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.

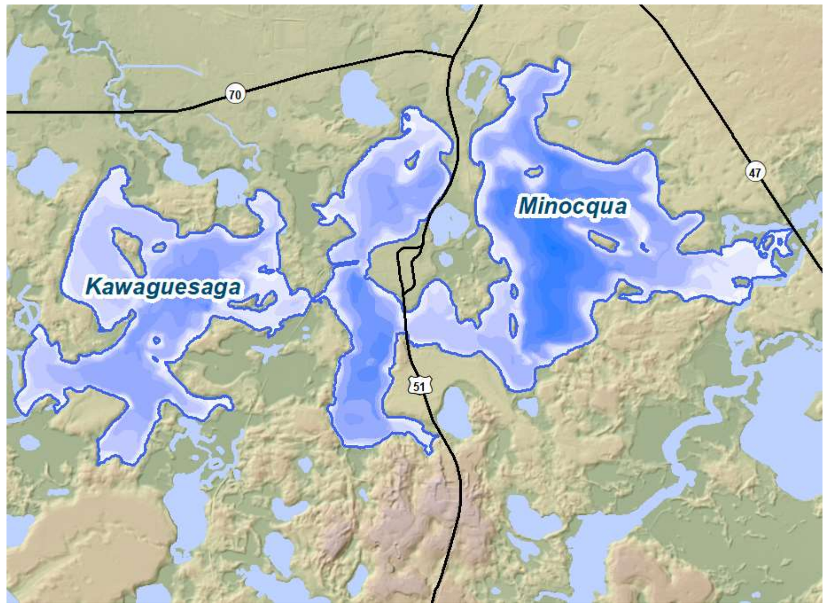


Figure 1.0-1. Minocqua and Kawaguesaga Lakes, Oneida County

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.

In 2024, the MKLPA continued with their ProcellaCOR™ treatments in specifically targeted locations within the system. Similar to 2023, these sites were monitored pre and post herbicide application to gauge the effectiveness of the treatment overall within the system. Manual removal and mechanical harvesting also played large roles in the management of the system-wide EWM population in 2024.

1.2 2024 EWM Control & Monitoring Strategy

The MKLPA applied for and was awarded a series of WDNR AIS grants during the fall 2023 cycle that provides funding assistance to carry out the 2024 EWM management and monitoring activities (ACEI-345-24 & ACEI-346-24). Consistent with the recent management strategy, the 2024 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 2024 herbicide treatment strategy targets the highest EWM occurrences in high-use areas, with attention to potential basin-wide impacts from these treatments. Five sites, totaling 52.4 acres, were initially proposed for treatment in 2024 with ProcellaCOR (Map 1). 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 and E-24 did not have sufficient riparians nor recreational need to justify herbicide management at these locations.

Two areas of EWM were ultimately permitted for management with the use of herbicides in 2024: A-24 and B-24. Proposed sites C-24 and D-24 were then devised to be mechanical harvesting sites during 2024 instead, while site E-25 was included in a DASH site instead (Map 2).

The professional manual removal (includes DASH as appropriate) program devised for 2024 was two pronged. The primary program would conduct professional-based EWM manual-removal on 2019-2023 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 2024 with partial funding from WDNR grant funds while also funding additional time with MKLPA funds. Map 2 outlines the 2024 EWM manual removal strategy.

1.3 Pretreatment Confirmation and Refinement Survey

On June 6-7, 2024, two Onterra field survey crews completed the Pretreatment Confirmation and Refinement Survey within the proposed 2024 treatment areas on Minocqua Lake. The main objective of the survey was to collect quantitative data within the sites 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 62°F throughout the water column, and pH was an average of 8.2 at mid depth in both treatment areas. 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 common waterweed (*Elodea canadensis*), coontail (*Ceratophyllum demersum*) and southern naiad (*Najas guadalupensis*) were the most commonly encountered native plants in both sites.

