

Monitoring and response following the discovery of starry stonewort (*Nitellopsis obtusa*) in Wisconsin

Illinois Lake Management Association Conference

March 22-24, 2018

Bloomington, IL

Michelle Nault

AIS Monitoring & Response Specialist

Wisconsin Department of Natural Resources



Photo: Paul Skawinski

What is starry stonewort?

- Starry stonewort (*Nitellopsis obtusa*) is a member of the Characeae family.
- Characeae are green algae that can range in size from centimeters to meters, and are found throughout the world.
- Not a vascular plant like most our aquatic plant species.



Native Range

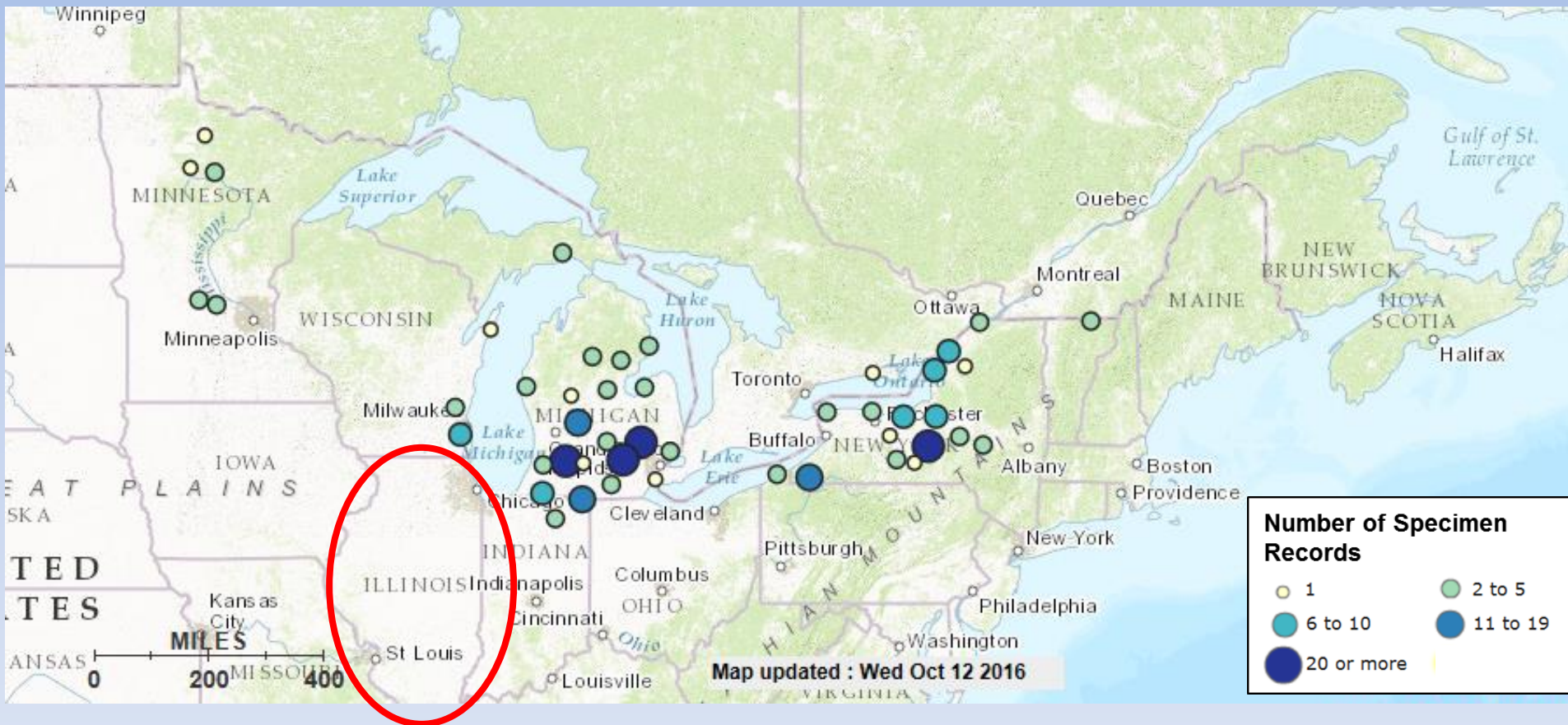
- Native to Europe and Asia
- Endangered species in the United Kingdom and Japan



Non-Native Range

- First documented in St. Lawrence River in 1970s; likely transported via international ballast water
- Documented in lower Michigan inland lakes in the mid-2000s.
- First documented in southeast Wisconsin (Waukesha Co.) in September 2014.
- Currently known from Indiana, Michigan (Lower), Minnesota, New York, Ohio, Pennsylvania, Vermont, Wisconsin, and Ontario, Canada.

