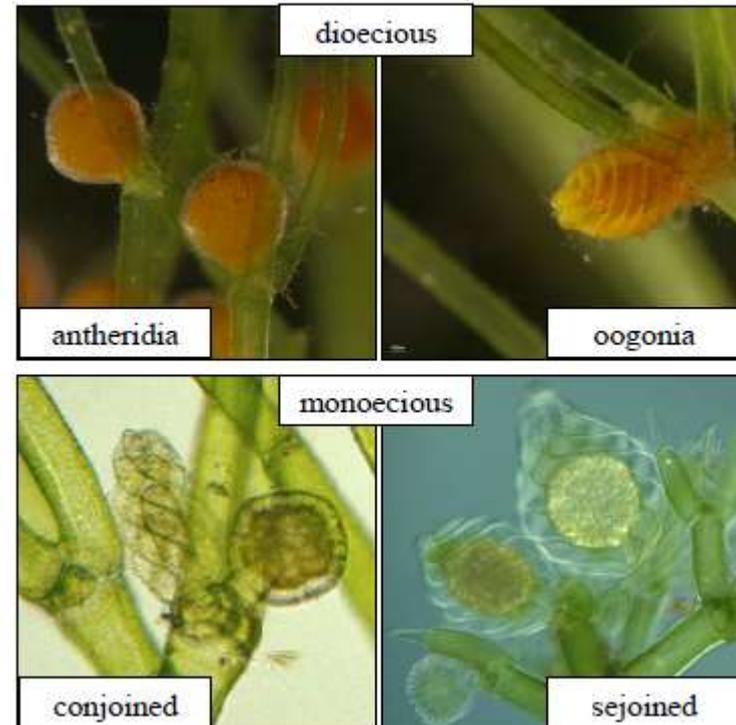
Characeae distribution – *Nitellopsis*



Reproductive and Dispersal Capacity



Characeae sexual state



- Capable of sexual and asexual reproduction
- North American clones are all male – no zygotes produced
- Asexual reproduction occurs by bulbil or plant fragments

How might starry stonewort affect a lake?

MICHIGAN LAKE & STREAM ASSOCIATIONS, INC.

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RESOU

Starry Stonewort Continues to Plague Michigan Inland Lakes

September 15th, 2011 | Scott Brown |



Starry Stonewort, a highly aggressive and rapidly spreading invasive macro algae, continues to infect Michigan inland lakes at an alarming rate. Introduced to the Great Lakes region via the ballast water of freighters navigating into the Great Lakes region from the St. Lawrence Seaway, Starry Stonewort (scientific name: *Nitellopsis obtusa*) was first observed in Lake St. Clair in 1986, and was detected in a Flint area inland lake in 2006.

The invasive macro algae, a native of the United Kingdom and Europe, is thought to have infected over two hundred Michigan inland lakes as of the summer of 2011.

Starry Stonewort is often confused with chara, a beneficial, native macro algae that occupies the near bottom shallow areas of many inland lakes.

Inland lakes plagued by Starry Stonewort rapidly lose diverse populations of native floating, emergent and submerged aquatic plants as increasingly large areas of the lake are covered by light green aquatic "meadows" of the invasive macro algae. Inland lakes infested with Starry Stonewort often develop very clear water by preventing the re-suspension of bottom sediments and depriving native phytoplankton (various species of native algae) of life sustaining nutrients.

How might starry stonewort affect a lake?

- May outcompete native aquatic plants
- Thick “meadows” may prevent fish from spawning
- Can become a navigational nuisance in shallow waters (< 6 feet)
- Meadows may increase water clarity by minimizing sediment resuspension, producing allelopathic substances that inhibit algae and precipitating calcium carbonate that may bind phosphorus.

How might starry stonewort affect a lake?



Photo: Paul Skawinski

Found in Wisconsin in September 2014

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Invasive algae found for the first time in a Wisconsin lake



Scott Brown

Stony stonewort, an invasive algae, was found for the first time in Wisconsin, in Little Muskego Lake in Waukesha County. The algae has caused problems for boaters and fishermen in lakes in Michigan.

By Lee Bergquist of the Journal Sentinel

Nov. 25, 2014

WIAA Division 3 State Baseball: Lake Country Tammann walks off with title | 3:07 p.m.

Wisconsin's unemployment rate rose to 4.6% in May | 2:38 p.m.

Regulator orders Esair to pay \$17.8 million after arbitration hearing | Updated: 2:18 p.m.

Pool play not suspected in death of woman | 2:13 p.m.

PelitaFact: Factchecking the Wisconsin state budget | 1:27 p.m.

Harley stock climbs after buyback plans announced | 1:27 p.m.

Pond du Lac restaurant apologizes to local firefighters | 1:08 p.m.

Common Ground meets with National PEY for

MOTOR HARLEY-DAVIDSON CYCLES MUSEUM

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Management alternatives

- **First, need to assess the amount of starry stonewort present and determine management goals.**
- **Chemical control**
 - Copper sulfate + hydrothol
 - Flumioxazin
 - Spot treatment –
 - Potential for targeting high traffic areas
 - Mixed success at best when attempting EWM control due to rapid herbicide dissipation.
 - Whole-lake treatment
- **Physical control**
 - Hand pulling and diver assisted suction harvest (DASH)
 - Dredging
 - Mechanical harvest
- **Drawdown**
- **Biological control – no control method known.**
- **“Wait and see” – monitoring and assessing**

Herbicide treatment

- Copper sulfate + hydrothol typically used
 - These treatments “give the mats a haircut”, but don’t kill plants.
 - Several treatments per year are often required.
 - Michigan and Clemson University lab research project to determine concentration and exposure time needed.
- Flumioxazin trials occurring
 - Indiana treated one 15 acre patch this year.
 - Indiana and Lonza lab research project to determine concentration and exposure time requirements.
- Both types of chemical treatments are not selective and will control many non-target plants.

Physical removal

- Hand pulling and DASH could be used in small new infestations if found early.
- Dredging may be employed to remove the sediments and bulbils following plant removal.



Photos: Scott Van Egeren – Little Muskego Lake

Drawdown?

- Exposing shallow sediments to freezing over the winter may damage plants and bulbils.
- Native Chara species do well following drawdowns.
 - They reproduce sexually and many zygospores are formed. Not the case with starry stonewort.
 - Research being started to determine the drying and freezing time needed to kill bulbils and fragments.

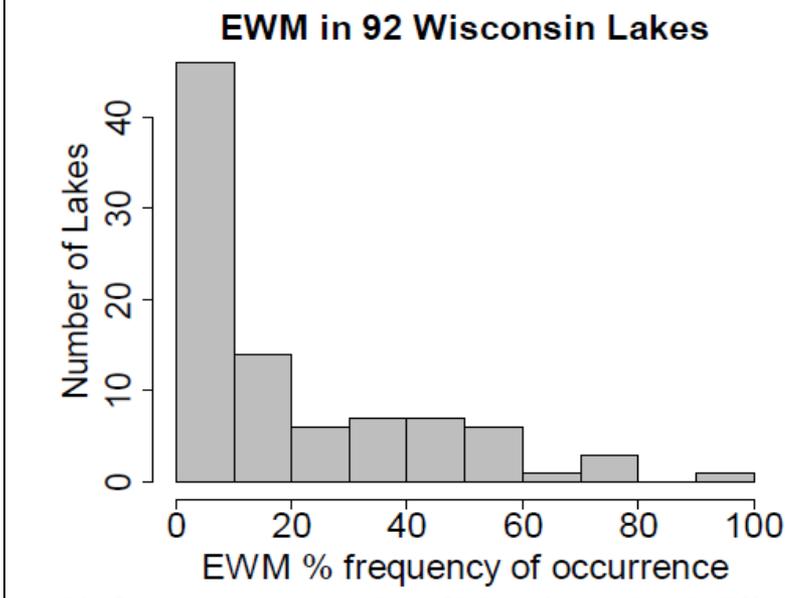
Monitor and Assess

- Native plant beds may compete with starry stonewort.
 - Allow native plants to compete with the invasive.
- Wait to see if the species becomes problematic.
- Prevention is a must with any of the management strategies.
 - Stop propagules from being spread from lake to lake.

Commonly Rare and Rarely Common: Comparing Population Abundance of Invasive and Native Aquatic Species

Gretchen J. A. Hansen^{1*^{da}}, M. Jake Vander Zanden¹, Michael J. Blum², Murray K. Clayton³, Ernie F. Hain⁴, Jennifer Hauxwell⁵, Marit Izzo^{1^{db}}, Matthew S. Kornis^{1^{dc}}, Peter B. McIntyre¹, Alison Mikulyuk^{1,5}, Erika Nilsson^{1^{dd}}, Julian D. Olden⁶, Monica Papeş^{1^{de}}, Sapna Sharma^{1^{df}}

EWM populations are often small in scale.



“both invasive and native species occurred at low densities in most locations where they were present.”

Plan for Little Muskego Lake

- The population is localized within the lake and coexists with native species.
- Handpulling and DASH to clear large infestation near boat landing and “satellite” locations farther from landing.
- Dredging to follow hand removal to control the bulbil reproduction.
- Monitoring the population
 - Before and after management
 - Whole-lake to watch for spread

Plan for Wisconsin

- Stress prevention of spread.
- Search for species at nearby heavily used lakes
- Assess the population at newly discovered sites to determine appropriate management.
- Engage local stakeholders in management planning.
- Stress monitoring of management actions.
- Work with other states and partners to learn and adaptively manage starry stonewort.