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

Based upon information from WDNR fisheries and UW Trout Lake researchers, peak walleye spawning activity was estimated during the last week of April on Tomahawk Lake and assumed to be roughly the same for Minocqua Lake. Onterra extrapolated as to when walleye were likely to be largely past their most vulnerable life stages to extended exposure auxin use rates (Figure 1.3-1). With this information, the treatment was scheduled to occur after June 15, 2024 and avoid the entire larval walleye life stage.

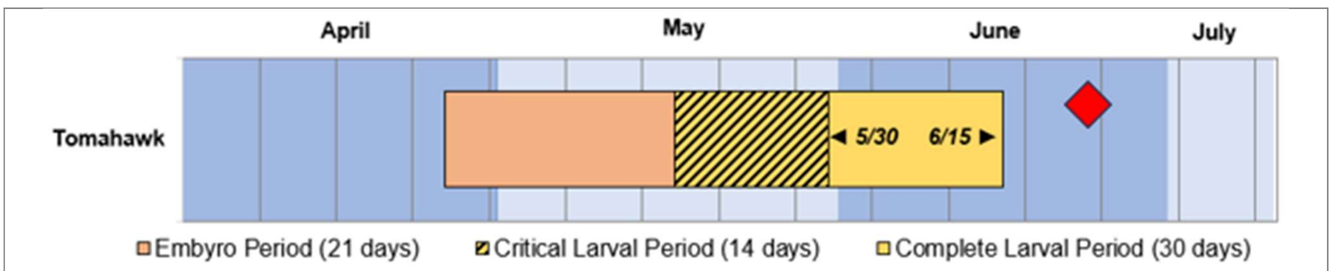


Figure 1.3-1. Sensitive stages of walleye to auxin herbicide exposure. Treatment date of 6/21/2024 shown as red diamond.

2.0 2024 AQUATIC PLANT MANAGEMENT ACTIVITIES

<u>Herbicide Treatment:</u>

The ProcellaCOR herbicide application were completed by Aquatic Plant Management, LLC on June 21, 2024. The application was completed without issue and with ideal conditions present including calm winds at the start of the early morning application. Details of the herbicide application are shown on page 3 of Appendix A.

Mechanical Harvesting:

Mechanical harvesting operations were originally designed to targeted Reubentown (D-24) and an area along the west shore of Minocqua Lake south of Huber Bay. Approximately 50% of the 2024 mechanical harvesting effort occurred at the Reubentown site. Due to adjacent herbicide impacts from the treatment of Huber Bay, mechanical harvesting did not occur at the preliminary site located to the south.

Table 2.0-1. 2024 Mechanical Harvesting Summary. Table extracted from APM 2024 EWM Removal Report

Site	Cutting Hours	Cubic Feet Removed
D-24	38.2	2,950
G-24	1.3	75
I-24	3.0	400
J1-24	2.7	250
L-24	0.4	0
M-24	0.1	5
N-24	1.7	70
O-24	1.6	530
P-24	0.7	15
V-24	1.3	15
W-24	0.1	5
X-24	7.1	770
Y-24	4.1	530
Grand Total	62.5	5,615

In response to the 2024 summer's conducive environmental conditions for growing aquatic plants following an almost non-existent winter; (short ice-on period and snow coverage) many lakes Onterra monitored had a banner year for EWM growth including Minocqua and Kawaguesaga Lakes. The MKLA contracted mechanical harvesting on an additional 14 sites around the two lakes to target substantial EWM populations that emerged in the early part of 2024 (Table 2.0-1). Approximate 62.5 hours of mechanical harvesting operations occurred on Minocqua and Kawaguesaga Lakes in 2024. Additional details of the mechanical harvesting effort and amount of EWM removed on a site-by-site basis can be found in the Aquatic Plant Management (APM) 2024 Report in Appendix A.

