1.0 INTRODUCTION

Often referred to as the Minocqua Chain of Lakes, Minocqua and Kawaguesaga Lakes are a part of a contiguous waterbody that spans over 6,000 acres that also includes the Tomahawk Lake System and Mid Lake (Figure 1.0-1). Minocqua (1,339 acres) and Kawaguesaga (700 acres) Lakes are the downstream lakes in this chain, impounded by a small dam at the Kawaguesaga outlet.

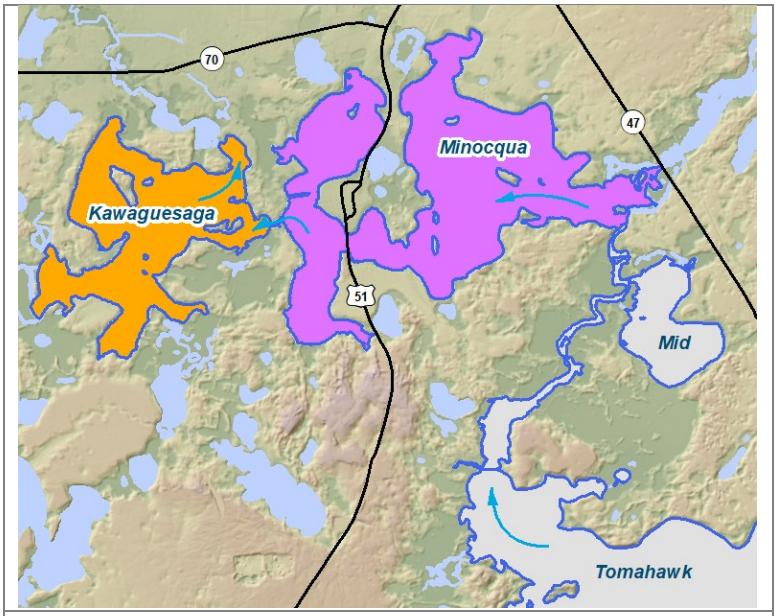


Figure 1.0-1. Minocqua and Kawaguesaga Lakes, Oneida County

The primary citizen-based organization leading management activities on Minocqua and Kawaguesaga Lakes is the Minocqua Kawaguesaga Lakes Protection Association (MKLPA), The Mid Lake Protection and Management District (MLPMD) and the Tomahawk Lake Association (TLA) are the entities focused on managing their specific waterbodies.

1.1 Historic EWM Management & Planning

Eurasian watermilfoil (EWM) was first documented in the early 2000s. The MKLPA targeted EWM populations during 2005-2015 with 2,4-D spot treatments, considered the best management practice of the time. Following a 3-year (2014-2017) hand-harvesting program and cessation of herbicide management, EWM populations in some areas of the chain increased to levels that impeded recreation and navigation. The MKLPA conducted a series of trial florpyrauxifen-benzyl (ProcellaCOR™ EC) beginning in 2019 to target EWM populations in high traffic areas of the system.

During 2022-2023, the MKLPA created an updated *Aquatic Plant Management* (APM) Plan, which primarily focused on revisiting the MKLPA's aquatic plant management-related goals and actions. The *APM Plan* was accepted by the WDNR in November 2023.

The *APM Plan* outlined several management goals, with specific actions outlined to assist with reaching each goal. In regards to EWM management, the MKLPA's defined goal is to:

> *Actively manage EWM to keep the population from negatively affecting water recreation and navigation, while maintaining a healthy and vibrant ecosystem*

In order to reach this objective, the MKLPA has developed a multi-pronged approach as part of this Integrated Pest Management (IPM) Program.

- ***Herbicide Treatment*** It is the MKLPA's preference to gain multi-year control of problematic areas through the use of spatially-targeted herbicide spot treatments, particularly when a site is too large or dense to be targeted with a manual removal program.

- ***Manual Removal*** The MKLPA will continue to conduct EWM manual removal, likely with the aid of Diver-Assisted Suction Harvest (DASH) equipment, to target scale-appropriate EWM occurrences. The objective is to maintain EWM populations below levels that would be applicable to herbicide treatment. The MKLPA aims to use manual removal/DASH as its primary management method, but understanding that large and dense areas of EWM are not practical to be managed with this activity.
- ***Mechanical Harvesting*** The MKLPA has historically had reservations about contracting mechanical harvesting efforts on the lake, due to concerns of increasing the spread of EWM through fragmentation. The MKLPA will continue to investigate mechanical harvesting through an analysis of strengths, weaknesses, opportunities, and threats (SWOT) to help determine whether the method is something they would consider in the future.

1.2 2023 EWM Control & Monitoring Strategy

The MKLPA applied for and was awarded a series of WDNR AIS grants during the fall 2022 cycle that provides funding assistance to carry out the 2023 EWM management and monitoring activities (ACEI-321-23 & ACEI-314-23). Consistent with the recent management strategy, the 2023 IPM strategy includes a combination of herbicide spot treatments and coordinated professional hand harvesting efforts. This report serves as the final written deliverable for these grants.

The proposed 2023 herbicide treatment strategy targets the highest EWM occurrences in high-use areas, with attention to potential basin-wide impacts from these treatments. Three sites, totaling 28.6 acres, were initially proposed for treatment in 2023 with ProcellaCOR (Map 1). Upon submitting the required WDNR permit application, WDNR fisheries managers raised concerns about treating areas of the lake that are important for walleye spawning. The Great Lakes Indian Fish and Wildlife Commission (GLIFWC) raised similar concerns about treating B-23. The WDNR offered the following commentary:

> *DNR is taking the precautionary approach and has determined that treating area B-23 could potentially be detrimental to ongoing efforts to rehabilitate the lake walleye populations due to the treatment site proximity to known walleye spawning areas.*
>
> *Department staff have determined that area C-23 does not have enough riparian interest in the area to warrant an herbicide treatment. similar to B-23 other management techniques could be utilized in this area to gain riparian access to open water if needed.*

Following concerns from fisheries biologists and WDNR lakes biologists, only a single area was ultimately permitted for the use of herbicides in 202 – A-23.

The professional manual removal (includes DASH as appropriate) program devised for 2023 was two pronged. The primary program would conduct professional-based EWM manual-removal on 2019-2022 treatment sites as follow-up IPM measures. The MKLPA also planned to conduct a substantial professional-based EWM hand-harvesting effort in other areas where EWM populations are low or were impacted as a result of being adjacent to prior herbicide treatments. The MKLPA planned multiple weeks of hand-harvesting in 2023 with partial funding from WDNR grant funds while also funding additional time with MKLPA funds. Map 2 outlines the 2023 EWM manual removal strategy.

1.3 Pretreatment Confirmation and Refinement Survey

On June 13, 2023, an Onterra field survey crew completed the Pretreatment Confirmation and Refinement Survey within the proposed 2023 treatment area on Minocqua Lake. The main objective of the survey was to collect quantitative data within the site to document native aquatic plants. Other tasks were to confirm active growth of EWM, evaluate the average depth of the site, and record pH and water temperatures. Water temperatures were 64°F throughout the water column, and pH was 8.0 at mid depth in the treatment area. EWM was largely present in the same areas documented in past mapping surveys and was green with plenty of active growth. Several species of pondweeds as well as coontail, (*Ceratophyllum demersum*) and common waterweed (*Elodea canadensis*) were the most commonly encountered native plants in site.

Photo 1.3-1. EWM observed during Pretreatment Survey on Minocqua Lake. Photo credit Onterra.

With help from staff at Great Lakes Indian Fish & Wildlife Commission (GLIFWC) conveying when walleye were likely spawning on the system during the spring of 2023, it was extrapolated as to when walleye were likely to be largely past their most vulnerable life stage (first 14 day of larval stage) to extended exposure auxin use rates (Figure 1.3-1). With this information, the scheduled treatment date was planned to occur after June 11, 2023, the conservative date of when most of the hatched walleye would have progressed passed their most sensitive stages to auxin herbicides. With this information, the treatment date was deliberately scheduled to occur after this time window. The herbicide applications were completed by Schmidt's Aquatic, LLC on June 19, 2023. The applicator noted light winds (2-3 mph) during treatment and a surface water temperature of 68°F.

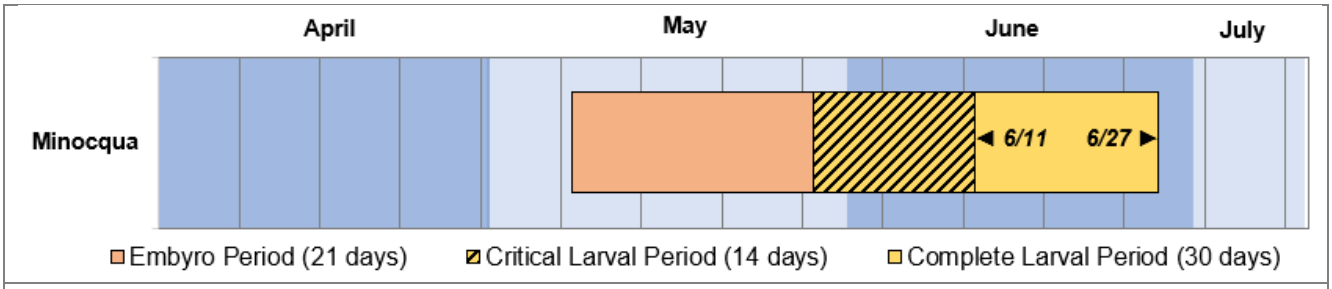


Figure 1.3-1. Sensitive stages of walleye to auxin herbicide exposure.

2.0 2023 PROFESSIONAL HAND-HARVESTING/DIVER ASSISTED SUCTION HARVES (DASH)

The MKLPA contracted with Aquatic Plant Management, LLC (APM) in 2023 to provide professional hand-harvesting services which includes the use of DASH. The MKLPA, in consultation with Onterra and APM, created a site prioritization methodology that considered EWM density from the 2022 Late Season EWM Mapping Survey, traffic patterns, and recent herbicide management history (Map 2). Through a total of 193 dives on 19 sites around Minocqua and Kawaguesaga Lakes, approximately 1,253 cubic feet of EWM were removed by APM in 2023 (Table 2.0-1). Of this total, 1,135 cubic feet was harvested through the use of DASH, while another 118 cubic feet was harvested with traditional hand harvesting techniques. Sites that received the largest amount of dive time and harvest totals included LR-23 (Lambert Road shoreline), and MS-23 (Minocqua Shores Bay) located in the western shores of the same basin in which the 2023 ProcellaCOR treatment took place, and EFI-23 (East Fifield Island Bay) located in the Kawaguesaga Lake near the constriction leading to Minocqua Lake. Additional details of hand-harvesting effort and amount of EWM removed on a site-by-site basis can be found in Appendix A.

Table 2.1-1. 2023 Hand-harvest & DASH Summary. Table extracted from APM 2023 EWM Removal Report

Service	Dive Location	Avg. Water Depth	# of Dives	Underwater Dive Time	AIS Removed (cubic feet)
DASH	LR-23	9.5	36	48.6	272.5
	EFI-23	6.3	29	41.4	262.5
	MS-23	6.6	25	25.8	180.5
	K1-19	6.7	9	13.6	118.0
	KW-23	7.5	4	11.7	76.5
	BRS-23	9.0	4	6.6	58.5
	NE-23	9.9	7	9.5	53.0
	D-20	5.9	19	15.5	48.0
	BRI-23	7.0	12	14.9	32.5
	O-21	7.0	1	3.0	15.0
	FIS-23	6.3	3	3.0	10.0
	CC-23	5.9	9	4.3	8.0
DASH Total		7.3	158	197.9	1,135.0
HH	G-20	8.8	10	13.4	46.0
	GS-23	12.5	7	13.5	34.0
	MP-23	5.3	4	3.8	18.5
	F-20	5.8	9	7.3	13.0
	TH-23	8.7	3	3.1	4.5
	BT-23	5.5	1	0.8	1.0
	CC-23	8.0	1	0.7	1.0
HH Total		8.2	35	42.5	118.0
Grand Total		7.5	193	240.4	1,253.0

3.0 2023 MONITORING RESULTS

It is important to note that two types of surveys are discussed in the subsequent materials: 1) point-intercept surveys and 2) EWM 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 (Photo 3.0-1). The survey methodology allows comparisons to be made over time, as well as between lakes. 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 was conducted on Minocqua and Kawaguesaga Lakes in 2022.

Photo 3.0-1. Point-intercept survey on a WI lake. Photo credit Onterra.

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 used within this report to evaluate the 2023 herbicide treatment site.

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 EWM mapping survey, the entire littoral area of the system is surveyed through visual observations from the boat (Photo 3.0-2). Field crews supplement the visual survey by deploying a submersible camera along with periodically doing rake tows. The EWM 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 AIS locations that were considered as *small plant colonies* (<40 feet in diameter), *clumps of plants*, or *single or few plants*.

Photo 3.0-2. EWM mapping survey. 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.

3.1 Herbicide Concentration Monitoring

The herbicide concentration monitoring plan associated with the treatment was developed by Onterra and the WDNR, with the intent of gaining sufficient data to aid in understanding the concentrations of florpyrauxifen-benzyl and florpyrauxifen acid that were achieved in the hours and days after treatment. A copy of the final herbicide concentration monitoring plan is included as Appendix B. Water samples

were collected by volunteer members of the MKLPA and upon completion of the sampling, were shipped to EPL Bio Analytical Services in Illinois for analysis. This lab was identified by the WDNR as being able to detect florpyrauxifen-benzyl at below 1 part per billion (ppb). The EPL Lab reports the concentration in parts per billion (ppb) of the initial parent active ingredient in ProcellaCOR™ (florpyrauxifen-benzyl, SX-1552), as well as an acid metabolite (florpyrauxifen acid, SX-1552-A) which is the immediate by-product that it breaks down into.

The measured concentrations of florpyrauxifen-benzyl were initially higher at the earliest sampling intervals within the application areas, with both sites containing concentrations of the active ingredient in ProcellaCOR at sufficient concentrations and exposure times to kill EWM. By 2 DAT, concentrations were below 0.1 ppb in all sites. From 4 DAT through 35 DAT concentrations were below detection limits in some samples and at detectable levels in others. Samples collected from the untreated location (site M3) were below detection limits until measuring 0.127 ppb at 4 DAT, and was detected at 14 DAT (0.038 ppb) and 35 DAT (0.0136 ppb).

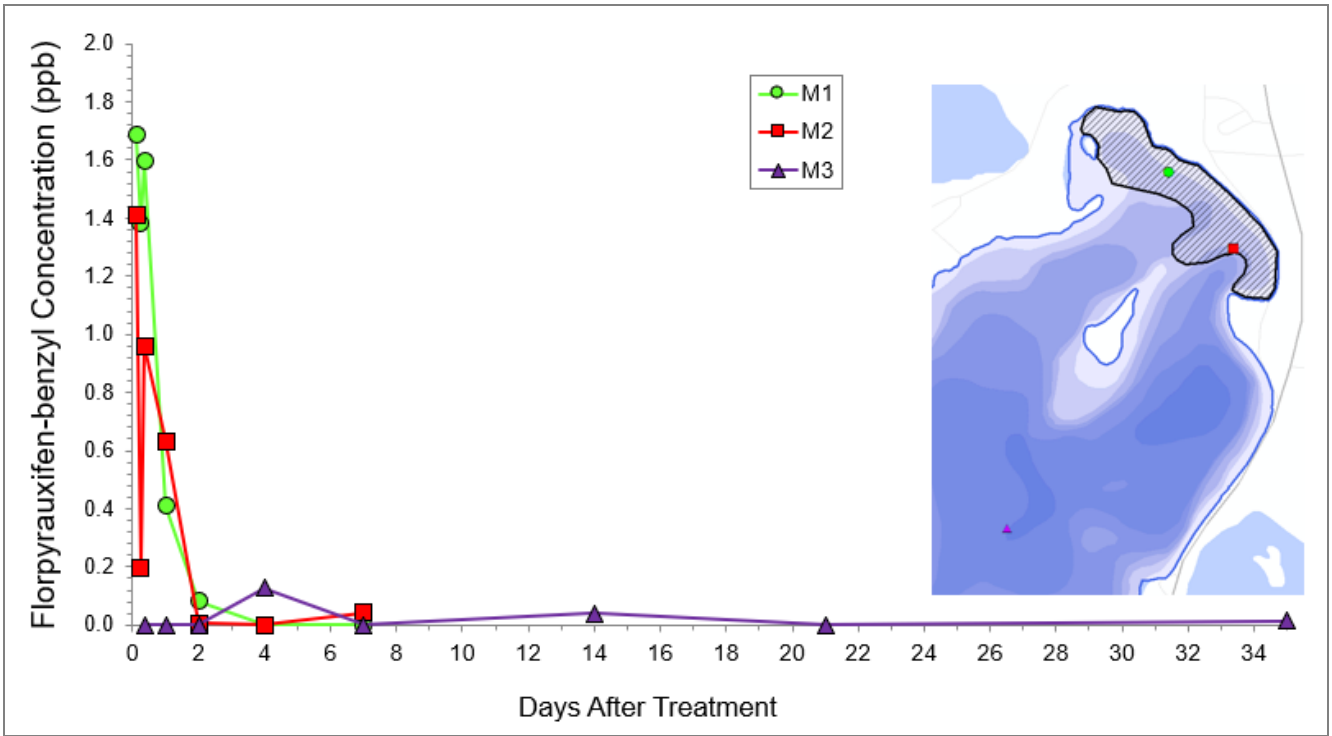


Figure 3.1-1. Florpyrauxifen-benzyl (SX-1552) concentrations associated with a 2023 treatment at site A-23 in Minocqua Lake. Herbicide application area shown in black hashed area.