Management take homes

- **Prevention and surveillance monitoring are necessary.**
- **Eradication is not a realistic goal.**
- **No one management strategy alone will control and maintain low levels of AIS, while not causing other impacts.**
- **A wait and see strategy is a viable option.**
- **Herbicide treatments have not been effective at large reductions in other states.**
- **We will adaptively learn together with other regional partners**

Questions



Photo: Paul Skawinski



Photo: Kathy Aron



Starry stonewort

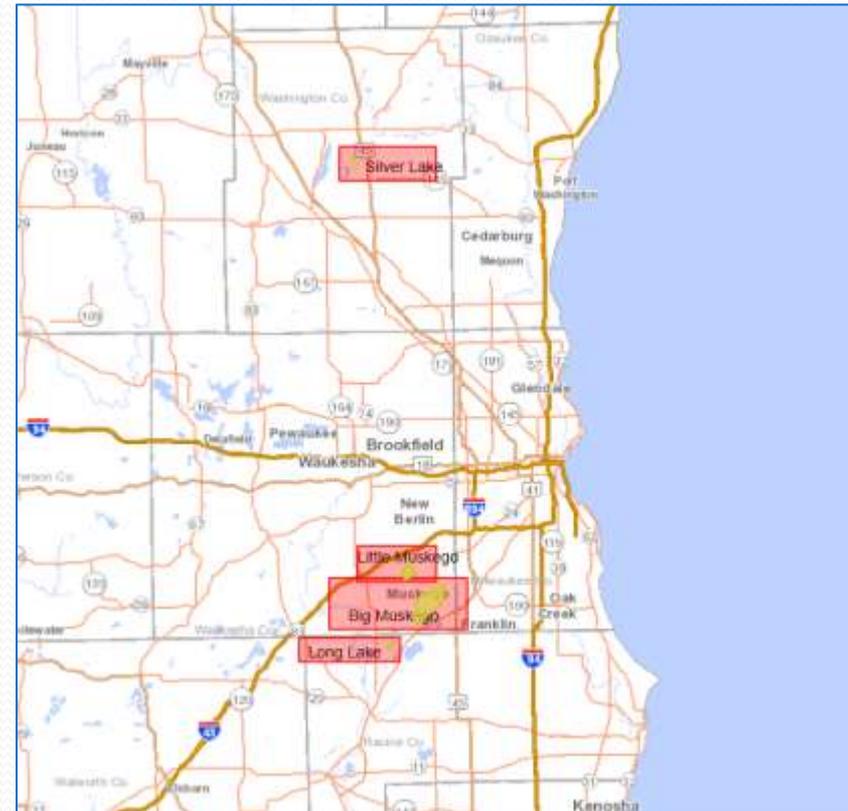
Status and Monitoring

Tim Plude

WI-DNR

Status of Starry stonewort, in WI

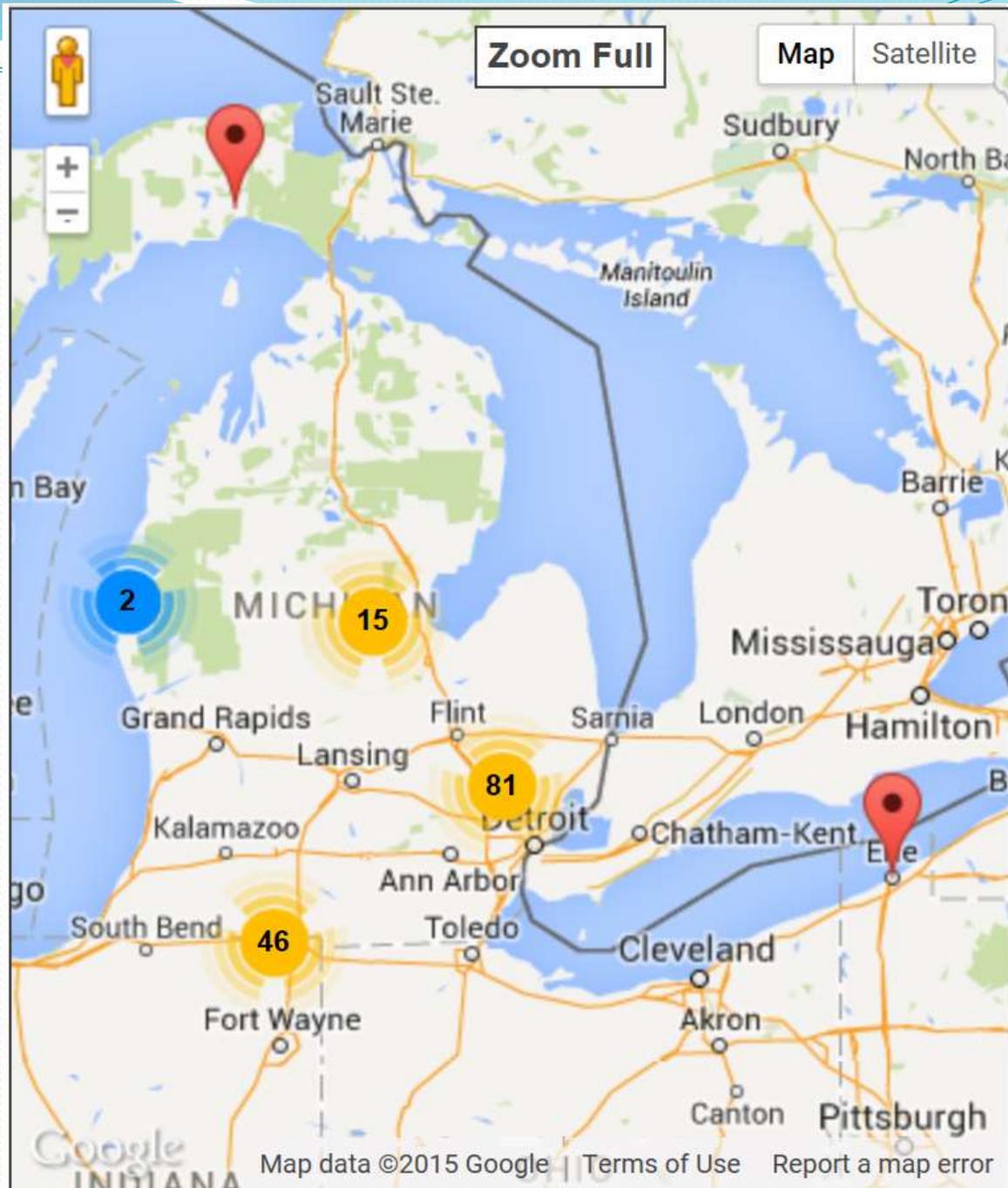
- Verified in 4 waterbodies, in 3 counties
 - Little Muskego Lake, Wauk. Co.
 - Big Muskego Lake, Wauk. Co.
 - Long Lake, Racine Co.
 - Silver Lake, Washington Co.

