

Report of survey of aquatic plants of Lake Joseph, surveyed July 25, 2020

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Background information

Lake Joseph (AKA St. Joseph's Lake) is a 236 acre shallow freshwater lake near Forestburg, NY in Sullivan Co. and part of the Delaware River watershed. It is impounded at the southern end, and the dam was repaired about 6 years ago according to Lake Joseph Homeowners manager TJ Chin. Aquatic weeds have come back especially strong in recent years, and I (Donna Vogler) was asked by TJ Chin to identify the problematic species in the lake. It was the intention of the Lake Joseph Homeowners Association to apply for a DEC permit for the release of grass carp to control the weeds.

On July 25, Donna Vogler (Professor of Biology) and Sarah Coney (graduate student in our Biology MS program), both of SUNY Oneonta, came to survey the lake. TJ motored us around the lake, we conducted rake-toss surveys at 3 sample points, and collected specimens of the aquatic plants encountered.

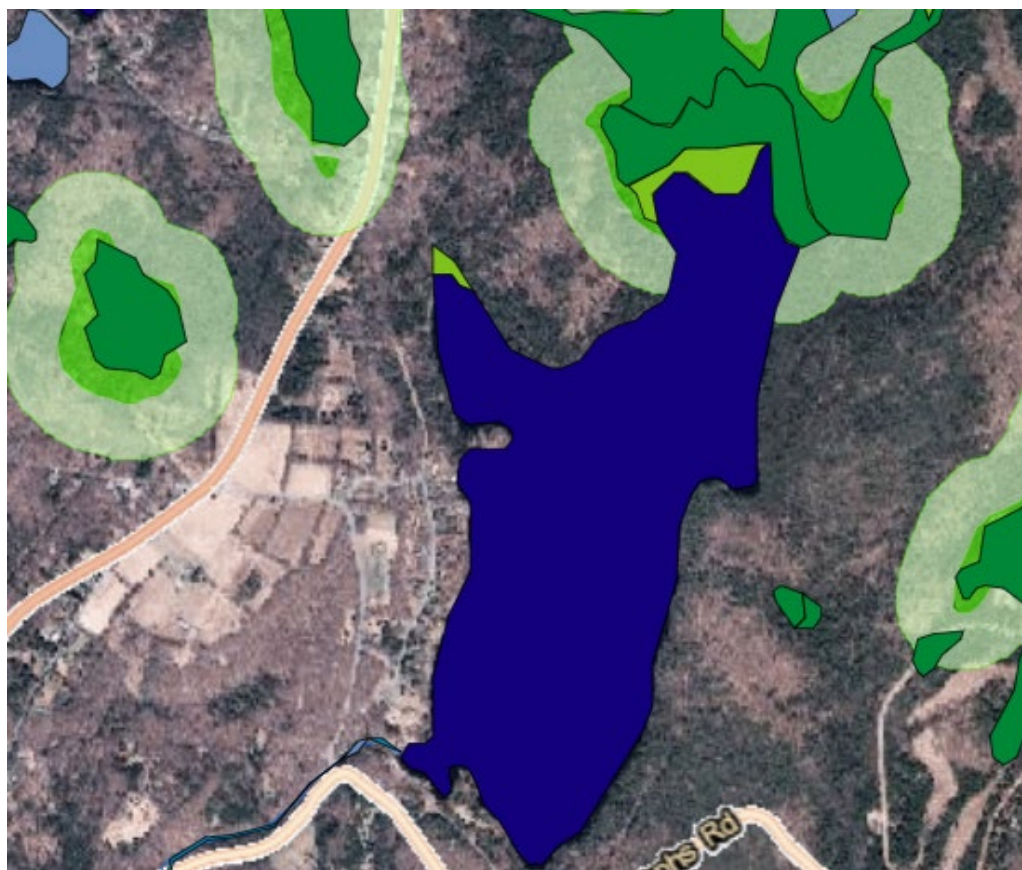


Fig. 1. Screenshot of the DEC Resource Mapper. Blue is Lake Joseph, of 236.7 acres classified as a LIUBHh Lacustrine system; which means a shallow lake. The Darker green at top refers to DEC listed Freshwater Wetlands; some forested (darker green) and some open (lighter green).

