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

Paul Skawinski

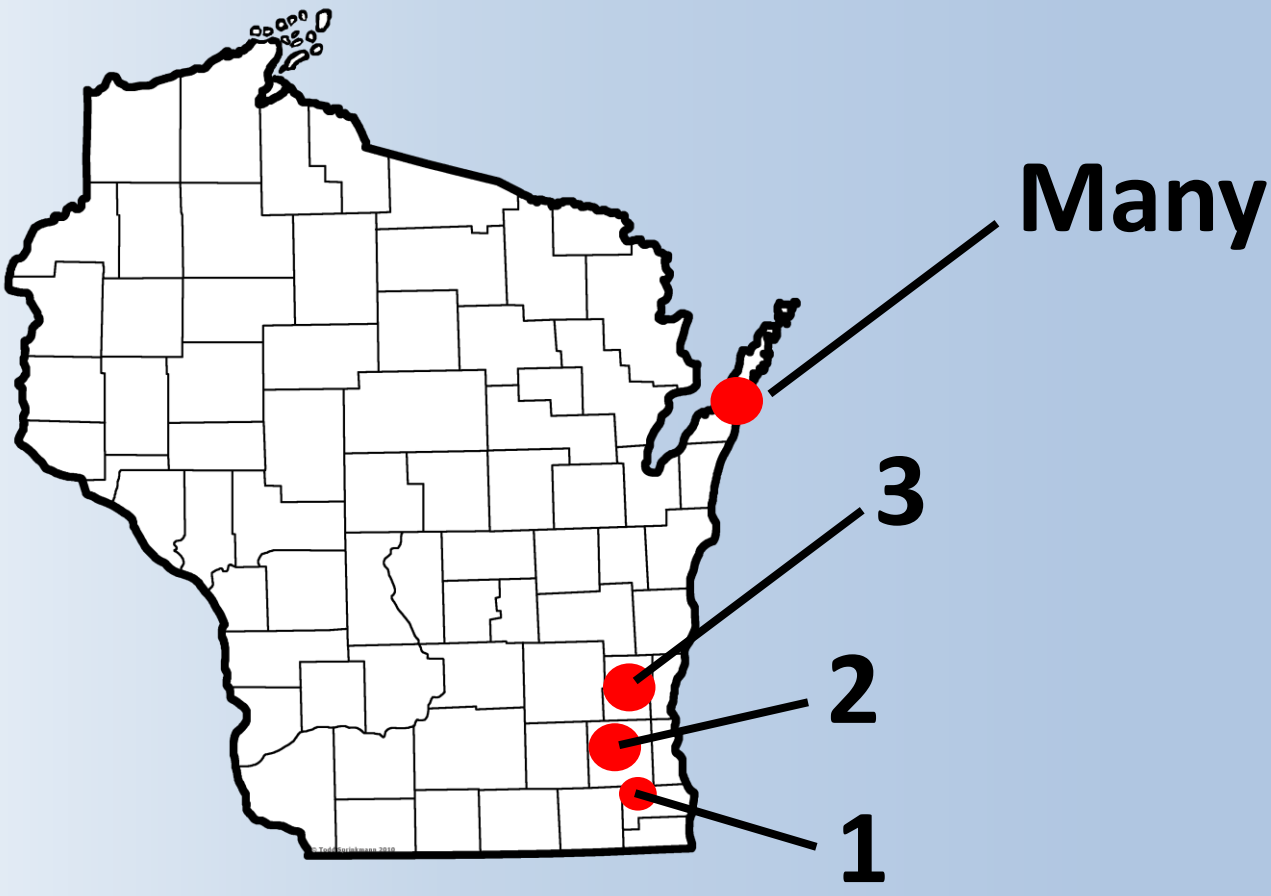
UW-Extension Lakes Program

Paul.Skawinski@uwsp.edu