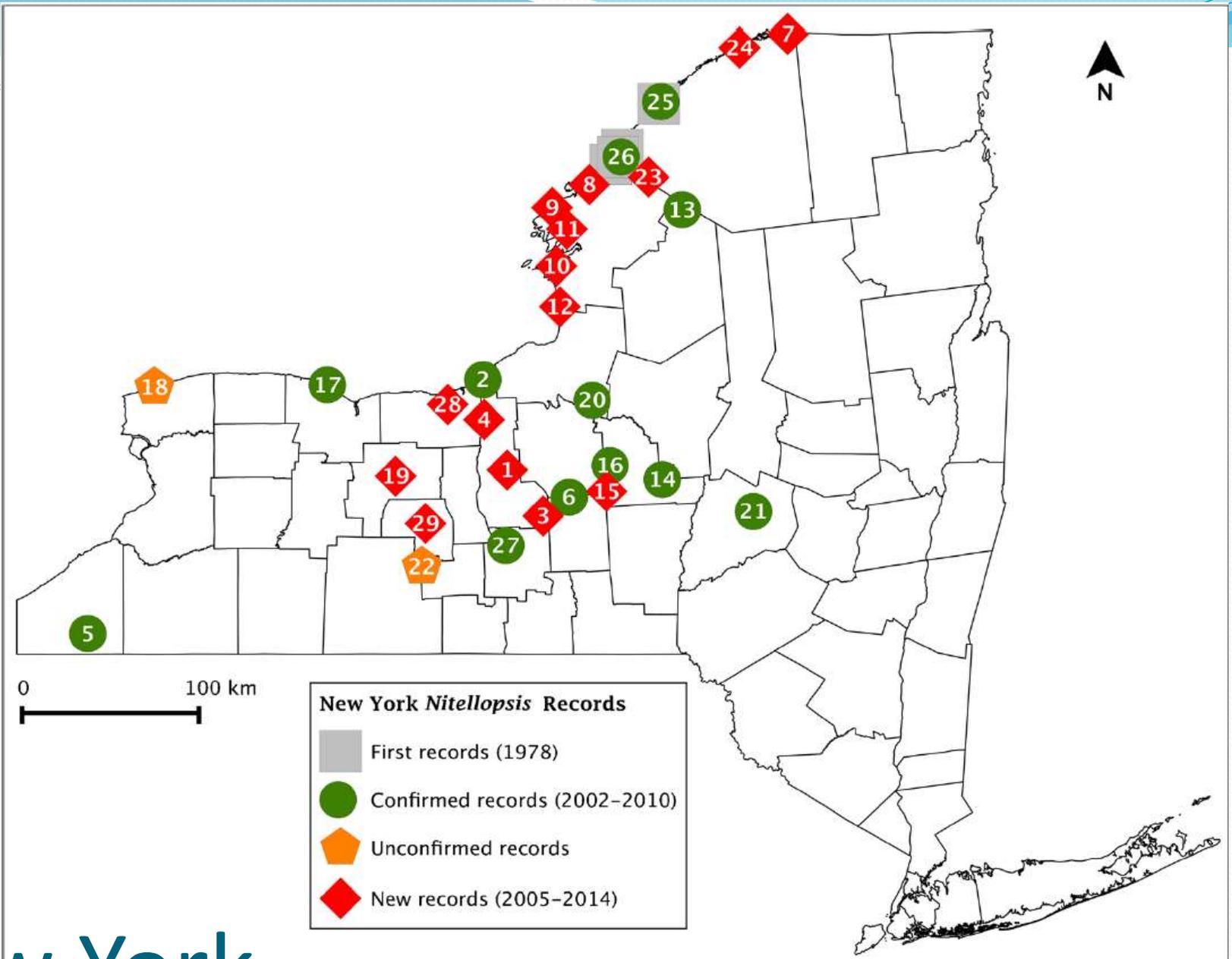


Known infestations in other States

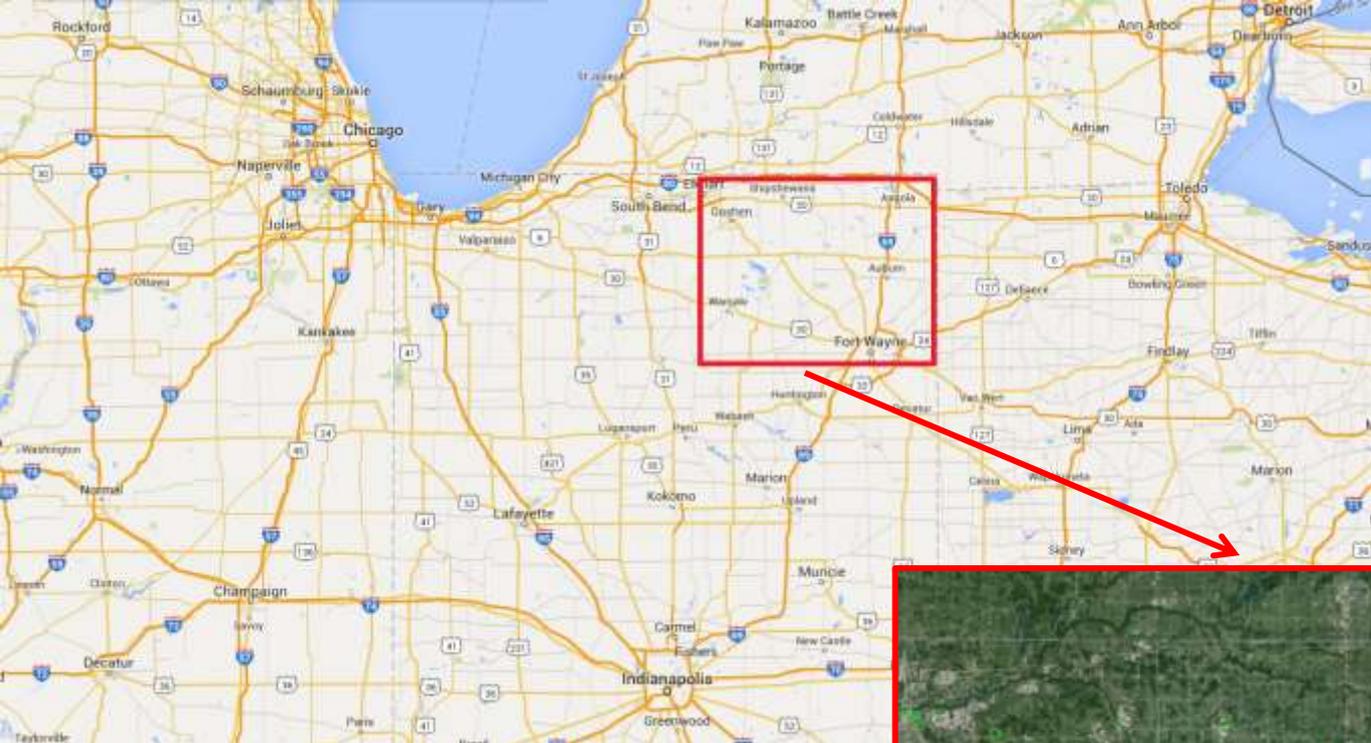
Michigan

Near 200 lakes know to be infested



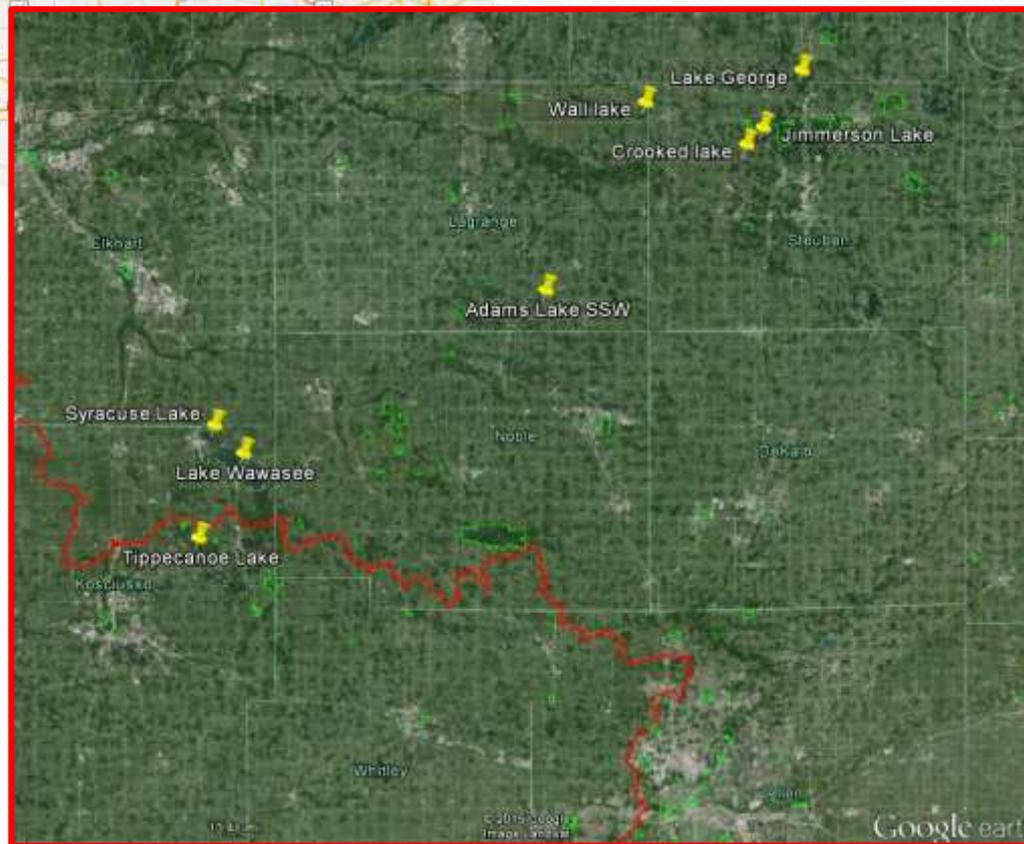


New York 29 Confirmed locations



Indiana

Currently 8 Lakes
with known
infestations



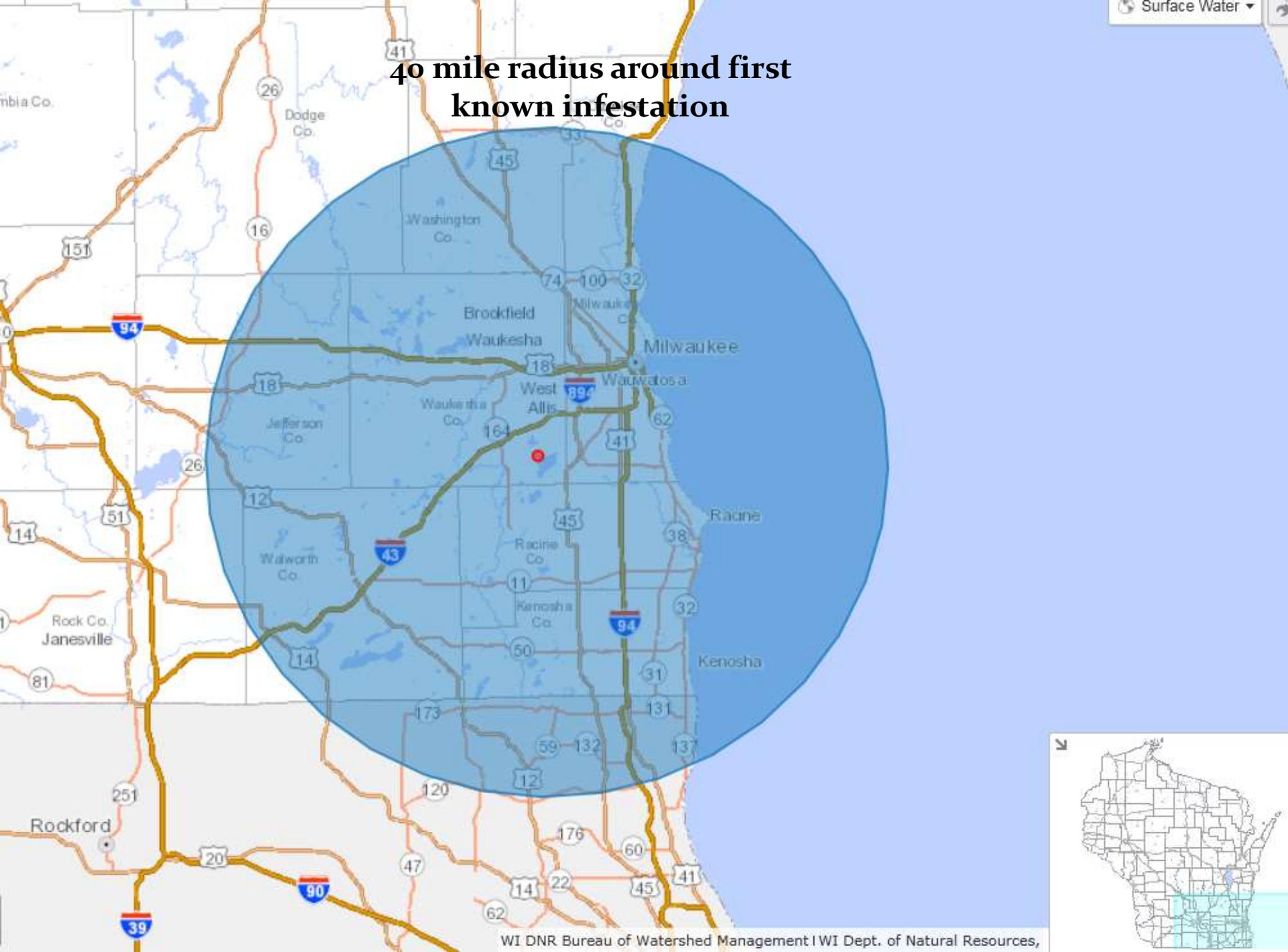
Monitoring

- Survey method-
 - Aquatic Invasive Species statewide Early Detection project protocol
- Slowly meander the entire shoreline, actively looking and dipping plant rakes
- Target Chara beds, boat landings, private landings for more intensive searching; snorkeling the target sites whenever possible

Monitoring

- Started with searching lakes within the immediate area of initial infestation (~7 mile radius around Little Muskego Lake).....then we found more
- Place **40** mile radius all around likely epicenter
- Include all lakes **>200** acres with public access

**40 mile radius around first
known infestation**



Monitoring

- **Large list**, (all 200+ac. lakes w/in 40 mi. radius)=
40+lakes
- Prioritized list for 2015
- Prioritize search by:
 - Is Chara a dominant species?
 - Are there multiple landings?
 - Is there respectively high recreational use?

