Cloverleaf Lakes
Shawano County, Wisconsin

2018-2020 Final AIS Monitoring & Control Strategy Assessment Report

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1.0 INTRODUCTION

Figure 1.0-1. Cloverleaf Lakes, Shawano County.

The Cloverleaf Lakes are a chain of three spring lakes: Round Lake, Grass Lake, and Pine Lake in Shawano County (Figure 1.0-1). Eurasian water milfoil (*Myriophyllum spicatum*; EWM) was first documented in Round Lake in 1992. It was later confirmed via DNA analysis to be a hybrid between EWM and the indigenous northern water milfoil (*M. sibiricum*) in 1994. Curly-leaf pondweed (CLP, (*Potamogeton crispus*), is also present in the system and has periodically been the target of active management along with continued monitoring. The Town of Belle Plaine and the Cloverleaf Lakes Protection Association (CLPA) have partnered on a number of projects, including Clean Boats Clean Waters (CBCW) staffing and education, enforcement, and cost-sharing on past and current projects.

1.1 HWM Management History Summary

The Cloverleaf Lakes have a history dating back to at least 2003 during which HWM control included nearly annual 2,4-D herbicide treatments. While it is understood that some HWM populations may be effectively controlled with traditional whole-lake 2,4-D use rates, Onterra believes that the 2,4-D use-history of the Cloverleaf Lakes likely has resulted in populations of EWM and sensitive strains of HWM being removed from the population resulting in a population of 2,4-D-tolerant invasive milfoil within the system. While higher 2,4-D concentrations may produce better HWM control, these elevated levels would be harmful to the native plant community above tolerable levels.

A few lake groups have subsequently embraced alternative whole-lake treatment strategies that are less commonly used in Wisconsin to targeted HWM populations while attempting to preserve the valuable native plant community of the system. Three such herbicide use patterns were investigated for applicability on the Cloverleaf Lake and ultimately the CLPA decided to move forward with a pelletized fluridone treatment to target HWM in Grass and Pine Lakes in 2016. Onterra developed a three-year control and monitoring strategy in which a whole-lake herbicide treatment would occur in year two of the project. Due to Round Lake's small size and narrow littoral band, this lake was managed with hand-harvesting in 2015 and 2016. Ultimately, the EWM population grew to a scale beyond that can be managed with hand harvesting and a whole-lake pelletized fluridone treatment occurred in 2018.

The evolved goal of the pelletized fluridone use pattern is to maintain between 2.0 ppb and 3.0 ppb throughout the growing season, with detectable levels of the herbicide being observed within the lake going into ice-on. Based upon reviewing the measured herbicide concentration during the summer as well as technical advice from SePRO, bump treatments of pelletized fluridone (Sonar One®) were conducted twice more during the summer following the initial application. The final dosing of these treatments was based on mixing zones determined by each lake's thermal stratification. The concentrations in Pine Lake and Round Lake approximately met the target concentrations, but concentrations in Grass Lake did not reach target levels until later in the summer. More specific details related to the past fluridone treatments have been reported on in recent annual reports as a part of this project.

1.2 2020 HWM Monitoring & Control Strategy

Many lake groups initiate a whole-lake herbicide strategy with the intention of implementing smaller-scale control measures (herbicide spot treatments, hand-removal) when EWM/HWM begins rebounding. This is referred to as Integrated Pest Management (IPM). The CLPA has conducted IPM management in recent years in the form of a coordinated professional hand harvesting strategy. This form of IPM showed encouraging results during 2019 as many of the sites that were targeted with hand harvesting actions showed reductions in the HWM population.

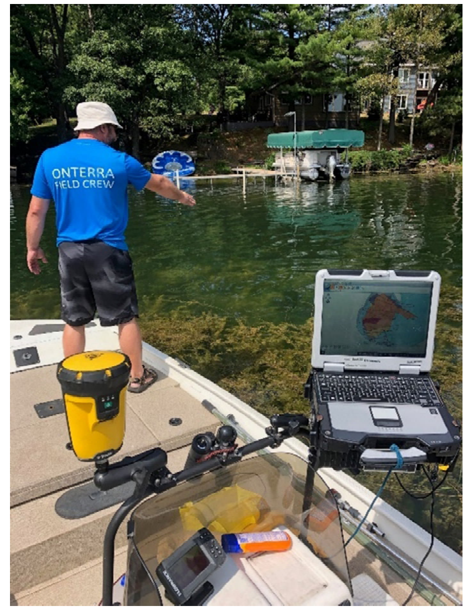
Monitoring surveys completed during 2019 showed the whole-lake treatment in Round Lake met the quantitative success criteria for the year after treatment. Minimal HWM was located within Round Lake in 2019 surveys and targeting all known occurrences in 2020 with a hand harvesting strategy would be considered as an IPM strategy moving forward. Pine Lake has had only minimal HWM detected since 2017 and has begun a relatively small scale IPM strategy in 2019 with targeted professional hand harvesting efforts. Hand harvesting is a management technique to consider in 2020 for addressing the relatively low HWM populations present in Round Lake and in Pine Lake. It was expected that a modest hand harvesting effort (1 or 2 days) would be sufficient to target the majority of the remaining HWM occurrences in Pine and Round Lakes. This report discusses the monitoring and control activities that took place during 2020 and offers a synopsis of the three-year project.

2.0 2020 AQUATIC PLANT MONITORING RESULTS

It is important to note that two types of surveys are discussed in the subsequent materials: 1) point-intercept surveys and 2) HWM mapping surveys. The point-intercept survey provides a standardized way to gain quantitative information about a lake's aquatic plant population through visiting predetermined locations and using a rake sampler to identify all the plants at each location. The survey methodology allows comparisons to be made over time, as well as between lakes. It is common to see a particularly plant species, such as HWM, very near the sampling location but not yield it on the rake sampler. Particularly in low-density colonies such as those designated by Onterra as *highly scattered* and *scattered*, large gaps between HWM plants may exist resulting in HWM not being present at a particular pre-determined point-intercept sampling location in that area.

The point-intercept survey can be applied at various scales. The point-intercept survey is most often applied at the whole-lake scale. The whole-lake point-intercept survey has been conducted on Cloverleaf Lakes during most years from 2010-2020. If a smaller area is being studied, a modified and finer-scale point-intercept sampling grid may be needed to produce a sufficient number of sampling points for comparison purposes. This sub-sample point-intercept survey methodology is often applied over management areas such as herbicide application sites. This type of sampling will be discussed in regards to the preliminary 2021 management strategy.

While the point-intercept survey is a valuable tool to understand the overall plant population of a lake, it does not offer a full account (census) of where a particular species exists in the lake. During the HWM mapping survey, the entire littoral area of the lake is surveyed through visual observations from the boat (Photograph 2.0-1). Field crews supplement the visual survey by deploying a submersible camera along with periodically doing rake tows. The HWM population is mapped using sub-meter GPS technology by using either 1) point-based or 2) area-based methodologies. Large colonies >40 feet in diameter are mapped using polygons (areas) and are qualitatively attributed a density rating based upon a five-tiered scale from *highly scattered* to *surface matting*. Point-based techniques were applied to HWM locations that were considered as *small plant colonies* (<40 feet in diameter), *clumps of plants*, or *single or few plants*.



Photograph 2.0-1. EWM mapping survey on Waushara County, WI lake. Photo credit Onterra.

Overall, each survey has its strengths and weaknesses, which is why both are utilized in different ways as part of this project. A whole-lake point-intercept survey and a late-summer HWM mapping survey occurred in 2020 on Cloverleaf Lakes and are discussed within this report.

2.1 Whole-Lake Point-Intercept Surveys

Point-intercept surveys have been conducted on the Cloverleaf Lakes in recent years in order to quantitatively monitor the aquatic plant populations during a period of active EWM management. As a part of the ongoing grant project, point-intercept surveys were completed on all three Cloverleaf Lakes in 2020. The point-intercept surveys in Grass Lake and Pine Lake correspond with four years after the whole-lake fluridone treatments while the survey of Round Lake corresponds to two-year-after treatment.

Along with understanding the level of HWM control achieved from the control action, the point-intercept data allows an understanding of non-target native plant impacts from the treatment. Native aquatic plants have been monitored in the years following the fluridone treatments to assess the dynamics of the native plant populations response and recovery from the treatment. Previous annual reports have documented the native aquatic plant populations as they were evaluated through point-intercept surveys in recent years.

Some species that are morphologically similar and sometimes difficult to identify in the field are combined for analysis purposes. Aquatic plants are subjected to environmental conditions that lead to naturally variable populations in any given year. Thus, changes in aquatic plant populations cannot be definitively distinguished between natural variability, active management that may be occurring, or some combination of both factors. Appendix A includes a full matrix of the point-intercept survey results.

Pine Lake

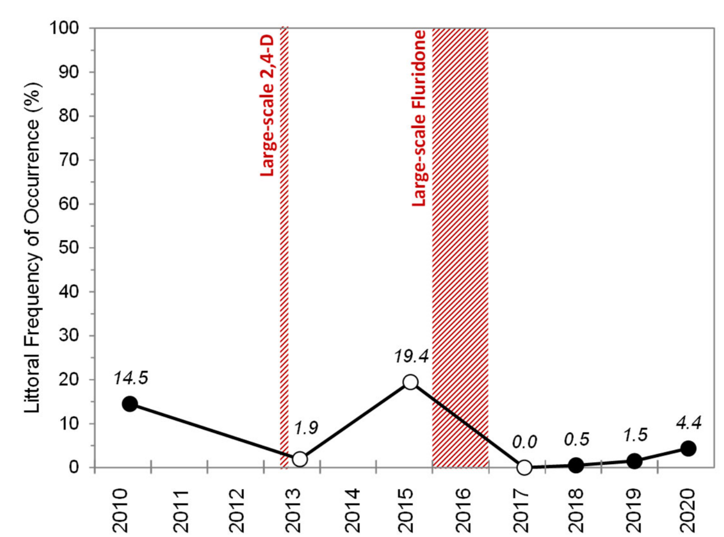


Figure 2.1-1. Littoral frequency of occurrence of HWM in Pine Lake from 2010-2020. Open circle represents statistically valid change from previous survey (Chi-Square α = 0.05).

