

Appendix C - Horseshoe Lake Management Discussion (Pages 75-77 from the APM Plan)

Management Discussion

Horseshoe Lake supports a valuable aquatic plant community with a number of uncommon species and a quality fishery valued by the lake community and the general public. The lake currently has only two known fully aquatic invasive species – limited curly-leaf pondweed and Eurasian/Hybrid watermilfoil. The main goal of the Aquatic Plant Management Plan is to control E-HWM in a sound, ecological manner. CLP management only consists of physical or diver removal.

E-HWM Management

The biggest failure of the previous APM Plan for Horseshoe Lake was the criteria put in place for management of E-HWM using aquatic herbicides. In the previous plan, aquatic herbicides could only be incorporated as a management tool when the amount of E-HWM in the lake reached or exceeded 6.0 acres. This value was too high and allowed the spread of E-HWM into new areas and the expansion of it in already known areas. It is difficult to determine if the amount of E-HWM in the lake is negatively impacting native aquatic vegetation because management actions completed under the last APM Plan managed to keep E-HWM below 2.0 acres in every year except 2018. Larger areas of E-HWM like what are present now could negatively impact the growth of native aquatic vegetation, but this has not been confirmed.

No management using aquatic herbicides has been completed in the last 3 years. As a result, E-HWM as identified in the fall survey has jumped from 0.09 acres in 2020 to 6.85 acres in 2022. Since HWM was first found in Horseshoe Lake in 2007, the amount of E-HWM in Horseshoe Lake as identified by fall bed-mapping surveys has fluctuated between <1 (2015 and 2020) and about 8 acres (2018) (Table 4). These values represent < 1% to about 2.5% of the littoral zone.

Table 4: E-HWM distribution based on fall bed-mapping surveys

| 2013 to 2022 Fall HWM Beds/High Density Areas | | | | | | | |
|---|-----------|---------------|--------------|-------------|--------------------|---------------------|--------------------|
| Year | # of Beds | Total Acreage | Smallest Bed | Largest Bed | Beds ≥ 0.5 ac | Beds ≥ 0.75 ac | Beds ≥ 1.0 ac |
| 2013 | 13 | 2.54 | 0.01 | 0.65 | 1 | 0 | 0 |
| 2014 | 14 | 1.13 | <0.01 | 0.29 | 0 | 0 | 0 |
| 2015 | 2 | 0.26 | 0.02 | 0.24 | 0 | 0 | 0 |
| 2016 | 10 | 1.93 | <0.01 | 1.12 | 1 | 1 | 1 |
| 2017 | 13 | 1.6 | <0.01 | 0.35 | 0 | 0 | 0 |
| 2018 | 11 | 7.88 | 0.02 | 4.82 | 4 | 2 | 2 |
| 2019 | 8 | 1.04 | 0.06 | 0.17 | 0 | 0 | 0 |
| 2020 | 3 | 0.09 | <0.01 | 0.07 | 0 | 0 | 0 |
| 2021 | 5 | 1.05 | 0.02 | 0.8 | 1 | 1 | 1 |
| 2022 | 5 | 6.85 | 0.26 | 3.73 | 4 | 3 | 3 |

Based on these numbers it is a reasonable goal to keep the level of E-HWM in Horseshoe Lake as identified in a fall bed-mapping survey or the equivalent, below 2.0 acres in any given year. Any amount of E-HWM can and should be managed, albeit in different ways. A combination of manual/physical removal and chemical control methods are recommended for Horseshoe Lake.

Application of Aquatic Herbicides

If any individual bed with a reasonable buffer or adjacent beds that can be reasonably combined reach or exceed 1.0 acres, herbicide application can be considered. For beds between 1.0 and 5.0 acres, ProcellaCOR should be used. For beds that reach 5 acres or larger, 2,4D, triclopyr-based, or ProcellaCOR herbicides can be considered dependent on the financial resources available. Smaller areas may be treated with 2,4D or triclopyr-based herbicides if a limno-barrier is installed around the treatment area prior to actual treatment.

In general, E-HWM management involving the use of aquatic herbicides in Horseshoe Lake will be based on the following criteria.

- 1) Late summer or fall E-HWM bedmapping will be completed every year.
- 2) Any amount of E-HWM in the lake can be managed at any time if herbicide application is not used. Non-chemical management actions include hand pulling, rake removal, and snorkel/scuba diver removal, and/or DASH removal.
- 3) Herbicide application using ProcellaCOR may be implemented if prior year bed mapping identifies an individual bed or combination of beds of E-HWM that are at least 1.0 acres in size. In order to use 2,4D or triclopyr-based herbicides, the minimum size required is 5.0 acres, unless a limno-barrier is installed.
 - a. If and when the WDNR approves the use of ProcellaCOR on smaller areas, this management action may be considered.
- 4) Herbicides applied to E-HWM beds that reach or exceed 10.0 acres in total in a given year will be considered large-scale herbicide applications. With a large-scale chemical treatment, the following activities will be added in support of that treatment.
 - a. Pre and post-treatment, point-intercept surveys will be completed in the year prior, and at least the year after the planned herbicide application. A third survey could be completed in the year of application.
 - b. Herbicide concentration testing will be completed unless deemed unnecessary by the WDNR.
- 5) The same area will not be chemically treated with the same herbicide, two years in a row.

Concerns exist when herbicide treatments using the same herbicide are done over multiple and subsequent years. Target plant species may build up a tolerance to a given herbicide, making it less effective. Susceptible plant species may be damaged and/or disappear from the lake (ex. water lilies), issues with fish and other wildlife might occur, and concern over recreational use in chemically treated water may be voiced. By using several different aquatic herbicides interspersed with physical removal efforts between treatments, many of these concerns are minimized.

Recent research completed by the WDNR suggests that large-scale or whole-lake application of aquatic herbicides can be more detrimental to the native aquatic plant community than the AIS meant to be controlled by the treatment (Mikulyuk, et al., 2020). Given the treatment history of Horseshoe Lake and the results of management, small-scale spot treatments do not appear to be causing great ecological harm to the aquatic plant community, and will continue to be the preferred method of management when the amount of E-HWM in an individual bed or combination of beds reaches or exceeds 1.0 acres.

Other AIS Monitoring and Management

CLP will only be monitored by the District and physical removal completed by the local dive team or by District volunteers. It is not expected that any other form of management to control CLP will be necessary during the five years covered by this APM Plan.

District volunteers will continue to monitor the shoreline for purple loosestrife removing what is found if possible. Over the course of the next five years, the District may choose to get involved in rearing beetles for biological control of purple loosestrife, or possibly collect and transfer beetles from local sources for transfer to Horseshoe Lake when possible. Releasing beetles for control of purple loosestrife is not counter-productive to the removal of flower heads to prevent seeding. Beetles need the leafy material to survive, not the flower itself.

Horseshoe Lake volunteers will participate in the Citizen Lake Monitoring Network Aquatic Invasive Species Monitoring Program annually looking for zebra mussels, spiny waterflea, rusty crayfish, hydrilla, and other AIS not already in the lake.