Monitoring

- Started looking in late-Spring of 2015
- So far, 11 lakes searched specifically for Starry stonewort...
- We will continue to search for possible infestations
- Currently using prioritized list then moving to larger list of lakes

Surveying as many lakes as possible this growing season with the help of DNR staff, other professional staff & citizen lake monitors

11 lakes monitored for Starry stonewort

Upper Nemahbin, Wauk. Co.
Lower Nemahbin, Wauk. Co.
Nagawicka Lake, Wauk. Co.
Pewaukee Lake, Wauk. Co.
Little Muskego Lake, Wauk. Co.
Lake Denoon, Wauk. Co.
Waubeesee Lake, Racine Co.
Long Lake, Racine, Co.
Wind Lake, Racine, Co.
Browns Lake, Racine Co.



Starry stonewort ID

- Some helpful characteristics to use when looking for *Nitellopsis obtusa*
 - **Squeeze test**
 - **Rough or Smooth?**
 - **Branchlet forking**

Charophytes

- **Chara**
- **Nitella**
- **Nitellopsis**
- Tolypella
- Lychnothamnus



Globular stonewort
Chara globularis
© Paul Skawinski 2012



Common stonewort
Chara corallina
© Paul Skawinski 2012



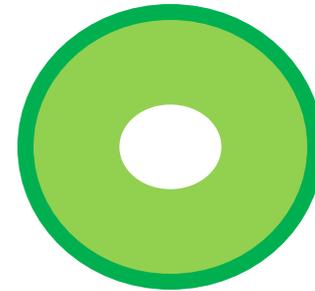


Starry stonewort
Nitellopsis obtusa
Paul Skawinski, UWEX Lakes

1. Squeeze Test



Common Chara response

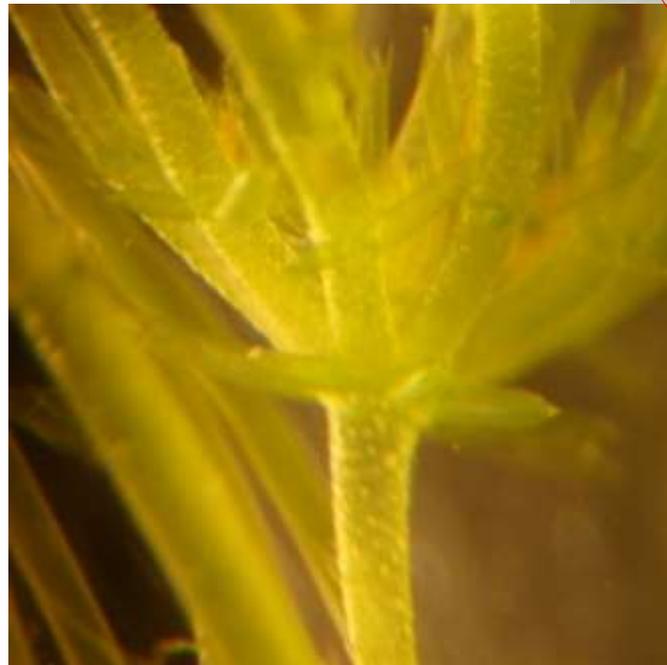


Starry and Nitella response

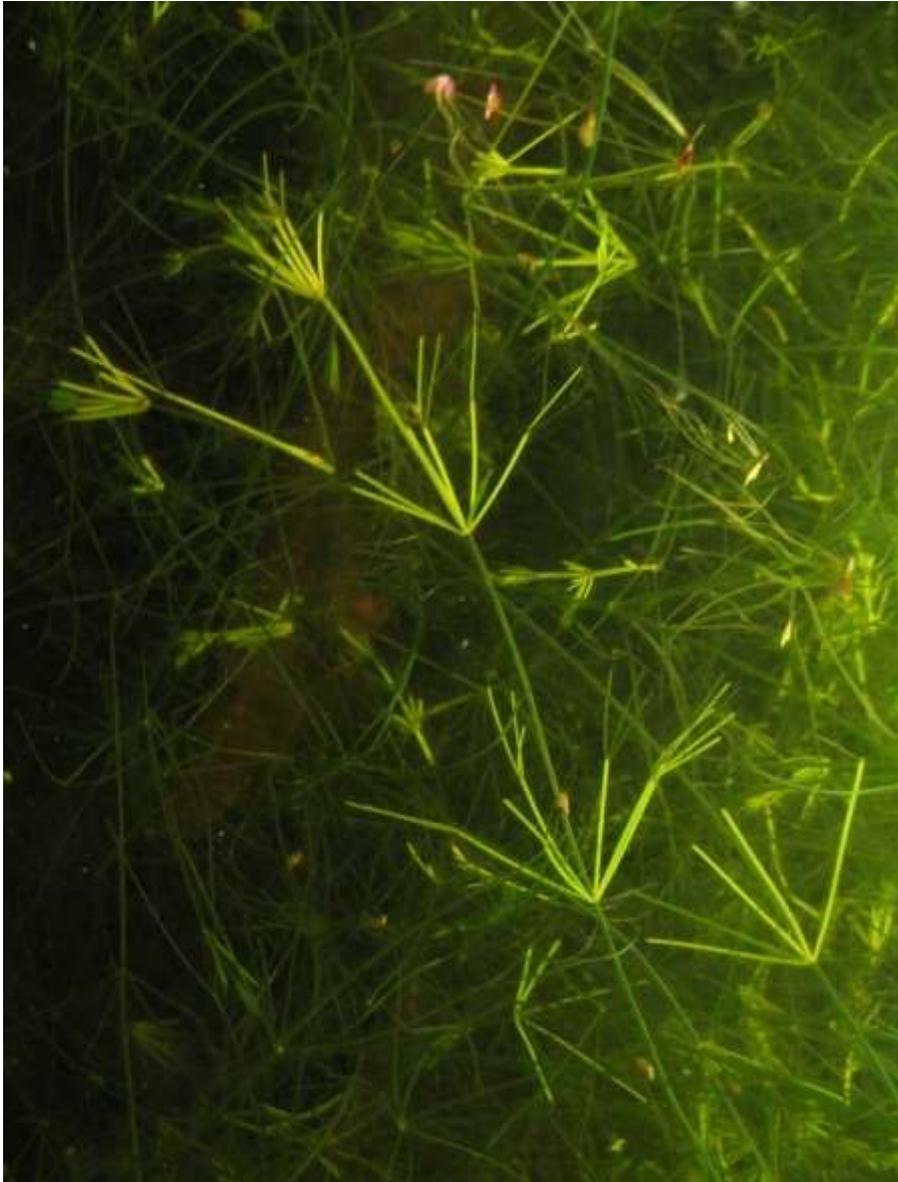


Most Chara will hold it's shape well after you pinch the stem in half. Nitella, Nitellopsis and a few others will not hold the shape and squish all green material out.

2. Rough or Smooth stems and branchlets?

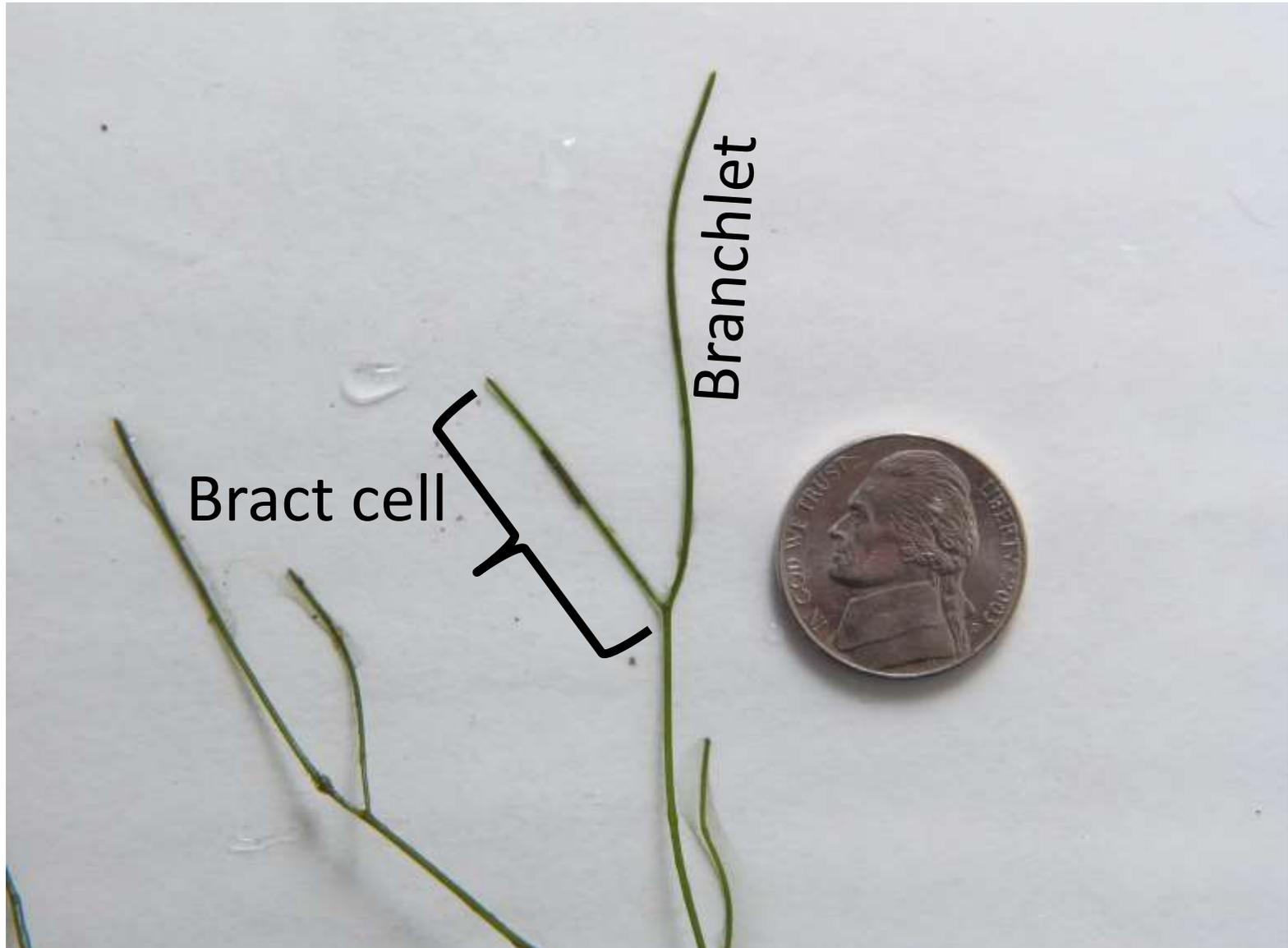


3. Branching/ forking in Nitella



Nitella will fork on many of the branchlet ends. Nitellopsis (starry) will occasionally look like it is branching but, it is not branching evenly.

