

A Review with Recommendations of the 2021 Hand Pulling of Starry Stonewort (*Nitellopsis obtuse*), on Geneva Lake WI, July 26-30, 2021

GLEA/TWP

Adopted by Board of Directors 1/20/2022

Starry Stonewort (SSW) is a macro-alga that has existed in Geneva Lake since 2018. It has been known to exist in North America for several decades.⁽¹⁾ It now exists in 12 Wisconsin lakes.⁽²⁾ First discovered in Trinke Lagoon, Geneva Lake in 2018, attempts to manage the spread of SSW in Geneva Lake have included two chemical treatments within the lagoon during 2019 and hand pulling in 2020 and 2021 at the lagoon outlet and a colony site within the lake. Plans are being made to conduct a Trinke Lagoon wide dredging for SSW removal in the fall of 2022.

This review will address Geneva Lake's SSW hand pulling conducted July 26-30, 2021. Hand pulling was conducted at sites identified as having SSW in 2020 and confirmed in 2021 in a sub-PI aquatic plant survey two weeks prior to 2021 SSW hand pulling.

In 2021 there were two starry stonewort hand pulling sites on Geneva Lake. The first site was in the lagoon outlet and was pulled in 2020 and 2021 (42° 33' 31.83" N, -88° 27' 47.27" W). The second site, which goes by several names including, the "colony site" is located to the east of the Trinke lagoon and in 14 ft. of water (N 42° 33' 35.8" N, -88° 27' 22.7" W). This site has been identified by several different names but for this report will be called the colony site. Parts of the colony site were pulled in both 2000 and 2021. In both years, only a portion of the existing population was removed. This colony of SSW has been estimated as 0.6 ac. and is a monoculture of SSW.

Hand pulling was conducted by a Dive Guys dive team, an aquatic weed remove company out of Minnesota. The six-man team spent a total of 42 hours pulling, loading, transferring, hauling, and composting SSW. They hand pulled SSW at the Trinke Lagoon outlet and at sites to the east where starry stonewort populations had been confirmed. (Appendix 1a and 1b).

The operation was staged out of Hillside Launch in the Town of Linn. Divers would descend to the lake bottom at known locations, pull the SSW and put it in a mesh bag. They ascended to the surface and

(1) Geis, J.W., Schumacher, G.J., Raynal, D.J., Hyduke, N.P., 1981. Distribution of *Nitellopsis obtusa* (Charophyceae, Characeae) in the St. Lawrence River: a new record for North America. *Phycologia* 20, 211–214. (Geis et al., 1981; Karol and Sleith, 2017).

(2) [Dnr.wi.gov/lakes/invasives/AISLists.aspx?species=STARRY STONEW.](http://Dnr.wi.gov/lakes/invasives/AISLists.aspx?species=STARRY%20STONEW)

unloaded the mesh bag on the barge. A full barge was brought into the staging area and the bagged SSW was unloaded into a trailer and truck. All pulled SSW was removed from the site and disposed at an offsite compost area.

On the morning of July 26, the dive team started their efforts by doing a reconnaissance of the Trinke Outlet location. Not having found any SSW at this location during the aquatic plant survey a week earlier, confirmation of its absence was desired.

Using a GoPro underwater camera, SSW was found and confirmed as being at this location. It was noted that the population at this location appeared to be growing in bunches as a ground cover in companionship with existing taller plants (figure 1).

The dive team reported that they visited the outlet site several mornings to “remove as much SSW as they could find.” Morning visits allowed them to have the best water clarity and avoid afternoon boat traffic. On their last visit to the outlet site, they could not find any SSW at the outlet site.

On Monday, July 26, after visiting and video recording SSW at the outlet site, they moved to the colony site to the east of Trinke. They conducted reconnaissance and filming of the colony site.

Figure 1. Starry stonewort mixed with native vegetation, Geneva Lake, WI .



Figure 2. Starry stonewort at the “colony” monoculture site. Note the diver and his orange tank in the background for size reference.



The remaining mornings and all afternoons, they pulled at the colony site. Video recording of this site showed a dense, monoculture community of healthy SSW (figure 2). Their reference point for this pulling was $42^{\circ} 33' 31.83''$ N, $-88^{\circ} 27' 47.27''$ W. Most of their hand pulling for the week was done at this site and points nearby where they found SSW.