Manual Removal:

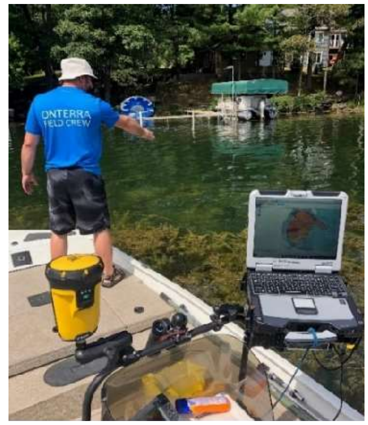
The MKLPA contracted with Aquatic Plant Management, LLC (APM) in 2024 to provide professional hand-harvesting services which includes the use of DASH. The MKLPA, in consultation with Onterra and APM, created a site prioritization methodology that considered EWM density from the 2023 Late Season EWM Mapping Survey, traffic patterns, and recent herbicide management history (Map 2). Through a total of 222 dives on 15 sites around Minocqua and Kawaguesaga Lakes, approximately 3,462.5 cubic feet of EWM were removed by APM in 2024 (Table 2.0-2). Of this total, 2,052.5 cubic feet was harvested through the use of DASH, while another 1,410 cubic feet was harvested with traditional hand harvesting techniques. Sites that received the largest amount of dive time and harvest totals included B-24, A-24, and D-24, which were all located in the western shores of Lake Kawaguesaga. Additional details of hand-harvesting effort and amount of EWM removed on a site-by-site basis can be found in the Aquatic Plant Management (APM) 2024 Report in Appendix A.

Table 2.0-2. 2024 Hand-harvest & DASH Summary. Table extracted from APM 2024 EWM Removal Report

Dive Location	# of Dives	Underwater Dive Time (Hours)	AIS Removed (cubic feet)
A-24	17	47.1	509.0
B-24	49	91.5	1,249.0
C-24	11	20.8	195.0
D-24	22	36.6	358.5
E-24	5	12.3	53.5
F-24	17	36.3	145.0
J-24	6	2.2	3.0
L-24	2	1.5	2.0
M-24	4	3.4	8.5
N-24	24	33	277.5
P-24	15	21.7	259.0
Q-24	4	5.8	39.5
V-24	14	17.3	166.5
W-24	17	23.2	143.0
Z-24	15	20.1	53.5
Grand Total	222	372.9	3,462.50

3.0 2024 MONITORING RESULTS

It is important to note that two types of aquatic plant surveys are discussed in the subsequent materials: 1) point-intercept surveys (Photograph 3.0-1) and 2) EWM mapping surveys (Photograph 3.0-2). Overall, each survey has its strengths and weaknesses, which is why both are utilized in different ways as part of this project.

	
Photograph 3.0-1. Point-intercept survey on a WI lake. Photo credit Onterra.	**Photo 3.0-2. EWM mapping survey on a Wisconsin lake.** Photo credit Onterra.

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. The point-intercept survey can be applied at various scales. The point-intercept survey is most often applied at the whole-lake scale. The <u>whole-lake point-intercept survey</u> was last conducted on Minocqua and Kawaguesaga Lakes in 2022.

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. The <u>subsample point-intercept survey</u> methodology is often applied over management areas such as herbicide application sites. This type of sampling is used within this project as a part of the herbicide spot treatment pre/post monitoring.

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 lake is surveyed through visual observations from the boat (Photograph 3.0-1). 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*.

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. 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 (FPB) 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 (Figure 3.1-1). By 2 DAT, FPB concentrations were below 0.4 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 M8) indicated no concentration of FPB throughout the entirety of the sampling dates.