Figure 3.1-2 displays the concentrations of acid metabolite of ProcellaCOR, florpyrauxifen acid. Note that the y-axis differs compared to the previous figure in order to display the values. Florpyrauxifen acid concentrations were somewhat higher at site M1 compared to M2 while both being located within the direct application area. The relatively high values measured at 9 HAT and 24 HAT may be an indication of uptake by aquatic plants and conversion from the active ingredient to the acid form. By 7 DAT concentrations of acid were below 0.1ppb within the application area.

Concentrations of florpyrauxifen acid at the untreated site M3 followed an expected pattern with lowest concentrations in the earliest intervals and then a relatively steady concentration through the remainder

of the sampling timeframe. Florpyrauxifen acid remained above detection limits at approximately 0.075ppb at the last sampling interval collected at 35 DAT.

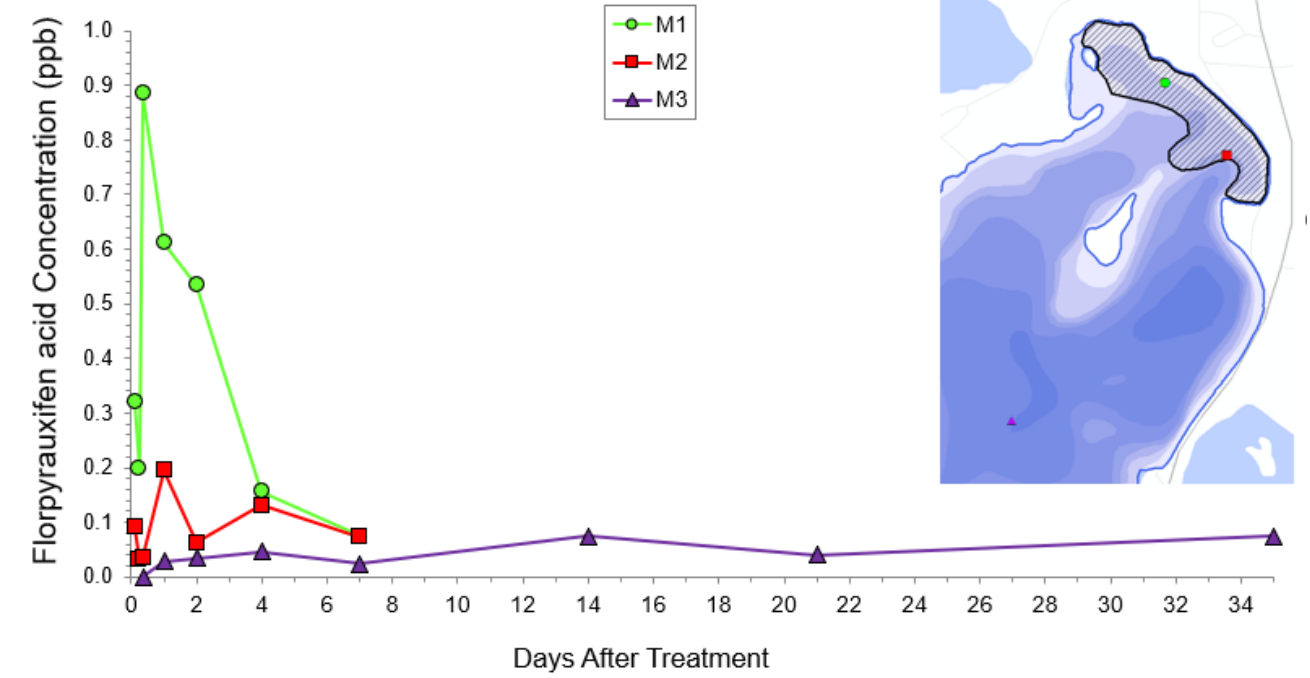


Figure 3.1-2. Florpyrauxifen acid (SX-1552-A) concentrations after a 2023 treatment at site A-23 in Minocqua Lake. Herbicide application area shown in black hashed area.

3.2 Subsample point-intercept Survey

A quantitative monitoring study was designed for this project which included the collection of sub-sample point-intercept survey data *prior to treatment* and compared to post treatment assessments during the *year of treatment* and the *year after treatment* (Figure 3.2-1). These surveys allowed a numeric understanding of the native and non-native aquatic plant population within the areas targeted with herbicide treatment. While sub-sample data collected during the *year of treatment* is important for understanding the initial results of the herbicide treatment, the data collected during the *year after treatment* allow un understanding if the impacts were sufficient that rebound did not occur and the treatment caused plant mortality.

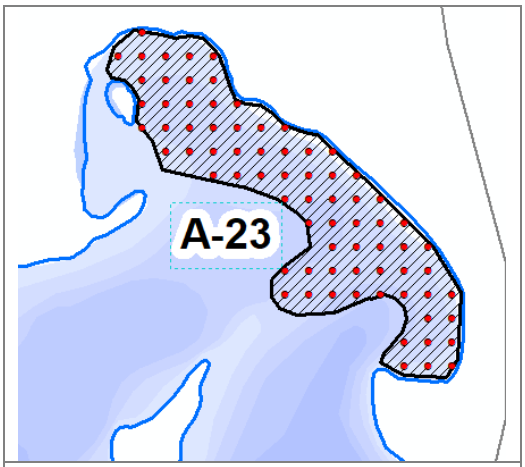


Figure 3.2-1. 2023 Treatment Quantitative Monitoring Plan. 28m spacing, N=75

When comparing aquatic plant populations over time, it is best to compare similar time periods from year to year. Often in practice, the locations of a spring herbicide treatment are not developed until after the time period to collect the late-summer pretreatment data has passed. In these instances, the early-season herbicide treatment may be delayed from roughly early-June to mid-June. This slight delay in implementation allows the pretreatment sub-sample point-intercept survey to take place after many native plants have

emerged from winter dormancy. However, it is believed that some species such as wild celery begin to grow a bit later in the growing season and are under-represented in the June survey. In reference to the 2023 treatment site, *pretreatmen*t data was collected during mid-June 2023 and is compared to data collected during the late-summer of 2023 (*year of treatment)* and is planned for replication during late-summer 2024 (*year after treatment*).

Monitoring results from site A-23 are displayed on Figure 3.2-2. These data show that most commonly encountered native species in the site (common waterweed, fern-leaf pondweed, coontail, and flat-stem pondweed) did not show valid changes in occurrence between the two surveys. The only native species that showed a valid decrease in occurrence was large-leaf pondweed (-52.9%). Southern naiad, small pondweed, and wild celery all showed statistically valid increases in occurrence between the two surveys. Some native species including wild celery, typically emerge a bit later in the growing season that some other native species and it is possible that the increased occurrence of some species is related to survey timing. The occurrence of EWM was reduced from 25.3% to 0%. The reduction in occurrence of curly leaf pondweed is believed to be simply the natural decline of this species at it typically senesces during early summer. A replication of this survey is planned to occur during 2024 which will evaluate the aquatic plant population dynamics in this site during the *year-after-treatment*.

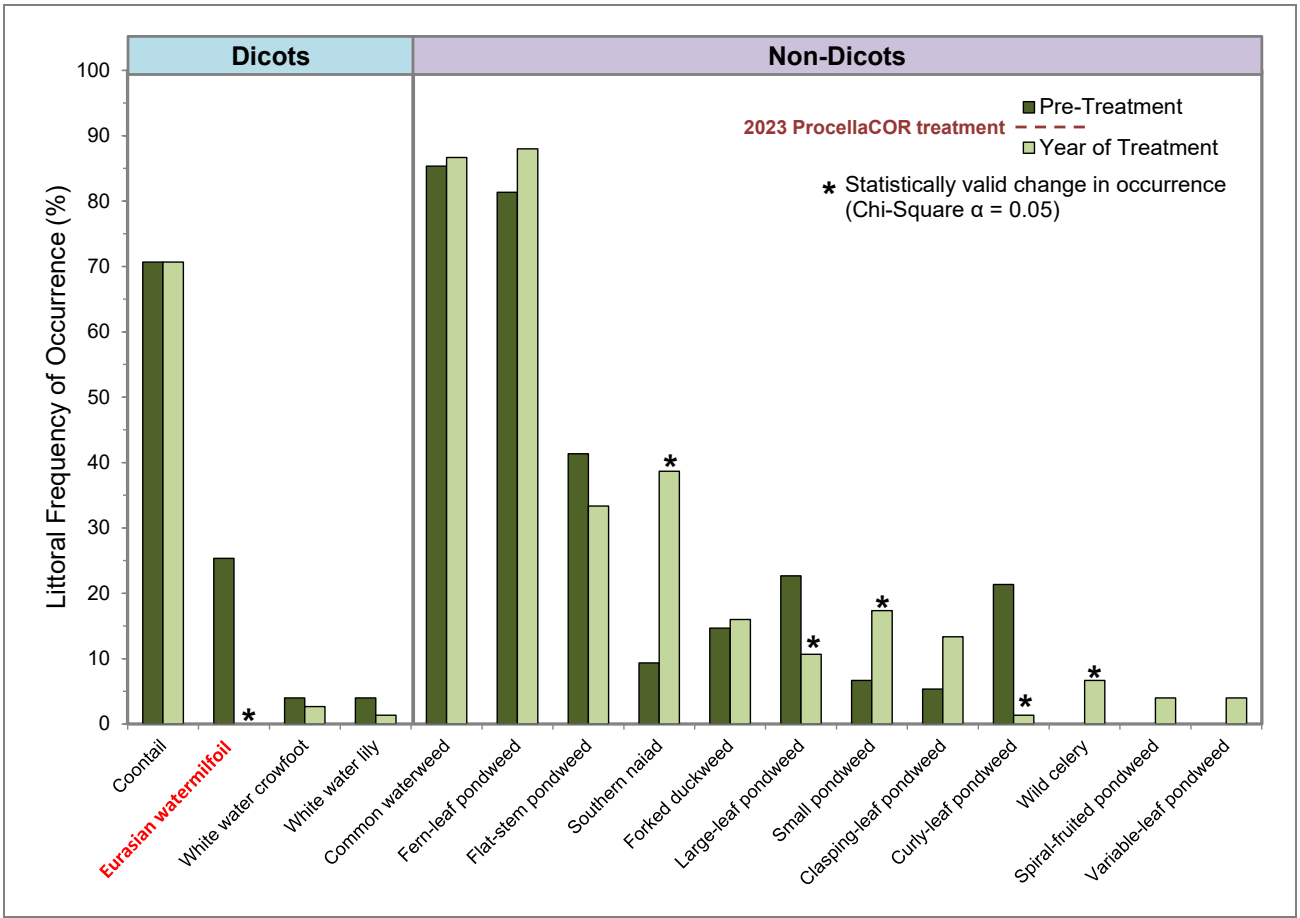


Figure 3.2-2. Frequency of occurrence of aquatic plants in site A-23 from June 2023 (Pretreatment) and August 2023 (Post treatment). n=75

3.3 Late-Summer EWM Mapping Surveys

For must lake users, investigating the EWM population before and after a treatment is best understood by comparting data from EWM mappings surveys. During this project, EWM mapping surveys occur annually during the latter part of the growing season when EWM has likely reached its peak growth stage for the year. The Late-Season EWM Mapping Survey from the year preceding the treatment is comparted to the *year of treatment* survey occurring a few months after the treatment, as well as the year *after treatment* survey which allows for the understanding if the reductions were maintained or if rapid rebound occurred.

Figure 3.3-1 highlights the EWM population from late-summer 2022 (pretreatment) and late-summer 2023 (post-treatment) for the herbicide treatment site A-23. Prior to treatment, a large portion of the site contained colonized EWM including *highly scattered*, *scattered*, and *dominant* densities along with a number of *single plants*, *clumps*, and *small plant colonies* (Figure 3.3-1 – left frame). After treatment, the only remaining EWM present in the site was several *single or few plants* occurrences located in the northwestern end of the application area (Figure 3.3-1 – right frame). These data show initial EWM control was high during the *year of treatment*.

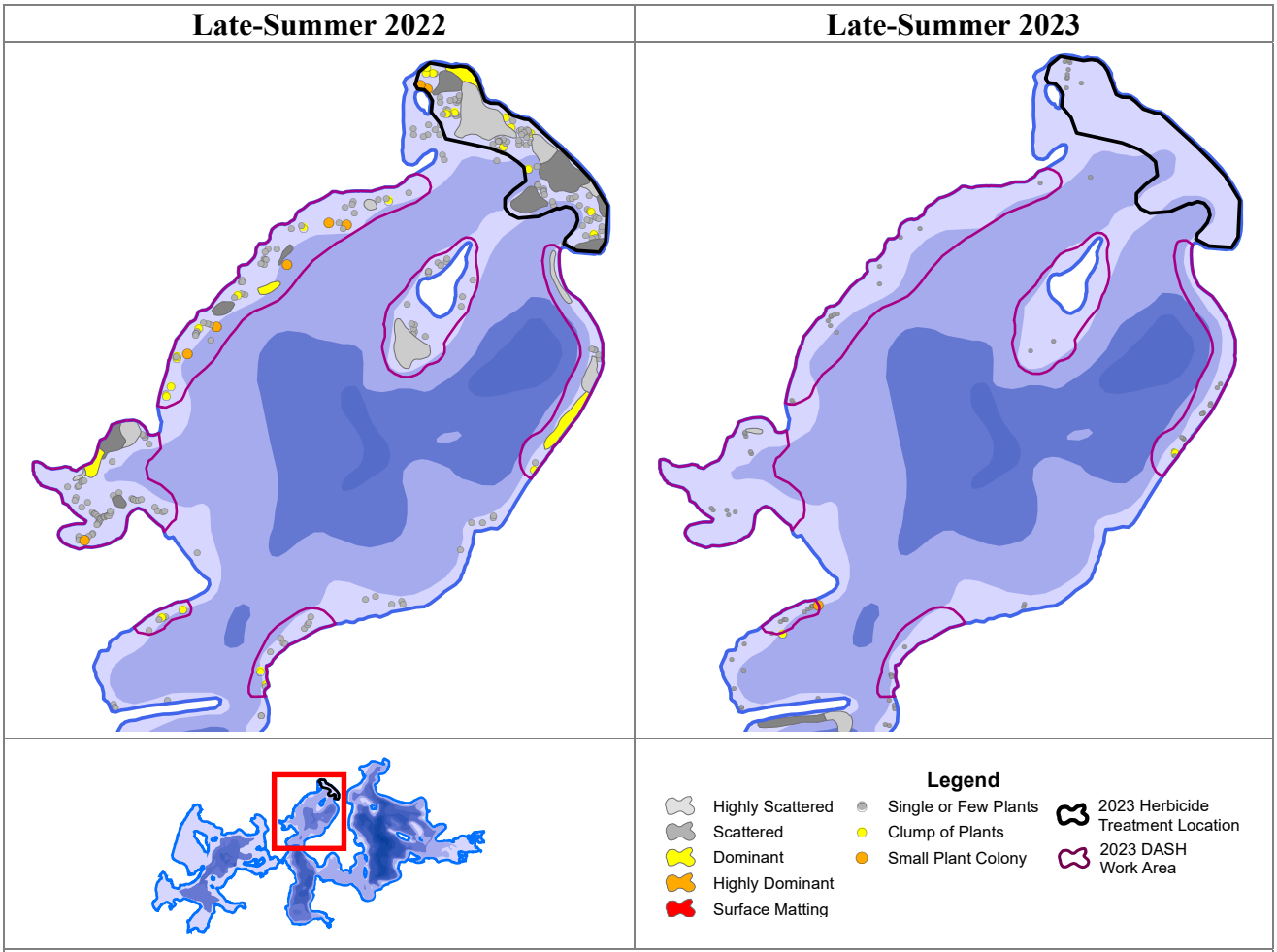


Figure 3.2-2. EWM population in managed basin of Minocqua Lake in 2023. Herbicide application area displayed in black outline. Professional hand harvesting work areas displayed in purple outline.

In many of the past ProcellaCOR treatments on this system, EWM impacts have been observed extending beyond application areas and into a larger area of potential impact where the herbicide mixes within a portion of the waterbody and reaches concentration exposure times that have impacts to EWM. The 2023 treatment site was predicted to have the potential to impact EWM throughout much of the basin that the treatment site was within. Herbicide concentration monitoring data confirmed measurable levels of active ingredient as well as a sustained period of low concentrations of florpyrauxifen acid in samples collected from the center of this basin of the lake. Based upon previous experience from this system, EWM rebound is typically faster in areas not directly targeted comparted to within the application sites.

Substantial professional hand harvesting activities also occurred within sites located within this bay of the lake and outside the extents of the herbicide treatment area, particularly along the western shoreline sites. The late-summer 2023 EWM mapping survey shows reduced EWM populations throughout the entire bay of the lake (Figure 3.2-2). The combination of hand harvesting efforts and herbicide treatment contributed to the EWM control in this area of the lake in 2023.