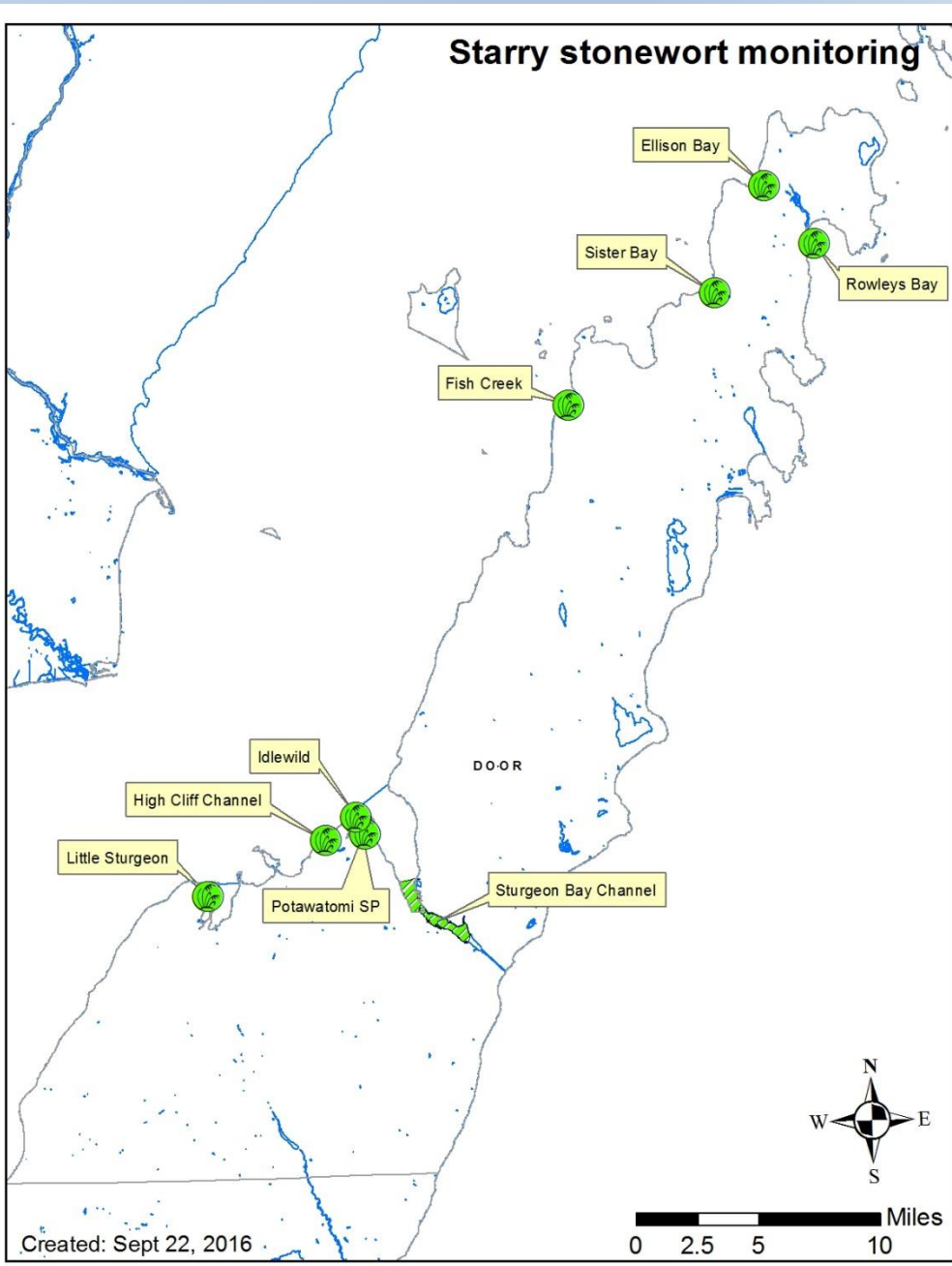
Origin

- 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.
- Documented in eastern Wisconsin in 2014.
- Documented in central Minnesota in 2015.