In 2010, the littoral frequency of occurrence of HWM in Pine Lake was 14.5% and following a whole-lake 2,4-D treatment in spring 2013, was reduced to 2.0% (Figure 2.1-1). The littoral frequency of occurrence of HWM increased to 19.4% by 2015 which led to the eventual whole-lake fluridone treatment in 2016. Following treatment, the occurrence of HWM was reduced to 0% in 2017 and 0.5% in 2018. The occurrence of HWM has slowly increased to 1.5% in 2019 and 4.4% in 2020.

Some of the most frequently encountered native aquatic plant species during the point-intercept surveys in Pine Lake include muskgrasses (*Chara* spp.), wild celery (*Vallisneria americana)*, naiads (*Najas* spp.), and pondweed species including clasping-leaf pondweed (*Potamogeton richardsonii*), Illinois pondweed (*P. Illinoensis*), and variable-leaf pondweed (*P. gramineus*).

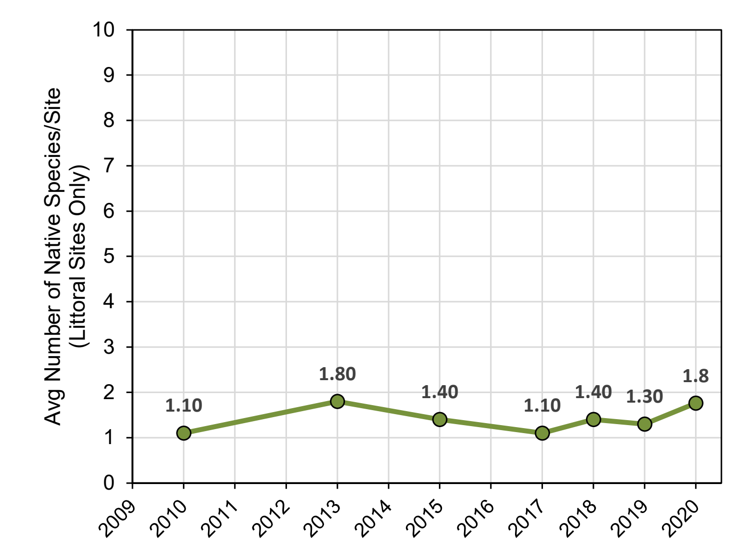


Figure 2.1-2. Average number of native aquatic plant species per littoral sampling site in Pine Lake.

Figure 2.1-2 displays the average number of native species per sampling site from 2010 to 2020 in Pine Lake. The data show that 1.4 native species were present for this metric in 2015 and decreased to 1.1 in the first post-treatment survey in 2017. By 2018, the average number of native species per site was back to pre-treatment levels of 1.4. The most recent survey conducted in 2020 found 1.8 species per site.

Illinois pondweed and the collective occurrences of naiad species (*Najas flexilis* and *N. guadalupensis*), initially exhibited a statistically valid decrease in littoral frequency of occurrence following the 2016 fluridone treatment in Pine Lake. Figure 2.1-3 displays the occurrences of these species in the following years. Illinois pondweed occurrence has increased incrementally each year reaching 6.8% in 2020 indicating full recovery since the 2016 treatment. The collective population of naiads showed early signs of rebound in the first few years after treatment and exhibited a statistically valid increase in occurrence between

2019-2020. The 33.5% occurrence in 2020 is slightly higher than the pre-treatment occurrence documented in 2015 indicated this species has fully recovered.

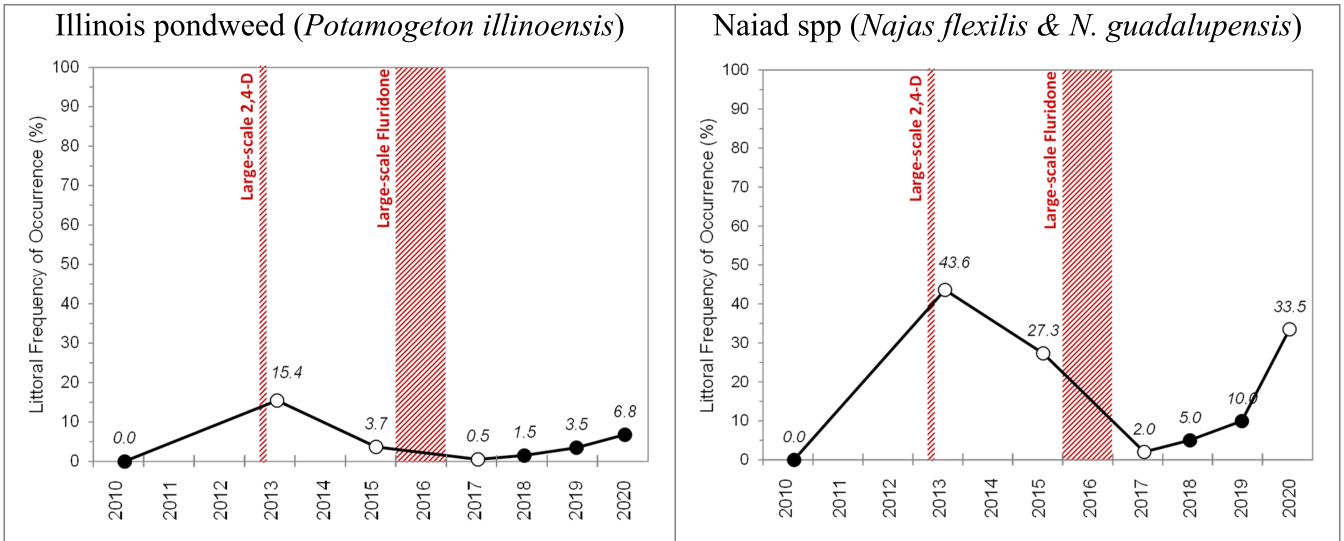


Figure 2.1-3. Littoral occurrence of aquatic plant species that exhibited statistically valid decreases following the 2016 fluridone treatment in Pine Lake.

Appendix A includes the littoral frequency of occurrence of aquatic plants for all point-intercept surveys conducted on Pine Lake.

Grass Lake

In 2010, the littoral frequency of occurrence of HWM in Grass Lake was 53.5% and following a whole-lake 2,4-D treatment in spring 2012, was reduced to 0.0% (Figure 2.1-4). The littoral frequency of occurrence of HWM increased to 41.9% by 2015 which led to the eventual whole-lake fluridone treatment in 2016. Following treatment, the occurrence of HWM was reduced to 0% in 2017 and increased to 5.2% in 2018 (Figure 2.1-4). Three years after treatment, the 2019 point-intercept survey indicated that the HWM occurrence was 10.6% which represents a 74.7% reduction compared to the 2015 occurrence. HWM exhibited a statistically valid increase in occurrence from 10.6% in 2019 to 30.4% in 2020.

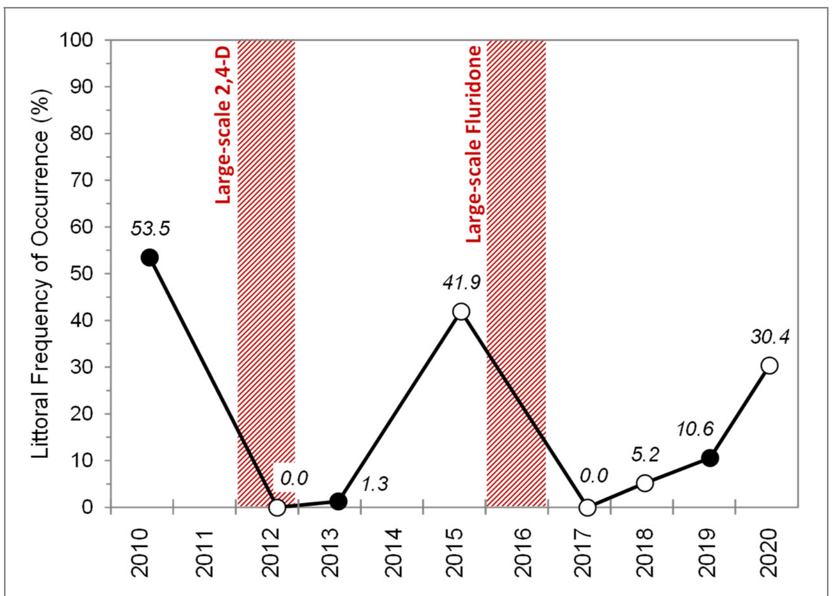


Figure 2.1-4. Littoral frequency of occurrence of HWM in Grass Lake from 2010-2020. Open circle represents statistically valid change from previous survey (Chi-Square α = 0.05).

Figure 2.1-5 displays the average number of native species per sampling site from 2010 to 2019 in Grass Lake. The data show the average number has trended lower since 2010. Prior to the most recent whole-lake herbicide treatment, 2.5 native species per sampling site were present. Following the 2016 whole-lake treatment, the number of native species per site decreased to 1.8 in 2017 and has remained at nearly the same level in the three years since.

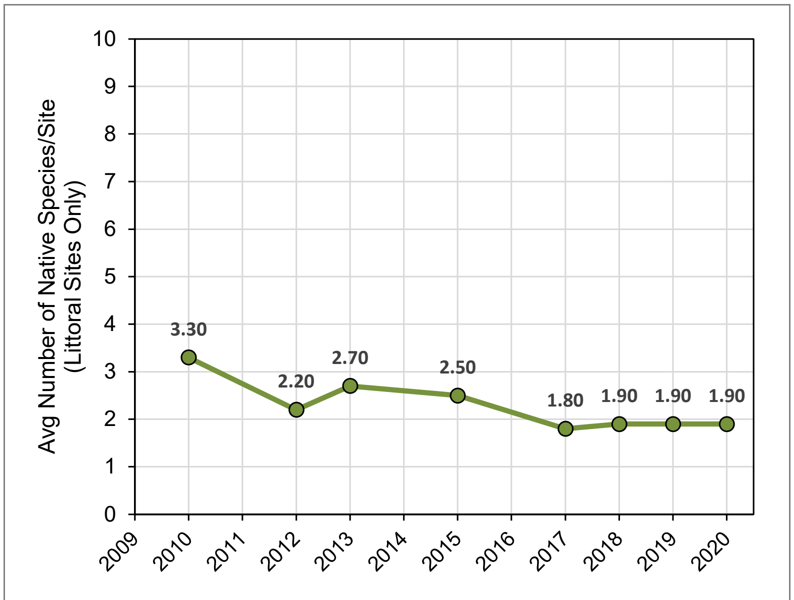


Figure 2.1-5. Average number of native aquatic plant species per littoral sampling site in Grass Lake.