For the rest of the week, the dive team worked on or near the colony site. In most cases they pulled in

the morning, returned to shore to unload the pulled SSW. In the afternoon they return to the SSW sites and pulled till about 4 pm. They returned to shore, unloaded the afternoon's pulled SSW, and took it to an offsite compost site.

Evaluation

A sub-PI aquatic plant survey was conducted two weeks prior to the hand pulling and focused on known locations of SSW and on boat access sites on Geneva Lake. Other than the known population of SSW, the only new populations of SSW were located near the existing colony site east of Trinke Lagoon as small “pockets” of SSW.

During the plant survey, plant populations and density were identified by dragging a double-headed garden rake along the bottom and identify the species of plants on the rake when retrieved. Plant density was identified by recording rake fullness as it was retrieved from the bottom. SSW rake fullness was always recorded as a one or two, on a scale of one to four, with one being lowest density. However, based on the GoPro videos it looks like some of the beds sampled were entirely SSW so the rake may not have been dropped deep enough into the bed to haul up a three rating in those instances.⁽³⁾

SSW was observed at some locations mixed in with Eurasian watermilfoil (EWM, *Myriophyllum spicatum*), eelgrass (*Vallisneria spp.*) Sago pondweed, (*Stuckenia pectinata*) and forked duckweed

(*Lemna trisulca*). In some locations forked duckweed was found to be growing on the top of SSW. From reviewing the GoPro videos, it looks like there were occasional strands of EWM, coontail, (*Ceratophyllum spp.*) a linear-leaved pondweed (potentially flat-stem pondweed, *Potamogeton zosteriformis*), and Sago pondweed growing through the SSW beds as well. ⁽⁴⁾

Within Trinke Lagoon, SSW was frequently intermixed with EWM curly-leaf pondweed (*Potamogeton crispus*), coontail, elodea (*Elodea spp.*), water stargrass, (*Heteranthera dubia*), and muskgrass (*Chara spp.*). Also observed were lilies and small duckweed (*Lemna minor*) growing on the water surface with

(3) SEWRPC Staff Memorandum, survey of Starry Stonewort Populations in Geneva Lake, Walworth County, Wisconsin, September 28, 2021.

(4) Ibid

SSW growing submerged below. ⁽⁵⁾

Based upon conversations with the dive team, the following estimates of the amount of 2021 removed SSW were made. Eight full barge loads (8 ft. wide X 16 ft. long X 2 ft. high) of SSW were removed. Each load was estimated to be 256 ft.³ or 9.48 yds.³. Using these numbers, 75.8 yds.³ of SSW biomass were removed during the five days of hand pulling in 2021.

A team of six divers worked a total of 42 hours each for a total of 252 dive hours, at a total cost of \$25,400. The cost per dive hour was \$100.79. With an estimated 75.8 yds.³ of SSW removed, the estimated cost per cubic yard for removal was \$335.09. Hand pulling numbers by the Dive Guys at the same locations in 2020 were \$93.13/hr., and \$393.49/yd.³ (table 1).

year	yd ³ removed*	dive hour	yd ³ /dive hr.	cost \$	\$/yd ³
2020	34	150	0.2	12,173	358.03
2021	75.8	252	0.3	25,400	335.09

* Based upon estimated barge loads. 2020 values include both dive teams.

In 2020, by the second day of hand pulling, a different crew, the Venture Crew Dive Team, felt they pulled most if not all the SSW present at the lagoon outlet. Although a 2021 plant inventory of the outlet site did not find SSW in this area, the 2021 Dive Guys team did find and record it in this area during their early reconnaissance. It is not known if SSW pulled in 2021 at the outlet site was a new

population in 2021 or a population missed in 2020, or the reestablishment of last year's population. Regardless, it was there and pulled again in 2021 to the degree that no more could be found at this location.

The 2021 dive team could not say if there was in noticeable impact from the 2020 hand pulling shown at the colony site in 2021. They did not find any open areas that would have been the results of the 2020 hand pulling.