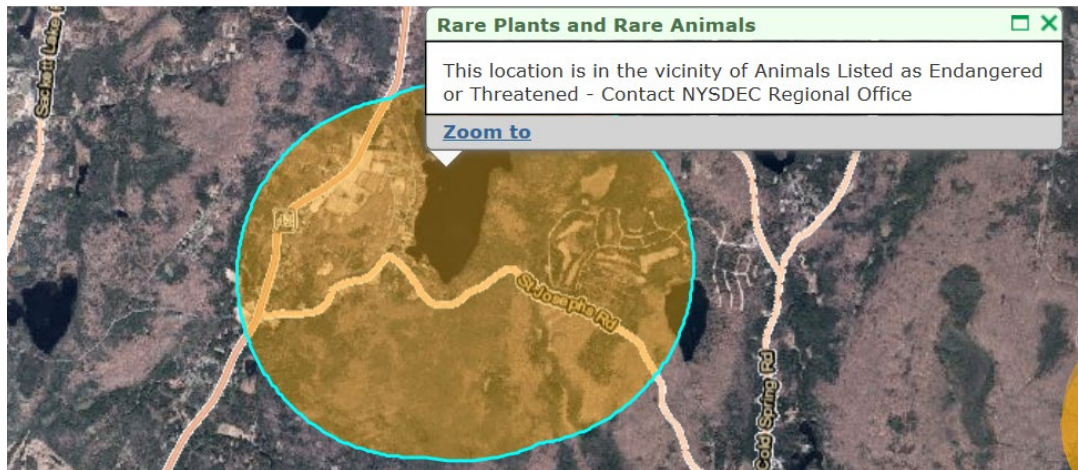


Fig. 2. In orange is the layer indicating a NY state listed species or species in the vicinity of Lake Joseph. The identify and specific location(s) of the species is not publicly listed, but DEC biologists can make that available to individuals under some circumstances. Source: DEC Resource mapper.

Aquatic plants encountered

The following species were found to be present in the lake, of which 14 were identified to species. Abundances given are general estimates as observed from the boat.

Floating Burr Reed. *Sparganium fluctuans*- this is the most problematic species; especially at the shallow areas. It is a rooted aquatic, a native species.

Pondweed. *Potamogeton vaseyi* – This is perhaps the most abundant plant in the submersed zone throughout the lake and especially problematic on boat rotors. It is thin and grass-like; highly branched and washes up the shoreline. It is a native pondweed, one of several in this genus.

Ribbon leaf pondweed. *Potamogeton epihydrus* – It is less common, with a somewhat flattened stem, and produces oval floating leaves later in summer. It is a native pondweed.

Pondweed. *Potamogeton berchtoldi* – This is a thin leaved pondweed, very similar to *Potamogeton pusillus*; both of which are native pondweeds common to hard-water systems.

Floating Pondweed. *Potamogeton natans* – Uncommon in the lake, but a common species elsewhere. Found in a few patches at the inlet side of the lake. A native pondweed.

Inflated Bladderwort. *Utricularia radiata* – This was the most unusual species. First it is a somewhat carnivorous plant (the bladders trap small zooplankton). Second, it normally floats below the water surface, but during flowering, it produces a ring of 5-6 “floats” that keep the yellow flower above the water line. It is similar to *Utricularia inflata*, but is smaller and only has branches towards the tips of the floats than *U. inflata*. Thirdly and most significantly this species (*U. radiata*) is listed as an “S2” species, which means it is rare in the state. The population here is widely scattered, and appears to be in a healthy state of about 100 individual plants. It is a native species, of special concern.

Alternate leaved Milfoil. *Myriophyllum alternifolia*. This too is somewhat unusual and uncommon in our survey, but not particularly rare as a species. There are many species of native milfoils and several invasive species, but this is the only one with alternate leaved arrangement. All the others have multiple leaves in whorls around the stem. Perhaps the greater surprise that we did not find any invasive milfoils that are so common in other lake systems.

Canada Waterweed. *Elodea canadensis*. A ubiquitous species throughout the northeast. This is a native species, eaten by a variety of aquatic insects and part of the food chain for fish.

Hornwort. *Ceratophyllum echinatum*. A closely related species *Ceratophyllum demersum* is the more common "Coontail". This species of hornwort is more delicate. Both are native species.

Naiad. *Najas flexilis*. This common native species has thin, short leaves that arch out in pairs. It was found in small patches across the lake, more often in the open water and abundant in spots.

Watershield. *Brasenia schreberi*. This is a common floating-leaved plant of acidic lakes and found across the lake, but never in large amounts. It has a distinctive red underside to the floating leaf, with a gelatinous coating.

Pond lilies: White Water Lily (*Nymphaea odorata*) and Yellow Cow Lily (*Nuphar advena*). Both are common in the shallows with the white water lily more common. Neither appear to be problematic. Both are likely the native species.

Duckweeds. Both the smaller common duckweed *Lemna minor*, and the larger *Spirodela polyrhiza* are native species. Neither was especially common.