Some of the most frequently encountered native aquatic plant species during point-intercept surveys in Grass Lake include wild celery, muskgrasses, naiads, common waterweed (*Elodea canadensis*), and various pondweed species (*Potamogeton spp.*).

Wild celery and the collective occurrences of naiad species, initially exhibited statistically valid decreases in littoral frequency of occurrence following the 2016 fluridone treatment in Grass Lake. Figure 2.1-6 displays the occurrences of these species in the following years and demonstrates that wild celery populations have remained relatively stable over the past four years at between 45-49% occurrence. The collective population of naiads showed a statistically valid increase in occurrence each year from 2017-2019. The 2020 survey showed an occurrence of 25.9% which is a statistically valid decrease in occurrence compared to 2019.

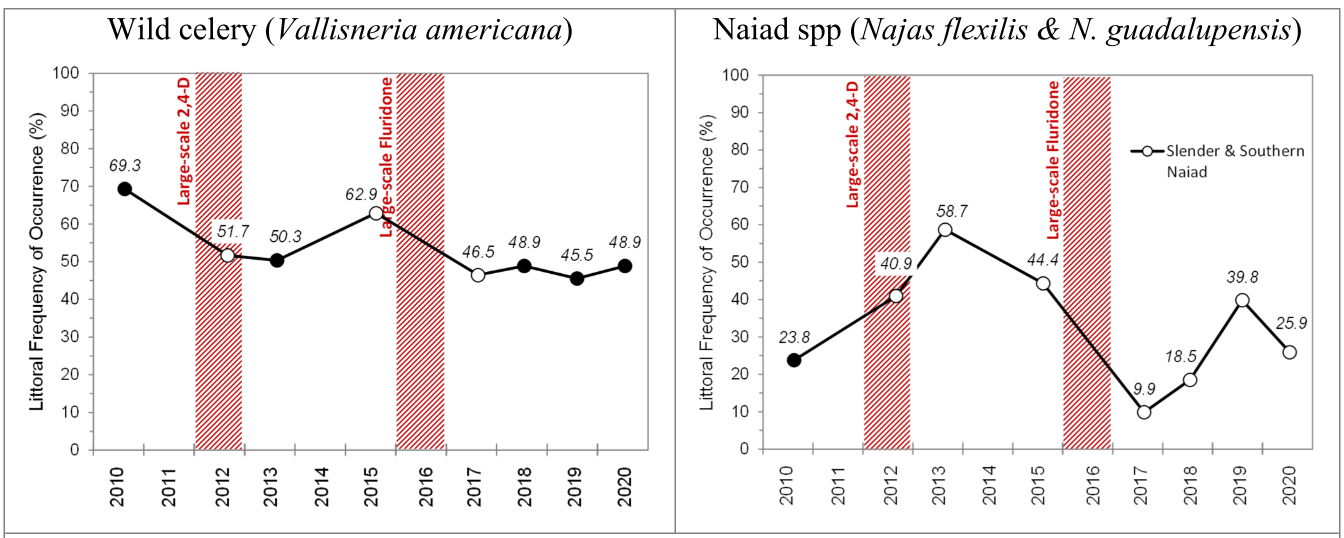


Figure 2.1-6. Littoral occurrence of aquatic plant species that exhibited statistically valid decreases following the 2016 fluridone treatment in Grass Lake.

Appendix A includes the littoral frequency of occurrence of aquatic plants for all point-intercept surveys conducted on Grass Lake.

Round Lake

The littoral frequency of HWM in Round Lake was 18.8% in 2010 and 9.8% and 7.0% in 2012-2013 respectively (Figure 2.1-7). The occurrence of HWM increased rapidly by 2015 with an occurrence of 40.6% and was 48.2% in 2017. The 2019 point-intercept survey found HWM exhibited an occurrence of 3.5%, representing a 92.7% decrease in occurrence compared to the pre-treatment survey in 2017. A replication of the survey during 2020 showed HWM exhibited an occurrence of 9.8%.

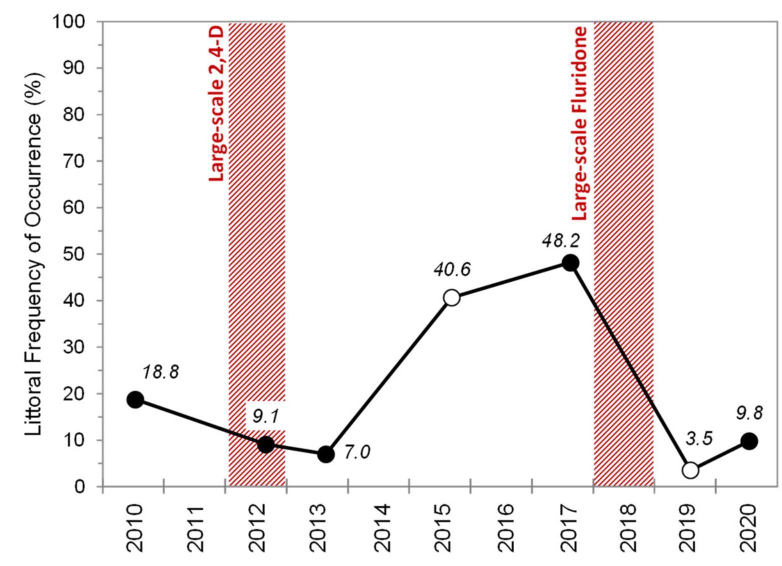


Figure 2.1-7. Littoral frequency of occurrence of HWM in Round Lake. Open circle represents statistically valid change from previous survey (Chi-Square α = 0.05).

Native aquatic plant species frequently encountered on point-intercept surveys in Round Lake include muskgrasses, wild celery, sago pondweed (*Stuckenia pectinata*), and white water lily (*Nymphaea odorata*).

Figure 2.1-8 shows the average number of native aquatic plant species present at each littoral sampling site in Round Lake. The highest recorded value for this metric was in 2015 at 2.42. The average number of native plant species per sampling site was reduced from 1.8 in 2017 to 1.5 in 2019 following the fluridone treatment. The 2020 point-intercept survey showed 1.6 native species per sample site.

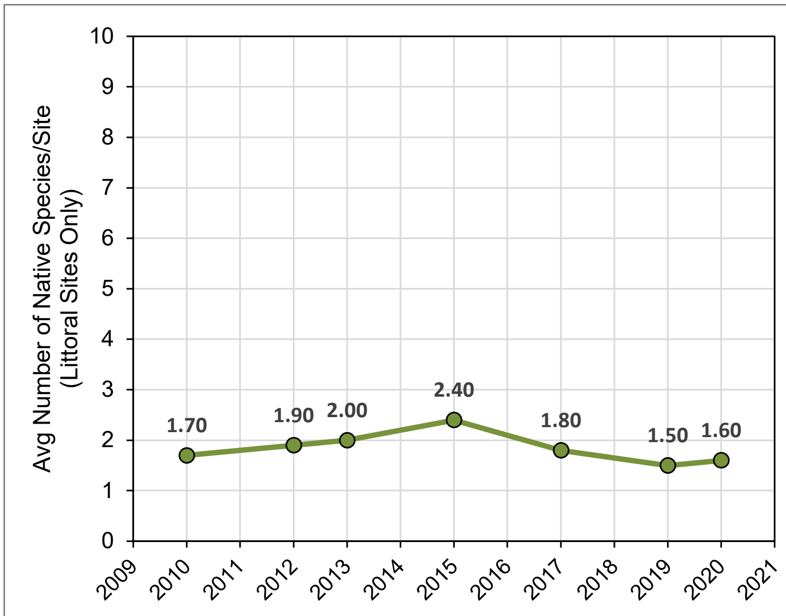


Figure 2.1-8. Average number of native aquatic plant species per littoral sampling site in Round Lake from 2010-2019.

Appendix A includes the littoral frequency of occurrence of aquatic plants for all point-intercept surveys conducted on Round Lake.

3.0 Hybrid Watermilfoil Mapping Surveys

On September 10, and 17, 2020, Onterra ecologists conducted the Late-Season HWM Mapping Survey on the Cloverleaf Lakes. All littoral areas of the Cloverleaf Lakes were included in the survey area. The survey crew supplemented the visual survey with the selective use of rake tows and submersible camera where applicable. The results of the survey are displayed on Map 1.

The HWM population in Round Lake was modest consisting mostly of *single or few plants* or *clumps of plants* along the shallow margins of the lake. One *small plant colony* was mapped on the northern end of the lake but no colonized areas that required area-based mapping methodologies were located anywhere in the lake. Overall, the population was similar to what had been mapped during the 2019 Late-Season Mapping Survey (Figure 3.0-1).