Starry stonewort distribution

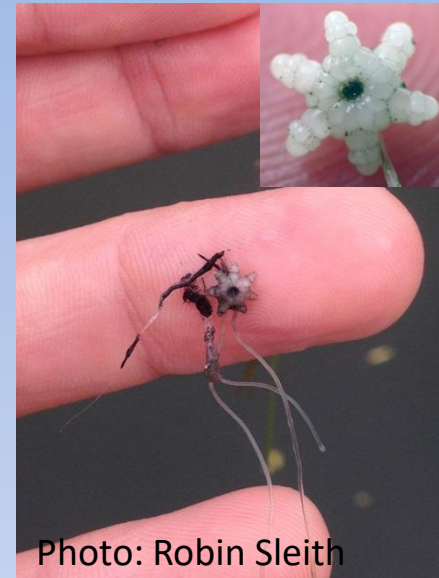


Ecology & Habitat

- Macroalgae species that can grow up to ~7 ft tall
- Anchored to the sediments with clear filaments called rhizoids, which resemble fishing line
- Can persist under the ice in St. Lawrence River
- In Detroit River, first appears in July with peak biomass in September, and declines beginning in November
- Occupies a broad range of habitats
- Occurs in lakes, ponds, and slow-moving water bodies
- Tolerant of low light conditions

Reproduction & Dispersal

- Fragmentation of the stem
- Specialized structures called bulbils
 - white, star-shaped and less than 1/3-inch (~1 cm)
- Only male starry stonewort has been found in North America
 - No sexual reproduction
- Primarily moved by boats, trailers, & anchors
- Waterfowl not believed to be source of dispersal due to lack of sexual reproduction (zygotes)



Impacts

- Impacts of starry stonewort are largely unknown – primarily anecdotal and not science based
- May outcompete native plants, alter fish spawning habitat, and become a navigational nuisance

MICHIGAN LAKE & STREAM ASSOCIATIONS, INC.

HOME

LEARN MORE ▾

MEMBERSHIP ▾

NEWS ▾

2015 ML&SA ANNUAL CONFERENCE

RESOU

Starry Stonewort Continues to Plague Michigan Inland Lakes

ember 15th, 2011 | Scott Brown |

Starry Stonewort Algae, an invasive species that spreads fast: “It’s the start of the death of a lake”

POSTED 10:02 PM, JULY 5, 2015, BY JONATHON GREGG, UPDATED AT 10:34PM, JULY 5, 2015

FACEBOOK 166

TWITTER

REDDIT

LINKEDIN

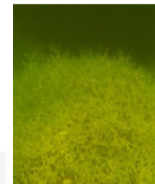
PINTEREST

EMAIL

This is an archived article and the information in the article may be outdated. Please look at the time stamp on the story to see when it was last updated.



Ashley
HOMESTORE
COLUMBUS
DAY SALE
Storewide Savings
+ Room Packages
starting at \$576



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 be 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 low areas of many inland lakes.

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.

First Discovery of SSW in Wisconsin

- WDNR staff first discovered starry stonewort in September 2014 while conducting an aquatic plant point-intercept (PI) survey out on Little Muskego Lake, Waukesha Co.
- Verified by WDNR and the New York Botanical Garden