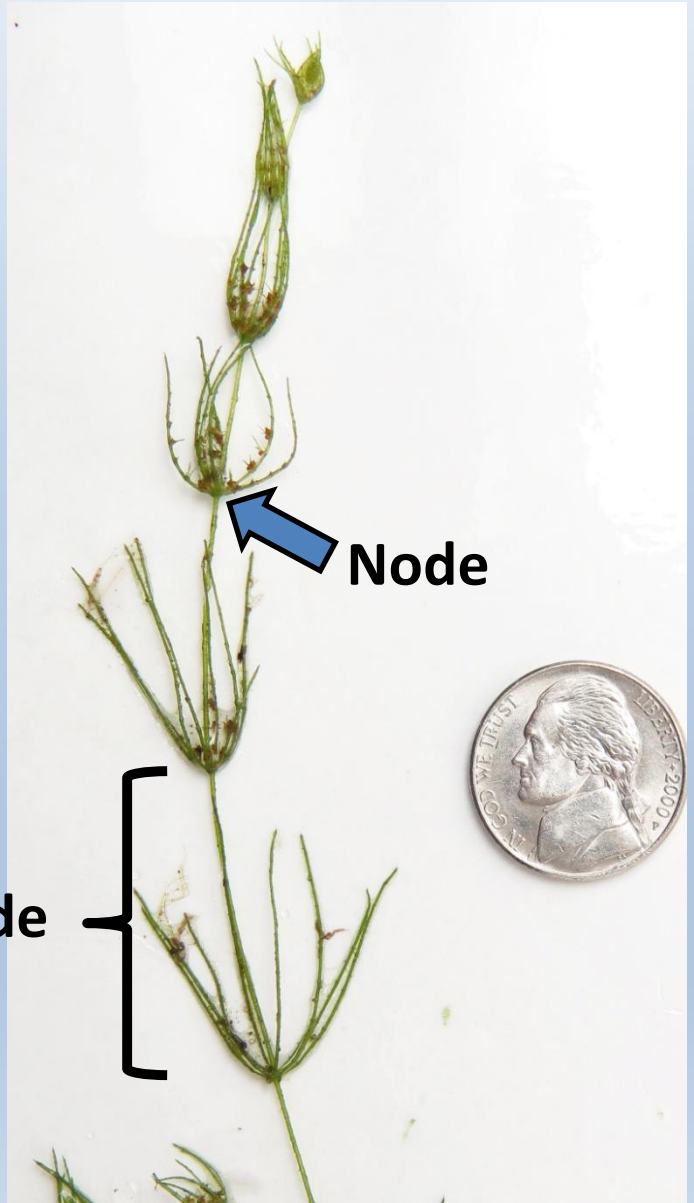
Starry Stonewort in Wisconsin
October 2016



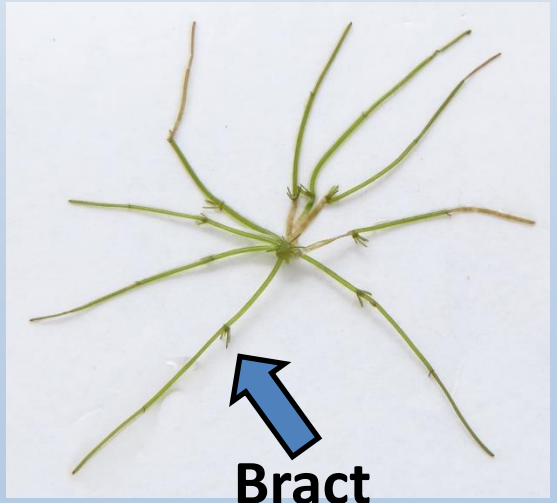
Starry Stonewort in Wisconsin: Door County