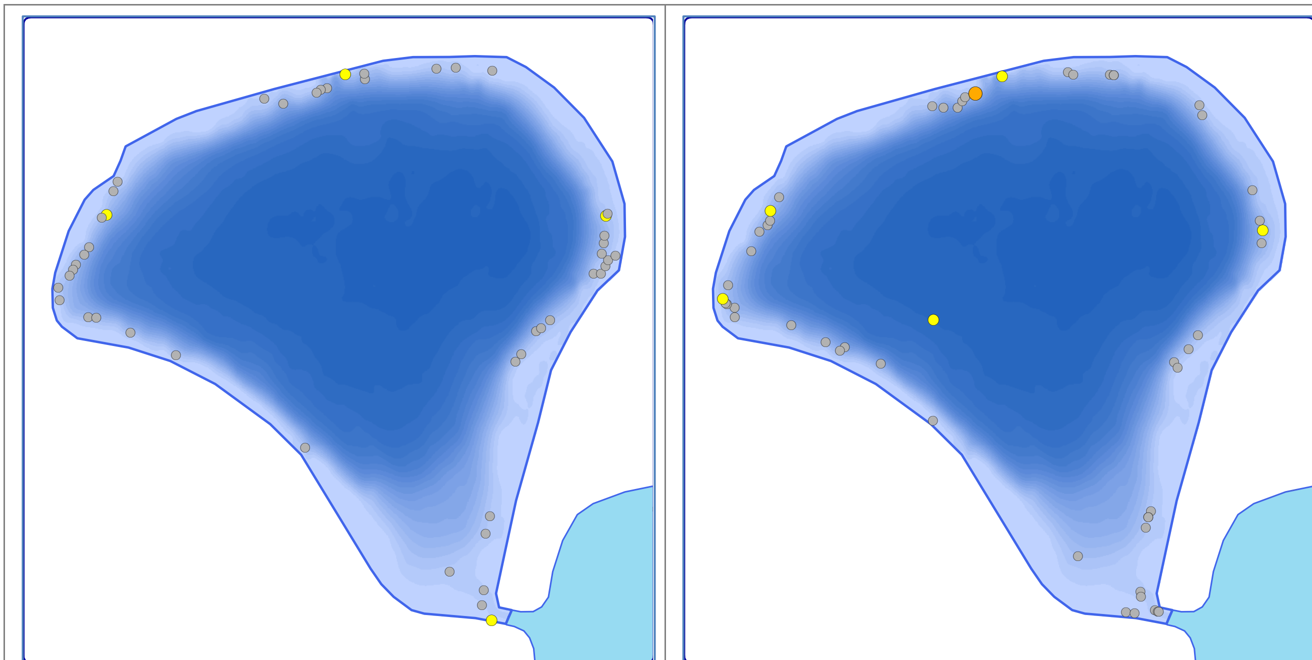


Figure 3.0-1. HWM Population in Round Lake from 2019-2020. Data from Onterra Late-Summer Mapping Surveys. Whole-lake fluridone treatment occurred in 2018.

The HWM population in Pine Lake consisted of many isolated *single or few plants*, *clumps of plants*, and *small plant colonies* as well as a few relatively small sized colonized populations (Map 1). The HWM colonies that were mapped as polygons totaled just 0.7 acres, of which 0.5 acres were of the lowest density ratings (*highly scattered* or *scattered*). No colonized areas of HWM had been mapped in Pine Lake since 2015, corresponding to the year prior to the whole-lake fluridone treatment. Overall, the HWM population in Pine Lake continues to be relatively modest and much lower than the pre-treatment population documented during 2015.

As has been the case in recent surveys, the largest HWM population in Cloverleaf Lakes was located within Grass Lake during the 2020 mapping survey. The HWM population has rebounded to inhabit much of the same footprint as it historically has. This includes a nearly continuous narrow strip of plants just off many riparian docks on the northern portion of the lake, as well as just north of the 'island' of emergent and floating-leaf communities near the southern end of the lake, as well as in the vicinity of the public boat launch (Map 1). A total of 9.5 acres of colonized HWM was mapped in 2020 within Grass Lake compared to 5.0 acres the previous year. After the 2016 treatment, the HWM population initially decreased to 0 acres in 2017. The population has trended higher each year since the whole-lake treatment, although remains somewhat below the 11.5 acres that was documented pre-treatment in 2015 (Figure 3.0-2). It is important to note that Figure 3.0-2 only accounts for HWM that is mapped with area-based mapping (polygons) and does not account for any occurrences mapped with point-based attributes such as single plants, clumps of plants, or small plant colonies.

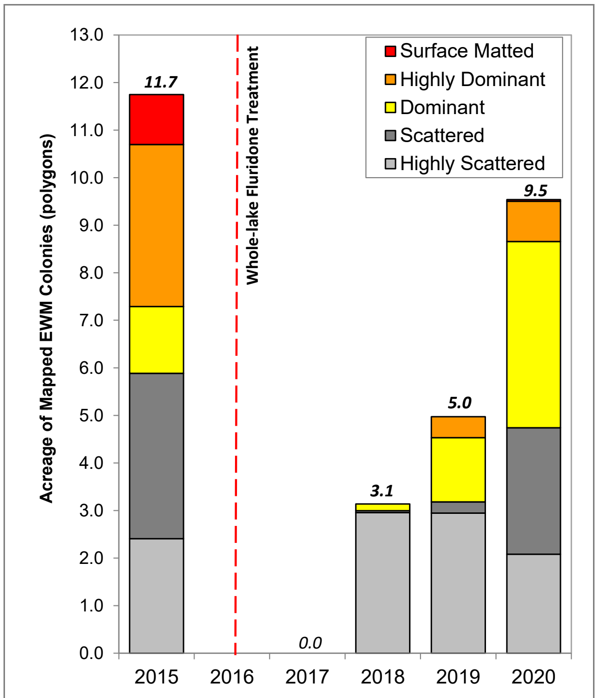


Figure 3.0-2. Acres of HWM Colonies Mapped in Grass Lake from 2015-2020. Data from Onterra' s late-summer mapping surveys.

4.0 Professional Hand Harvesting Activities

The CLPA contracted with DASH Aquatic Services, LLC to conduct professional hand-harvesting of select locations of HWM in 2020. The CLPA led the prioritization of the 2020 hand harvesting efforts considering the results of the 2019 HWM mapping surveys. Professional hand harvesting efforts were conducted on June 23-25, 2020 and resulted in the harvest of 1,202 pounds of HWM from the Cloverleaf Lakes. Harvesting efforts took place in each of the three lakes comprising Cloverleaf Lakes. The greatest amount of harvest was reported from Pine Lake with approximately 738 pounds harvested from littoral areas of the lake. Approximately 340 pounds was harvested from Grass Lake within areas near the public boat launch and the channel near Gibson Island, and another 126 pounds was harvested around the shallow margins of Round Lake. A summary report of the hand harvesting activities completed in 2020 is included as Appendix B.

Professional hand harvesting activities over the past few years have targeted many of the early rebounding EWM occurrences in Pine Lake and Round Lake. These efforts likely helped to maintain the low EWM populations in these lakes and inhibited EWM from rapidly re-establishing in areas that were formerly occupied with dense EWM colonies. To date, hand harvesting as a form of IPM following the fluridone treatments has been an effective tool in managing and suppressing the resurgent EWM population particularly within Pine and Round Lakes. This management technique has proven somewhat less impactful in Grass Lake as the EWM population recovery has significantly outpaced the removal efforts in recent years.

5.0 CONCLUSIONS AND DISCUSSION

Monitoring surveys completed on Cloverleaf Lakes during 2020 indicate that the HWM population has increased slightly in each individual lake compared to 2019. The HWM population in Grass Lake is approaching levels last documented prior to the 2016 whole-lake herbicide treatment, whereas the HWM rebound has been slower in Pine Lake and Grass Lake. Professional hand harvesting efforts that took place during 2020 likely resulted in HWM suppression in the areas that were targeted. These efforts likely improved localized HWM conditions on a small scale in sites that were targeted and contributed towards minimizing the potential of these locations to interfere with riparian use of the lake resource. The hand harvesting efforts were of a relatively fine scale and were not specifically monitored through the surveys completed in 2020 which were a lake-wide population assessment. Point-intercepts survey completed in 2020 serve to document the aquatic plant populations in the system and evaluate the longer-term population dynamics following past whole-lake herbicide treatments.

The CLPA has partnered with the Town of Belle Plaine in developing an updated Comprehensive Management Plan for the Cloverleaf Lakes with funding assistance acquired through a WDNR grant awarded following the December 2019 cycle. The project will update all aspects of the Cloverleaf Lake's management including an updated AIS management plan. The project includes components in addition to those already planned from the open AIS EPC grant during 2020 and 2021.

5.1 2021 HWM Management Strategy Development

In light of the rebounding HWM population in Grass Lake, the applicability of hand harvesting as a form of initial follow-up integrated pest management is no longer a scale appropriate management technique. In recent years there has been a change in preferred strategy amongst many lake managers and regulators when it comes to managing established HWM populations. Instead of chasing the entire HWM population with management, perhaps focusing on the areas that are causing the largest impacts can be more economical and cause less ecological stress. The WDNR supports using the management method that will impart the least stress on the overall ecosystem.

Some lake groups have decided to implement herbicide spot treatments to provide targeted EWM control. As new herbicides, use-patterns, and techniques emerge; the CLPA will investigate their applicability for HWM management on the Cloverleaf Lakes. This includes the use of barrier or limno-curtains to contain herbicide within an area to hold herbicide concentrations and exposure times to sufficient levels. To date, most of these research endeavors have focused on using 2,4-D, as it is one of the most economical herbicides. As discussed above, Onterra maintains concern for using 2,4-D in Cloverleaf Lakes; the extensive use of this product may have created herbicide resistance and therefore herbicide rotation away from this herbicide is suggested. More conversation about limno-curtains, their future applicability and limitations, will occur as a part of the ongoing Lake Management Planning project.

To gain multi-year HWM suppression without the addition of a limno-curtain, spot herbicide treatments would need to rely on herbicides or herbicide combinations thought to be more effective under short exposure situations than with traditional weak-acid auxin herbicides (e.g. 2,4-D). At the time of this writing, florpyrauxifen-benzyl (ProcellaCOR™), a combination of 2,4-D/endothall (Chinook®), and a combination of diquat/endothall (Aquastrike™) are examples of herbicides with reported short exposure time requirements that are employed for invasive watermilfoil control in Wisconsin.

ProcellaCOR™ is currently the state's most popular spot-treatment strategy. In Onterra's experience monitoring approximately a dozen ProcellaCOR™ treatments within the state during 2020, EWM/HWM control has been high with almost no EWM being located during the summer post treatment. Within these treatments, native plant impacts have been minimal outside of some sensitive dicot species such as northern watermilfoil. Of the native species known to be impacted by this chemistry, white water lily, spatterdock, and coontail are present within Grass Lake.