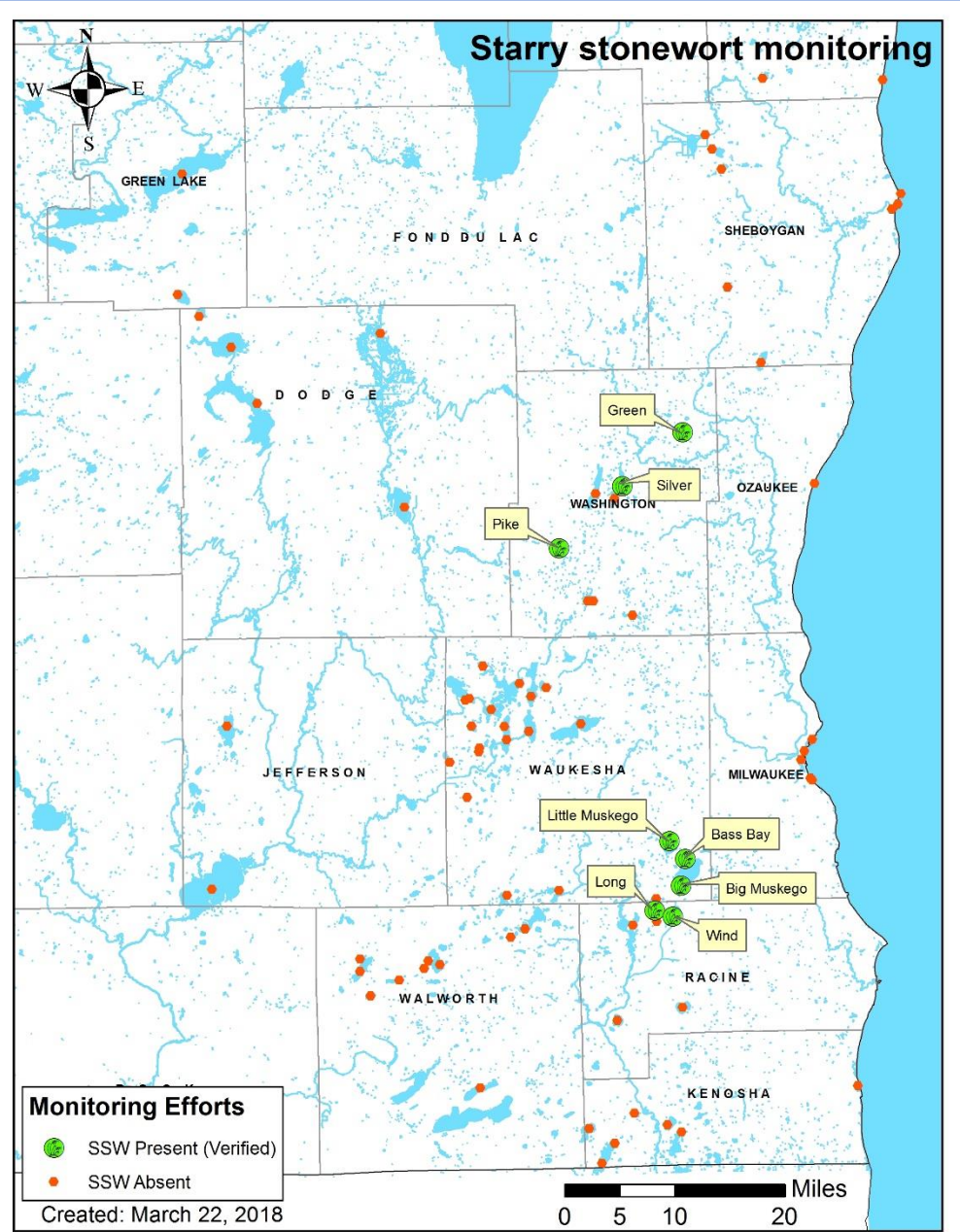


Little Muskego, Waukesha Co.

Monitoring Approach

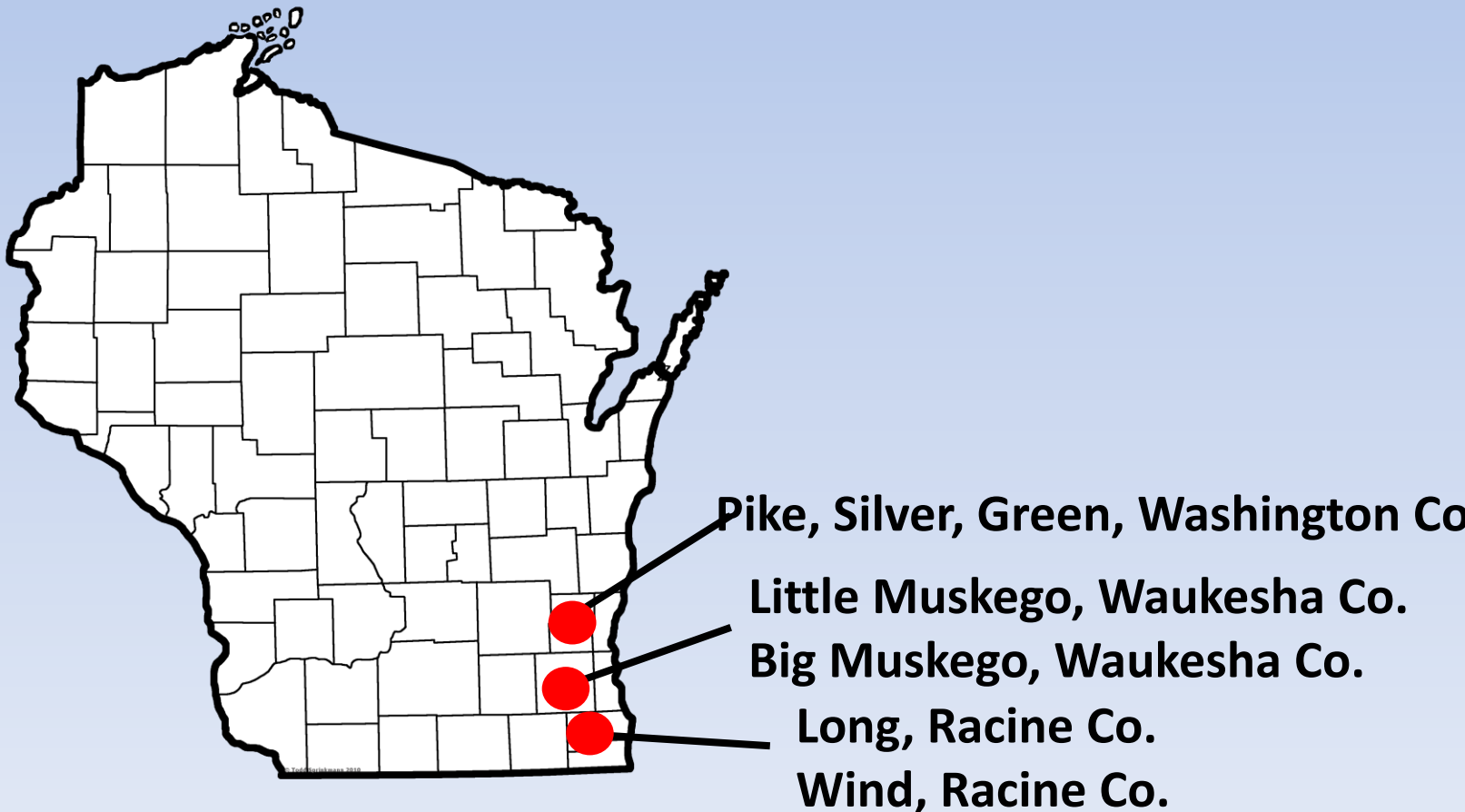
- Regional SSW Monitoring (Rapid Assessment)
 - Targeted monitoring effort in southeast WI waterbodies around Little Muskego Lake
 - Monitoring consisted of rake tosses at boat launches, shoreline meanders, snorkeling, and lakewide AIS surveys
 - Some efforts were made to prioritize surveying waterbodies based on within lake characteristics (i.e. presence of other native Characeae, hardness)

Rapid Assessment – Southeast WI



Rapid Assessment – Southeast WI

- 2014: Little Muskego
- 2015: Big Muskego (Bass Bay), Long, Pike, Silver
- 2016: Green
- 2017: Wind