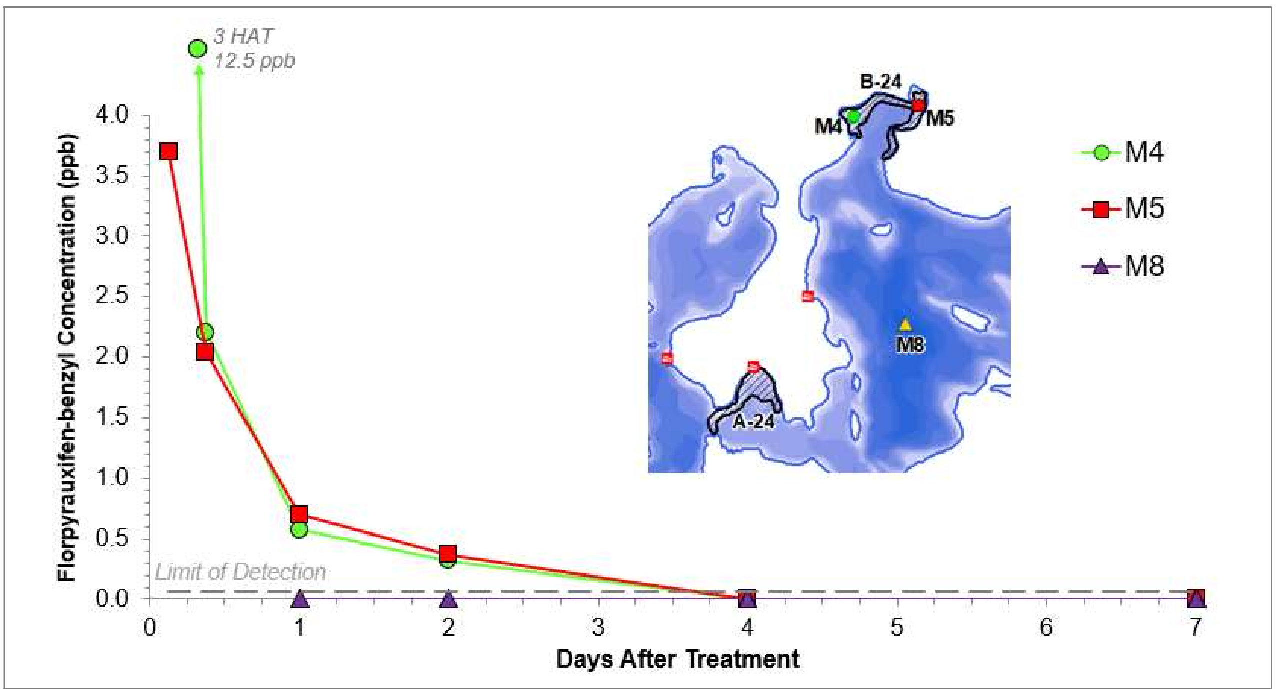


Figure 3.1-1. Florpyrauxifen-benzyl (SX-1552) concentrations associated with a 2024 treatment at site B-24 in Minocqua Lake. Herbicide application area shown in black hashed area. Site A-24 is also displayed but concentrations were not tracked within this site.

Figure 3.1-2 displays the concentrations of acid metabolite of ProcellaCOR, florpyrauxifen acid (FP 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 M4 compared to M5 while both being located within the direct application area. The relatively high FP acid values measured at 9 HAT and 2

DAT 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 detection limits within the application area.

Concentrations of FP acid at the untreated site M8 site never reached above the limit of detection during sampling intervals.