Starry stonewort (*Nitellopsis obtusa*)



Starry stonewort (*Nitellopsis obtusa*)



Starry stonewort (*Nitellopsis obtusa*)

Bulbils



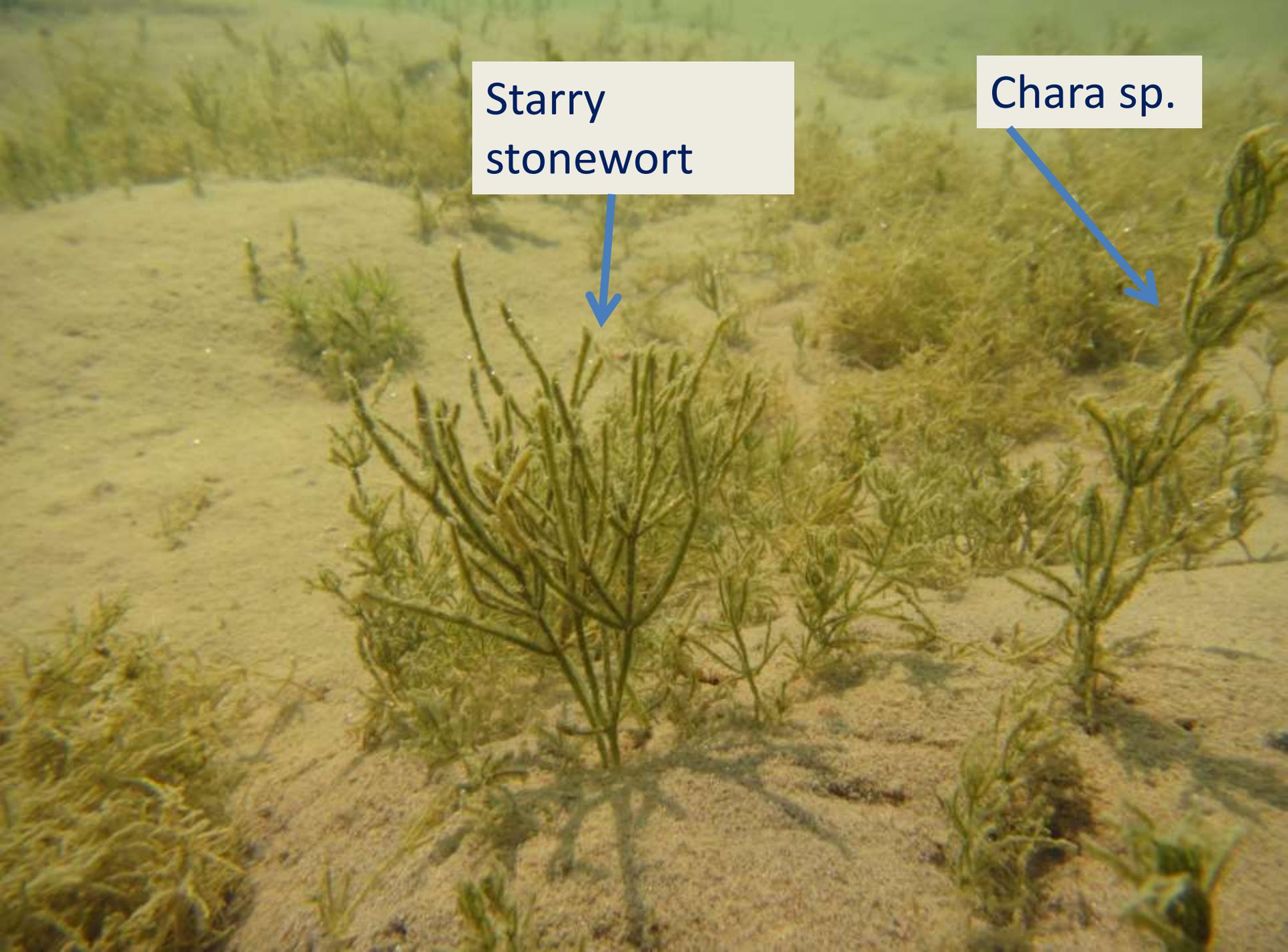
Starry stonewort (*Nitellopsis obtusa*)



Starry
stonewort



Chara sp.





Starry stonewort
Nitellopsis obtusa
Paul Skawinski, UWEX Lakes

Thanks

Tim Plude

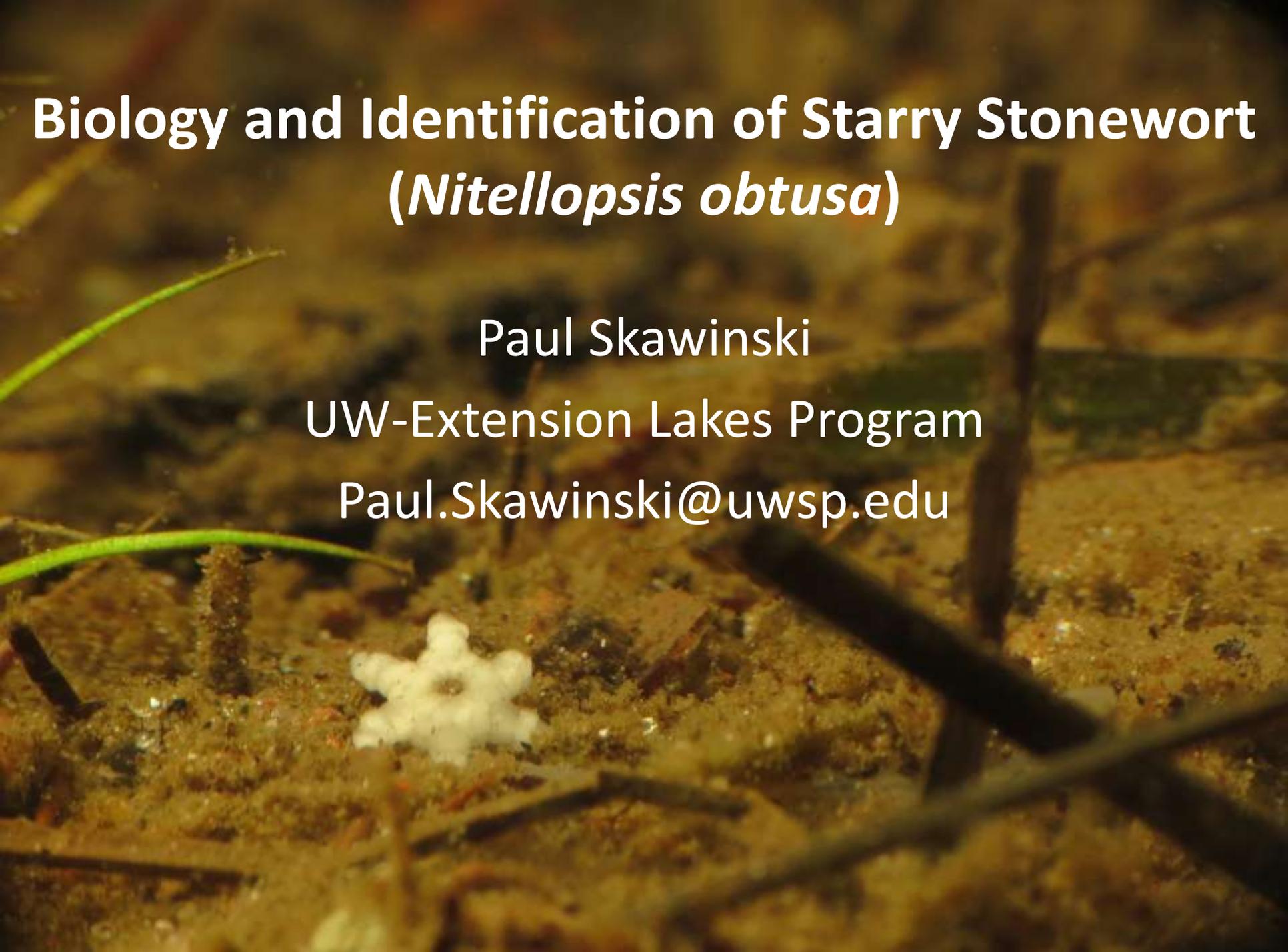
Southern Lake Michigan Basin Aquatic Invasive Species
Rapid Response Coordinator

1155 Pilgrim Rd.

Plymouth, WI 53073

Timothy.plude@wisconsin.gov

920-893-8552

An underwater photograph showing a starry stonewort (Nitellopsis obtusa) growing on a sandy bottom. The plant is a small, white, star-shaped organism with six distinct arms. It is surrounded by dark, woody debris and other aquatic plants. The background is a murky, brownish water column.