First Discovery of SSW in Lake Michigan/Green Bay

- Reported to WDNR in August 2016 by a lake management consultant conducting an aquatic plant PI survey out on the Sturgeon Bay Channel (Door Co.)
- Verified by WDNR and the New York Botanical Garden



Monitoring Approach

- Regional SSW Monitoring (Rapid Assessment)
 - WDNR conducted rapid assessment of public access locations surrounding the initial report, and along the Lake Michigan/Green Bay coastlines
 - Monitoring consisted of random rake tosses via shore off piers, docks, boat launches, marinas, beaches, etc.
 - Areas monitored were limited by what could be reached via shore monitoring
 - Communicated with other DNR programs (i.e. Fisheries, Law Enforcement, etc.) and partners (i.e. USFWS, Universities, etc.) to report any SSW observed

Green Bay/Lake Michigan Distribution



Green Bay/Lake Michigan Distribution

Phenology observations:

PI survey conducted by consultant in June 2016 did not observe SSW in Sturgeon Bay channel; SSW was observed in August 2016

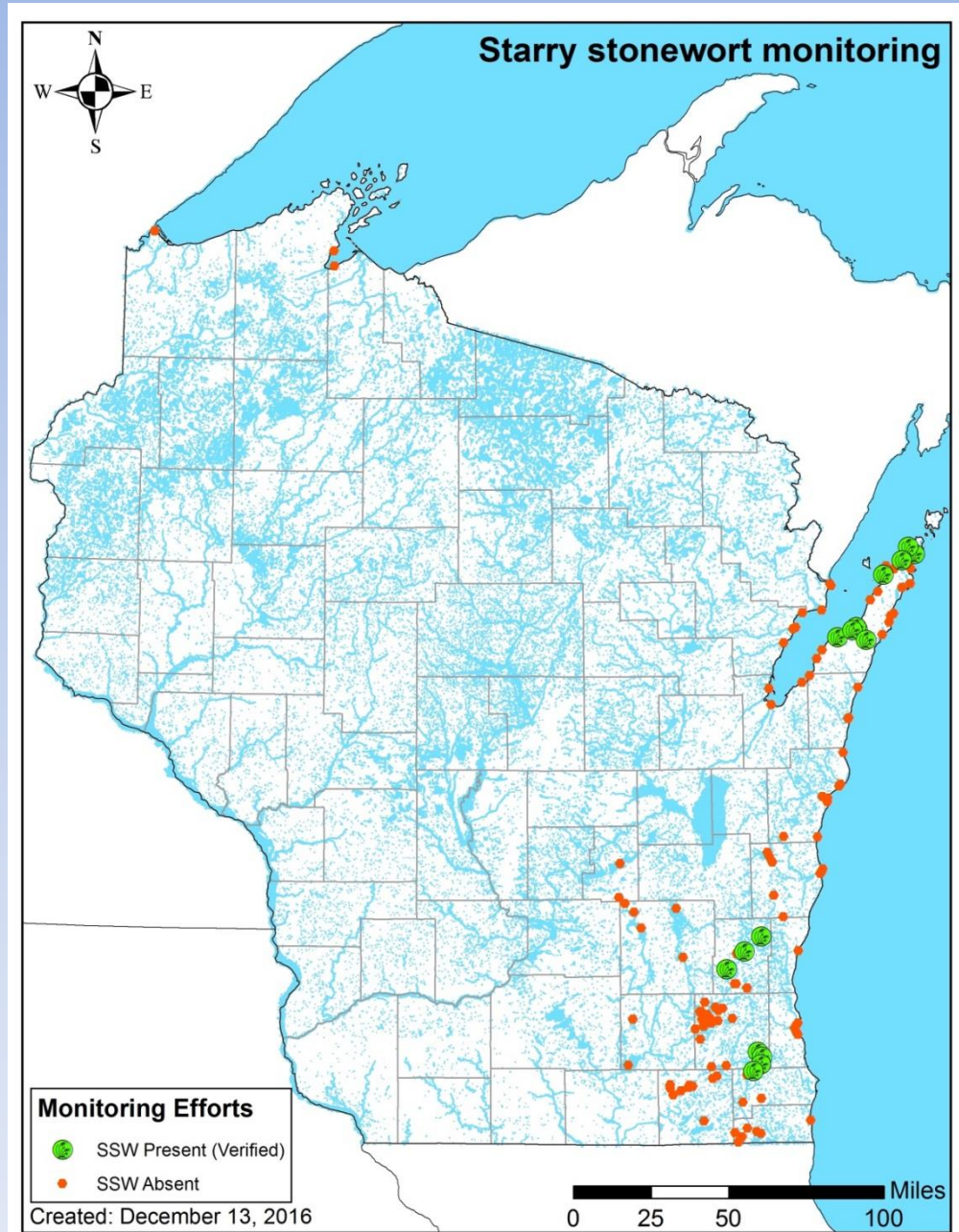
Observed to be very dominant (monoculture) in September 2016 at Little Sturgeon Bay