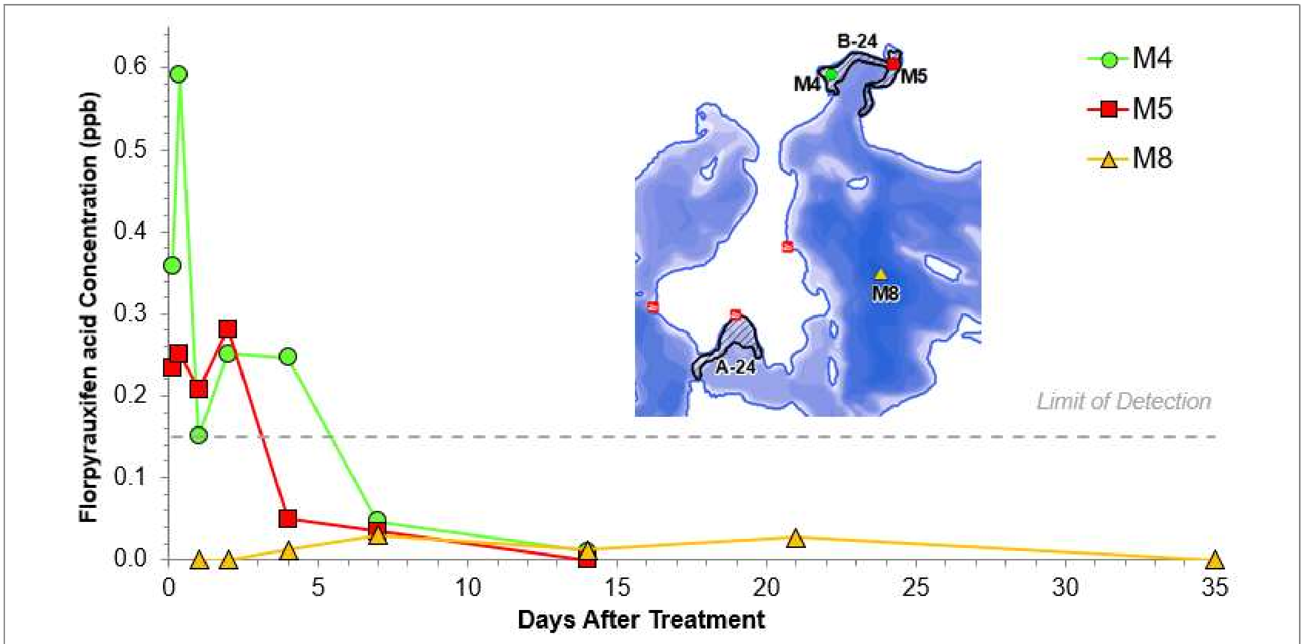


Figure 3.1-2. Florpyrauxifen acid (SX-1552-A) concentrations after a 2024 treatment at site B-24 in Minocqua Lake. Herbicide application area shown in black hashed area. Site A-24 is also displayed but concentrations were not tracked within this site.

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 in two different treatment areas *prior to treatment* and compared to a post treatment assessment during the *year of 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.

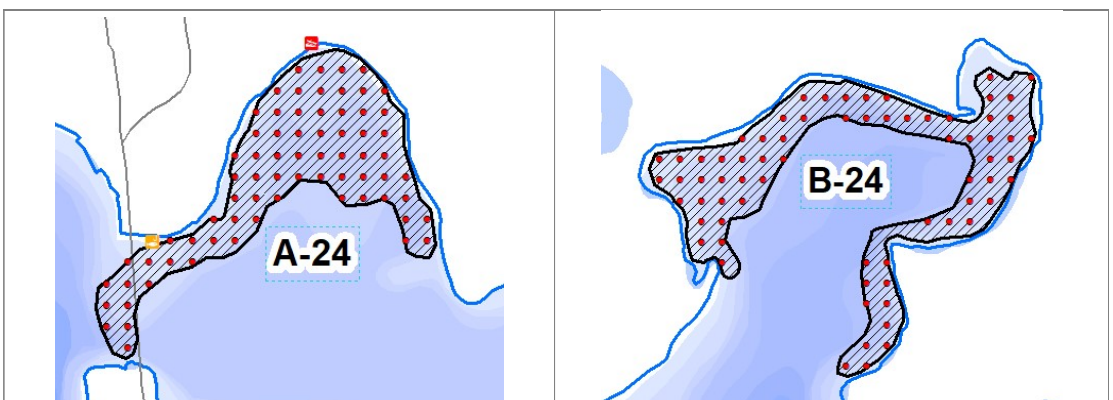


Figure 3.2-1. 2024 Treatment Quantitative Monitoring Plan. 32m spacing, A-24 n=71, B-24 n=70

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 2024 treatment sites, *pretreatmen*t data was collected during mid-June 2024 and is compared to data collected during the late-summer of 2024.

Monitoring results from site A-24 are displayed on Figure 3.2-2. The occurrence of EWM was reduced from 59.2% to 0%. Broad-leaved (dicot) species tend to be more sensitive to herbicides like ProcellaCOR. Reductions were observed from all dicots, with a statistically valid reduction occurring in coontail populations. These data show that three of the most commonly encountered native species in the site (common waterweed, fern-leaf pondweed and flat-stem pondweed) did not show valid changes in occurrence between the two surveys. Several narrow-leaved (monocot) species, such southern naiad and water stargrass showed statistically valid population decreases. Clasping-leaf pondweed and wild celery both showed statistically valid increases in occurrence between the two surveys. As discussed above, 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 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 2025 which will evaluate the aquatic plant population dynamics in this site during the *year-after-treatment*.