Biology and Identification of Starry Stonewort (*Nitellopsis obtusa*)

Paul Skawinski

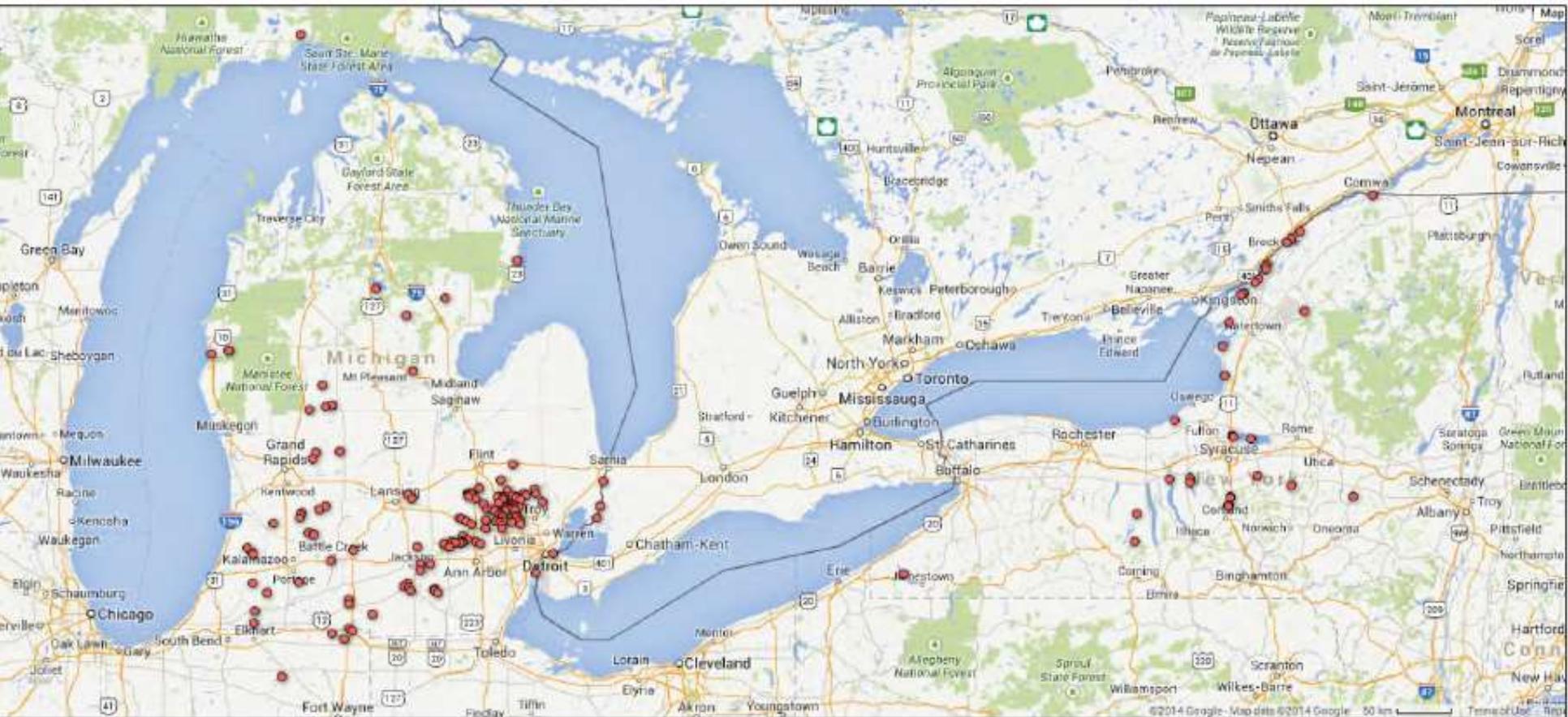
UW-Extension Lakes Program

Paul.Skawinski@uwsp.edu

Origin

- Native to Europe and Asia
- Documented in St. Lawrence River in 1978
- Documented in Lake St. Clair in Michigan in 1983.
- Documented in inland Michigan lakes in 2000.
- Found in Waukesha County, WI in Sept. 2014.

Characeae distribution – *Nitellopsis*



Dispersal

- Probably moved by boats, trailers, anchors (NOT waterfowl)
- Only male starry stonewort has been found in North America. No sexual reproduction (seeds)





Identification

- Related to many native macro-algae in Wisconsin
 - *Chara* (10+ species)
 - *Nitella* (9+ species)
 - *Tolypella* (2 species)
 - *Lychnothamnus* (1 species)
- All tend to improve water clarity and quality



Identification

HUGE compared to most of its native relatives

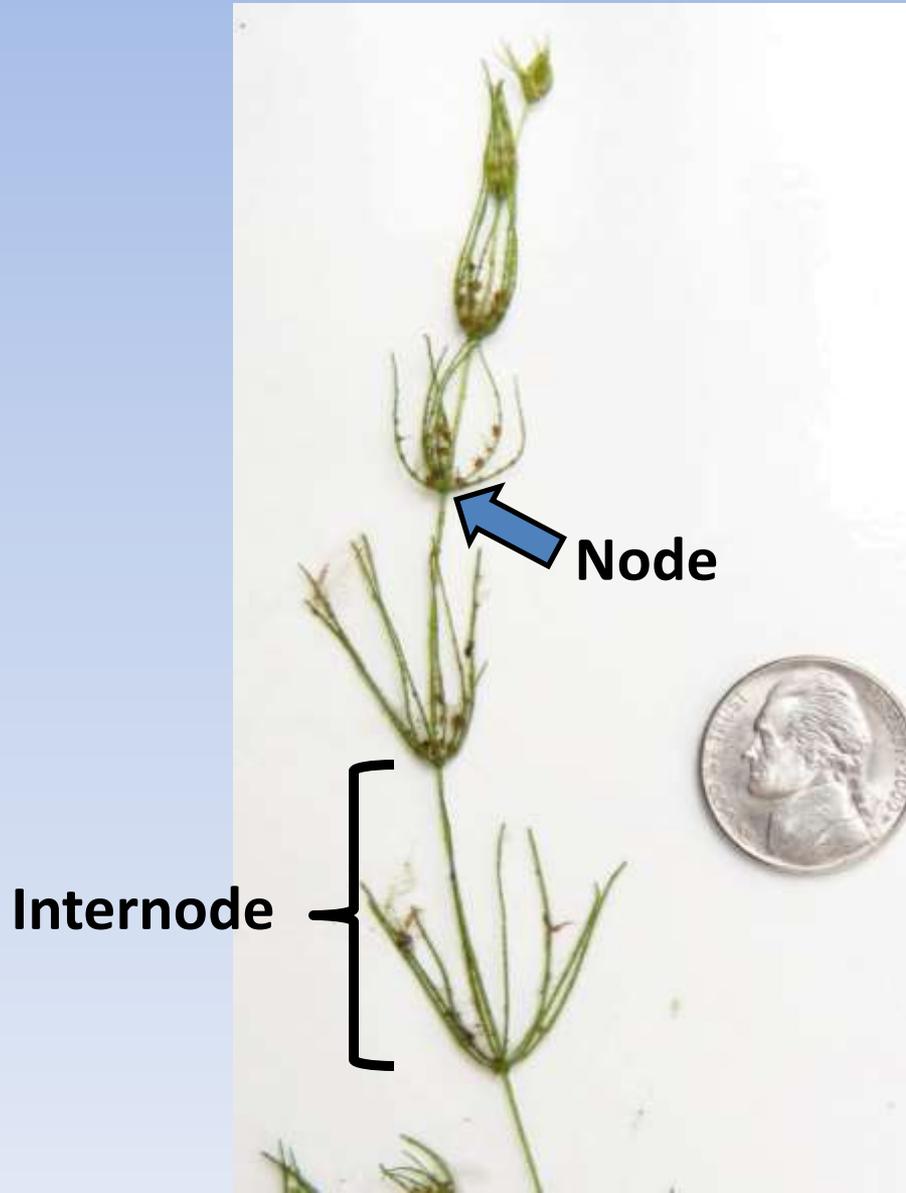
Starry stonewort

Nitellopsis obtusa

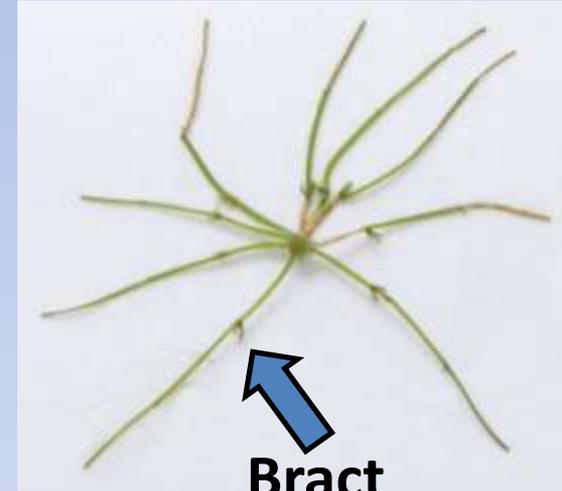
Chara contraria *Chara globularis* *Nitella flexilis*



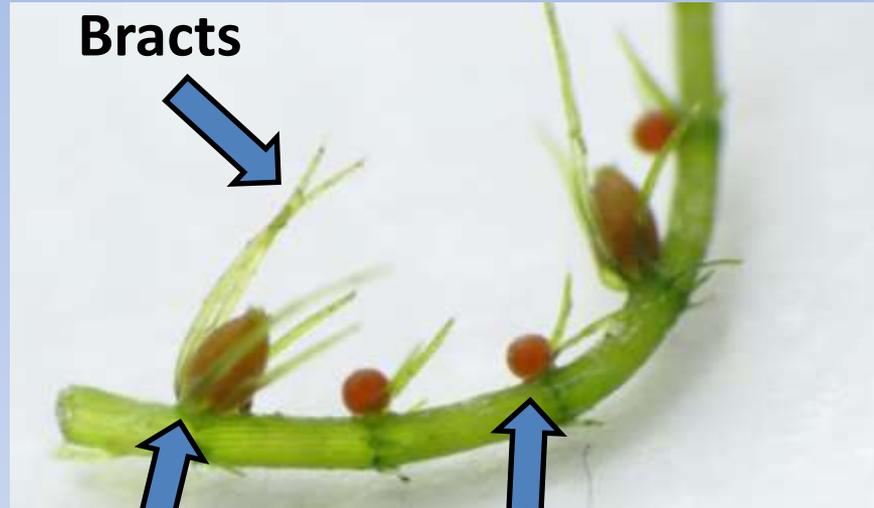
Identification – basic body plan



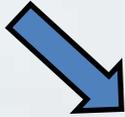
Whorl of branchlets



Identification – basic body plan



Bracts



**Oogonium
(female)**



**Antheridium
(male)**



**Oogonium
(female)**

**Antheridium
(male)**



Identification – basic body plan

If you see/feel these long cells on the stem, it is NOT starry stonewort



Chara contraria

Identification

Starry stonewort
Nitellopsis obtusa



**Branchlet has a short
bract coming off the
right side**

Nitella mucronata



**Branchlet divides into
equal-length parts**

Identification

- Bulbils
- Most macro-algae do NOT produce bulbils.