Observed to be sparse in mid-June (2017) at same locations

Observed to be very dominant (monoculture) in August 2017



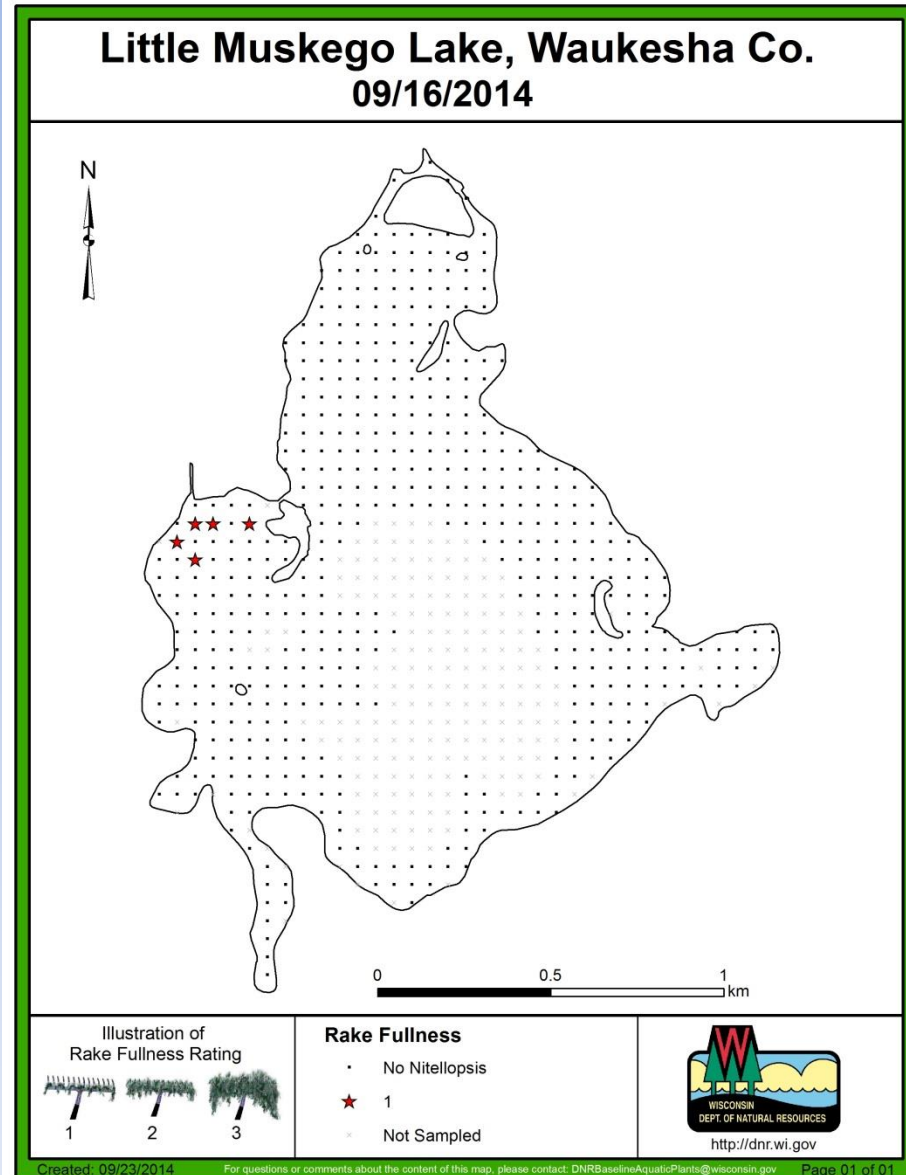
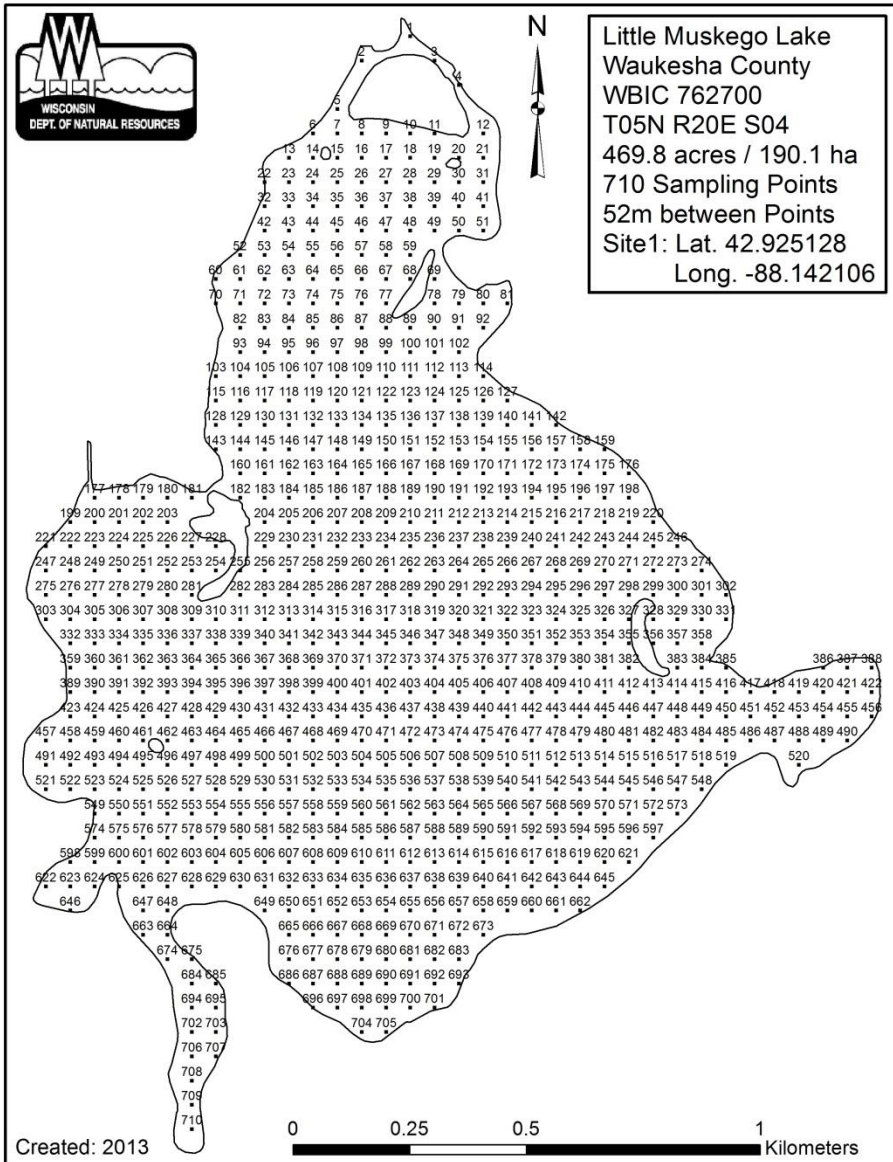
Statewide SSW Distribution