Mosses and Liverworts: One aquatic moss was common in the north end of the lake (Rake toss #3). Also, a common liverwort of the genus *Riccia* was observed in association with some of the pondweeds. These are both likely to be native species, and both were somewhat uncommon.

Starry Stonewort. *Nitellopsis obtusa*. This was only found in the western edge of the lake, but may become a nuisance species. It is a type of algae (macroalgae) similar to native Stinkweed (*Chara*). While we did not find the distinctive star-shaped reproductive structures, if it is indeed the Starry Stonewort, it would be the only non-native and invasive species we encountered in Lake Joseph.

Rake-toss data

Three rake tosses were conducted to sample parts of the lake. These were placed where aquatic weeds are becoming thick, but not yet enough to impede small boats. These three snapshot samples are not intended to represent the entire lake, which would have required 20 or more sample units, and at multiple times of the year. Still, these sample units provide some data for future comparisons.

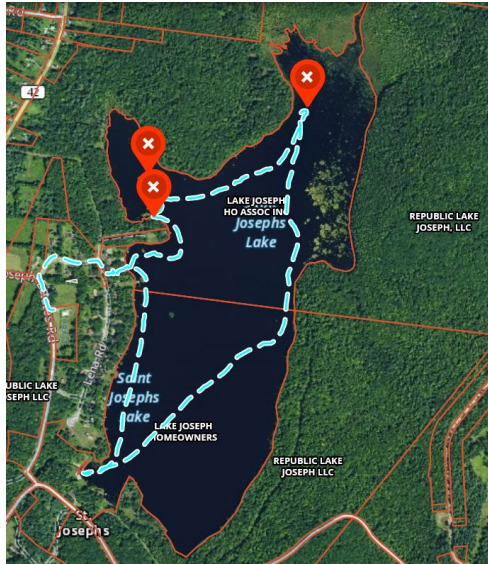


Fig. 3. Map of route taken in our survey. The three rake-toss sampling points are noted.

The topmost point (sample #3) is the edge where plant growth makes boat travel difficult.

Point 1 41.59947; -74.70733 South edge of the western spur. Species abundances as follows: Pondweed *P.vaseyi*, 50%; Floating Burr Reed 35%; Starry Stonewort 10%; Inflated bladderwort 5%. The rake was moderately full.

Point 2 41.60083; -74.70755 North edge of the western spur. Species abundances as follows: Pondweed *P.vaseyi*, 65%; Inflated Bladderwort 20%; Naiad 10%; Starry Stonewort 5%. The rake was moderately full.

Point 3 41.60292; -74.70086 North end of lake, when boat became bogged down in weeds. The rake was full. An aquatic moss (unidentified) 30%; Pondweed *P.vaseyi*, 20%; Alternate leaved milfoil 15%; Pondweed *P. natans* 15%; Inflated Bladderwort 5%; Canada Waterweed -trace; Hornwort- trace.

What we did not find

Public access lakes across the region typically have one or more invasive aquatic plants; such as European Milfoil, Curly Pondweed, Water Chestnut, Hydrilla (Finger Lakes), and Fanwort (southern NY). We were especially pleased not to find any of these in St. Joseph's Lake. Some years ago, there was an unconfirmed report of the water primrose (*Ludwigia peploides*) at Lake Joseph but this species was not found in 2018 (by DV), nor in our current survey. In short, the lake was found to have a variety of representative aquatic native species, and only one invasive, the Starry Stonewort.

Recommendations

The two most problematic plants were the Floating Burr Reed *Sparganium fluctuans* and the pondweed, *Potamogeton vaseyi*. These have become a nuisance to lake shore properties around the docks and currently impedes fishing boats, especially at the northern half of the lake. At our July survey, these two

species were somewhat problematic, and it is likely they will become more extensive as the temperature stays warm and the water level drops.

The homeowners have expressed an interest in stocking grass carp, and at least one vendor has suggested stocking up to 1500 fingerlings (assuming 70% early mortality) to control aquatic weeds. While grass carp are often viewed as a “quick fix” for aquatic weed growth, several factors suggest that stocking grass carp may not have the desired effect in St. Joseph’s Lake.