Lake managers continue to learn how to successfully implement this form of treatment after being registered for use in Wisconsin only a couple of years ago. ProcellaCOR™ has a high sediment/organic binding affinity (Koc) and relatively short persistence (half-life of > 6 days), so it is thought to stay where applied better than other chemistries. However; in many of the treatment Onterra has monitored, EWM impacts have been observed extending outside of the application area (i.e through herbicide dissipation), as this chemical has shown activity at even low concentrations and exposure times. Additional information from the WDNR related to aquatic herbicide regulation and the WDNR's Chemical fact sheet for florpyrauxifen-benzyl are included in Appendix C.

During the winter of 2020-2021, the CLPA has been in discussion between Onterra ecologist/planners and the regional WDNR lake coordinator (Brenda Nordin) to develop a preliminary 2021 trial herbicide spot treatment using ProcellaCOR™ as displayed on Map 2. The proposed treatment includes two application areas totaling 6.8 acres in Grass Lake at a dosing rate of 3.5-4.0 prescription dosing units (PDU's). The HWM in these locations is of the some of the highest density colonies, and are located in high-use parts of the lake.

Calculations indicate that a potential whole-lake epilimnetic herbicide concentration of 0.25 ppb ae could be achieved upon complete mixing of the herbicide within the epilimnetic volume of the entire lake. As a relatively new herbicide, expectations are uncertain if HWM impacts will be limited to the herbicide application area, adjacent waters, or lake-wide. The CLPA is in the process of developing an herbicide concentration monitoring plan with the assistance of Onterra and WDNR. The sampling plan would include volunteer collection of water samples at a number of locations and time intervals following the treatment. The CLPA has experience in completing this type of monitoring in the past. Onterra will meet with volunteers from the CLPA to deliver the equipment and supplies necessary to complete this monitoring as well as provide any needed training.

The CLPA plans on monitoring the treatment impacts at both treatment area (sub-sample point-intercept survey) and lake-wide (whole-lake point-intercept survey) scales (Figure 5.1-1). Aquatic plant data would be collected before and after the treatment at these locations to quantitively understand the level of HWM control and potential non-target plant impacts. The 2021 herbicide treatment is planned for roughly the middle of June. This slight delay in implementation will allow the pretreatment sub-sample point-intercept survey to take place after many native plants have emerged from winter dormancy. The whole-lake point-intercept survey occurred in mid-summer 2020 and will serve as the pretreatment dataset. These locations would likely be sampled during the *year after treatment* (2022) to understand if longer than seasonal impacts are achieved.

Qualitative monitoring would include comparing the EWM population mapped during the 2020 Late-Summer EWM Mapping Survey (*year-before-treatment)* to a replication of the survey during the late-summer of 2021 (*year-of-treatment*). Further, reductions in the EWM population would be expected to persist into the following year (*year-after-treatment*).

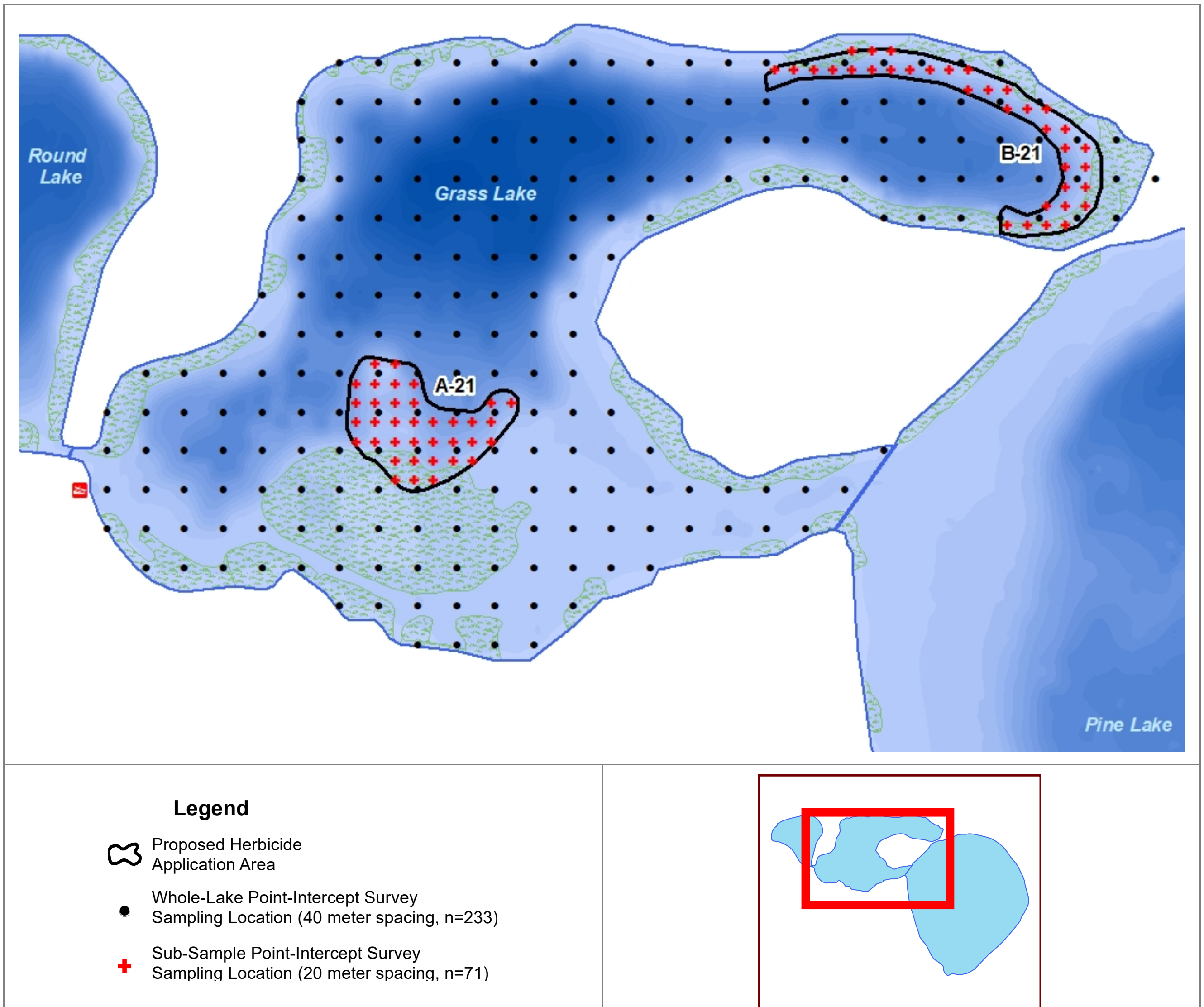
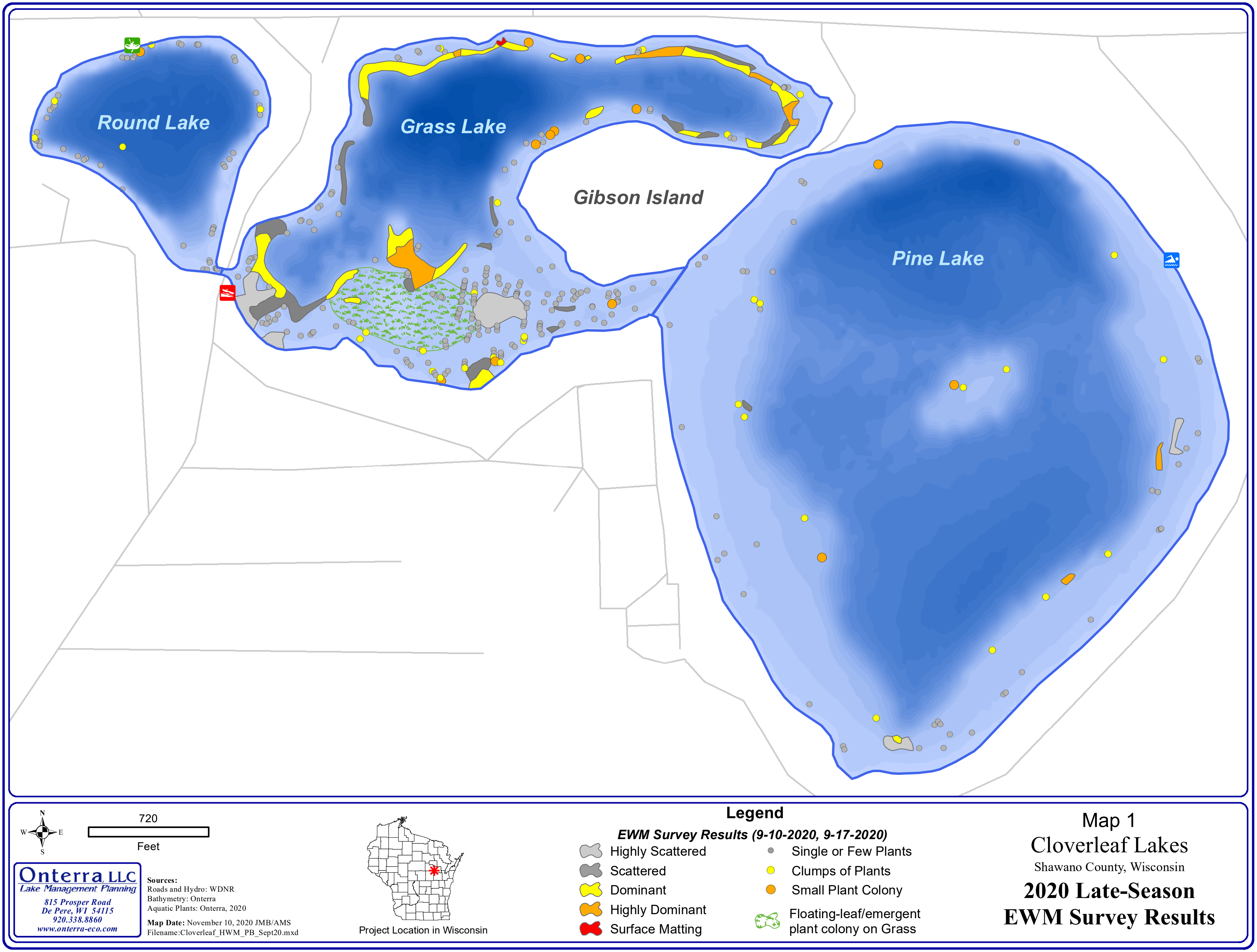