Monitoring Approach

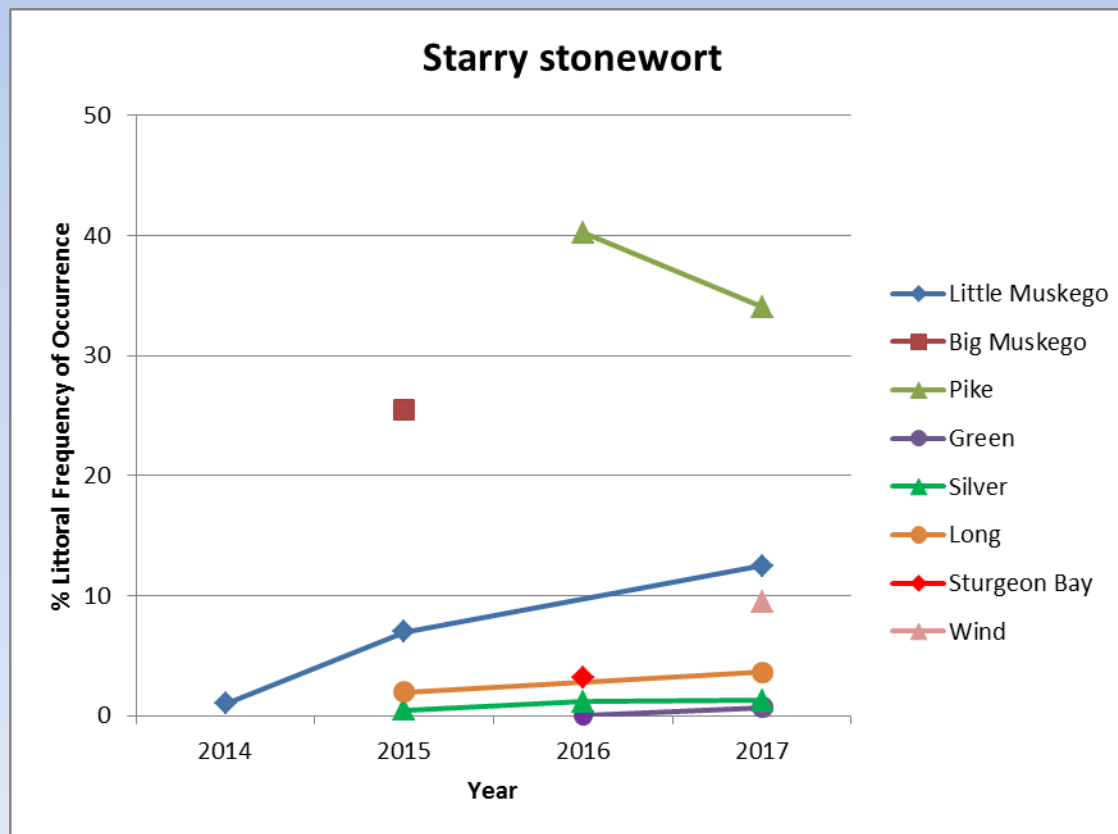
- Lakewide SSW Monitoring
 - Aquatic plant point-intercept (PI) surveys conducted on an annual basis on the majority of verified SSW lakes
 - Standardized PI methodology allows for quantitative data collection
 - PI data used to look at plant community changes over time within a lake, as well as changes amongst different lakes
 - PI methodology is relatively easy to implement and provides statistically robust geolocated data
 - Data collected on SSW as well as native plant community