An overview of the 2023 Late-Season EWM Mapping Survey data is displayed on Map 3, followed by an 8-page map book (Maps 4-11) that investigates these results at a zoomed-in scale. The EWM population in the system was comprised of approximately 51.8 acres of colonized areas as well as many occurrences mapped with point-based techniques. The total acreage of EWM in the system was drastically lowered from 2019-2021 following herbicide management that was occurring. The total acres of EWM have increased in the last two years as some amount of EWM rebound is occurring in areas of the lake that saw declines after the past herbicide management.

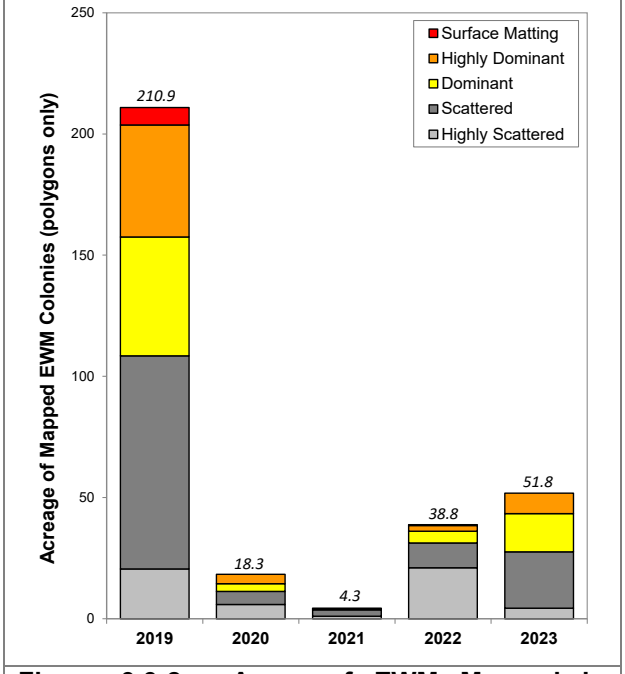


Figure 3.3-2. Acres of EWM Mapped in Minocqua & Kawaguesaga Lakes from 2019-2023. Data from Onterra Late-Summe EWM Mapping Surveys.

In an effort to increase the flow of information between lake stakeholders and project planners, the MKLPA added an interactive web map application to their website, allowing users to see each year's late-season EWM mapping survey and management areas as they relate to their property or favorite recreation and fishing spots. Various layers can be turned on and off, and some layers can be selected and a pop-up window will provide additional information. This platform allows a better understanding of the EWM population dynamics and management strategies over time. A direct link to access this interactive map is below:

https://www.arcgis.com/apps/View/index.html?appid=2d571b0ab1304deebb816ed72e5cc4f6

4.0 CONCLUSIONS & DISCUSSION

The MKLPA feels strongly the positive strides in EWM management have been made since 2019. The MKLPA's IPM strategy of conducting herbicide management and professional hand harvesting efforts over the past several years has aided in maintaining a low overall EWM population in the system.

The results of the 2023 herbicide treatment appear highly successful, but continued monitoring in 2024 and beyond is warranted to fully evaluate this management event. The late-summer 2023 EWM mapping survey indicated a few locations in the system where dense EWM colonies are present. The MKLPA understands the importance of continued dialogue with the WDNR lakes and fisheries program as it relates to their future EWM management program, especially when herbicide treatments are being discussed.

4.1 2024 EWM Management & Monitoring Strategy Development

The MKLPA applied for a WDNR AIS grant during the fall 2023 cycle which was successful and provides funding assistance to carry out the proposed 2024 EWM management and monitoring activities. Consistent with the recent management strategy, the 2024 IPM strategy includes a combination of herbicide spot treatments, a mechanical harvesting component, and coordinated professional hand harvesting efforts.

During a joint meeting of the MKLPA and the Tomahawk Lake Association (TLA), the WDNR lakes and fisheries departments, and Onterra (represents both the MKLPA and TLA) in mid-December 2023, discussions about the preliminary 2024 herbicide treatment strategy. The MKLPA originally entertained five (5) sites that met the trigger defined in their APM Plan for considering herbicide treatment (Map 12). The WDNR indicated that they would again not approve treatment of Reubentown (D-24), as the adjacent area near the islands contain high walleye spawning activity and they would rather not have any herbicide treatment occurring in this area while the walleye restoration project is ongoing. The WDNR continued to believe C-24 did not have sufficient riparians nor recreational need to justify herbicide management in this location. Based upon the discussion that took place, the WDNR was amenable to allowing herbicide treatment in A-24 and B-24. The MKLPA and WDNR agreed that treatment of E-24 could be postponed until 2025.

4.2 EWM Management Strategy

Herbicide Spot-Treatment

The proposed 2024 herbicide treatment strategy targets EWM occurrences in high-use areas including the areas locally known as "Library Landing' and "Huber Bay". The two sites are proposed for treatment in 2024 with ProcellaCOR (Map 12). The proposed dosing rates for each site (4.0 and 5.0 PDU's) have been confirmed by experts with SePRO.

Mechanical Harvesting

The MKLPA plans to implement another management technique in 2024 through the development of a trial mechanical harvesting program. Two sites have been identified for mechanical harvesting operations including locally known "Reuben Town" and an area on the northwest shoreline of Minocqua Lake (Map 13). Both of these sites contain too high EWM population to be managed with manual

removal techniques. However, the WDNR currently opposes both of these sites for herbicide treatment, leaving mechanical harvesting as the only option for management.

The Reubentown site (D-24) is the primary mechanical harvesting site proposed for 2024. Due to all the docks, swim platforms, and recreational use in this location, it is unclear if mechanical harvesting will be a logistically feasible method for EWM management. The MKLPA intends to use 2024 as a trial effort, to understand future applicability as well as to understand if the results achieved meet their EWM management goals.

Due to the proximity of herbicide treatment in Huber Bay (B-24), the two-part site C-24 may not require mechanical harvesting. But in the event that adjacent herbicide impacts are not realized in this location, this site would be targeted with mechanical harvesting as a contingency strategy that allows for harvesting in areas of riparian frontage.

Professional Hand Harvesting/Diver Assisted Suction Harvest

The professional hand-harvesting (includes DASH as appropriate) program devised for 2024 will include targeting past herbicide treatment sites as follow-up IPM measures as well as targeting other known areas around the system in a prioritized fashion (Map 14). A budget of 10 days per lake has been included within the MKLPA's grant application and additional efforts will be funded out of pocket.

Hand-harvesting will take place between early June and the Late-Season EWM Mapping surveys (roughly mid-September). With the spatial data from the latest EWM mapping survey and delineated harvest areas loaded onto a GPS unit, harvesters will remove EWM following the previously outlined strategy. Along with general notes about the weather/lake conditions, harvesters would provide the professional monitors with information about how much effort is spent in each site and how much EWM is removed. When DASH equipment is utilized, a WDNR permit would be secured and contractors would adhere to the conditions outlined in that permit, which likely include additional reporting (% native bycatch, etc).

Map 14 displays a preliminary hand harvesting strategy for 2024. The sites included in the preliminary strategy include most of the concentrated areas of EWM in the system that were identified in the late-summer 2023 EWM mapping survey with exception of the areas that are proposed for herbicide or mechanical harvesting management. The MKLPA, Onterra, and APM are currently working on a prioritization system based on strategic location, past management history, and size and density of the EWM population in the area. The MKLPA and professional harvesting firm would continue to communicate during the 2024 summer to adjust the prioritization as appropriate.

4.3 EWM Monitoring Plan

Pretreatment Confirmation and Refinement Survey

Onterra ecologists would conduct a *Pretreatment Confirmation and Refinement Survey* prior to the early-season herbicide application to verify application area extents and inspect the condition of the EWM colonies targeted for treatment through the use of a combination of surface surveys, rake tows, and submersible video monitoring. This meander-based survey would investigate for colonial expansion, reduced occurrence, growth stage of the EWM (and native plants), application area specifies (e.g. average depth & extents), and other aspects that could warrant a modification to the treatment plan. The

pretreatment sub-sample point-intercept survey described below would also be conducted during this visit. This survey is planned to occur during approximately the second week of June 2023.

Following the *Pretreatment Confirmation & Refinement Survey*, an email-style report with map(s) of the survey results and finalized treatment plan would be provided to the MKLPA, WDNR, and other project partners for review prior to the treatment. Spatial data would be provided to the herbicide applicator in appropriate format. The chosen contractor, in conjunction with the MKLPA, will be responsible for completing appropriate permit-related documentation and deliverables to the WDNR.

Qualitative EWM Monitoring

A Late Season EWM Mapping Survey would be conducted towards the end of the growing season each year to produce the mapping data to document a census of the EWM population within the lake at the perceived peak growth stage. Comparing these data to previous surveys will help lake stakeholders understand management outcomes and the overall state of the EWM population to direct management in subsequent years.

Quantitative Aquatic Plant Monitoring

Quantitative monitoring of the 2024 treatment sites includes a sub-sample point-intercept survey which will be collected immediately prior to treatment in 2023 (i.e. mid-June) and replicated in late-summer 2023, and late-summer 2024 as a post treatment comparative survey. The sub-sample monitoring plan is indicated on Figure 4.3-1 and would include sampling at pre-determined locations spaced 32 meters apart for a total of 141 sampling locations. These data would largely serve to evaluate the native aquatic plant species response during the *year of treatment* (~3 months post treatment). *Year after treatment* monitoring of the 2023 treatment site would also be conducted in the late-summer of 2024.

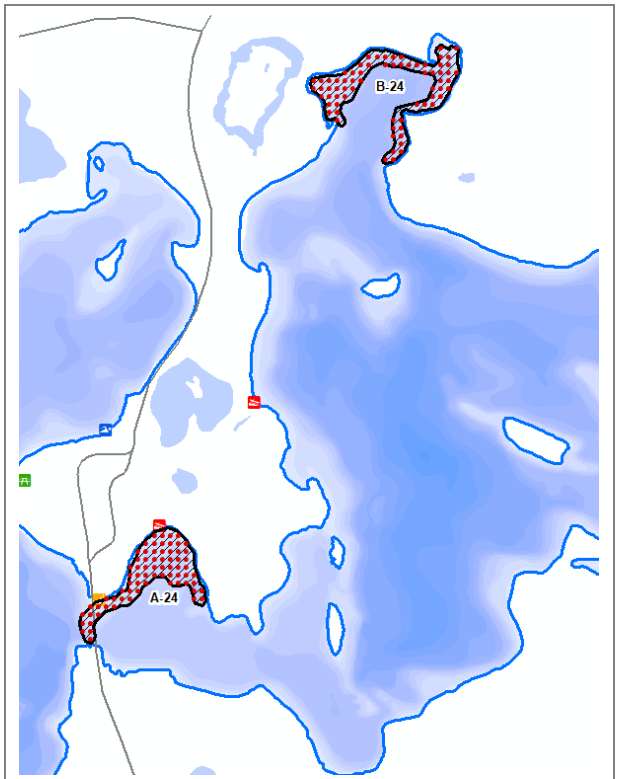


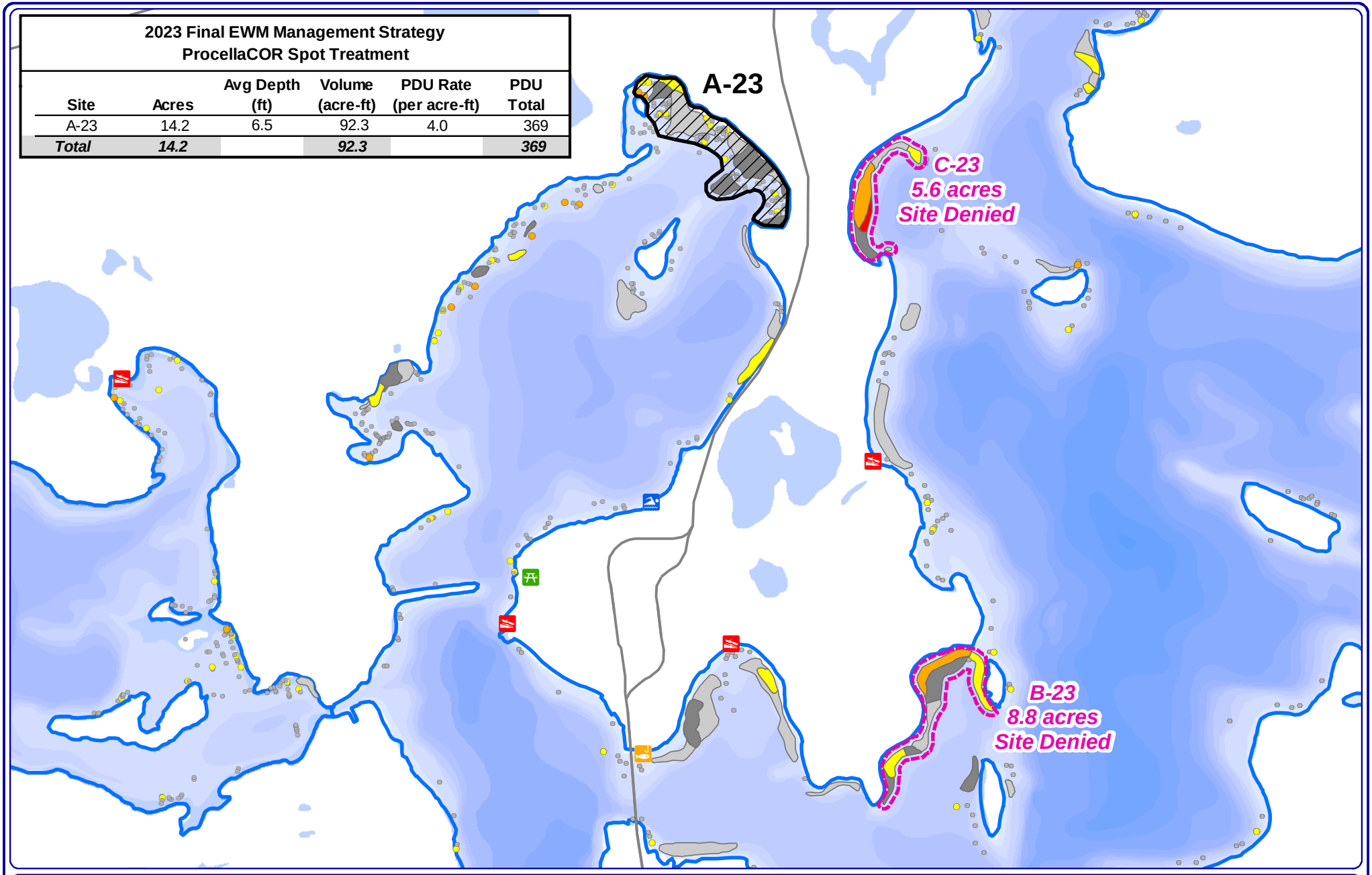
Figure 4.3-1. 2024 Herbicide Treatment Proposed Quantitative Monitoring Plan. 32m spacing, n=141

Herbicide Concentration Monitoring

MKLPA volunteers would collect herbicide concentration monitoring during the hours/days following treatment following a sampling regime that will be created through collaborative efforts of the WDNR and Onterra. Samples would be collected at specified time intervals and locations within and outside the application areas. Sample collection would be focused on understanding the quantity and longevity of the herbicide active ingredient and the acid metabolite. Properly preserved samples would be overnight-delivered to EPL Bio Analytical Services where the herbicide analysis is conducted.