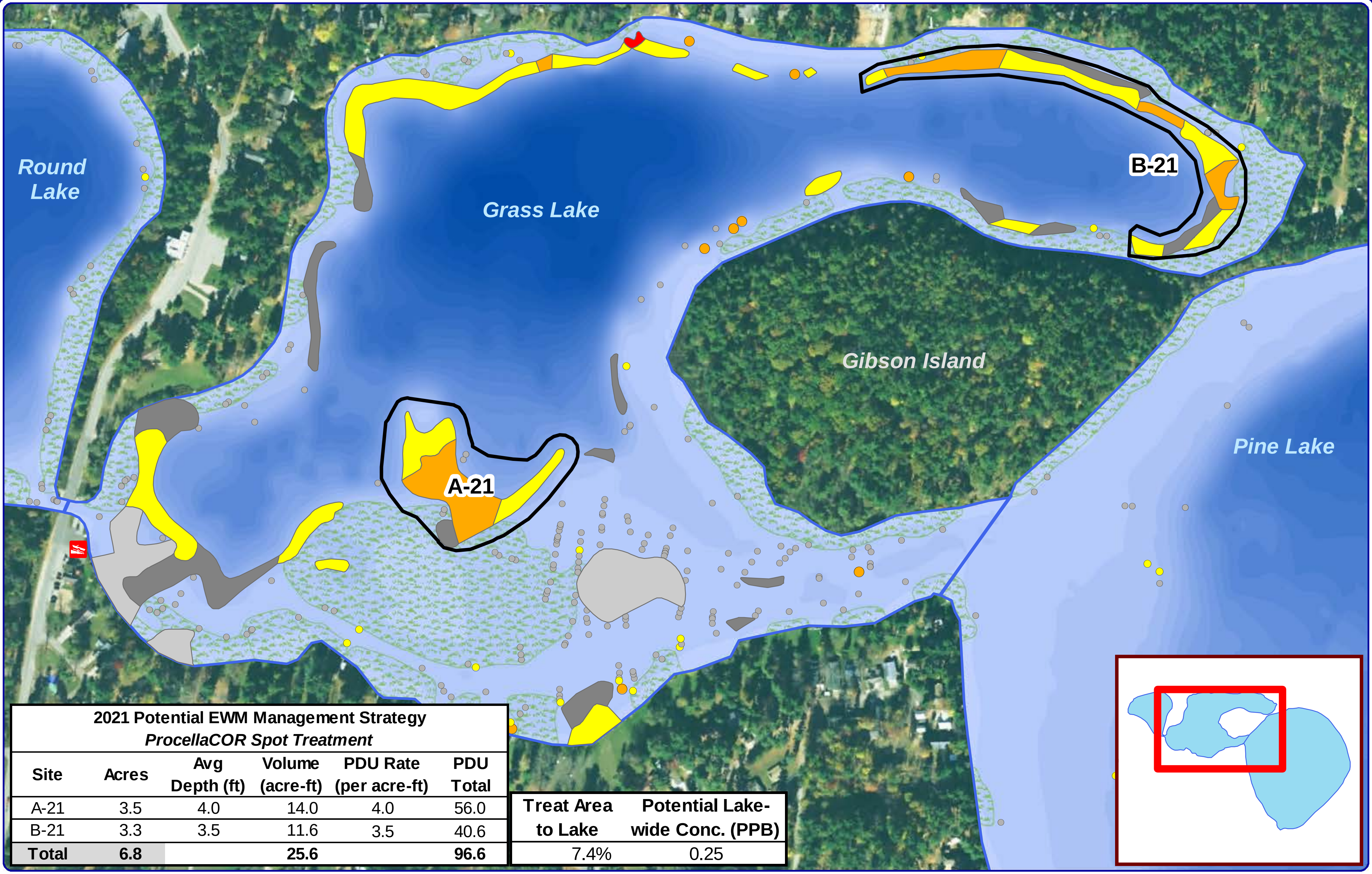
Figure 5.1-1. Quantitative Monitoring Plan associated with a proposed 2021 herbicide treatment strategy in Grass Lake.

The CLPA will continue to focus professional hand harvesting efforts in 2021 towards HWM within Pine and Round Lakes. This would be a continuation of the IPM strategy that the CLPA has conducted over the past several years. A realistic goal of implementing this strategy would be to maintain the HWM population in Round Lake at its current modest population level. The HWM population in Pine Lake may be trending higher to a level that targeting the entire population is not cost effective and therefore prioritization of particular locations would become necessary. Hand harvesting efforts could serve to target the few small but relatively dense colonies of HWM that are most likely to be visible by lake users and the most likely to potentially cause nuisance conditions in the near future in the absence of management. Directing hand harvesting efforts in Grass Lake during 2021 is not initially recommended considering the proposed herbicide management and the unknown area of impact. If remnant HWM is causing nuisance conditions during the second half of the summer, they may be prioritized for hand-harvesting. A permit is not required for hand harvesting unless DASH is being used. If the CLPA elects to pursue a hand harvesting effort in 2021, Onterra would assist through the creation and distribution of the associated maps and spatial data to the CLPA and contractor. Any hand harvesting efforts would be guided by the mapping data collected during the 2020 Late-Summer EWM Mapping Survey.

Having experience in managing HWM in recent years, the CLPA has developed an increasingly clear understanding of the capabilities, limitations, and costs in implementing a coordinated hand harvesting strategy as a tool to manage HWM in Cloverleaf Lakes. The CLPA will use this experience in determining the appropriate application of this management technique in Cloverleaf Lakes in 2021. The CLPA will consider whether the expectations of employing this management technique are commensurate with the associated costs.



Map 1
Cloverleaf Lakes
Shawano County, Wisconsin
2020 Late-Season EWM Survey Results



2021 Potential EWM Management Strategy
ProcellaCOR Spot Treatment

Site	Acres	Avg Depth (ft)	Volume (acre-ft)	PDU Rate (per acre-ft)	PDU Total
A-21	3.5	4.0	14.0	4.0	56.0
B-21	3.3	3.5	11.6	3.5	40.6
Total	**6.8**		**25.6**		**96.6**

Treat Area to Lake	Potential Lake-wide Conc. (PPB)
7.4%	0.25

390
Feet

Onterra LLC
Lake Management Planning
815 Prosper Road
De Pere, WI 54115
920.338.8860
www.onterra-eco.com

Sources:
Roads and Hydro: WDNR
Bathymetry: Onterra
Aquatic Plants: Onterra, 2020

Map Date: February 17, 2021 TWH
Filename:Cloverleaf_HWM_PB_Sept20.mxd

Project Location in Wisconsin

Legend

EWM Survey Results (9-10-2020, 9-17-2020)

- Highly Scattered
- Scattered
- Dominant
- Highly Dominant
- Surface Matting
- Single or Few Plants
- Clumps of Plants
- Small Plant Colony

Preliminary 2021 Treatment Site

Floating-leaf/emergent plant colonies

Map 2
Cloverleaf Lakes
Shawano County, Wisconsin

Preliminary 2021 HWM Mgmt Discussion v2

Not For Permit Use

A

APPENDIX A

Summer Point-Intercept Survey Data Matrix

Pine Lake (Cloverleaf Lakes) 2010-2020 Point-Intercept Surveys: Littoral Frequency of Occurrence of Aquatic Plants

	Scientific Name	Common Name	LFOO (%) 2010	2013	2015	2017	2018	2019	2020
Dicots	*Myriophyllum spicatum*	Eurasian w atermilfoil	14.5	1.9	19.4	0.0	0.5	1.5	4.4
	Ceratophyllum demersum	Coontail	0.0	10.0	2.3	0.5	2.0	0.5	1.0
	Myriophyllum sibiricum	Northern w atermilfoil	0.0	0.0	0.0	0.0	0.0	0.0	1.0
	Utricularia vulgaris	Common bladderw ort	0.0	0.0	0.0	0.0	0.5	0.0	0.5
	Nymphaea odorata	White w ater lily	0.5	0.0	0.0	0.5	0.0	0.0	0.0
	Nuphar variegata	Spatterdock	0.5	0.0	0.0	0.0	0.0	0.0	0.0
	Ceratophyllum echinatum	Spiny hornw ort	0.0	0.0	0.0	0.0	0.0	0.5	0.0
Non-dicots	*Chara spp.*	Muskgrasses	38.6	37.5	42.6	36.7	51.3	43.3	47.1
	Vallisneria americana	Wild celery	23.7	39.4	40.3	32.2	41.2	38.8	41.7
	Najas flexilis & N. guadalupensis	Slender & Southern Naiad	0.0	43.6	27.3	2.0	5.0	10.0	33.5
	Najas guadalupensis	Southern naiad	0.0	43.6	20.8	0.5	0.0	2.0	17.5
	Potamogeton richardsonii	Clasping-leaf pondw eed	23.7	19.3	4.6	11.6	10.6	13.9	6.8
	Najas flexilis	Slender naiad	0.0	0.4	6.9	2.0	5.0	8.5	21.8
	Stuckenia pectinata	Sago pondw eed	1.0	6.2	6.0	8.0	8.0	3.5	8.3
	Potamogeton illinoensis	Illinois pondw eed	0.0	15.4	3.7	0.5	1.5	3.5	6.8
	Potamogeton gramineus	Variable-leaf pondw eed	0.0	5.8	1.4	2.5	3.5	5.5	10.2
	Nitella spp.	Stonew orts	0.0	1.9	3.7	5.5	5.0	3.5	6.3
	Potamogeton zosteriformis	Flat-stem pondw eed	0.0	1.2	4.6	3.5	4.0	5.0	3.4
	Potamogeton amplifolius	Large-leaf pondw eed	21.7	0.0	0.0	0.0	0.0	0.5	0.0
	Elodea canadensis	Common w aterw eed	0.0	1.2	2.8	1.0	2.0	1.0	3.4
	Potamogeton crispus	Curly-leaf pondw eed	0.5	0.0	0.0	0.0	0.5	0.0	1.0
	Potamogeton strictifolius	Stiff pondw eed	0.0	0.0	0.0	0.0	1.0	1.5	0.0
	Potamogeton foliosus	Leafy pondw eed	0.0	0.4	0.0	1.0	0.5	0.0	0.0
	Potamogeton friesii	Fries' pondw eed	0.0	0.0	0.0	0.0	0.5	0.0	0.5
	Potamogeton X scoliophyllus	Large-leaf X Illinois pondw eed	0.0	0.4	0.0	0.0	0.0	0.0	0.0
	Potamogeton robbinsii	Fern-leaf pondw eed	0.0	0.4	0.0	0.0	0.0	0.0	0.0
	Potamogeton pusillus	Small pondw eed	0.0	0.0	0.5	0.0	0.0	0.0	0.0
	Potamogeton praelongus	White-stem pondw eed	0.0	0.0	0.0	0.5	0.0	0.0	0.0
	Heteranthera dubia	Water stargrass	0.0	0.0	0.0	0.0	0.0	0.5	0.0