The predominant vegetation problem is the floating leaved burr reed. State extension agencies are somewhat split on evidence that grass carp would even feed on burr reeds; the Penn State Extension Service suggests they do not, nor does the NYS DEC. Some sources (mostly grass carp vendors) claim that grass carp will eat burr reed, admitting that this is only if there is not much else for the grass carp to eat. Essentially, burr reed is not a preferred species to the grass carp. In Lake Joseph, there are other plant species the carp would eat—namely any of the several species of native pondweeds (*Potamogeton* species). Typically grass carp are brought in to control monocultures of non-native or exotic invasive plants (AIS, or aquatic invasive species), but here the plants causing most of the problems are native species and the only non-native invasive is a macroalgae that carp would not eat. Moreover, there are two native aquatic plants that are uncommon and add biodiversity value to this headwater lake: the inflated bladderwort (*Utricularia radiata*) and the alternate leaved pondweed. All the native aquatic plants—but especially the pondweeds and milfoils—provide food and shelter to the fish community. A healthy layer of submersed aquatic plants also tends to inhibit algal blooms. Of the two problems, it may be easier to live with a late summer layer of aquatic plants, than have to cope with pea-soup waters or harmful algal blooms. Other factors against stocking grass carp would be that the large size of the lake, the fact that it is a headwater to the Delaware River, and the indication of one or more rare animals in the area. These additional factors would make it difficult to justify a permit for grass carp, but not impossible.

My first recommendation is to delay the consideration of grass carp for another year or two, or perhaps look to other solutions entirely. Other solutions may come from the hiring of a Certified Lake Manager. There are several commercial vendors that do professional lake management (e.g., SOLutus Inc.). Alternately, the homeowners association could work with the SUNY Oneonta Biological Field Station and their students pursuing a master’s degree in Lake Management. The latter would involve some financial support to the student. A useful guide to lake management and some of the aquatic plant control issues are nicely summarized in a 300 page document “Diet for a Small Lake” http://www.dec.ny.gov/docs/water_pdf/dietlake09.pdf offered through our NYS DEC.

My second recommendation is to preserve the wetland to the north of the lake. The recent issues of plant growth may be triggered by upstream nutrients coming in from soil disturbance or wastewater from septic or municipal systems (i.e., eutrophication). The village of Monticello is above the headwaters, and there has been some recent construction of a raceway also upstream. Nutrient inflow from upstream places high value on the freshwater wetlands to the north to sop up nutrients and filter out particulate pollutants before the flow enters the Lake. Water quality measures, including a full spectrum nitrogen and phosphorus analysis would provide useful data on the degree of eutrophication.

My third recommendation is to consider spot treating the aquatic plant growth around homeowners docks. I understand that the homeowners are reluctant to consider herbicides, but in fact limited use by a certified applicator could be considered if hand pulling doesn’t help. Personally, hand pulling may

not be the worst option, and use of the weeds as mulch works well in a garden. When the lake was drawn down to repair the dam and remove stumps 5 or 6 years ago, some nutrients may have been released from the muck and some of the plants (e.g. burr reed) may be still reacting to that disturbance. Partial winter drawdowns have been utilized in other lakes to reduce shoreline aquatic plant growth, but the few studies to test that with burr reed showed the drawdowns had minimal effect. If this is the case, waiting a few years to see if the lake stabilizes may be the cautious approach before these alternatives are implemented. These alternatives are also explained in the “Diet for a Small Lake” mentioned above.

Things to watch for

Sarah and I are willing to take another look in August if the plants come on very strong. With the shallowness of the lake, some weeds may be an inevitable end-of-summer event, but it is at least better than algal blooms and reduced numbers game fish.

Algal blooms can be serious, but currently two factors protect Lake Joseph against harmful or nuisance levels of algae. First is the darker “tea-colored” water from the tannins from upstream forests and peatlands. Tannins prevent some light penetration that would otherwise encourage filamentous algae. Second is the deep layer of submersed plants. The submersed plants both filter light and take up minerals —robbing algae of light and nutrients. Some algal growth is a necessary part of the lake’s food web, but too much is not only a nuisance and may be dangerous as some species of algae produce toxins in warm, eutrophic waters. I saw no evidence of excessive algal growth in late July.

The only invasive plant species noted was the Starry Stonewort. Keep an eye out for stringy algal clumps with small calcified “stars” about the size of a small pea. These are very different than the common filamentous algae that forms a slimy mass. Macro-algae like *Nitellopsis obtusa* have segments that are visible to the naked eye and the stars are distinctive to Starry Stonewort. In fact, any plant that seems unusual, rapidly growing, and choking out other species needs to be investigated. The tight control that you have on the watercraft of this lake is good evidence that the invasive species found in so many other lakes in our region are being kept out of Lake Joseph.

I give my best wishes to you, TJ, and the Lake Joseph Homeowners Association in managing this wonderful lake. While it does have a nuisance plant problem at least in some years, overall the quality appears to be good. If the growth continues to be excessive, then you and the homeowners will need to consider implementing some management. I will not be able to help you out in the management as that is not my expertise, but I encourage you to work with the DEC or a Certified Lake Manager.

Yours truly,

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