Characeae-family Body Plan



Whorl of **branchlets**



HUGE compared to most of its native relatives

Starry stonewort
Nitellopsis obtusa

Chara contraria

Chara globularis

Nitella flexilis

Bulbils

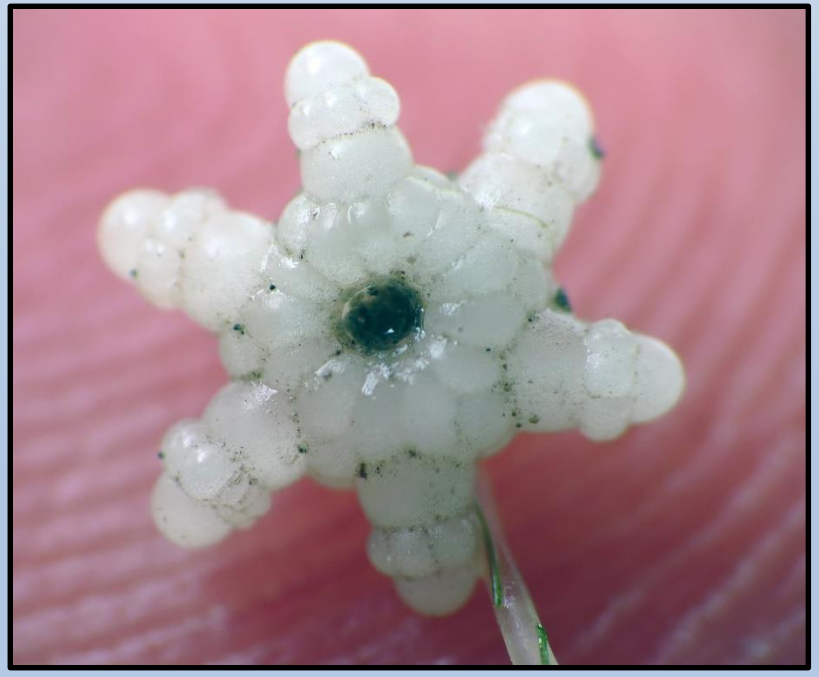
- Bulbils produce clones of the parent
- Most macro-algae do NOT produce bulbils.

Nitellopsis obtusa (starry stonewort)

Bulbils

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

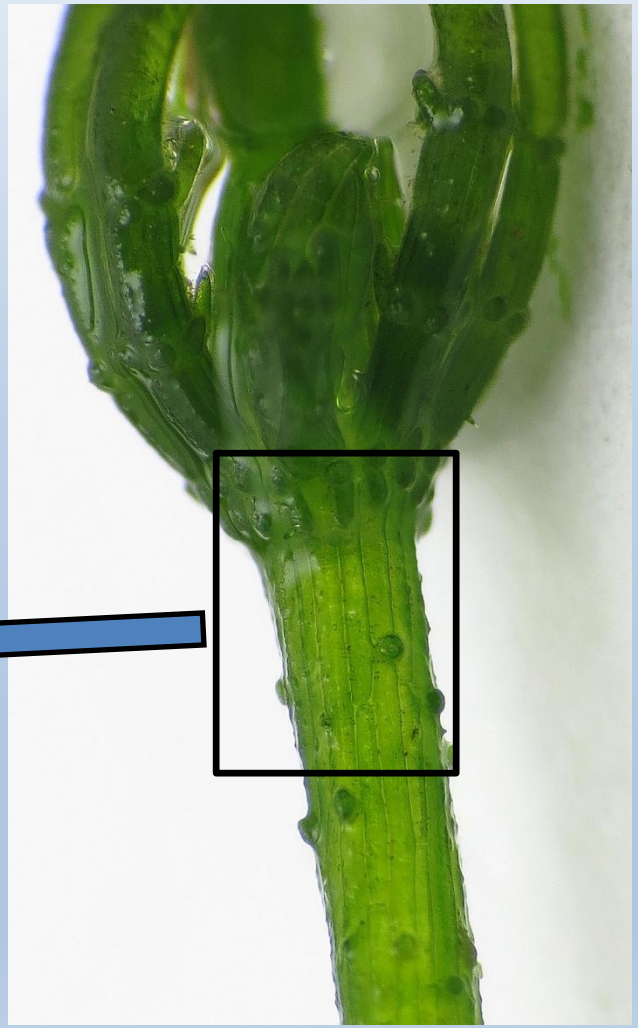
Chara aspera



Nitellopsis obtusa (starry stonewort)