2023 Final EWM Management Strategy
ProcellaCOR Spot Treatment

Site	Acres	Avg Depth (ft)	Volume (acre-ft)	PDU Rate (per acre-ft)	PDU Total
A-23	14.2	6.5	92.3	4.0	369
Total	***14.2***		***92.3***		***369***



N
W E
S

1,100
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: WDNR, digitized by Onterra
Aquatic Plants: Onterra, 2022
Map Date: March 4, 2024 - EJH

Project Location in Wisconsin

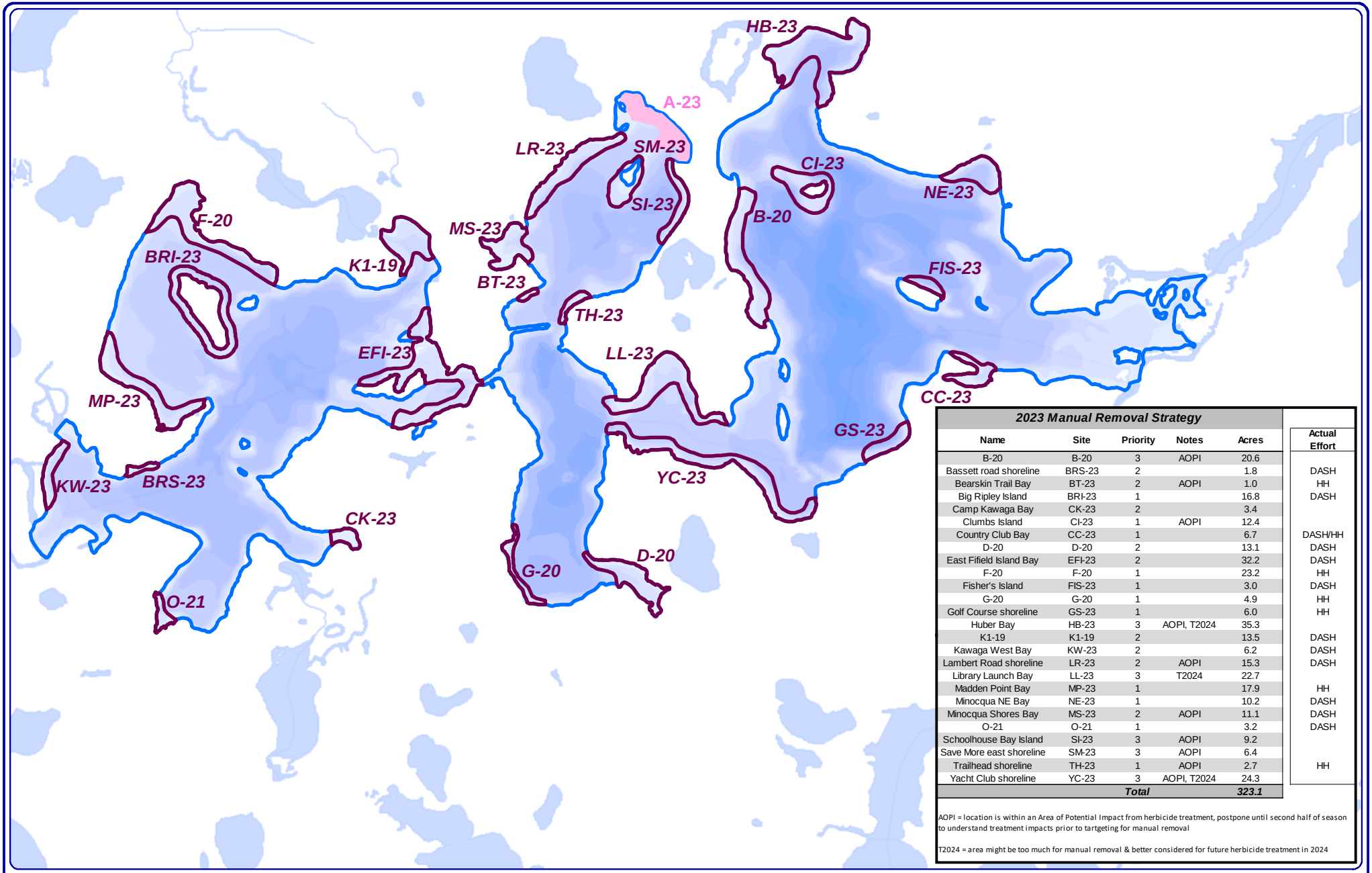
Legend

EWM Mapping Survey: September 7-9, 2022

- Highly Scattered
- Scattered
- Dominant
- Highly Dominant
- Surface Matting
- Single or Few Plants
- Clumps of Plants
- Small Plant Colony
- 2023 Herbicide Application Area
- Proposed Herbicide Site Denied by WDNR

Map 1
Minocqua & Kawaguesaga Lakes
Oneida County, Wisconsin

Final 2023 Herbicide Treatment Strategy



2023 Manual Removal Strategy

Name	Site	Priority	Notes	Acres	Actual Effort
B-20	B-20	3	AOPI	20.6	
Bassett road shoreline	BRS-23	2		1.8	DASH
Bearskin Trail Bay	BT-23	2	AOPI	1.0	HH
Big Ripley Island	BRI-23	1		16.8	DASH
Camp Kawaga Bay	CK-23	2		3.4	
Clumbs Island	CI-23	1	AOPI	12.4	
Country Club Bay	CC-23	1		6.7	DASH/HH
D-20	D-20	2		13.1	DASH
East Fifield Island Bay	EFI-23	2		32.2	DASH
F-20	F-20	1		23.2	HH
Fisher's Island	FIS-23	1		3.0	DASH
G-20	G-20	1		4.9	HH
Golf Course shoreline	GS-23	1		6.0	HH
Huber Bay	HB-23	3	AOPI, T2024	35.3	
K1-19	K1-19	2		13.5	DASH
Kawaga West Bay	KW-23	2		6.2	DASH
Lambert Road shoreline	LR-23	2	AOPI	15.3	DASH
Library Launch Bay	LL-23	3	T2024	22.7	
Madden Point Bay	MP-23	1		17.9	HH
Minocqua NE Bay	NE-23	1		10.2	DASH
Minocqua Shores Bay	MS-23	2	AOPI	11.1	DASH
O-21	O-21	1		3.2	DASH
Schoolhouse Bay Island	SI-23	3	AOPI	9.2	
Save More east shoreline	SM-23	3	AOPI	6.4	
Trailhead shoreline	TH-23	1	AOPI	2.7	HH
Yacht Club shoreline	YC-23	3	AOPI, T2024	24.3	
		Total		*323.1*	

AOPI = location is within an Area of Potential Impact from herbicide treatment, postpone until second half of season to understand treatment impacts prior to tartgeting for manual removal

T2024 = area might be too much for manual removal & better considered for future herbicide treatment in 2024

N W E S

2,500 Feet

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815 Prosper Road
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Sources:
Roads and Hydro: WDNR
Bathymetry: WDNR,1972
- digitized by Onterra
Orthophoto: NAIP, 2022
Aquatic Plants: Onterra, 2023
Map Date: October 13, 2023 RMF

Project Location in Wisconsin

Legend

EWM Mapping Survey: September 7-9, 2022

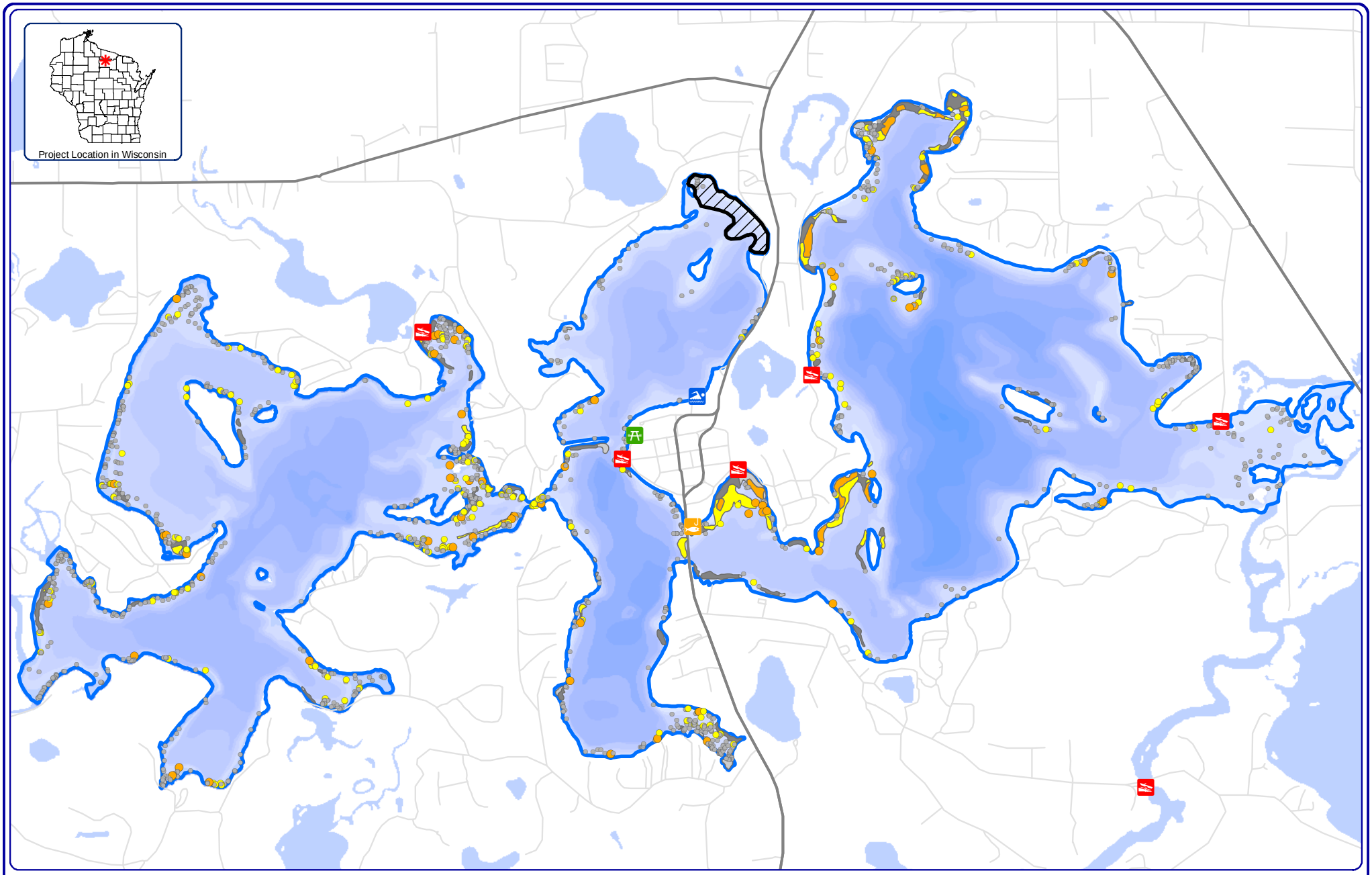
- Highly Scattered
- Scattered
- Dominant
- Highly Dominant
- Surface Matting
- Single or Few Plants
- Clumps of Plants
- Small Plant Colony
- 2024 Manual Removal Site
- 2023 Herbicide Application Area

Map 2

Minocqua & Kawaguesaga

Oneida County, Wisconsin

2023 EWM Manual Removal Strategy



N
W E
S

2,250
Feet

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Sources:
Roads and Hydro: WDNR
Bathymetry: Onterra
Aquatic Plants: Onterra, 2022

Map Date: October 18th, 2022 KLW
Filename: MinocKawa_EWMPB_Sept22_Overview.mxd

Legend

EWM Survey: 8/24/2023-8/29/2023

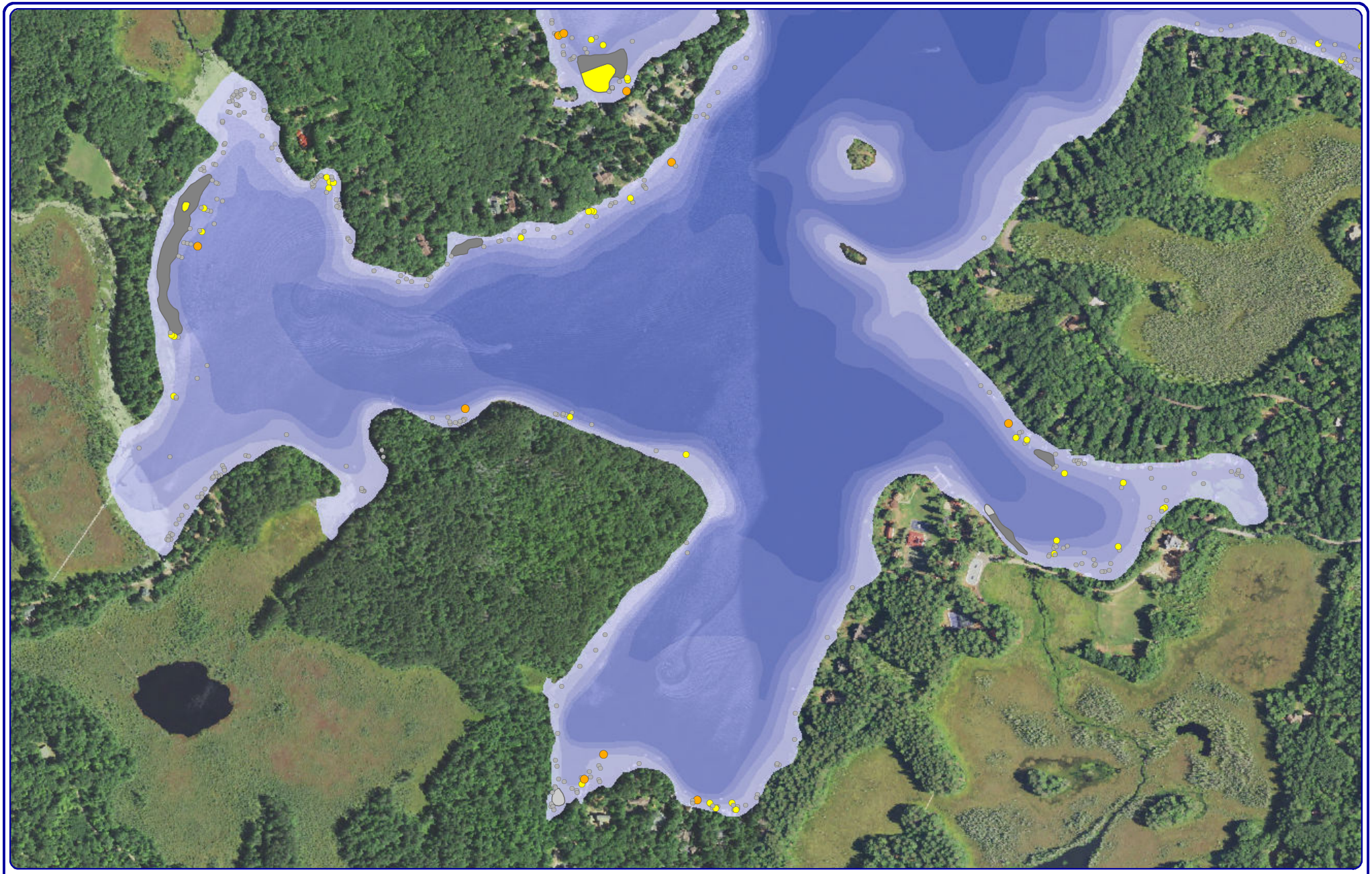
- Highly Scattered
- Scattered
- Dominant
- Highly Dominant
- Surface Matting
- Single or Few Plants
- Clumps of Plants
- Small Plant Colony
- 2023 Herbicide Applicaiton Area
- Public Boat Landing
- Bearskin Trailhead Park
- Beach
- Fishing Pier

Map 3 - Overview

Minocqua & Kawaguesaga

Oneida County, Wisconsin

Late-Season 2023 EWM Survey Results



N
W E
S

725
Feet

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Sources:
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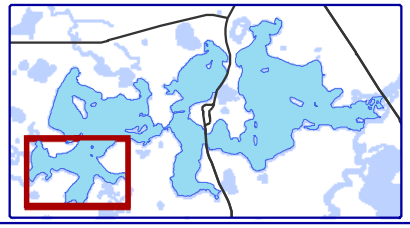
Bathymetry: WDNR,1972
- digitized by Onterra
Orthophoto: NAIP, 2022
Aquatic Plants: Onterra, 2023
Map Date: October 13, 2023 RMF



Legend

EWM Survey: 8/24/2023-8/29/2023

- Highly Scattered
- Scattered
- Dominant
- Highly Dominant
- Surface Matting
- Single or Few Plants
- Clumps of Plants
- Small Plant Colony
- 2023 Herbicide Applicaiton Area

Map 4 (inset 1 of 8)

Minocqua & Kawaguesaga

Oneida County, Wisconsin

Late-Season 2023 EWM Survey Results

N
W E
S

725
Feet

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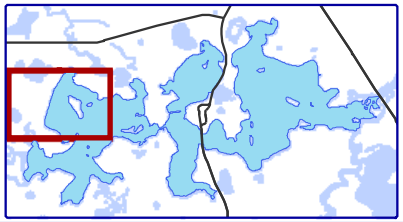
Sources:
Roads and Hydro: WDNR
Bathymetry: WDNR,1972
- digitized by Onterra
Orthophoto: NAIP, 2022
Aquatic Plants: Onterra, 2023
Map Date: October 13, 2023 RMF



Legend

EWM Survey: 8/24/2023-8/29/2023

- Highly Scattered
- Scattered
- Dominant
- Highly Dominant
- Surface Matting
- Single or Few Plants
- Clumps of Plants
- Small Plant Colony
- 2023 Herbicide Applicaiton Area

Map 5 (inset 2 of 8)

Minocqua & Kawaguesaga

Oneida County, Wisconsin

Late-Season 2023 EWM Survey Results

N
W E
S

725
Feet

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Sources:
Roads and Hydro: WDNR
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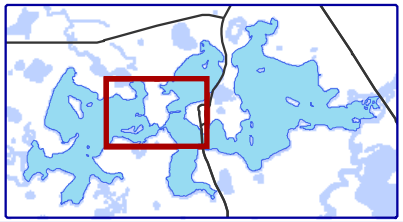
- digitized by Onterra
Orthophoto: NAIP, 2022
Aquatic Plants: Onterra, 2023
Map Date: October 13, 2023 RMF