Chara aspera

Identification

- Bulbils produce clones of the parent
- Most macro-algae do NOT produce bulbils.



Chara aspera



Nitellopsis obtusa (starry stonewort)

Identification

- Bulbils produce clones of the parent
- Most macro-algae do NOT produce bulbils.



Nitellopsis obtusa (starry stonewort)

Identification

Horned pondweed
(*Zannichellia palustris*)

vs.

Starry stonewort
(*Nitellopsis obtusa*)

NATIVE



Identification

Sago pondweed
(*Stuckenia pectinata*)

vs.

Starry stonewort
(*Nitellopsis obtusa*)

NATIVE



Wisconsin's Citizen Lake Monitoring Network



The screenshot shows the University of Wisconsin Stevens Point website. The header includes the university name, navigation links (Giving, Directory, Site Index, myPoint, D2L, Web Email), a search bar, and a 'Sign In' button. Below the header is a purple navigation bar with links for Admissions, Academics, Athletics, Alumni, Campus Life, and Community. The main content area features a banner for 'UW-Extension Lakes' with the text 'College of Natural Resources' and a large 'LAKE S' graphic. A sidebar on the left contains a menu with items like 'About UWEX Lakes', 'Events', 'Lake Organization Search', 'Clean Boats Clean Waters', 'Citizen Lake Monitoring Network', 'Lake Leaders', 'Bookstore', 'Newsletter', and 'Resources'. The main content area displays the 'Citizen Lake Monitoring Network' logo, a list of buttons for 'Get Involved', 'Monitoring types', 'Using the data', 'Submit Data', 'Forms', 'Resources', and 'CLMN Newsletter', and a photograph of three people in a boat on a lake. Below the photo is the text 'Monitoring - another excuse to be on the lake!'.

1000+ active citizens

Monitoring changes in water clarity, water chemistry, aquatic plant communities, aquatic invasive species, duration of ice cover, lake levels

Wisconsin's Citizen Lake Monitoring Network



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LAKES
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- About UWEX Lakes
- Events
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- Clean Boats Clean Waters
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- Newsletter
- Resources



Aquatic Invasive Species Monitoring

- CLMN home
- How-to video
- Training Manual
- Forms
- Resources
- Submit Data
- Get Involved



Eurasian Watermilfoil/Rusty Crayfish

Aquatic invasive species (AIS) monitors

- Familiarize themselves with identification of AIS

Wisconsin's Citizen Lake Monitoring Network



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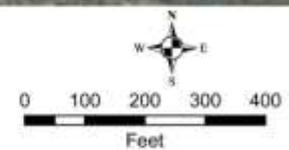
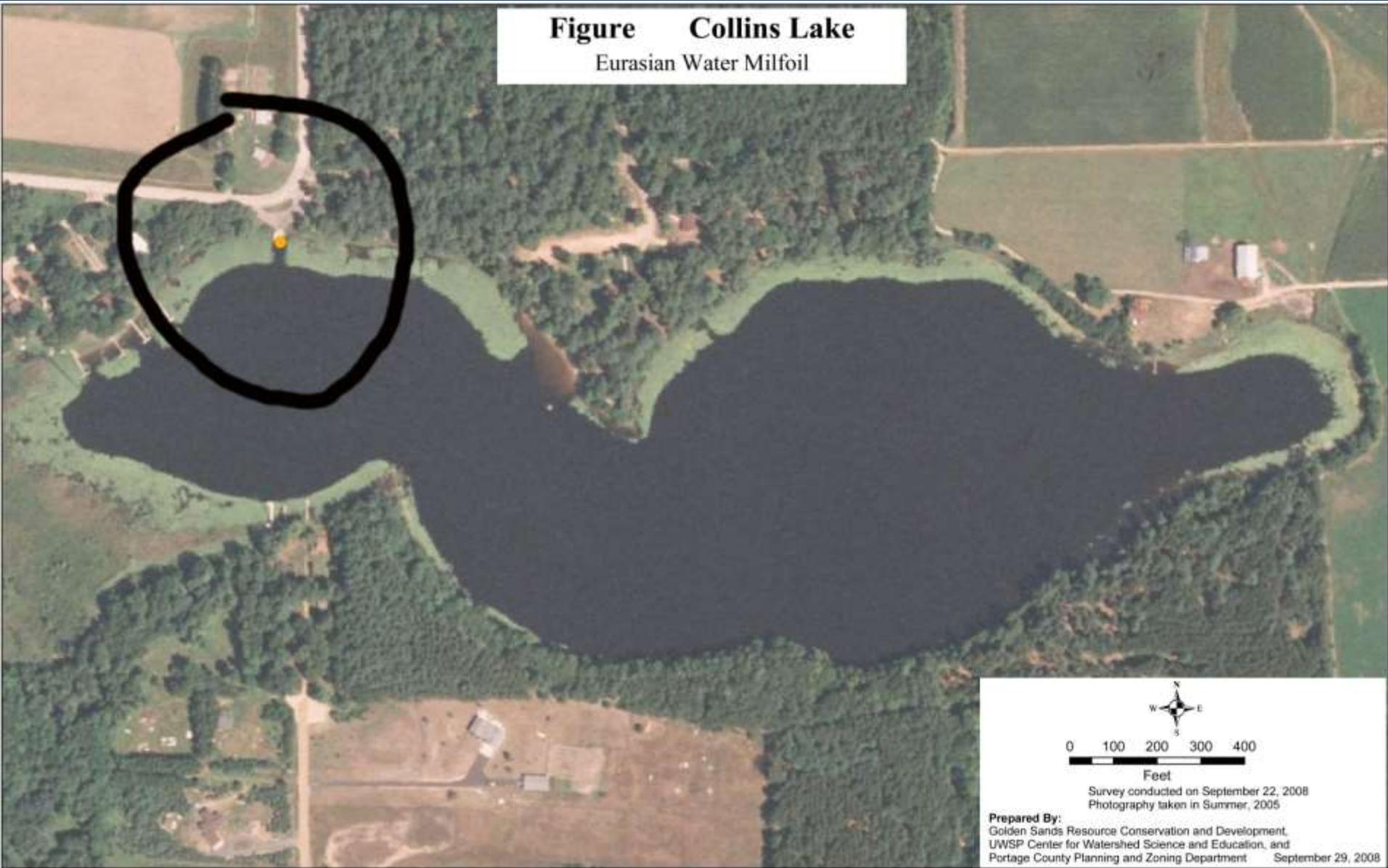
Eurasian Watermilfoil/Rusty Crayfish

Aquatic invasive species (AIS) monitors
- Search areas of likely introduction

Where should I look for Eurasian watermilfoil?



Figure Collins Lake
Eurasian Water Milfoil



Survey conducted on September 22, 2008
Photography taken in Summer, 2005

Prepared By:
Golden Sands Resource Conservation and Development,
UWSP Center for Watershed Science and Education, and
Portage County Planning and Zoning Department September 29, 2008

Figure Lime Lake
Eurasian Water Milfoil



Prepared By:
Golden Sands Resource Conservation and Development,
UWSP Center for Watershed Science and Education, and
Portage County Planning and Zoning Department September 29, 2008

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Eurasian Watermilfoil/Rusty Crayfish

Aquatic invasive species (AIS) monitors

- Detect species early so that management can be initiated quickly and inexpensively

Wisconsin's Citizen Lake Monitoring Network



AIS fact sheets

[Asian clam \(*Corbicula fluminea*\)](#)

[Banded mystery snail \(*Viviparus georgianus*\)](#)

[Big-eared Radix \(*Radix auricularia*\)](#)

[Brittle naiad \(*Najas minor*\)](#)

[Chinese mystery snail \(*Cipangopaludina chinensis*\)](#)

[Curly-leaf pondweed \(*Potamogeton crispus*\)](#)

[Eurasian watermilfoil \(*Myriophyllum spicatum*\)](#)

[Faucet snail \(*Bithynia tentaculata*\)](#)

[Flowering rush \(*Butomus umbellatus*\)](#)

[Hydrilla \(*Hydrilla verticillata*\)](#)

[Japanese knotweed \(*Fallopia japonica*\)](#)

[New Zealand mudsnail \(*Potamopyrgus antipodarum*\)](#)

[Phragmites a.k.a. common reed \(*Phragmites australis*\)](#)

[Purple loosestrife \(*Lythrum salicaria*\)](#)

[Rusty crayfish \(*Orconectes rusticus*\)](#)

[Starry stonewort \(*Nitellopsis obtusa*\)](#)

[Water chestnut \(*Trapa natans*\)](#)

[Yellow floating heart \(*Nymphoides peltata*\)](#)

[Yellow Iris \(*Iris pseudacorus*\)](#)

[Zebra mussel \(*Dreissena polymorpha*\)](#)



Free 1-page printable PDFs on 20 AIS of concern for Wisconsin

Wisconsin's Citizen Lake Monitoring Network



Aquatic Invasive Species Monitoring Resources



Aquatic Invasive Species: A Guide for Proactive and Reactive Management ([Vilas County](#))

[Aquatic Invasive Species Publications listing](#)



[Through the Looking Glass: A Field Guide to Aquatic Plants](#) (Second edition released in 2014)

This delightful, large-format field guide to aquatic plants in North America is accessible and inviting to general readers, yet detailed enough for use by botanists and natural resource managers.