Corticating Cells

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



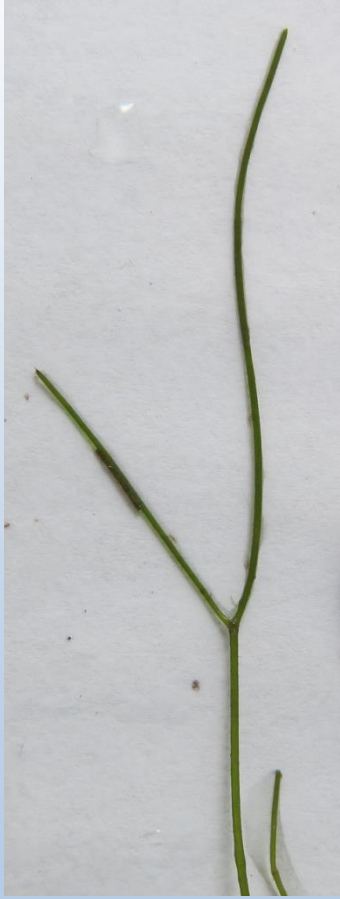
Chara contraria

Impacts

- Largely unknown
- Most information available is based on anecdotal accounts
- Several studies currently underway
  - Bulbil viability
  - Disinfection
  - Herbicide trials

Dispersal

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



Branchlet Structure

Starry stonewort
Nitellopsis obtusa

Branchlet has a short bract coming off the right side

Nitella mucronata

Branchlet divides into equal-length parts

Starry Stonewort Fact Sheets

Aquatic Invasive Species Quick Guide

Starry Stonewort (*Nitellopsis obtusa* L.)

Golden Sands Resource Conservation & Development Council, Inc.

Description: Starry stonewort is a non-native species of large algae in the Characeae family. It has whorls of 4-6 long branchlets. It is more robust than most members of its family, and can grow to over two meters tall. Anchored by colorless filaments (rhizoids) that contain up to several dozen 4-5mm, star-shaped bulbils, starry stonewort typically grows in marl sediments of alkaline lakes, up to 9 meters deep. Orange reproductive structures are located in the axils of the upper branchlets. Starry stonewort is typically an annual, but can behave as a perennial during mild winters. Interestingly, starry stonewort is listed as an endangered species in the United Kingdom.

Starry stonewort has many whorls of long branchlets. Some branchlets may appear forked due to short bracts where reproductive structures are forming.

North American Distribution: Michigan, northern Indiana, and the northeastern United States. Recently found in Wisconsin and Minnesota.

Star-shaped bulbils are produced in the sediments, and give starry stonewort its name.

Dispersal Vectors: Starry stonewort is native to Europe and western Asia. It was probably introduced to the Great Lakes via ballast water carried in trans-oceanic ships. Fragments of starry stonewort can be spread between lakes by boats, trailers, and anchors holding sediments. Local dispersal occurs by bulbils or fragments being transported by water currents or boats within the lake. Since only male starry stonewort exists in the U.S., no viable "seeds" are produced.

Ecological Impacts: By forming dense mats of vegetation, starry stonewort can greatly reduce the diversity of aquatic plants in a lake. It can also impede movement of fish and other animals, and may decrease successful spawning activity of some fishes. Mats growing to the surface can reduce water flow and make recreational activities difficult.

Control Options: Manual removal of starry stonewort is possible, but difficult, and may be impractical on a large scale. Abundant bulbils on the rhizoids can dislodge if disturbed, and will sprout new individuals. Manual removal efforts must emphasize careful removal of these bulbils.