Legend

EWM Survey: 8/24/2023-8/29/2023

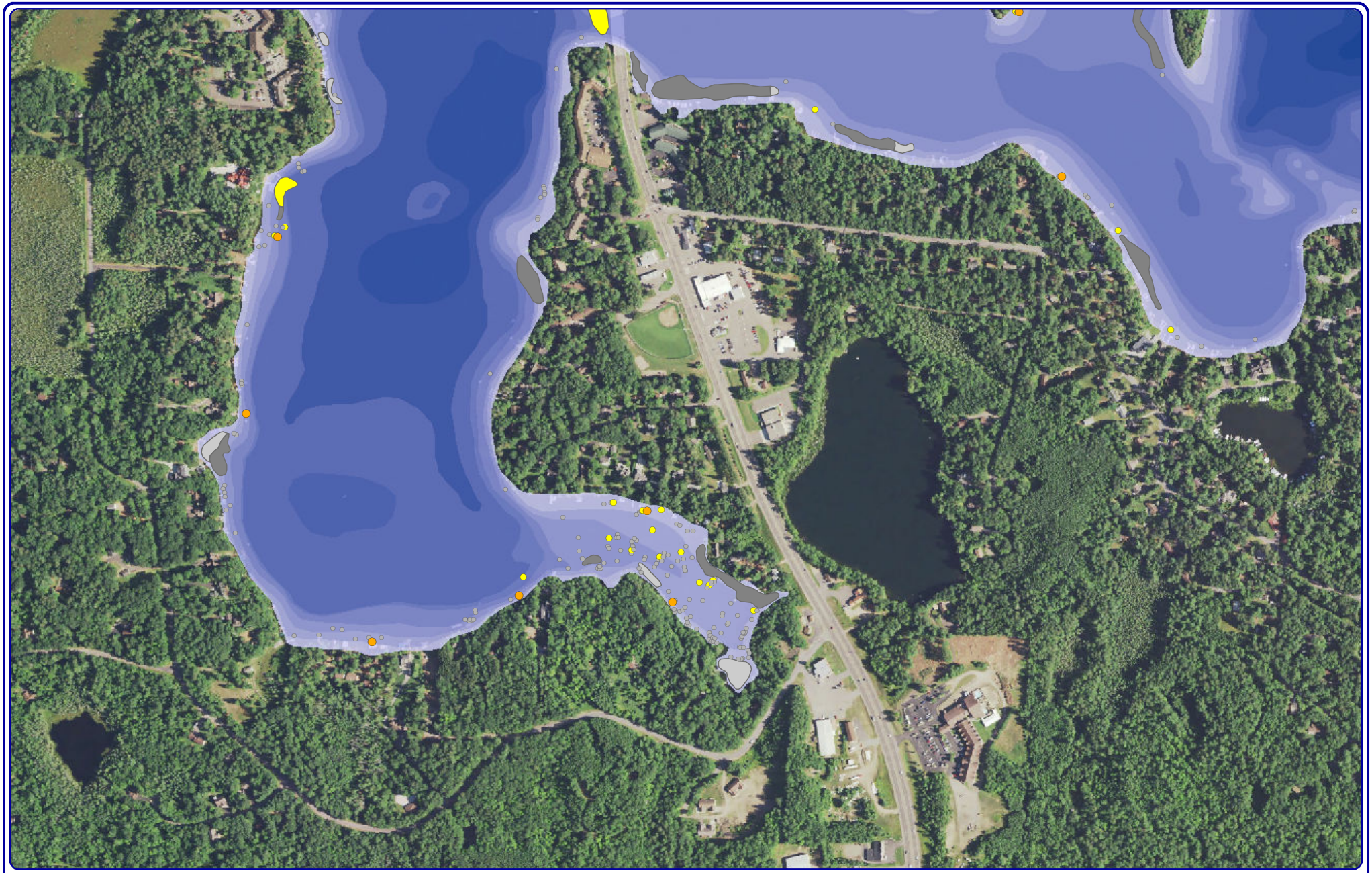
- Highly Scattered
- Scattered
- Dominant
- Highly Dominant
- Surface Matting
- Single or Few Plants
- Clumps of Plants
- Small Plant Colony
- 2023 Herbicide Applicaiton Area

Map 6 (inset 3 of 8)

Minocqua & Kawaguesaga

Oneida County, Wisconsin

Late-Season 2023 EWM Survey Results



N
W E
S

725
Feet

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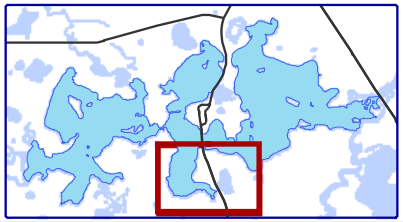
De Pere, WI 54115
920.338.8860
www.onterra-eco.com

Sources:
Roads and Hydro: WDNR
Bathymetry: WDNR,1972
- digitized by Onterra
Orthophoto: NAIP, 2022
Aquatic Plants: Onterra, 2023
Map Date: October 13, 2023 RMF



Legend

EWM Survey: 8/24/2023-8/29/2023

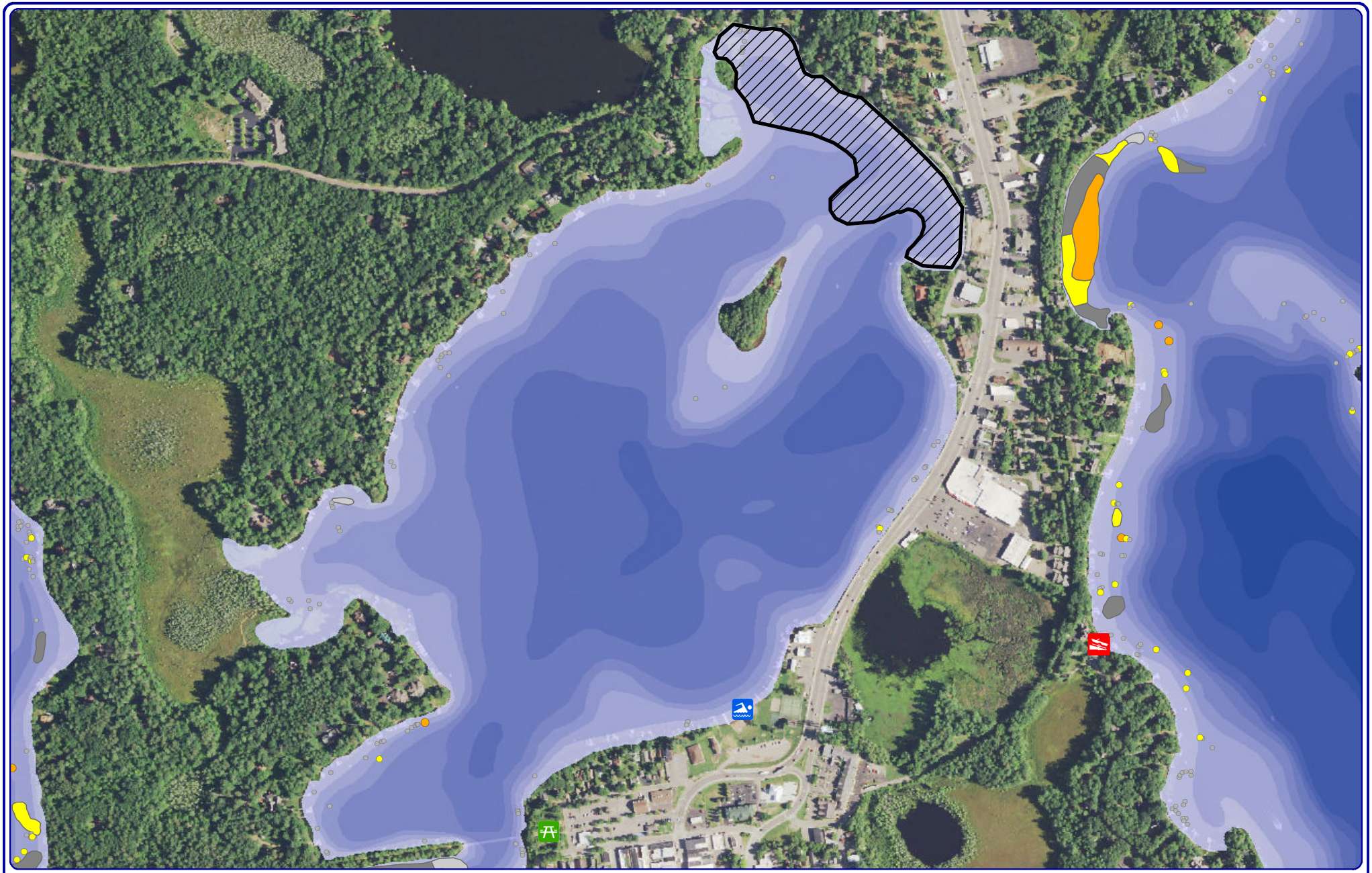
- Highly Scattered
- Scattered
- Dominant
- Highly Dominant
- Surface Matting
- Single or Few Plants
- Clumps of Plants
- Small Plant Colony
- 2023 Herbicide Applicaiton Area

Map 7 (inset 4 of 8)

Minocqua & Kawaguesaga

Oneida County, Wisconsin

Late-Season 2023 EWM Survey Results



N
W E
S

725
Feet

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Sources:
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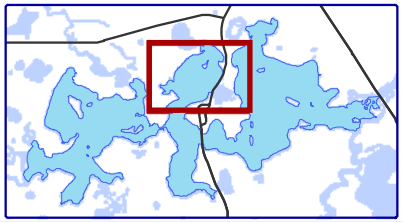
Bathymetry: WDNR,1972
- digitized by Onterra
Orthophoto: NAIP, 2022
Aquatic Plants: Onterra, 2023
Map Date: October 13, 2023 RMF



Legend

EWM Survey: 8/24/2023-8/29/2023

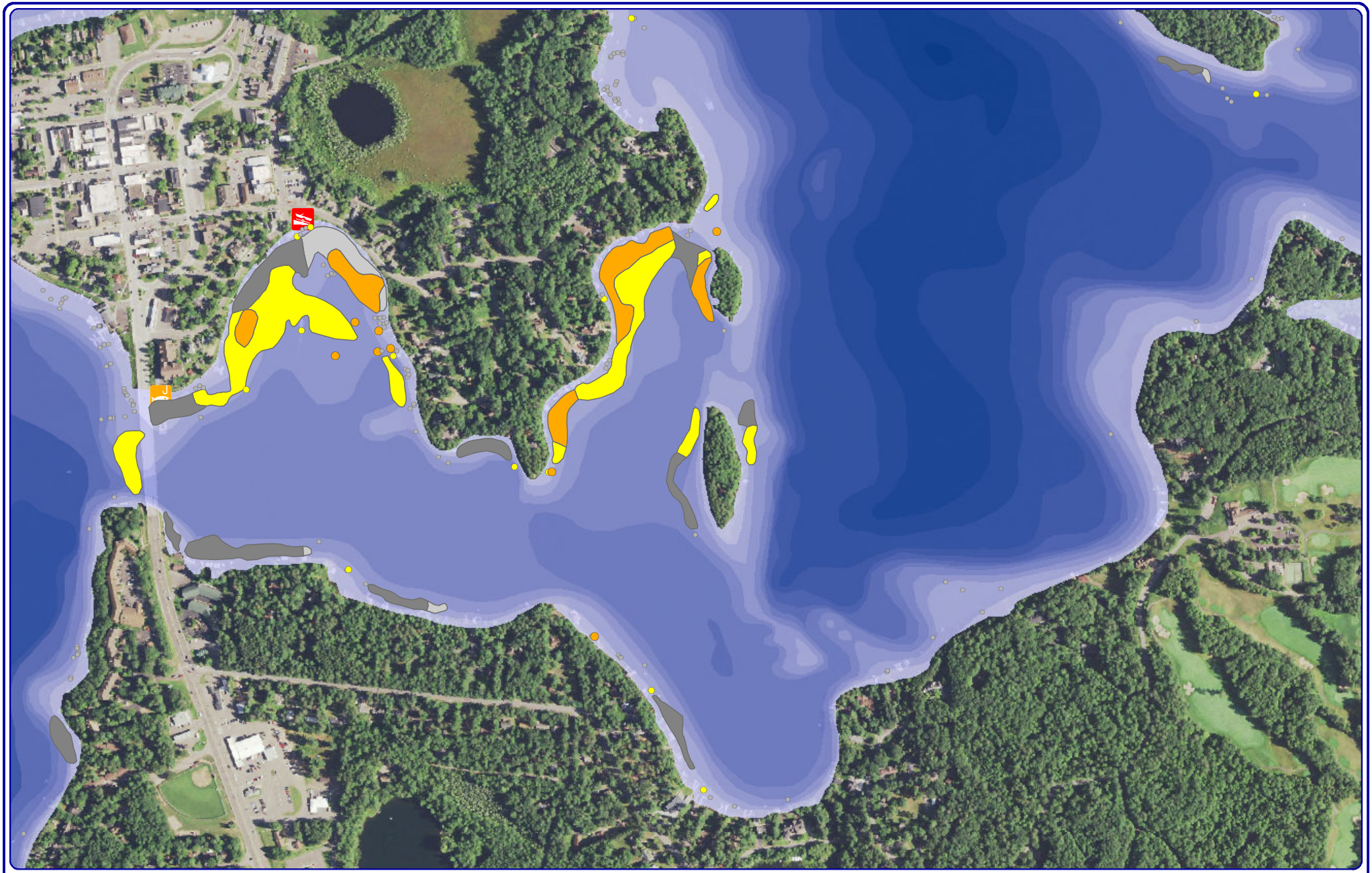
- Highly Scattered
- Scattered
- Dominant
- Highly Dominant
- Surface Matting
- Single or Few Plants
- Clumps of Plants
- Small Plant Colony
- 2023 Herbicide Applicaiton Area

Map 8 (inset 5 of 8)

Minocqua & Kawaguesaga

Oneida County, Wisconsin

Late-Season 2023 EWM Survey Results



N
W E
S

725
Feet

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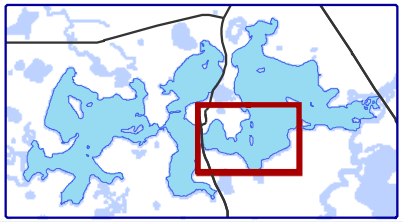
Sources:
Roads and Hydro: WDNR
Bathymetry: WDNR,1972
- digitized by Onterra
Orthophoto: NAIP, 2022
Aquatic Plants: Onterra, 2023
Map Date: October 13, 2023 RMF



Legend

EWM Survey: 8/24/2023-8/29/2023

- Highly Scattered
- Scattered
- Dominant
- Highly Dominant
- Surface Matting
- Single or Few Plants
- Clumps of Plants
- Small Plant Colony
- 2023 Herbicide Applicaiton Area

Map 9 (inset 6 of 8)

Minocqua & Kawaguesaga

Oneida County, Wisconsin

Late-Season 2023 EWM Survey Results

N
W E
S

725
Feet

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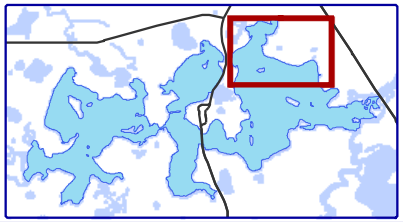
Sources:
Roads and Hydro: WDNR
Bathymetry: WDNR,1972
- digitized by Onterra
Orthophoto: NAIP, 2022
Aquatic Plants: Onterra, 2023
Map Date: October 13, 2023 RMF



Legend

EWM Survey: 8/24/2023-8/29/2023

- Highly Scattered
- Scattered
- Dominant
- Highly Dominant
- Surface Matting
- Single or Few Plants
- Clumps of Plants
- Small Plant Colony
- 2023 Herbicide Applicaiton Area

Map 10 (inset 7 of 8)

Minocqua & Kawaguesaga

Oneida County, Wisconsin

Late-Season 2023 EWM Survey Results

N
W E
S

725
Feet

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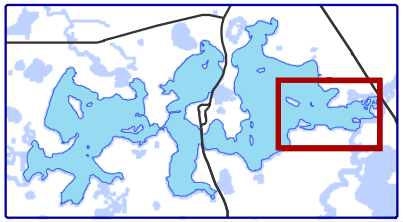
Sources:
Roads and Hydro: WDNR
Bathymetry: WDNR,1972
- digitized by Onterra
Orthophoto: NAIP, 2022
Aquatic Plants: Onterra, 2023
Map Date: October 13, 2023 RMF



Legend

EWM Survey: 8/24/2023-8/29/2023

- Highly Scattered
- Scattered
- Dominant
- Highly Dominant
- Surface Matting
- Single or Few Plants
- Clumps of Plants
- Small Plant Colony
- 2023 Herbicide Applicaiton Area

Map 11 (inset 8 of 8)

Minocqua & Kawaguesaga

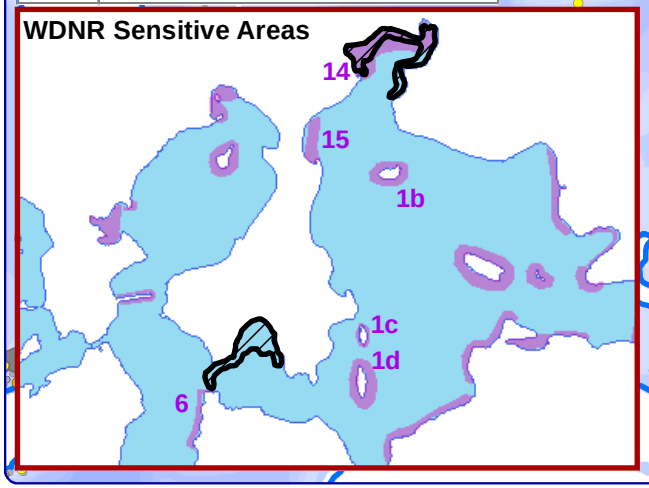
Oneida County, Wisconsin

Late-Season 2023 EWM Survey Results

2024 Preliminary EWM Management Strategy
ProcellaCOR Spot Treatment

Site	Acres	Avg Depth (ft)	Volume (acre-ft)	PDU Rate (per acre-ft)	PDU Total
A-24	16.6	7.5	124.5	5.0	623
B-24	18.5	7.0	129.5	4.0	518
	35.1		***254.0***		***1,141***

1	Islands - promote native vegetation and protect surrounding sand/rock bars - fisheries & wildlife interest
6	Steep shoreline - protect native vegetation and protect shoreland buffers - fisheries & wildlife interest
14	Huber Bay - promote emergent & floating-leaf vegetation - wildlife interest
15	Sandy shoreline - protect native vegetation and protect shoreland buffers - fisheries & wildlife interest