Lakewide SSW Monitoring



Lakewide SSW Monitoring

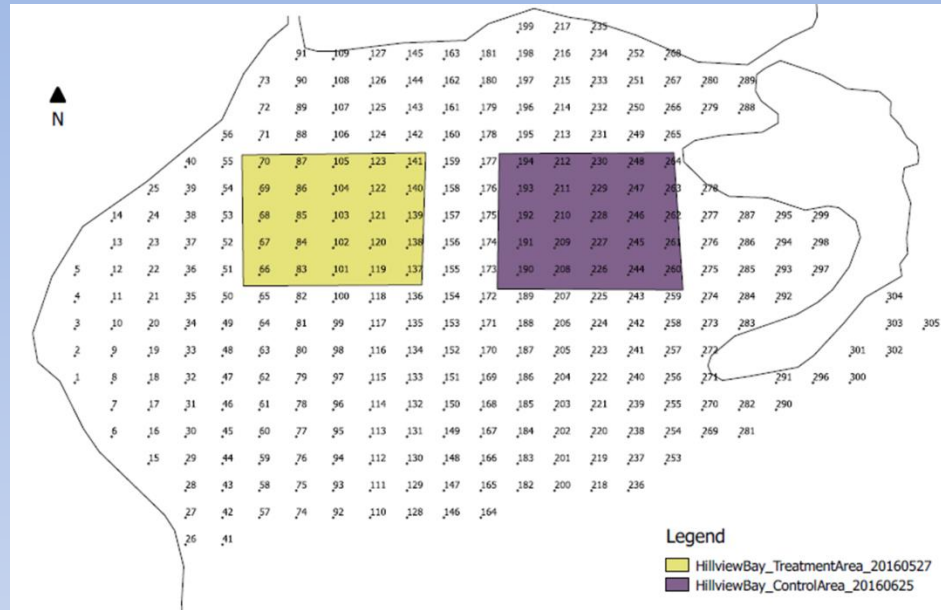
- Lakewide SSW Monitoring
 - SSW littoral % frequency of occurrence has ranged from 0 – 40%.
 - Mean: 9.5%; Median: 3.1%



Monitoring Approach

- Within Lake SSW Monitoring
 - Modified aquatic plant point-intercept (PI) surveys being conducted pre/post treatment on areas targeted for management
 - Reference plots without active management also established when feasible
 - PI data can be used to look at plant community changes over time within a treatment area, as well as changes amongst different treatments
 - Data collected on SSW as well as native plant community
 - Biomass collection also being implemented in scenarios where the PI method is not feasible

Monitoring Approach



Lake	County	Date(s) Treated	Product(s)	Rate(s)	Treatment area	% SSW Change (Pre vs. Post)*
Little Muskego	Waukesha	06/29/2016	Copper	0.5 ppm	2.4 acres	-12%
Long	Racine	06/08/2016	Copper	0.8ppm	2.7 acres	+27%
		06/29/2016	Copper + Hydrothol	0.8 ppm + 0.29 ppm	2.7 acres	
		06/16/2016	Copper + Flumioxazin	0.83 ppm + 0.15 ppm	1.0 acres	+57%
		06/26/2016	Copper + Diquat	0.83 ppm + 0.35 ppm	0.74 acres	
Big Muskego	Waukesha	09/24/2015	Copper + Hydrothol	0.8 ppm + 0.17 ppm	1.5 acres	-9%
		06/27/2016	Copper + Hydrothol	0.8 ppm + 0.17 ppm	1.5 acres	
		06/27/2016	Copper + Hydrothol	0.8 ppm + 0.17 ppm	1.3 acres	+33%
		09/24/2015	Flumioxazin	0.2 ppm	0.75 acres	+89%
		06/27/2016	Copper	0.4 ppm	0.75 acres	

* Little Muskego and Long evaluated % frequency of occurrence; Big Muskego evaluated biomass. **Bold** indicates a statistically significant change

Future Monitoring

- Continue detection monitoring for SSW on lakes in close proximity to established populations, as well as other high-use waterbodies.
- Integrate available ecological modelling and invasion risk data to prioritize monitoring locations.
- Monitoring will be collaboratively conducted by WDNR staff, county partners, consultants, regional agencies, and volunteers.
- Long-term monitoring (PI surveys) is anticipated to occur on lakes with established SSW.

Management Options

- Management of starry stonewort has been largely unsuccessful in other states
- Chemical herbicide treatments (i.e. copper sulfate, hydrothol)
 - may provide temporary nuisance relief or biomass reduction, but does not kill the entire plant
 - generally non-selective and may impact native species
- Physical control
 - hand-removal, DASH, dredging, mechanical harvesting
- Drawdown and/or freezing?
- No known biocontrol methods
- “Wait and see”
- Eradication is likely not a realistic goal

Outreach/Education

- Local/Regional
 - AIS communication protocol
 - Public meetings
 - CLMN/volunteers
 - WDNR has issued 6 rapid response grants, and 4 CBCW grants
- Statewide
 - Clean Boats, Clean Waters (CBCW)
 - Traditional media coverage
 - Targeted outreach events:
 - Drain campaign, July 4th blitz, waterfowl hunter outreach, etc.



Identification

- Related to many native macroalgae in Wisconsin (& the Midwest)
 - *Chara* (10+ species)
 - *Nitella* (9+ species)
 - *Tolypella* (2 species)
 - *Lychnothamnus* (1 species)
- Can be difficult to distinguish non-native starry stonewort from these native species