Some hand pulling did take place at the other sites located further east from the main colony. On Monday afternoon the divers worked their way back, going east to west in a grid pattern toward the

(5) SEWRPC Staff Memorandum, Survey of Starry Stonewort Populations in Geneva Lake, Walworth County Wisconsin, September 28, 2021

monoculture colony patch. They did not find any additional SSW monoculture patches, but SSW was observed intermixed with other native vegetation, just not as thick).⁽⁶⁾

Despite chemical treatment and hand pulling efforts to remove and control starry stonewort, there appears to be little evidence of SSW reduction. 2020 hand pulling of SSW may have reduced the amount of SSW at Trinke Lagoon's outlet, but it was found in the same areas again in 2021.

2020 hand pulling showed little if any impact on SSW at the deep-water colony site. Although approximately 30 yd.³ of SSW biomass were removed during 120 dive hours over three days at a cost of over \$11,000, very little if any impact could be observed in 2021. The original site did not show any sign of reduction in size. Of concern was the identification of new nearby SSW plants.

The most recent attitude towards managing populations of SSW where it is mixed in with native plants is to disturb the site the least amount possible⁽⁷⁾. Removing native plants or causing disturbance to the existing plant community, may open the areas for the invasive SSW to establish new populations in the disturbed sites.

Hand pulling may remove SSW biomass, but it does not remove the potential of the plant to colonize or recolonize either the disturbed areas or new areas. Hand pulling may encourage the spread of SSW by disturbing a stabilized community and by dispersing bulbils and other plant material to enhance

colonization. Studies in Minnesota have indicated that disturbing existing population of SSW by rapid reduction of biomass may stimulate bulbil production, development, and growth. ⁽⁸⁾

Over the last two years, starry stonewort management has involved 402-man hrs. of hand pulling to remove 109.8 yds³ at a cost of \$37,573. The status of SSW in Geneva Lake has not changed. The areas where SSW was hand pulled, have not shown any decrease of SSW. SSW has shown an increase in both

(6) *Personal conversation with Logan Dop, Dive Guys, September 2, 2021*

(7) *Personal conversation with Heidi Bunk, WI DNR, Water Resource Mgmt. Spec Southeastern Wisconsin Lake biologist.*

(8) *Glisson WJ, Wagners CK, McComas SR, Farnum K, Verhoeven MR, Muthukrishan R, and Larkin DJ. 2018 Response of invasive alga starry stonewort (Nitellopsis obtuse) to control efforts in a Minnesota lake. Lake and Reservoir Management 34: 282-291.*

density and new locations near the colony site. From observation in 2021, hand pulling in 2020 did not have any significant impact upon the deep-water colony site.

Recommendations

It is recommended to not conduct hand pulling in 2022 for fear of increasing the presence of SSW especially in the areas where it is inter-mixed with native population. It is questionable whether the WI DNR would permit hand pulling at the colony site as two years of hand pulling has not caused any significant reduction in SSW. Under the authority of NR 107.05(3)(c) & (4), NR 109.05 (3) (a) & (b), unless an effective method of SSW population control is found, permits to control SSW populations are not likely to be issued. ⁽⁹⁾

Disturbing these sites by vegetation removal by dredging, hand pulling or other mechanical means, may encourage the spread of SSW by disturbing the area and leaving it open for SSW to colonize. Not all bulbils and plant fragments are removed from the site. Their dispersal caused by mechanical management may encourage the spread of the SSW. Aggressive mechanical management may promote additional plant and bulbil growth.

A complete lake sub-PI survey should be conducted in 2022 to assess if any new populations of SSW have been established in the lake. The status of existing populations of SSW should be monitored.

Areas where SSW was pulled in 2021 should be monitored to identify the impacts of SSW's management.

(9) *Wisconsin Department of Natural Resources, Permitting Guide for Starry Stonewort, Revised March 2021.*

The GLEA will closely monitor the Starry Stonewort two times during the summer of 2022. We will utilize different equipment for each monitoring, including a diver and ROV.

The Geneva Lake Environmental Agency Board of Directors approved and accepted the Recommendations and Evaluations of this report on January 20, 2022.

APPROVED