B-24

C-24
5.8 acres

D-24
5.5 acres

A-24

E-24
3.0 acres

N
W E
S

1,300
Feet

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Sources:
Roads and Hydro: WDNR
Bathymetry: Onterra
Aquatic Plants: Onterra, 2023
Map Date: December 15, 2023


Project Location in Wisconsin

Legend

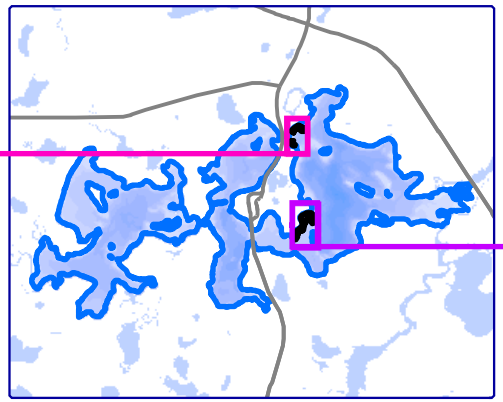
EWM Survey: Aug 28-29, 2023

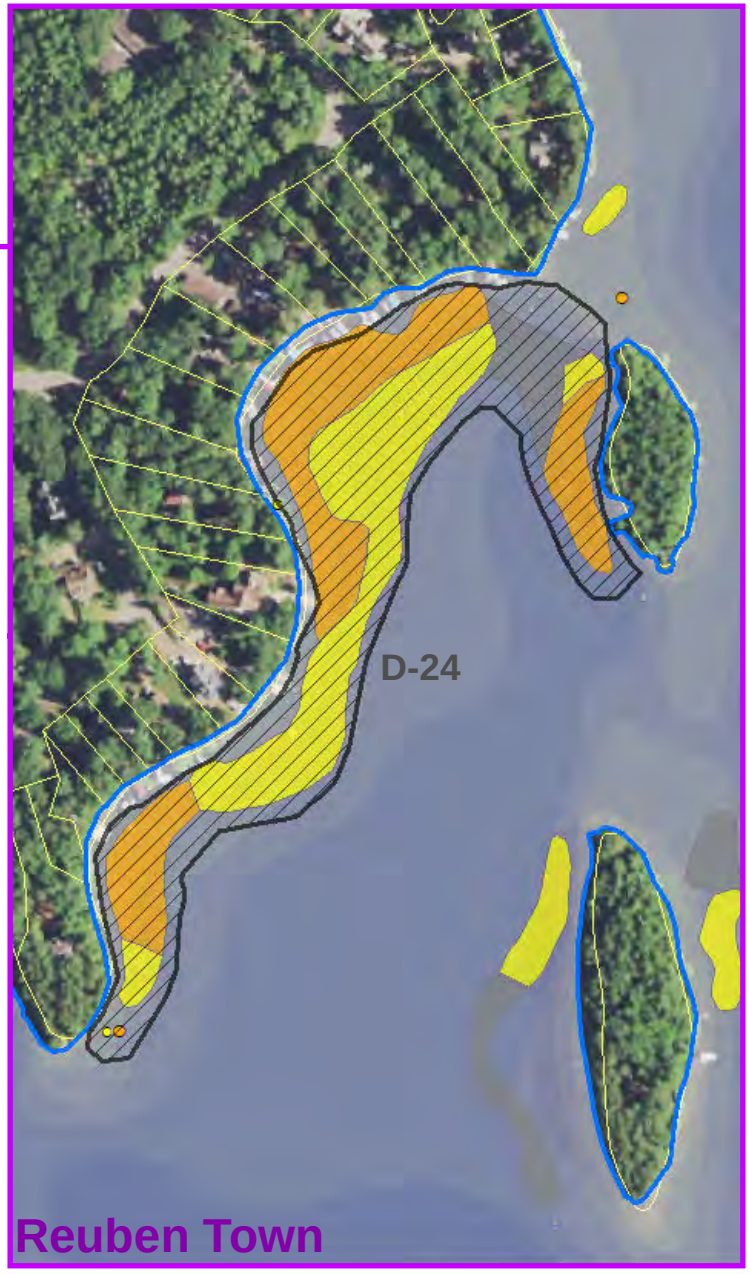
- Highly Scattered
- Scattered
- Dominant
- Highly Dominant
- Surface Matting
- Single or Few Plants
- Clumps of Plants
- Small Plant Colony
- 2024 Preliminary Application Area
- Site Initially Considered For Herbicide Treatment, But Removed

Map 12

Minocqua & Kawaguesaga Lakes
Oneida County, Wisconsin

Preliminary 2024 EWM Treatment Strategy v2.1





2024 Preliminary EWM Management Strategy *Mechanical Harvest*		
Site	Acres	Avg Depth (ft)
C1-24	2.8	7.0
C2-24	0.9	8.0
D-24	8.5	7.5
Total	***12.2***	

N W E S

10,000 Feet

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De Pere, WI 54115
920.338.8860
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Sources:
Roads and Hydro: WDNR
Bathymetry: Onterra
Parcels: SCO, 2018
Aquatic Plants: Onterra, 2023
Map Date: December 15, 2023

Project Location in Wisconsin

Legend

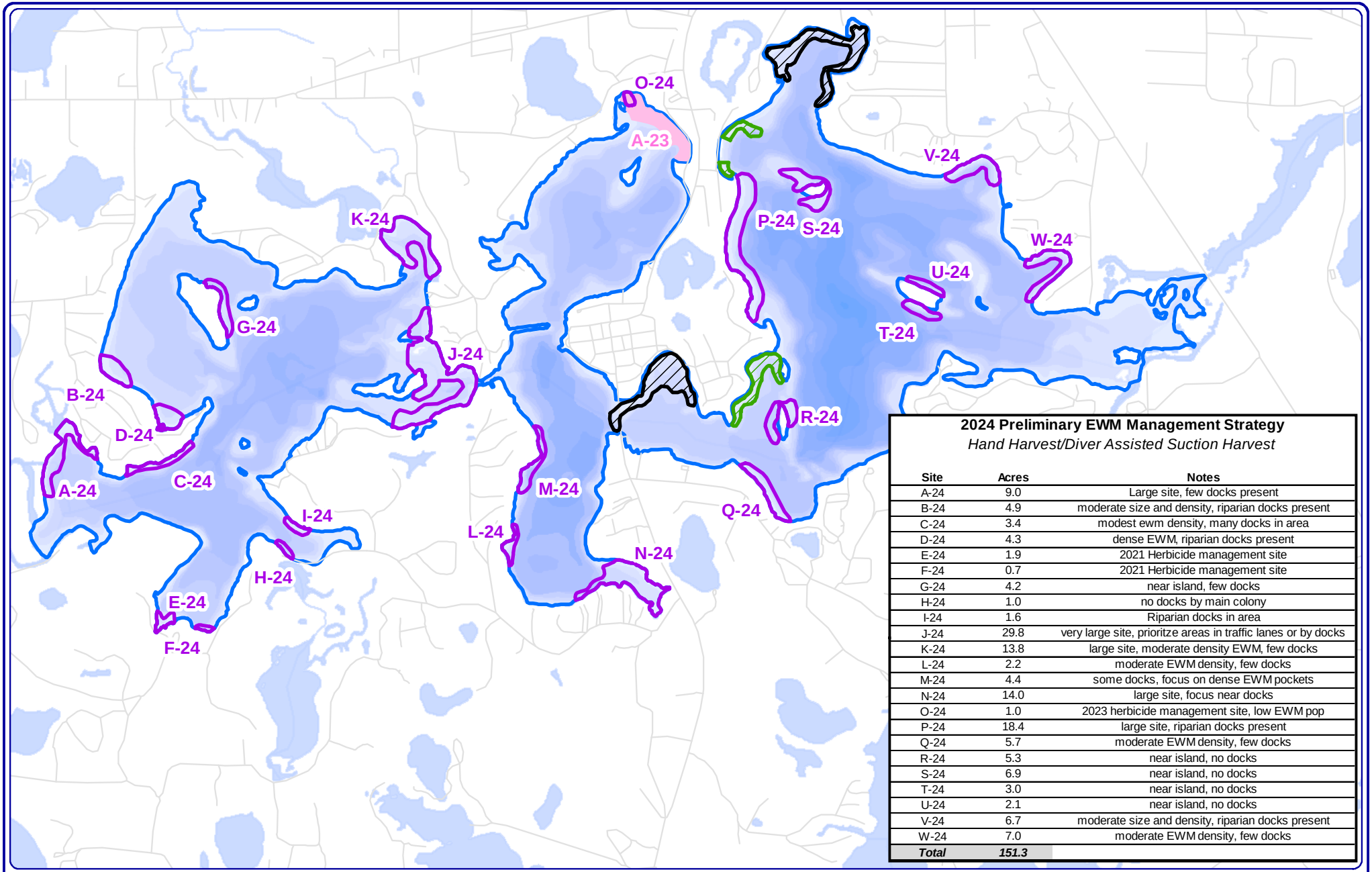
EWM Survey: Aug 28-29, 2023

- Highly Scattered
- Scattered
- Dominant
- Highly Dominant
- Surface Matting
- Single or Few Plants
- Clumps of Plants
- Small Plant Colony
- 2024 Preliminary Mechanical Harvest Area

Map 13

Minocqua & Kawaguesaga
Oneida County, Wisconsin

Preliminary 2024 EWM Mechanical Harvest Strategy v1



2024 Preliminary EWM Management Strategy

Hand Harvest/Diver Assisted Suction Harvest

Site	Acres	Notes
A-24	9.0	Large site, few docks present
B-24	4.9	moderate size and density, riparian docks present
C-24	3.4	modest ewm density, many docks in area
D-24	4.3	dense EWM, riparian docks present
E-24	1.9	2021 Herbicide management site
F-24	0.7	2021 Herbicide management site
G-24	4.2	near island, few docks
H-24	1.0	no docks by main colony
I-24	1.6	Riparian docks in area
J-24	29.8	very large site, prioritze areas in traffic lanes or by docks
K-24	13.8	large site, moderate density EWM, few docks
L-24	2.2	moderate EWM density, few docks
M-24	4.4	some docks, focus on dense EWM pockets
N-24	14.0	large site, focus near docks
O-24	1.0	2023 herbicide management site, low EWM pop
P-24	18.4	large site, riparian docks present
Q-24	5.7	moderate EWM density, few docks
R-24	5.3	near island, no docks
S-24	6.9	near island, no docks
T-24	3.0	near island, no docks
U-24	2.1	near island, no docks
V-24	6.7	moderate size and density, riparian docks present
W-24	7.0	moderate EWM density, few docks
Total	***151.3***	

N
W E
S

2,500
Feet

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Sources:
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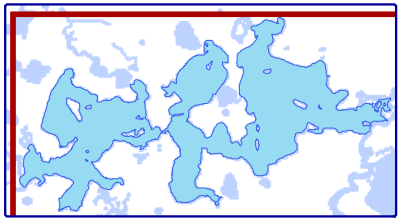
Bathymetry: WDNR,1972
- digitized by Onterra
Orthophoto: NAIP, 2022
Aquatic Plants: Onterra, 2023
Map Date: October 13, 2023 RMF



Legend

EWM Survey: 8/24/2023-8/29/2023

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

- 2024 Preliminary DASH Location
- 2024 Herbicide Application Area
- 2024 Mechanical Harvesting Area
- 2023 Herbicide Application Area

Map 14

Minocqua & Kawaguesaga

Oneida County, Wisconsin

Preliminary 2024 DASH Locations

A

APPENDIX A

Minocqua Kawaguesaga Lakes 2023 EWM Manual Removal Report – *Aquatic Plant Management LLC.*

EST. 2013

AQUATIC PLANT MANAGEMENT

Minocqua Kawaguesaga Lakes
2023 EWM Manual Removal Report

Monday, September 18, 2023

Site Summary

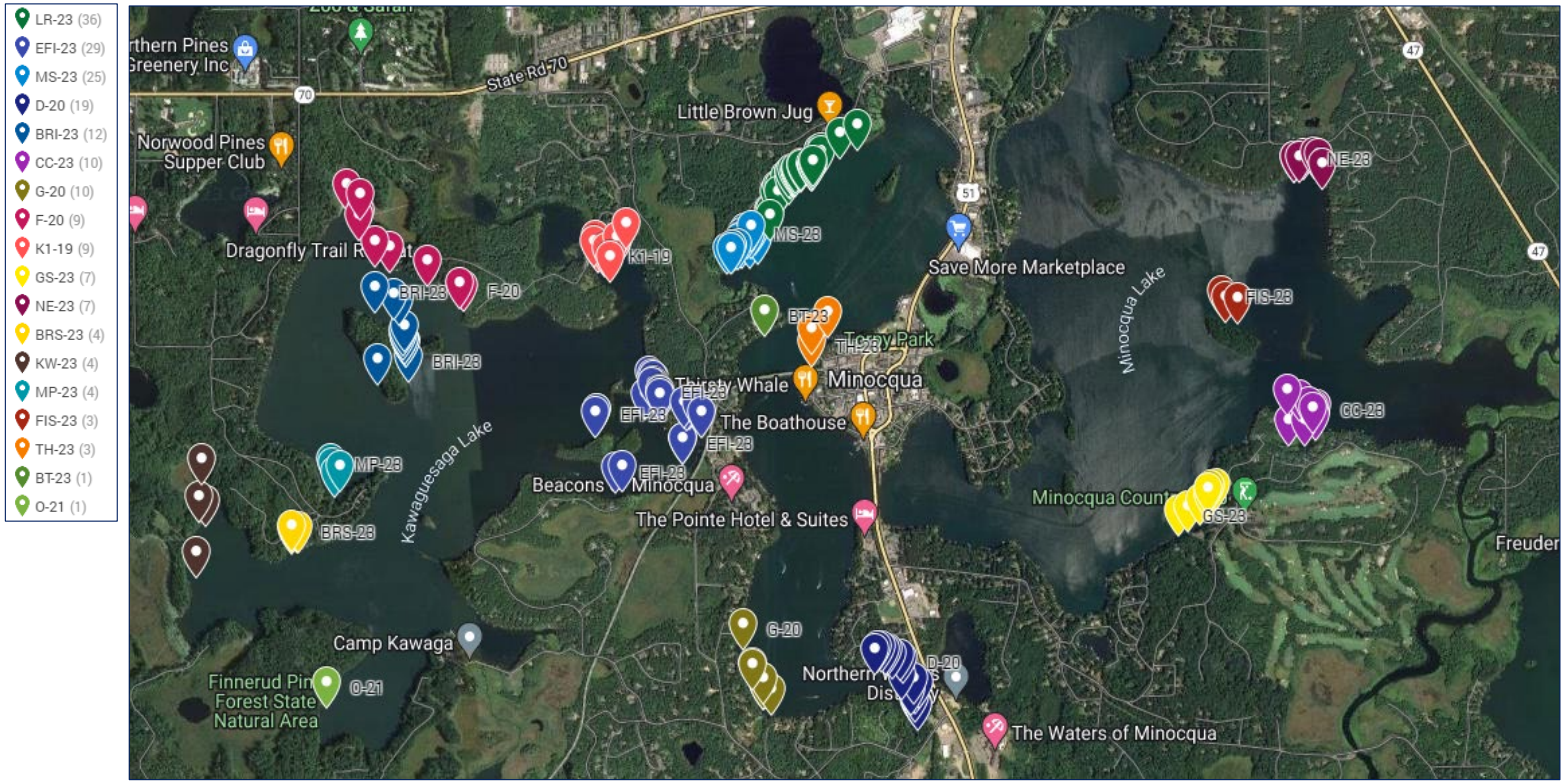
MKLPA

Dates: 6/12 - 9/01

Service	Dive Location	Avg. Water Depth	# of Dives	Underwater Dive Time	AIS Removed (cubic feet)
DASH	LR-23	9.5	36	48.6	272.5
	EFI-23	6.3	29	41.4	262.5
	MS-23	6.6	25	25.8	180.5
	K1-19	6.7	9	13.6	118.0
	KW-23	7.5	4	11.7	76.5
	BRS-23	9.0	4	6.6	58.5
	NE-23	9.9	7	9.5	53.0
	D-20	5.9	19	15.5	48.0
	BRI-23	7.0	12	14.9	32.5
	O-21	7.0	1	3.0	15.0
	FIS-23	6.3	3	3.0	10.0
	CC-23	5.9	9	4.3	8.0
DASH Total		**7.3**	**158**	**197.9**	**1,135.0**
HH	G-20	8.8	10	13.4	46.0
	GS-23	12.5	7	13.5	34.0
	MP-23	5.3	4	3.8	18.5
	F-20	5.8	9	7.3	13.0
	TH-23	8.7	3	3.1	4.5
	BT-23	5.5	1	0.8	1.0
	CC-23	8.0	1	0.7	1.0
HH Total		**8.2**	**35**	**42.5**	**118.0**
Grand Total		**7.5**	**193**	**240.4**	**1,253.0**