Grass Lake (Cloverleaf Lakes) 2010-2020 Point-Intercept Surveys: Littoral Frequency of Occurrence of Aquatic Plants

	Scientific Name	Common Name	LFOO (%)							
			2010	2012	2013	2015	2017	2018	2019	2020
Dicots	*Myriophyllum spicatum*	Eurasian w atermilfoil	53.5	0.0	1.3	41.9	0.0	5.2	10.6	30.4
	Nuphar variegata	Spatterdock	43.6	7.4	8.4	7.3	4.9	5.9	4.9	8.9
	Nymphaea odorata	White w ater lily	7.9	9.4	13.5	8.9	6.3	5.2	7.3	10.4
	Brasenia schreberi	Watershield	15.8	4.7	5.8	5.6	4.2	3.0	3.3	3.0
	Ceratophyllum demersum & C. echinatur	Coontail & Spiny hornw ort	7.9	8.7	3.9	1.6	4.2	2.2	4.1	4.4
	Ceratophyllum demersum	Coontail	5.0	8.7	3.9	1.6	3.5	2.2	3.3	4.4
	Utricularia vulgaris	Common bladderw ort	0.0	0.0	1.3	2.4	2.1	1.5	0.8	0.7
	Myriophyllum sibiricum	Northern w atermilfoil	0.0	0.0	0.0	0.8	0.0	0.0	7.3	0.0
	Utricularia gibba	Creeping bladderw ort	0.0	0.0	0.6	0.0	0.0	3.7	0.0	0.0
	Ceratophyllum echinatum	Spiny hornw ort	3.0	0.0	0.0	0.0	0.7	0.0	0.8	0.0
	Myriophyllum tenellum	Dw arf w atermilfoil	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Bidens beckii	Water marigold	0.0	0.0	0.6	0.0	0.0	0.0	0.0	0.0
Non-dicots	*Vallisneria americana*	Wild celery	69.3	51.7	50.3	62.9	46.5	48.9	45.5	48.9
	Chara spp.	Muskgrasses	42.6	31.5	34.2	46.8	39.4	47.4	35.8	36.3
	Najas flexilis & N. guadalupensis	Slender & Southern Naiad	23.8	40.9	58.7	44.4	9.9	18.5	39.8	25.9
	Najas guadalupensis	Southern naiad	22.8	0.0	58.1	41.9	0.7	2.2	23.6	14.1
	Najas flexilis	Slender naiad	1.0	40.9	3.9	7.3	9.2	16.3	21.1	13.3
	Potamogeton richardsonii	Clasping-leaf pondw eed	48.5	17.4	23.9	14.5	8.5	8.1	1.6	2.2
	Elodea canadensis	Common w aterw eed	6.9	5.4	13.5	11.3	6.3	8.1	8.9	13.3
	Stuckenia pectinata	Sago pondw eed	22.8	6.0	12.3	7.3	10.6	9.6	3.3	6.7
	Potamogeton zosteriformis	Flat-stem pondw eed	5.0	2.0	6.5	9.7	10.6	10.4	6.5	6.7
	Potamogeton illinoensis	Illinois pondw eed	0.0	16.8	20.0	4.0	2.8	5.2	0.0	1.5
	Potamogeton gramineus	Variable-leaf pondw eed	0.0	0.0	0.6	3.2	2.8	2.2	7.3	15.6
	Schoenoplectus acutus & S. tabernaemo	Hard-stem and Soft-stem bulrush	9.9	2.0	3.2	3.2	1.4	3.0	0.0	0.7
	Potamogeton foliosus	Leafy pondw eed	17.8	0.0	0.0	0.0	2.1	0.0	0.0	0.0
	Schoenoplectus acutus	Hardstem bulrush	0.0	2.0	3.2	3.2	1.4	1.5	0.0	0.7
	Potamogeton natans	Floating-leaf pondw eed	3.0	1.3	1.3	3.2	1.4	0.7	1.6	0.7
	Sagittaria sp. (rosette)	Arrow head sp. (rosette)	0.0	2.7	0.0	3.2	2.1	2.2	2.4	0.0
	Spirodela polyrhiza	Greater duckw eed	0.0	0.7	1.3	0.8	1.4	0.7	2.4	1.5
	Potamogeton amplifolius	Large-leaf pondw eed	4.0	0.0	1.3	0.0	0.0	3.0	1.6	0.7
	Schoenoplectus tabernaemontani	Softstem bulrush	9.9	0.0	0.0	0.0	0.0	1.5	0.0	0.0
	Potamogeton praelongus	White-stem pondw eed	0.0	0.0	0.0	2.4	2.1	1.5	0.0	0.0
	Potamogeton pusillus	Small pondw eed	0.0	0.0	0.0	0.0	1.4	0.7	0.8	0.7
	Wolffia spp.	Watermeal spp.	0.0	2.0	0.6	0.0	0.0	0.0	0.8	0.0
	Potamogeton strictifolius	Stiff pondw eed	0.0	0.0	1.3	0.0	0.0	1.5	0.0	0.0
	Lemna turionifera	Turion duckw eed	0.0	2.7	0.0	0.0	0.0	0.0	0.0	0.0
	Typha spp.	Cattail spp.	1.0	0.7	0.6	0.0	0.0	0.0	0.0	0.0
	Sagittaria latifolia	Common arrow head	1.0	0.7	0.6	0.0	0.0	0.0	0.0	0.0
	Nitella spp.	Stonew orts	0.0	1.3	0.0	0.0	0.7	0.0	0.0	0.0
	Lemna minor	Lesser duckw eed	0.0	0.0	0.0	0.0	1.4	0.7	0.0	0.0
	Sagittaria graminea	Grass-leaved arrow head	0.0	1.3	0.0	0.0	0.0	0.0	0.0	0.0
	Potamogeton X scoliophyllus	Large-leaf X Illinois pondw eed	0.0	0.0	1.3	0.0	0.0	0.0	0.0	0.0
	Potamogeton crispus	Curly-leaf pondw eed	1.0	0.0	0.0	0.0	0.7	0.0	0.0	0.0
	Pontederia cordata	Pickerelw eed	0.0	0.7	0.6	0.0	0.0	0.0	0.0	0.0
	Lemna trisulca	Forked duckw eed	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7
	Fissidens spp. & Fontinalis spp.	Aquatic Moss	0.0	0.0	0.0	0.0	0.0	0.0	1.6	0.0
	Zannichellia palustris	Horned pondw eed	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Heteranthera dubia	Water stargrass	0.0	0.0	0.6	0.0	0.0	0.0	0.0	0.0
	Eleocharis palustris	Creeping spikerush	0.0	0.7	0.0	0.0	0.0	0.0	0.0	0.0

Round Lake (Cloverleaf Lakes) 2010-2020 Point-Intercept Surveys: Littoral Frequency of Occurrence of Aquatic Plants