Starry stonewort
Nitellopsis obtusa

Identification

Large compared to most of its native relatives

Starry stonewort

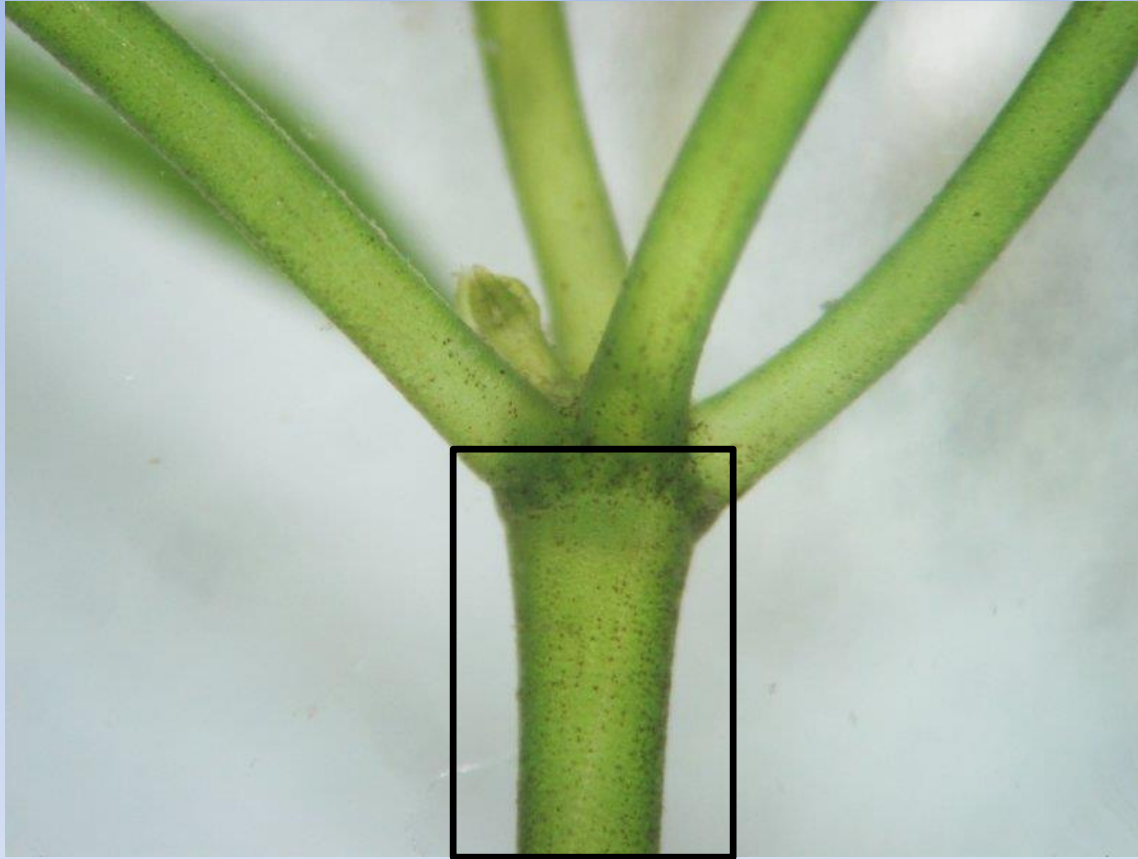
Nitellopsis obtusa

Chara contraria *Chara globularis* *Nitella flexilis*



Identification

Smooth stem – no bumps or ridges



Starry stonewort
Nitellopsis obtusa



Chara contraria

Identification

Starry stonewort
Nitellopsis obtusa



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

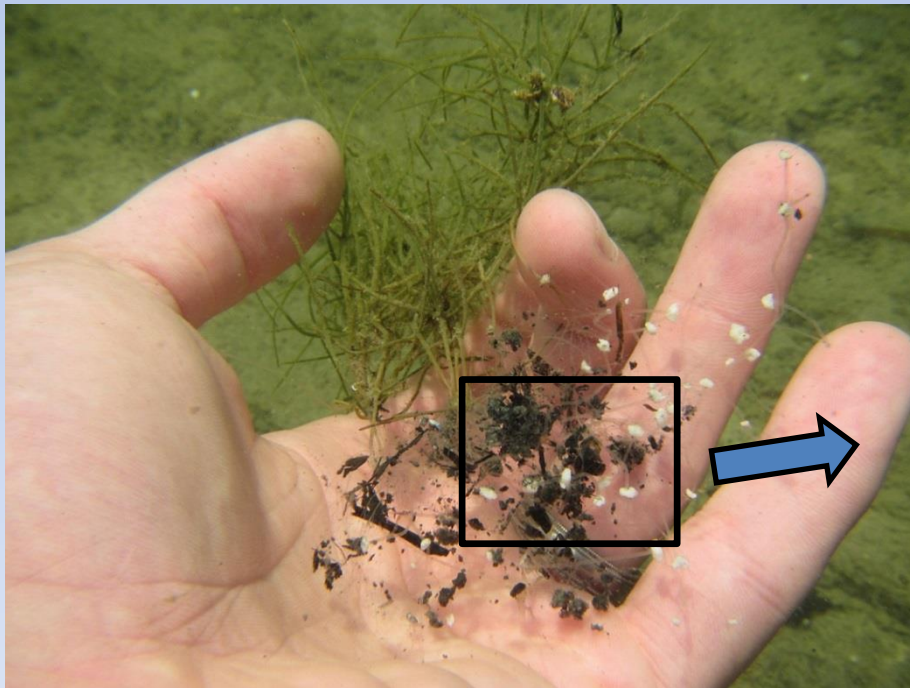
Nitella mucronata



**Branchlet divides into
equal-length parts**

Identification

- Starry stonewort produces distinct star-shaped bulbils



Nitellopsis obtusa (starry stonewort)

Next steps

- Prevent the further spread of starry stonewort to inland lakes.
- Search for starry stonewort at nearby heavily used lakes.
- Assess the population at newly discovered sites to help guide appropriate management.
- Engage local stakeholders in management planning and education/outreach activities (i.e. CBCW).
- If management occurs, collect quantitative data to assess efficacy and longevity of control.
- Work with other states and partners to learn and adaptively manage starry stonewort.



Questions?



michelle.nault@wisconsin.gov

920-662-5110