Dive Map

Minocqua & Kawaguesaga Lakes, Oneida County



Dive Detail

MKLPA

Dates: 6/12 - 9/01

Date	Dive Location	Latitude	Longitude	Underwater Dive Time (hrs)	AIS Removed (cubic ft)	AIS Density	Avg Water Depth (ft)	Native Species	Native By-Catch	Substrate Type
6/12/2023	BRI-23	45.87083	-89.74111	1.50	0.5	Single or Few	6.0	Northern Milfoil	0.5	Organic
6/12/2023	BRI-23	45.87097	-89.73913	0.75	1.5	Scattered	7.0	Northern Milfoil	0.5	Organic
6/12/2023	BRI-23	45.87161	-89.73936	0.50	0.5	Scattered	7.0	Northern Milfoil	0.0	Organic
6/12/2023	BRI-23	45.87161	-89.73936	1.67	1.0	Scattered	8.0	Northern Milfoil	0.0	Organic
6/13/2023	BRI-23	45.87172	-89.73940	0.67	7.0	Highly Scattered	7.0	Northern Milfoil	2.0	Organic
6/13/2023	BRI-23	45.87172	-89.73940	1.75	7.0	Highly Scattered	7.0	Northern Milfoil	2.0	Organic
6/13/2023	BRI-23	45.87193	-89.73948	2.33	3.5	Highly Scattered	7.0	Pondweeds	0.5	Organic
6/13/2023	BRI-23	45.87207	-89.73948	0.92	2.5	Scattered	7.0	Pondweeds	0.5	Organic
6/14/2023	BRI-23	45.87229	-89.73946	1.75	5.0	Highly Scattered	7.0	Coontail	0.5	Organic
6/14/2023	BRI-23	45.87340	-89.73980	1.25	3.0	Scattered	9.0	Coontail	0.5	Organic
6/14/2023	BRI-23	45.87361	-89.74011	0.58	0.5	Scattered	6.0	None	0.0	Organic
6/14/2023	BRI-23	45.87393	-89.74128	1.25	0.5	Highly Scattered	6.0	None	0.0	Organic
6/14/2023	KW-23	45.86251	-89.75274	1.25	3.5	Clumps	6.0	Northern Milfoil	1.0	Organic/Sand
6/15/2023	F-20	45.87397	-89.73560	0.92	1.5	Dominant	6.5	Elodea	0.5	Organic/Sand
6/15/2023	F-20	45.87410	-89.73592	0.92	1.5	Small Plant Colony	6.0	Charophytes	0.5	Organic/Sand
6/15/2023	F-20	45.87509	-89.73800	1.17	2.0	Scattered	7.5	Charophytes	0.5	Sand
6/15/2023	F-20	45.87564	-89.74036	0.58	2.0	Scattered	8.5	Elodea	0.5	Organic/Sand
6/15/2023	F-20	45.87592	-89.74133	0.42	0.5	Scattered	6.0	Charophytes	0.5	Organic/Sand
6/15/2023	F-20	45.87837	-89.74311	0.42	0.5	Single or Few	3.0	Coontail	0.0	Organic
6/16/2023	F-20	45.87723	-89.74223	1.25	2.5	Scattered	5.5	Charophytes	0.5	Organic
6/16/2023	F-20	45.87706	-89.74236	0.83	1.5	Scattered	5.5	Coontail	0.5	Organic
6/16/2023	F-20	45.87792	-89.74223	0.75	1.0	Scattered	4.0	Pondweeds	0.5	Organic
6/16/2023	MP-23	45.86650	-89.74412	1.08	3.0	Clumps	7.0	Charophytes	0.5	Organic/Sand
6/16/2023	MP-23	45.86635	-89.74409	1.25	6.0	Clumps	4.0	Charophytes	1.0	Organic/Sand
6/16/2023	MP-23	45.86599	-89.74384	1.08	7.0	Dominant	5.0	Coontail	0.5	Organic/Sand
6/16/2023	MP-23	45.86620	-89.74354	0.42	2.5	Scattered	5.0	Pondweeds	0.5	Organic/Sand
6/16/2023	NE-23	45.87970	-89.68197	1.50	10.0	Scattered	12.0	Pondweeds	1.5	Organic/Sand
6/16/2023	NE-23	45.87955	-89.68263	1.75	17.0	Scattered	12.0	Pondweeds	3.0	Organic/Sand
6/16/2023	NE-23	45.87955	-89.68263	1.92	5.0	Scattered	12.0	Pondweeds	2.0	Organic/Sand
6/16/2023	NE-23	45.87957	-89.68228	1.67	6.0	Highly Scattered	10.0	Pondweeds	3.0	Organic/Sand
6/26/2023	BRS-23	45.86361	-89.74624	2.42	19.0	Small Plant Colony	8.0	Northern Milfoil	1.5	Organic/Gravel
6/26/2023	BRS-23	45.86364	-89.74660	1.67	18.0	Small Plant Colony	10.0	Northern Milfoil	1.5	Organic/Gravel
6/27/2023	BRS-23	45.86359	-89.74629	1.42	11.0	Small Plant Colony	8.0	Northern Milfoil	1.5	Organic/Gravel
6/27/2023	BRS-23	45.86356	-89.74664	1.08	10.5	Small Plant Colony	10.0	Northern Milfoil	1.5	Organic/Gravel
7/5/2023	LR-23	45.87797	-89.71561	3.75	35.0	Scattered	10.0	Grasses	5.0	Organic/Sand
7/5/2023	LR-23	45.87824	-89.71539	2.50	8.0	Highly Scattered	11.0	Grasses	1.0	Organic/Sand
7/5/2023	LR-23	45.87726	-89.71619	0.75	1.5	Single or Few	5.5	Grasses	0.0	Organic/Sand
7/6/2023	O-21	45.85690	-89.74442	3.00	15.0	Dominant	7.0	Northern Milfoil	1.0	Organic/Gravel
7/6/2023	KW-23	45.86475	-89.75210	3.17	18.0	Dominant	7.5	Northern Milfoil	2.0	Organic/Gravel
7/7/2023	CC-23	45.86884	-89.68111	0.58	0.5	Scattered	7.5	Elodea	1.0	Organic/Sand
7/7/2023	CC-23	45.86878	-89.68134	0.33	0.5	Scattered	7.5	Elodea	1.0	Organic/Gravel
7/7/2023	CC-23	45.86856	-89.68123	0.42	1.5	Scattered	7.5	Elodea	1.5	Organic/Gravel
7/7/2023	CC-23	45.86843	-89.68123	0.83	1.0	Clumps	7.5	Grasses	2.0	Organic/Gravel
7/7/2023	CC-23	45.86818	-89.68298	0.33	0.0	Highly Scattered	2.0	Grasses	0.0	Organic
7/7/2023	CC-23	45.86818	-89.68187	0.42	2.5	Clumps	2.5	Pondweeds	0.5	Organic
7/7/2023	CC-23	45.86925	-89.68227	0.58	1.0	Scattered	5.5	Northern Milfoil	0.5	Sand
7/7/2023	CC-23	45.86897	-89.68166	0.42	0.5	Scattered	6.5	Northern Milfoil	0.5	Organic/Sand
7/7/2023	CC-23	45.86876	-89.68140	0.42	0.5	Single or Few	7.0	Grasses	0.5	Organic
7/7/2023	KW-23	45.86493	-89.75259	4.17	20.0	Clumps	7.5	Northern Milfoil	1.0	Organic/Gravel
7/7/2023	KW-23	45.86653	-89.75234	3.08	35.0	Dominant	9.0	Northern Milfoil	2.0	Organic/Gravel
7/17/2023	FIS-23	45.87373	-89.68726	0.83	2.0	Scattered	6.5	Elodea	1.0	Organic/Gravel
7/17/2023	FIS-23	45.87352	-89.68697	0.58	0.5	Scattered	5.5	Elodea	0.5	Organic/Gravel
7/17/2023	FIS-23	45.87346	-89.68623	1.58	7.5	Clumps	7.0	Elodea	1.5	Organic/Gravel
7/17/2023	NE-23	45.87972	-89.68131	1.17	6.5	Clumps	8.5	Elodea	7.0	Organic/Sand
7/17/2023	NE-23	45.87966	-89.68105	0.83	7.0	Scattered	8.5	Elodea	8.0	Organic/Sand
7/17/2023	NE-23	45.87925	-89.68077	0.67	1.5	Clumps	6.0	Elodea	1.5	Sand
7/18/2023	TH-23	45.87162	-89.71339	1.00	1.0	Highly Scattered	10.0	Pondweeds	0.5	Organic/Sand
7/18/2023	TH-23	45.87217	-89.71341	1.00	1.5	Highly Scattered	8.0	Pondweeds	0.5	Organic/Sand
7/18/2023	TH-23	45.87287	-89.71235	1.08	2.0	Highly Scattered	8.0	Pondweeds	0.0	Organic/Sand
7/18/2023	GS-23	45.86434	-89.68999	1.25	3.0	Scattered	11.0	Northern Milfoil	0.0	Organic/Sand
7/18/2023	GS-23	45.86452	-89.68935	1.67	11.0	Scattered	12.0	Northern Milfoil	0.5	Organic/Sand
7/19/2023	GS-23	45.86480	-89.68862	2.08	4.0	Scattered	13.0	None	0.0	Organic/Sand
7/19/2023	GS-23	45.86500	-89.68813	1.08	6.0	Scattered	13.0	None	0.0	Organic/Sand
7/19/2023	GS-23	45.86542	-89.68755	0.75	3.0	Scattered	14.5	None	0.0	Organic/Sand
7/19/2023	CC-23	45.86950	-89.68303	0.67	1.0	Scattered	8.0	None	0.0	Organic/Sand
7/19/2023	BT-23	45.87290	-89.71638	0.75	1.0	Scattered	5.5	None	0.0	Organic/Sand
7/19/2023	G-20	45.85685	-89.71652	0.58	9.0	Small Plant Colony	11.0	None	0.5	Organic/Sand
7/20/2023	G-20	45.85688	-89.71641	1.67	6.0	Scattered	10.0	Grasses	0.5	Organic/Sand
7/20/2023	G-20	45.85688	-89.71641	1.33	4.5	Scattered	10.0	Grasses	0.5	Organic/Sand
7/20/2023	G-20	45.85685	-89.71654	1.17	5.0	Scattered	10.0	Grasses	0.5	Organic/Sand
7/20/2023	G-20	45.85713	-89.71671	1.17	3.0	Scattered	10.0	Grasses	0.5	Organic/Sand
7/20/2023	G-20	45.85772	-89.71722	0.75	1.0	Scattered	10.0	Grasses	0.5	Organic/Sand
7/24/2023	D-20	45.85629	-89.70678	0.75	1.5	Scattered	4.0	None	0.0	Organic
7/24/2023	D-20	45.85621	-89.70688	0.42	1.0	Scattered	4.0	None	0.0	Organic
7/24/2023	D-20	45.85610	-89.70682	0.92	2.0	Scattered	4.0	Pondweeds	0.5	Organic
7/24/2023	D-20	45.85599	-89.70662	0.75	1.5	Scattered	4.0	None	0.0	Organic
7/24/2023	D-20	45.85596	-89.70665	0.67	2.0	Scattered	4.0	None	0.0	Organic
7/24/2023	D-20	45.85633	-89.70679	0.58	2.5	Clumps	4.5	None	0.0	Organic
7/24/2023	D-20	45.85667	-89.70677	0.92	3.0	Clumps	5.0	None	0.0	Organic
7/24/2023	D-20	45.85689	-89.70651	1.08	5.0	Clumps	5.0	None	0.5	Organic
7/25/2023	D-20	45.85658	-89.70705	1.08	1.5	Scattered	4.5	Pondweeds	0.5	Organic
7/25/2023	D-20	45.85711	-89.70691	0.75	1.0	Highly Scattered	5.5	Pondweeds	0.5	Organic
7/25/2023	D-20	45.85727	-89.70763	0.83	1.5	Clumps	6.5	Pondweeds	0.5	Organic
7/25/2023	D-20	45.85798	-89.70758	0.92	3.0	Clumps	4.5	Pondweeds	0.5	Organic
7/25/2023	D-20	45.85812	-89.70775	0.58	1.0	Scattered	5.5	Pondweeds	0.5	Organic
7/25/2023	D-20	45.85818	-89.70822	0.67	5.0	Clumps	7.0	Grasses	0.5	Organic
7/25/2023	D-20	45.85835	-89.70853	1.08	5.5	Clumps	8.0	Grasses	0.5	Organic
7/26/2023	D-20	45.85834	-89.70872	0.67	1.5	Clumps	7.0	Pondweeds	0.5	Organic
7/26/2023	D-20	45.85843	-89.70895	0.92	3.0	Clumps	10.0	Pondweeds	0.5	Organic
7/26/2023	D-20	45.85846	-89.70919	0.92	2.0	Clumps	10.0	Pondweeds	0.5	Organic
7/26/2023	D-20	45.85835	-89.70938	1.00	4.5	Clumps	10.0	Pondweeds	0.5	Organic
7/26/2023	EFI-23	45.87029	-89.72380	1.25	14.0	Small Plant Colony	5.0	Pondweeds	1.0	Organic
7/26/2023	EFI-23	45.87019	-89.72366	0.92	9.0	Small Plant Colony	4.5	Pondweeds	0.5	Organic
7/26/2023	EFI-23	45.87005	-89.72343	0.42	3.0	Small Plant Colony	4.5	Pondweeds	0.5	Organic
7/27/2023	EFI-23	45.86866	-89.72718	1.17	5.0	Clumps	7.5	Elodea	1.0	Organic/Gravel
7/27/2023	EFI-23	45.86866	-89.72718	1.75	6.0	Clumps	7.5	Elodea	1.0	Organic/Gravel
7/27/2023	EFI-23	45.86858	-89.72721	0.50	5.0	Clumps	7.5	Elodea	1.0	Organic/Gravel
7/28/2023	LR-23	45.87731	-89.71609	1.00	2.5	Single or Few	8.0	None	0.0	Organic/Sand
7/28/2023	LR-23	45.87804	-89.71578	1.75	6.0	Single or Few	8.0	None	0.0	Organic/Sand
7/28/2023	LR-23	45.87829	-89.71562	0.58	2.0	Single or Few	8.0	None	0.0	Organic/Sand
7/28/2023	LR-23	45.87838	-89.71543	0.50	1.5	Single or Few	8.0	None	0.0	Organic/Sand
7/28/2023	LR-23	45.87870	-89.71512	0.25	0.5	Single or Few	8.0	None	0.0	Organic/Sand
7/28/2023	LR-23	45.87887	-89.71487	0.50	2.5	Single or Few	8.0	None	0.0	Organic/Sand