Some chemical herbicides and algaecides have been effective at reducing starry stonewort. Herbicide applications may be less effective on tall stands of starry stonewort, as the chemical is quickly absorbed into the upper parts of the algae, leaving the lower parts unharmed. Most states require chemical use permits for any herbicide/algaecide treatments in standing water or wetland situations.

An effective biological control agent is not known at this time.

Starry stonewort (front, center), much more robust than the surrounding native muskgrasses (*Chara* spp.).

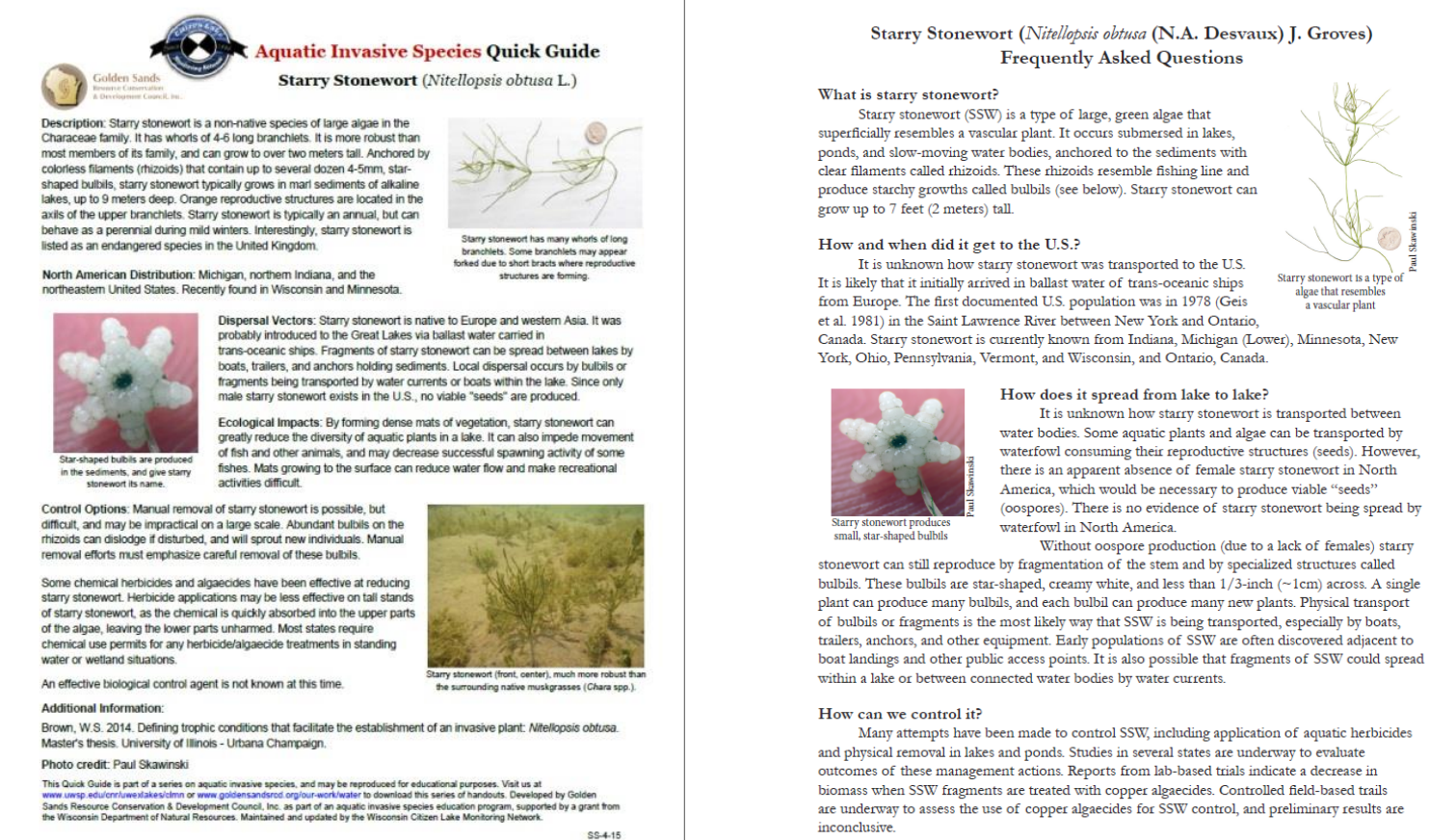
Additional Information:

Brown, W.S. 2014. Defining trophic conditions that facilitate the establishment of an invasive plant: *Nitellopsis obtusa*. Master's thesis. University of Illinois - Urbana Champaign.

Photo credit: Paul Skawinski

This Quick Guide is part of a series on aquatic invasive species, and may be reproduced for educational purposes. Visit us at www.uwsp.edu/cnr/uwexlakes/clmn or www.goldensandsrcd.org/our-work/water to download this series of handouts. Developed by Golden Sands Resource Conservation & Development Council, Inc. as part of an aquatic invasive species education program, supported by a grant from the Wisconsin Department of Natural Resources. Maintained and updated by the Wisconsin Citizen Lake Monitoring Network.

SS-4-15



Starry Stonewort (*Nitellopsis obtusa* (N.A. Desvaux) J. Groves)
Frequently Asked Questions

What is starry stonewort?

Starry stonewort (SSW) is a type of large, green algae that superficially resembles a vascular plant. It occurs submersed in lakes, ponds, and slow-moving water bodies, anchored to the sediments with clear filaments called rhizoids. These rhizoids resemble fishing line and produce starchy growths called bulbils (see below). Starry stonewort can grow up to 7 feet (2 meters) tall.

Starry stonewort is a type of algae that resembles a vascular plant

Paul Skawinski

How and when did it get to the U.S.?

It is unknown how starry stonewort was transported to the U.S. It is likely that it initially arrived in ballast water of trans-oceanic ships from Europe. The first documented U.S. population was in 1978 (Geis et al. 1981) in the Saint Lawrence River between New York and Ontario, Canada. Starry stonewort is currently known from Indiana, Michigan (Lower), Minnesota, New York, Ohio, Pennsylvania, Vermont, and Wisconsin, and Ontario, Canada.

Starry stonewort produces small, star-shaped bulbils

Paul Skawinski

How does it spread from lake to lake?

It is unknown how starry stonewort is transported between water bodies. Some aquatic plants and algae can be transported by waterfowl consuming their reproductive structures (seeds). However, there is an apparent absence of female starry stonewort in North America, which would be necessary to produce viable "seeds" (oospores). There is no evidence of starry stonewort being spread by waterfowl in North America.

Without oospore production (due to a lack of females) starry stonewort can still reproduce by fragmentation of the stem and by specialized structures called bulbils. These bulbils are star-shaped, creamy white, and less than 1/3-inch (~1cm) across. A single plant can produce many bulbils, and each bulbil can produce many new plants. Physical transport of bulbils or fragments is the most likely way that SSW is being transported, especially by boats, trailers, anchors, and other equipment. Early populations of SSW are often discovered adjacent to boat landings and other public access points. It is also possible that fragments of SSW could spread within a lake or between connected water bodies by water currents.

How can we control it?

Many attempts have been made to control SSW, including application of aquatic herbicides and physical removal in lakes and ponds. Studies in several states are underway to evaluate outcomes of these management actions. Reports from lab-based trials indicate a decrease in biomass when SSW fragments are treated with copper algaecides. Controlled field-based trails are underway to assess the use of copper algaecides for SSW control, and preliminary results are inconclusive.

www.uwsp.edu/cnr/uwexlakes/clmn

Starry stonewort ID video (UW-Extension Lakes)