[Aquatic Plants of the Upper Midwest](#) (Second edition released in 2014)

This full-color, spiral-bound, photographic guide walks the reader through how to identify all 152 submergent and floating species of aquatic plants in the Upper Midwest, including the difficult macro-algae (*Chara*, *Nitella*, etc.). The second edition features about 30 additional species, a large section on possible future aquatic invasive plant species, several new botanical keys, a new UV-cured coating on all pages to resist water damage, and more.



[Lake Plants You Should Know: A Visual Field Guide](#)

Spiral bound and laminated, this beautiful guide includes 22 plant species both native and non-native that every lake lover should know. The guide boasts crystal clear scanned images of actual pressed plants and very descriptive narrative for easy identification.

AIS fact sheets

Free 1-page printable PDFs on 20 AIS of concern for Wisconsin



Clean Boats, Clean Waters Watercraft Inspection

- Trains volunteers, citizens, & staff to conduct boater education campaigns in their local communities
- Over 3,000 people trained since 2004
- Began as grassroots effort in northern WI



Credit: Bob McVety

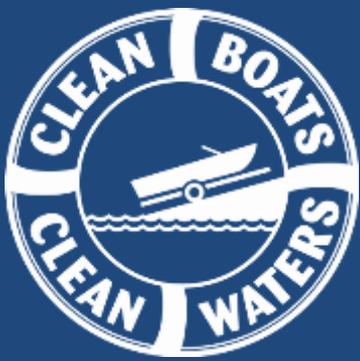


Clean Boats, Clean Waters Watercraft Inspection

What do CBCW inspections involve?

- **Educating** landing visitors on how to prevent spread of AIS & discussing AIS laws
- **Engaging** visitors in taking steps
- **Collecting & reporting** some data





Clean Boats, Clean Waters Watercraft Inspection

Why watercraft inspection?

- ✓ Most cost effective prevention (& containment) effort
- ✓ Visual inspection removes plants as effectively as washing & >90% effective in removing small-bodied organisms when combined with washing
(Rothlisberger, et al. Fisheries, 2010)
- ✓ Learn about boater awareness of AIS on your lake
- ✓ Provides opportunity to take action! Get involved!



Clean Boats, Clean Waters Watercraft Inspection

- Grant funding available for CBCW
 - State funds 75% project
 - 200 hr/landing annual requirement
- CBCW also built into other AIS grant categories
- AIS staff available to conduct trainings & support your efforts!

Bradley Steckart, AIS Coordinator, 262-335-4806

Heidi Bunk, DNR Lake Coordinator, 262-574-2130

Erin McFarlane, CBCW Educator, 715-346-4978



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Paul Skawinski, CLMN Coordinator

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www.uwsp.edu/cnr/uwexplakes/clmn

Wisconsin Lake and River Grants

December 10th - Planning

- Lake Management Planning
 - Small Scale
 - Large Scale
- Lake Classification & Ordinance Development
- Aquatic Invasive Species (AIS)
 - Education, Prevention, & Planning
 - Clean Boats Clean Waters
- River Planning

YEAR-ROUND

- AIS Early Detection & Response
- AIS Maintenance & Containment

FEBRUARY 1 - Management

- Lake Protection
 - Land/Easement Acquisition
 - Wetland & Shoreline Habitat Restoration
 - Lake Management Plan Implementation
 - Healthy Lakes Project
- AIS Established Population Control
- River Protection
 - River Management
 - Land/Easement Acquisition

WDNR 2015 Surface Water Grants

Grant Type	# Grants	Amount Awarded
Lake Planning	36	\$481,085.73
Lake Classification & Ordinance Development	5	\$222,204.19
Lake Management Plan Implementation	7	\$590,783.28
Lake Land/Easement Acquisition	3	\$296,546.00
Wetland/Shoreline Habitat Restoration	4	\$382,846.55
Healthy Lakes	11	\$81,540.54
AIS Rapid Response	14	\$229,713.79
AIS Education, Prevention, and Planning	18	\$1,094,020.26
Clean Boats, Clean Water	102	\$571,080.01
AIS Established Population Control	22	\$1,547,844.10
AIS Research	3	\$309,922.95
River Planning	17	151,129.25
River Protection	3	\$133,918.14
All	245	\$6,092,634.79

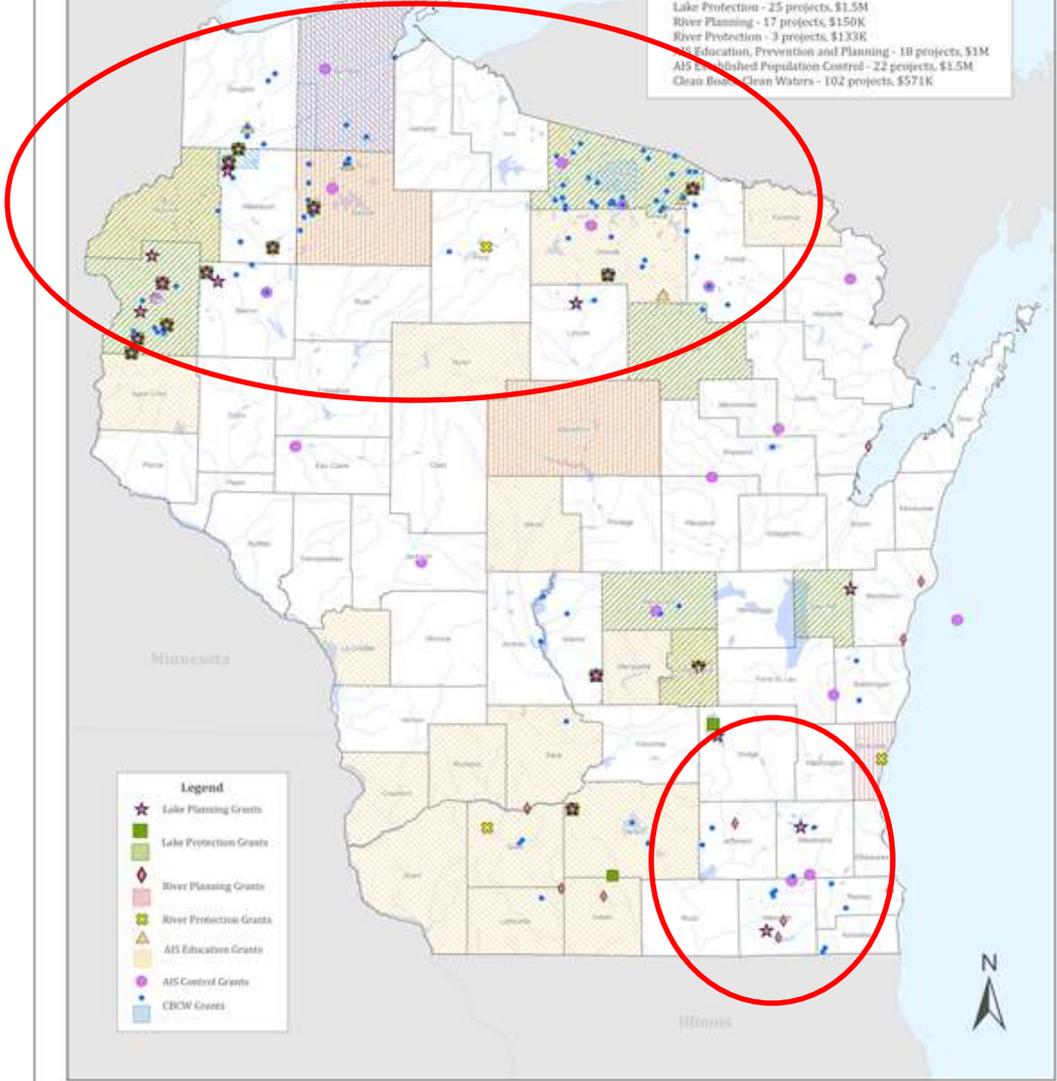
2015 WDNR Surface Water Grants

2015 Surface Water Grants

\$5.2 million awarded to 228 groups in 47 counties

Lake Planning - 36 projects, \$475K
Lake Protection - 25 projects, \$1.5M
River Planning - 17 projects, \$150K
River Protection - 3 projects, \$133K
AIS Education, Prevention and Planning - 18 projects, \$1M
AIS Established Population Control - 22 projects, \$3.5M
Clean Boats, Clean Waters - 102 projects, \$571K

- Legend**
- ★ Lake Planning Grants
 - Lake Protection Grants
 - ◆ River Planning Grants
 - River Protection Grants
 - ▲ AIS Education Grants
 - AIS Control Grants
 - CBCW Grants



Suggested Surface Water Grant Timeline (for Grants due December 10):

June/July	Meet with your Lake/River Group to brainstorm potential grant project
October	Meet with your DNR Regional Lake/River/AIS Biologist PDF] to discuss project idea
October (or before)	Identify project partners and meet with them to discuss partnership opportunities (in-kind donation of cash, volunteer time, etc)
November (at the latest)	Complete draft grant application [PDF] and submit to DNR Regional Lake/River/AIS Biologist and/or Environmental Grant Specialist for review
December	Email completed grant application and attachments to DNR Surface Water Grants

Grant Contacts in SER

- Walt Ebersohl, Environmental Grants Specialist, 414.263.8569
- Heidi Bunk, Lakes Biologist, 262.574.2130
- <http://dnr.wi.gov/aid/surfacewater.html>

December 10th - Planning

- Lake Management Planning
 - Small Scale
 - Large Scale
- Lake Classification & Ordinance Development
- Aquatic Invasive Species (AIS)
 - Education, Prevention, & Planning
 - Clean Boats Clean Waters
- River Planning

YEAR-ROUND

- AIS Early Detection & Response
- AIS Maintenance & Containment

FEBRUARY 1 - Management

- Lake Protection
 - Land/Easement Acquisition
 - Wetland & Shoreline Habitat Restoration
 - Lake Management Plan Implementation
 - Healthy Lakes Project
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- River Protection
 - River Management
 - Land/Easement Acquisition

Questions

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Public Informational Meeting