Dive Detail

MKLPA

Dates: 6/12 - 9/01

Date	Dive Location	Latitude	Longitude	Underwater Dive Time (hrs)	AIS Removed (cubic ft)	AIS Density	Avg Water Depth (ft)	Native Species	Native By-Catch	Substrate Type
7/31/2023	LR-23	45.87804	-89.71555	2.50	7.0	Scattered	8.0	Pondweeds	0.5	Organic
7/31/2023	LR-23	45.87857	-89.71484	1.58	14.0	Small Plant Colony	11.0	Pondweeds	3.0	Organic/Gravel
7/31/2023	LR-23	45.87883	-89.71481	1.67	7.0	Scattered	8.0	Pondweeds	3.5	Organic
7/31/2023	LR-23	45.87893	-89.71464	1.08	7.0	Clumps	10.0	Pondweeds	3.0	Organic
8/1/2023	LR-23	45.87896	-89.71462	1.50	4.0	Scattered	7.0	Pondweeds	2.0	Organic/Sand
8/1/2023	LR-23	45.87890	-89.71485	0.58	3.5	Scattered	4.0	Elodea	1.5	Organic/Sand
8/1/2023	LR-23	45.87904	-89.71468	1.08	3.5	Clumps	7.0	Grasses	1.0	Organic/Sand
8/1/2023	LR-23	45.87905	-89.71433	1.25	10.5	Clumps	8.0	Coontail	4.0	Organic/Sand
8/1/2023	LR-23	45.87895	-89.71449	1.75	10.5	Clumps	10.0	Coontail	5.0	Organic/Sand
8/1/2023	LR-23	45.87895	-89.71442	0.67	6.0	Clumps	12.0	Coontail	1.5	Organic/Sand
8/2/2023	LR-23	45.87910	-89.71448	1.50	2.0	Scattered	7.0	Grasses	0.5	Organic/Sand
8/2/2023	LR-23	45.87912	-89.71412	2.17	21.0	Small Plant Colony	6.0	Coontail	3.0	Organic/Sand
8/2/2023	LR-23	45.87924	-89.71411	1.00	3.5	Clumps	8.0	Coontail	1.5	Organic/Sand
8/2/2023	LR-23	45.87922	-89.71407	1.42	7.0	Clumps	6.0	Coontail	2.0	Organic/Sand
8/2/2023	LR-23	45.87923	-89.71352	0.50	7.0	Small Plant Colony	11.0	Grasses	2.0	Organic
8/3/2023	LR-23	45.87970	-89.71306	3.75	24.5	Small Plant Colony	14.0	Grasses	3.5	Organic
8/3/2023	LR-23	45.87980	-89.71300	2.25	14.0	Small Plant Colony	15.0	Grasses	3.5	Organic/Sand
8/3/2023	LR-23	45.87987	-89.71297	0.58	3.0	Small Plant Colony	15.0	Grasses	0.5	Organic/Sand
8/4/2023	LR-23	45.87994	-89.71285	1.33	4.0	Clumps	17.0	Pondweeds	1.0	Organic/Sand
8/4/2023	LR-23	45.87981	-89.71285	1.17	11.5	Small Plant Colony	17.5	Pondweeds	1.0	Organic/Sand
8/4/2023	LR-23	45.87922	-89.71341	1.42	12.0	Dominant	9.5	Pondweeds	1.0	Organic/Sand
8/4/2023	LR-23	45.87922	-89.71341	1.50	10.5	Dominant	9.5	Pondweeds	1.0	Organic/Sand
8/4/2023	LR-23	45.87928	-89.71330	1.00	12.0	Dominant	9.0	Pondweeds	1.0	Organic/Sand
8/7/2023	EFI-23	45.87011	-89.72353	1.08	3.5	Scattered	6.0	Coontail	0.5	Organic
8/7/2023	EFI-23	45.86990	-89.72350	1.25	6.0	Scattered	6.0	Coontail	0.5	Organic
8/7/2023	EFI-23	45.86975	-89.72334	1.00	4.5	Scattered	6.0	Coontail	0.5	Organic
8/7/2023	EFI-23	45.86975	-89.72334	1.17	4.0	Small Plant Colony	6.5	Elodea	1.0	Organic
8/7/2023	EFI-23	45.86962	-89.72328	1.83	7.5	Small Plant Colony	6.0	Elodea	1.0	Organic
8/7/2023	EFI-23	45.86944	-89.72318	0.42	5.0	Small Plant Colony	7.0	Elodea	1.0	Organic
8/8/2023	EFI-23	45.86934	-89.72312	2.75	10.0	Small Plant Colony	5.5	Grasses	0.5	Organic/Sand
8/10/2023	EFI-23	45.86963	-89.72330	1.83	2.0	Scattered	5.0	Pondweeds	0.5	Organic
8/10/2023	EFI-23	45.86931	-89.72405	1.33	15.0	Small Plant Colony	7.0	Grasses	3.0	Organic
8/10/2023	EFI-23	45.86980	-89.72359	1.42	7.0	Scattered	6.5	Pondweeds	0.5	Organic
8/10/2023	EFI-23	45.86950	-89.72315	2.08	7.0	Clumps	4.0	Pondweeds	2.0	Organic
8/11/2023	EFI-23	45.86946	-89.72312	3.67	11.0	Clumps	6.0	Elodea	2.0	Organic/Gravel
8/11/2023	EFI-23	45.86946	-89.72312	1.50	7.0	Clumps	7.0	Elodea	2.0	Organic
8/11/2023	EFI-23	45.86930	-89.72303	1.58	8.0	Clumps	5.0	Elodea	2.0	Organic
8/14/2023	MS-23	45.87646	-89.71732	1.42	6.0	Scattered	5.0	Coontail	1.0	Organic/Gravel
8/14/2023	MS-23	45.87653	-89.71749	1.33	6.0	Scattered	5.0	Coontail	1.0	Organic/Gravel
8/14/2023	MS-23	45.87642	-89.71768	0.67	6.0	Scattered	4.0	Coontail	1.0	Organic/Gravel
8/14/2023	MS-23	45.87642	-89.71768	1.17	7.5	Scattered	5.5	Coontail	1.0	Organic/Gravel
8/14/2023	MS-23	45.87629	-89.71786	0.83	1.5	Scattered	5.5	Coontail	0.5	Organic/Gravel
8/14/2023	MS-23	45.87612	-89.71783	0.83	6.0	Scattered	5.5	Coontail	1.0	Organic/Gravel
8/15/2023	MS-23	45.87581	-89.71810	1.42	18.0	Scattered	7.0	Pondweeds	6.0	Organic
8/15/2023	MS-23	45.87572	-89.71844	1.25	30.0	Clumps	6.0	Pondweeds	8.0	Organic
8/15/2023	MS-23	45.87572	-89.71844	1.25	15.0	Clumps	6.0	Pondweeds	5.0	Organic
8/15/2023	MS-23	45.87559	-89.71860	1.08	15.0	Clumps	5.0	Pondweeds	4.0	Organic
8/16/2023	MS-23	45.87562	-89.71880	0.67	3.0	Clumps	3.0	Pondweeds	1.0	Organic
8/16/2023	MS-23	45.87565	-89.71847	0.42	2.0	Clumps	3.0	Pondweeds	1.0	Organic
8/16/2023	MS-23	45.87588	-89.71821	0.75	5.0	Clumps	6.0	Pondweeds	1.0	Organic
8/16/2023	MS-23	45.87644	-89.71703	0.83	5.0	Clumps	5.0	Pondweeds	1.0	Organic
8/16/2023	MS-23	45.87629	-89.71725	1.92	24.0	Clumps	10.0	Pondweeds	10.0	Organic
8/16/2023	MS-23	45.87624	-89.71756	1.25	9.0	Clumps	8.0	Pondweeds	3.0	Organic
8/17/2023	MS-23	45.87644	-89.71740	1.08	3.5	Clumps	10.0	Pondweeds	0.5	Organic
8/17/2023	MS-23	45.87611	-89.71766	0.75	1.5	Clumps	12.0	Pondweeds	0.5	Organic
8/17/2023	MS-23	45.87585	-89.71791	0.42	0.5	Scattered	10.0	Pondweeds	0.5	Organic
8/17/2023	MS-23	45.87607	-89.71796	0.50	1.0	Scattered	5.0	Pondweeds	0.5	Organic
8/17/2023	MS-23	45.87582	-89.71737	2.08	5.0	Scattered	10.0	Pondweeds	0.5	Organic
8/17/2023	MS-23	45.87605	-89.71686	1.42	3.0	Scattered	12.0	Pondweeds	0.5	Organic
8/21/2023	MS-23	45.87581	-89.71830	1.25	3.0	Scattered	5.5	Pondweeds	0.5	Organic
8/21/2023	MS-23	45.87600	-89.71804	0.42	0.5	Single or Few	6.0	None	0.0	Organic
8/21/2023	LR-23	45.87704	-89.71606	0.58	2.0	Highly Scattered	6.5	None	0.0	Organic
8/21/2023	LR-23	45.88059	-89.71164	0.83	2.0	Highly Scattered	11.0	Coontail	0.5	Organic
8/21/2023	LR-23	45.88095	-89.71051	0.33	0.5	Single or Few	10.0	None	0.0	Organic
8/21/2023	LR-23	45.87940	-89.71331	2.00	3.5	Scattered	9.5	Pondweeds	0.5	Organic
8/21/2023	MS-23	45.87655	-89.71729	0.83	3.5	Scattered	4.5	Pondweeds	0.5	Organic
8/25/2023	K1-19	45.87613	-89.72725	3.75	45.0	Clumps	7.0	Elodea	1.0	Organic/Sand
8/25/2023	K1-19	45.87565	-89.72708	2.25	20.0	Clumps	5.0	Elodea	1.0	Organic/Sand
8/25/2023	K1-19	45.87547	-89.72661	0.75	6.0	Clumps	5.5	Elodea	1.0	Organic/Sand
8/29/2023	GS-23	45.86537	-89.68790	3.42	3.0	Scattered	12.0	Grasses	0.0	Organic
8/29/2023	GS-23	45.86529	-89.68806	3.25	4.0	Scattered	12.0	Grasses	0.5	Organic
8/30/2023	EFI-23	45.86619	-89.72591	2.58	27.0	Clumps	9.0	Pondweeds	5.0	Organic/Sand
8/30/2023	EFI-23	45.86623	-89.72555	0.92	6.0	Scattered	8.0	Pondweeds	1.0	Organic/Sand
8/30/2023	EFI-23	45.86740	-89.72163	1.33	21.0	Dominant	12.0	Pondweeds	2.0	Organic/Sand
8/30/2023	EFI-23	45.86740	-89.72163	1.17	18.0	Dominant	12.0	Pondweeds	1.5	Organic/Sand
8/31/2023	G-20	45.85662	-89.71601	1.17	2.5	Single or Few	7.0	None	0.0	Sand
8/31/2023	G-20	45.85708	-89.71653	2.00	6.5	Small Plant Colony	7.0	None	0.0	Organic/Sand
8/31/2023	G-20	45.85765	-89.71715	2.33	1.5	Single or Few	7.0	None	0.0	Organic/Sand
8/31/2023	G-20	45.85940	-89.71780	1.25	7.0	Small Plant Colony	6.0	None	0.0	Organic/Sand
8/31/2023	K1-19	45.87590	-89.72734	1.75	17.5	Clumps	4.0	Elodea	8.0	Organic/Sand
8/31/2023	K1-19	45.87563	-89.72652	0.67	3.5	Highly Scattered	8.0	Elodea	2.0	Organic
8/31/2023	K1-19	45.87598	-86.72581	1.00	5.0	Dominant	10.0	Pondweeds	0.5	Organic
8/31/2023	K1-19	45.87608	-89.72582	0.92	3.5	Clumps	10.0	Pondweeds	0.5	Organic
8/31/2023	K1-19	45.87525	-89.72627	1.00	3.5	Scattered	5.0	Charophytes	1.5	Organic
8/31/2023	K1-19	45.87670	-89.72523	1.50	14.0	Small Plant Colony	6.0	Pondweeds	6.0	Organic/Sand
9/1/2023	EFI-23	45.86890	-89.72121	1.25	4.0	Clumps	4.0	Coontail	0.5	Organic
9/1/2023	EFI-23	45.86888	-89.72137	1.08	5.0	Clumps	4.0	Coontail	0.5	Organic
9/1/2023	EFI-23	45.86896	-89.72156	2.83	10.0	Clumps	6.0	Coontail	1.0	Organic
9/1/2023	EFI-23	45.86892	-89.72076	1.00	26.0	Clumps	4.0	Coontail	9.0	Organic
9/1/2023	EFI-23	45.86857	-89.72048	0.33	6.0	Clumps	4.0	Coontail	1.5	Organic
Total	**193**			**240.44**	**1253.0**				**243.0**	

B

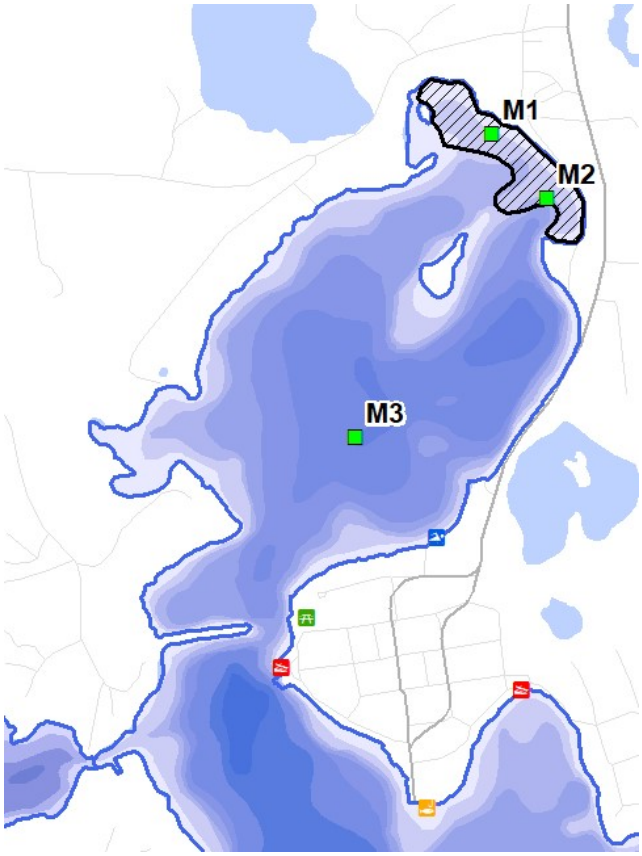
APPENDIX B

2023 Herbicide Concentration Monitoring Plan

Minocqua Lake, Oneida County (WBIC: 1542400)
2023 Herbicide Sample Plan
Onterra, LLC

Minocqua Lake, located in Oneida County, is an approximately 1,339-acre drainage lake that has a maximum depth of 60 feet. Florpyrauxifen-benzyl (commercially as ProcellaCOR™) is proposed to be applied to one application area totaling 14.2 acres in early-summer 2023 to control Eurasian watermilfoil. Herbicide concentration sampling will be conducted in order to monitor the herbicide concentrations in the hours and days following the application.

Water samples will need to be collected at the sites and depths listed below. Coordinates are in decimal degrees. Locations of each sampling site are displayed with green squares on the image below.



Lake Minocqua Herbicide Sample Sites					
Site Label	**Site Description**	**Station ID**	**Latitude**	**Longitude**	**Sample Depth**
M1	Application area A-23	10052553	45.88053724	-89.70130821	Integrated (0-6 feet)
M2	Application area A-23	10052555	45.88243	-89.70684	Integrated (0-6 feet)
M3	NW Basin	443173	45.88095999	-89.70505998	Integrated (0-6 feet)

Please note that a single sample is to be collected before the treatment as a 'control' for the lab analysis. Please collect the pre-treatment sample from site M1 at a time that is most convenient for the volunteer but as close to the treatment date as possible. After the herbicide application is completed, 22 additional samples will need to be collected at ten different time intervals throughout the project and are listed in the table below. Sample collection intervals are listed either as Hours After Treatment (HAT) or Days After Treatment (DAT). Direct communication

between the water sample collector and the herbicide applicator is necessary to ensure the collector is prepared to begin three hours after treatment is completed. If a sample cannot be collected at the interval listed below, please collect the sample as soon as reasonably possible and record the change.

Sampling Interval Matrix (X indicates sample to be collected)			
Interval	Application Area (A-23)		AOPI
	Site M1	Site M2	Site M3
Pre-Treatment	X		
3 HAT	X	X	
6 HAT	X	X	
9 HAT	X	X	X
24 HAT	X	X	X
2 DAT	X	X	X
4 DAT	X	X	X
7 DAT	X	X	X
14 DAT			X
21 DAT			X
35 DAT			X
HAT = Hours After Treatment, DAT = Days After Treatment			

All water samples will be collected using a six-foot integrated sampler (Photo 1). A video tutorial demonstrating the proper sample collection methodology is available on Onterra's YouTube web page: click here

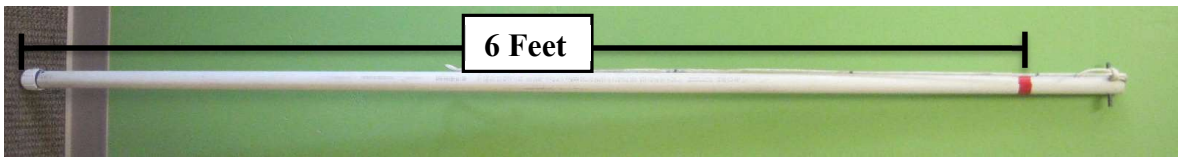


Photo 1. 6-foot Integrated sampling device constructed of PVC tubing.

Due to the extremely low concentrations being measured at the laboratory (<1 part per billion), **it is very important to thoroughly rinse the integrated sampler device and the custom mixing bottle with the water from each sampling site upon arrival at the site**. Water is collected by pushing the integrated sampler straight down to a depth of six feet; or in water shallower than six feet, down to approximately one foot above the bottom sediment. The sampler is brought to the surface and emptied into a customized mixing bottle by pushing open the stop valve at the end of the integrated sampler (Photo 2). Water should be poured from the custom mixing bottle to triple rinse the clear glass bottle. After the clear glass bottle is triple rinsed, it is to be filled for a fourth time with the water from the custom mixing bottle and then carefully poured into the brown glass bottle which has a preservative solution already inside (Photo 3).

Please use a fine-tipped permanent marker to record the date and time the sample is collected on the sticker label of the brown glass bottle. The final sample (in the brown bottle) as well as the emptied clear glass bottle should be carefully placed back within the bubble wrapped pouch to protect from accidental breakage.

While the samples are being collected, they should be kept cold and out of direct sunlight by keeping them in a small cooler on the boat. After collection, all samples should be stored in a refrigerator until shipping.

Photo 2. Emptying the water sample from the integrated sampler device into the custom mixing bottle.

Photo 3. Clear glass mixing bottle and final brown glass bottle.

Onterra will provide all of the necessary supplies to complete the sampling and provide training to the volunteer(s) collecting the samples. Onterra has a supply of handheld GPS units and integrated sampler devices available to loan out for the duration of the sampling upon request. All other materials, including sampling bottles with labels, a customized mixing bottle and necessary paperwork will be provided.

Please fill out the yellow highlighted fields on the Chain of Custody forms including:

- Sampler: (Volunteer Name)
- Client Sample ID: (example: M1, M2, M3)
- Date sample is collected

Shipping Instructions

1) When all sampling is complete, make sure all sample vials are placed in bubble wrap within the provided soft cooler.
2) Put an ice pack into the soft cooler. This can also be a frozen water bottle (contained in an unlabeled zip lock bag). Do not place loose ice in the cooler.
3) Find a cardboard box that will fit the soft cooler for transport. If needed, pack empty space with packing material so the soft cooler is secure within the cardboard box.
4) Place the completed Chain of Custody forms in the cardboard box.
5) Only ship Monday - Thursday. The lab will not be open to receive the samples on a Saturday.
6) We recommend utilizing *FedEx Standard Overnight* so the samples can be received the next day by the lab before 4:30PM (when the lab closes).
7) Shipping costs are expected to be $150-$200 for next day delivery.
8) Ship the cardboard box containing the soft-sided cooler bag, water samples, and Chain of Custody forms to the address below:

EPL Bio Analytical Services
9095 W. Harristown Blvd.
Niantic, IL 62551

May 3, 2023