	Scientific Name	Common Name	LFOO (%)						
			2010	2012	2013	2015	2017	2019	2020
Dicots	*Myriophyllum spicatum*	Eurasian watermilfoil	18.8	9.1	7.0	40.6	48.2	3.5	9.8
	Nymphaea odorata	White water lily	0.0	21.8	15.8	18.8	14.3	10.5	2.0
	Nuphar variegata	Spatterdock	35.4	7.3	1.8	0.0	1.8	1.8	3.9
	Ceratophyllum demersum	Coontail	4.2	3.6	8.8	7.8	1.8	0.0	2.0
	Ranunculus aquatilis	White water crowfoot	0.0	0.0	0.0	1.6	1.8	0.0	2.0
	Nasturtium officinale	Watercress	0.0	0.0	0.0	0.0	0.0	0.0	2.0
	Myriophyllum sibiricum	Northern watermilfoil	0.0	3.6	0.0	0.0	0.0	0.0	0.0
	Brasenia schreberi	Watershield	0.0	0.0	0.0	0.0	1.8	0.0	0.0
Non-dicots	*Charophytes*	Muskgrasses & Stoneworts	68.8	87.3	73.7	82.8	75.0	84.2	82.4
	Chara spp.	Muskgrasses	68.8	70.9	73.7	75.0	64.3	77.2	74.5
	Vallisneria americana	Wild celery	20.8	18.2	21.1	34.4	19.6	12.3	13.7
	Stuckenia pectinata	Sago pondweed	0.0	9.1	21.1	7.8	19.6	7.0	5.9
	Nitella spp.	Stoneworts	0.0	16.4	0.0	12.5	10.7	8.8	11.8
	Potamogeton richardsonii	Clasping-leaf pondweed	16.7	14.5	1.8	12.5	8.9	5.3	2.0
	Schoenoplectus acutus	Hardstem bulrush	0.0	9.1	10.5	4.7	5.4	7.0	3.9
	Najas flexilis & N. guadalupensis	Slender & Southern Naiad	0.0	5.5	15.8	6.3	7.1	1.8	2.0
	Potamogeton gramineus	Variable-leaf pondweed	0.0	3.6	17.5	1.6	3.6	1.8	0.0
	Potamogeton illinoensis	Illinois pondweed	0.0	5.5	0.0	4.7	3.6	1.8	5.9
	Najas guadalupensis	Southern naiad	0.0	5.5	14.0	1.6	3.6	0.0	0.0
	Lemna minor	Lesser duckweed	0.0	0.0	0.0	15.6	0.0	0.0	3.9
	Potamogeton zosteriformis	Flat-stem pondweed	0.0	0.0	3.5	3.1	1.8	3.5	5.9
	Spirodela polyrhiza	Greater duckweed	0.0	0.0	1.8	6.3	1.8	7.0	2.0
	Najas flexilis	Slender naiad	0.0	0.0	5.3	4.7	5.4	1.8	2.0
	Schoenoplectus tabernaemontani	Softstem bulrush	14.6	0.0	0.0	4.7	0.0	0.0	0.0
	Elodea canadensis	Common waterweed	0.0	3.6	1.8	0.0	3.6	1.8	3.9
	Wolffia spp.	Watermeal spp.	0.0	0.0	0.0	6.3	0.0	0.0	3.9
	Potamogeton crispus	Curly-leaf pondweed	2.1	0.0	0.0	0.0	0.0	1.8	5.9
	Potamogeton amplifolius	Large-leaf pondweed	4.2	0.0	0.0	0.0	0.0	0.0	3.9
	Lemna turionifera	Turion duckweed	0.0	1.8	1.8	0.0	0.0	1.8	2.0
	Potamogeton pusillus	Small pondweed	0.0	3.6	0.0	1.6	0.0	1.8	0.0
	Potamogeton foliosus	Leafy pondweed	0.0	0.0	1.8	4.7	0.0	0.0	0.0
	Potamogeton berchtoldii	Slender pondweed	0.0	0.0	0.0	0.0	0.0	0.0	3.9
	Potamogeton strictifolius	Stiff pondweed	0.0	0.0	0.0	0.0	0.0	0.0	2.0
	Lemna trisulca	Forked duckweed	0.0	1.8	0.0	1.6	0.0	0.0	0.0
	Heteranthera dubia	Water stargrass	0.0	0.0	0.0	1.6	1.8	0.0	0.0
	Typha spp.	Cattail spp.	2.1	0.0	0.0	0.0	0.0	0.0	0.0
	Sagittaria sp. (rosette)	Arrowhead sp. (rosette)	0.0	0.0	0.0	0.0	1.8	0.0	0.0
	Fissidens spp. & Fontinalis spp.	Aquatic Moss	0.0	0.0	0.0	0.0	1.8	0.0	0.0

B

APPENDIX B

2020 Hand Harvesting Summary: DASH Aquatic Services, LLC

DASH
Aquatic Services LLC

2020 DASH SUMMARY

Hand harvesting of Eurasian Water Milfoil (EWM) was performed on June 23, 24, 25, 2020

June 23, 2020

Hand picking began on Pine Lake

Area G-19 174 lbs.

Area F-19 66 lbs.

Winds were fairly strong so we moved to Grass Lake

We worked both sides of the boat landing towards deeper water until the EWM was too overwhelming to hand pick efficiently.

56 lbs. were harvested

We then moved to harvest the channel on the backside of the island on Grass Lake heading towards Pine Lake

64 lbs. were harvested

June 24, 2020

Hand picking was performed on Round Lake starting at the culvert and following the shoreline around the lake until returning to the culvert

Individual plants and some small clumps of plants were found all of wich were easily found and removed

126 lbs. were harvested

The remainder of the day was spent at area F-19 on Pine Lake

166 lbs. were harvested

June 25, 2020

Starting at area F-19 on Pine Lake divers were towed south around the lake to the channel to Grass Lake

Using the gps map from Onterra we targeted locations for hand picking. We concentrated our efforts on areas with scattered plants and small clumps of plants skipping over the dense areas of EWM

330 lbs. were harvested

The remainder of the day was spent on Grass Lake in the northwest "corner" of the lake

220 lbs. were harvested

1202 lbs. were harvested over the three days

C

APPENDIX C

Florpyrauxifen-benzyl (ProcellaCOR™) WDNR Chemical Fact Sheet

Wisconsin Department of Natural Resources

July 2018

Florpyrauxifen-benzyl Chemical Fact Sheet

Formulations

Florpyrauxifen-benzyl was registered with the EPA for aquatic use in 2017. The active ingredient is 2-pyridinecarboxylic acid, 4-amino-3-chloro-6-(4-chloro-2-fluoro-3-methoxyphenyl)-5-fluoro-, phenyl methyl ester. The current Wisconsin-registered formulation is a liquid (ProcellaCOR™ EC) solely manufactured by SePRO Corporation.

Aquatic Use and Considerations

Florpyrauxifen-benzyl is a systemic herbicide that is taken up by aquatic plants. The herbicide is a member of a new class of synthetic auxins, the arylpicolinates, that differ in binding affinity compared to other currently registered synthetic auxins. The herbicide mimics the plant growth hormone auxin that causes excessive elongation of plant cells that ultimately kills the plant. Susceptible plants will show a mixture of atypical growth (larger, twisted leaves, stem elongation) and fragility of leaf and shoot tissue. Initial symptoms will be displayed within hours to a few days after treatment with plant death and decomposition occurring over 2 – 3 weeks. Florpyrauxifen-benzyl should be applied to plants that are actively growing; mature plants may require a higher concentration of herbicide and a longer contact time compared to smaller, less established plants.

Florpyrauxifen-benzyl has relatively short contact exposure time (CET) requirements (12 – 24 hours typically). The short CET may be advantageous for localized treatments of submersed aquatic plants, however, the target species efficacy compared to the size of the treatment area is not yet known.

In Wisconsin, florpyrauxifen-benzyl may be used to treat the invasive Eurasian watermilfoil (*Myriophyllum spicatum*) and hybrid Eurasian watermilfoil (*M. spicatum* X *M. sibiricum*). Other invasive species such as floating hearts (*Nymphoides* spp.) are also susceptible. In other parts of the country, it is used as a selective, systemic mode of action for spot and partial treatment of the invasive plant hydrilla (*Hydrilla verticillata*). Desirable native species that may also be negatively affected include waterlily species (*Nymphaea* spp. and *Nuphar* spp.), pickerelweed (*Pontederia cordata*), and arrowhead (*Sagittaria* spp.).

It is important to note that repeated use of herbicides with the same mode of action can lead to herbicide-resistant plants, even in aquatic plants. Certain hybrid Eurasian watermilfoil genotypes have been documented to have reduced sensitivity to aquatic herbicides. In order to reduce the risk of developing resistant genotypes, avoid using the same type of herbicides year after year, and utilize effective, integrated pest management strategies as part of any long-term control program.

Post-Treatment Water Use Restrictions

There are no restrictions on swimming, eating fish from treated waterbodies, or using water for drinking water. There is no restriction on irrigation of turf. Before treated water can be used for non-agricultural irrigation besides turf (such as shoreline property use including irrigation of residential landscape plants and homeowner gardens, golf course irrigation, and non-residential property irrigation around business or industrial properties), follow precautionary waiting periods based on rate and scale of application, or monitor herbicide concentrations until below 2 ppb. For agricultural crop irrigation, use analytical monitoring to confirm dissipation before irrigating. The latest approved herbicide product label should be referenced relative to irrigation requirements.

Herbicide Degradation, Persistence and Trace Contaminants

Florpyrauxifen-benzyl is broken down quickly in the water by light (i.e., photolysis) and is also subject to microbial breakdown and hydrolysis. It has a half-life (the time it takes for half of the active ingredient to degrade) ranging from 1 – 6 days. Shallow clear-water lakes will lead to faster degradation than turbid, shaded, or deep lakes.

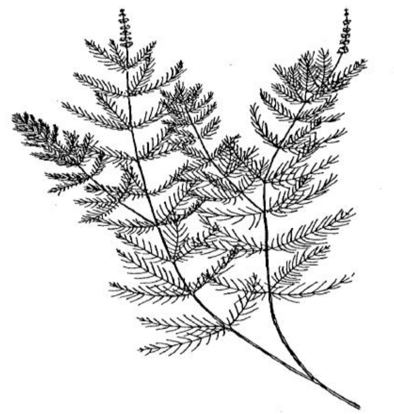
Florpyrauxifen-benzyl breaks down into five major degradation products. These materials are generally more persistent in water than the active herbicide (up to 3 week half-lives) but four of these are minor metabolites detected at less than 5% of applied active ingredient. EPA concluded no hazard concern for metabolites and/or degradates of florpyrauxifen-benzyl that may be found in drinking water, plants, and livestock.

Florpyrauxifen-benzyl binds tightly with surface sediments, so leaching into groundwater is unlikely. Degradation products are more mobile, but aquatic field dissipation studies showed minimal detection of these products in surface sediments.

Impacts on Fish and Other Aquatic Organisms

Toxicity tests conducted with rainbow trout, fathead minnow, water fleas (*Daphnia* sp.), amphipods (*Gammarus* sp.), and snails (*Lymnaea* sp.) indicate that florpyrauxifen-benzyl is not toxic for these species. EPA concluded florpyrauxifen-benzyl has no risk concerns for non-target wildlife and is considered "practically non-toxic" to bees, birds, reptiles, amphibians, and mammals.

Florpyrauxifen-benzyl does not bioaccumulate in fish or freshwater clams due to rapid metabolism and chemical depuration.



Human Health

EPA has identified no risks of concern to human health since no adverse acute or chronic effects, including a lack of carcinogenicity or mutagenicity, were observed in the submitted toxicological studies for florpyrauxifen-benzyl regardless of the route of exposure. EPA concluded with reasonable certainty that drinking water exposures to florpyrauxifen-benzyl do not pose a significant human health risk.

For Additional Information

Environmental Protection Agency Office of Pesticide Programs
www.epa.gov/pesticides

Wisconsin Department of Agriculture, Trade, and Consumer Protection
http://datcp.wi.gov/Plants/Pesticides/

Wisconsin Department of Natural Resources
608-266-2621
http://dnr.wi.gov/lakes/plants/

National Pesticide Information Center
1-800-858-7378
http://npic.orst.edu/

Washington State Department of Ecology. 2017.
https://fortress.wa.gov/ecy/publications/documents/1710020.pdf