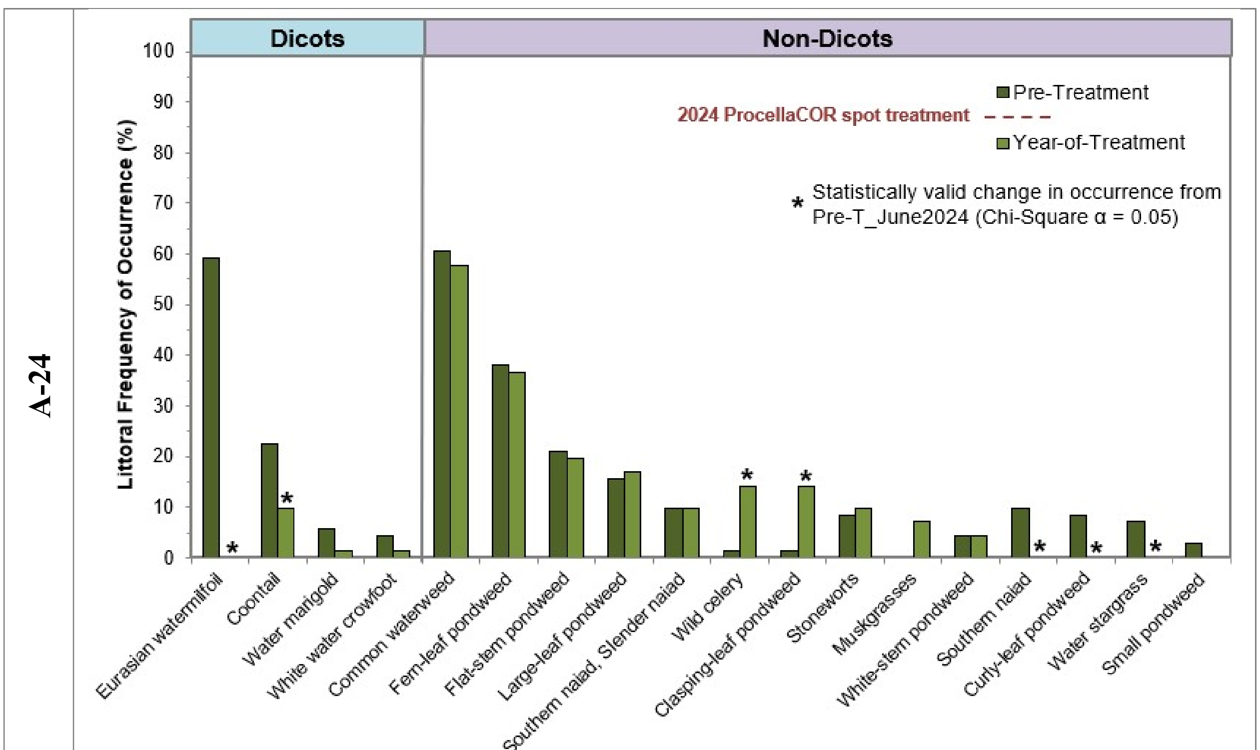


Figure 3.2-2. Frequency of occurrence of aquatic plants in site A-24 from June 2024 (Pretreatment) and August 2024 (Post treatment). n=71

Monitoring results from site B-24 are displayed on Figure 3.2-3. The occurrence of EWM was reduced from 50.0% to 0%. These data show that four of the 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. White-water crowfoot, stoneworts and water stargrass all showed statistically valid decreases in occurrence, with all species not being found at all in the *year of treatment* survey. Large-leaf pondweed, forked duckweed and muskgrasses all showed statistically valid increases in occurrence between the two surveys. A replication of this survey is planned to occur during 2025 which will evaluate the aquatic plant population dynamics in this site during the *year-after-treatment*.

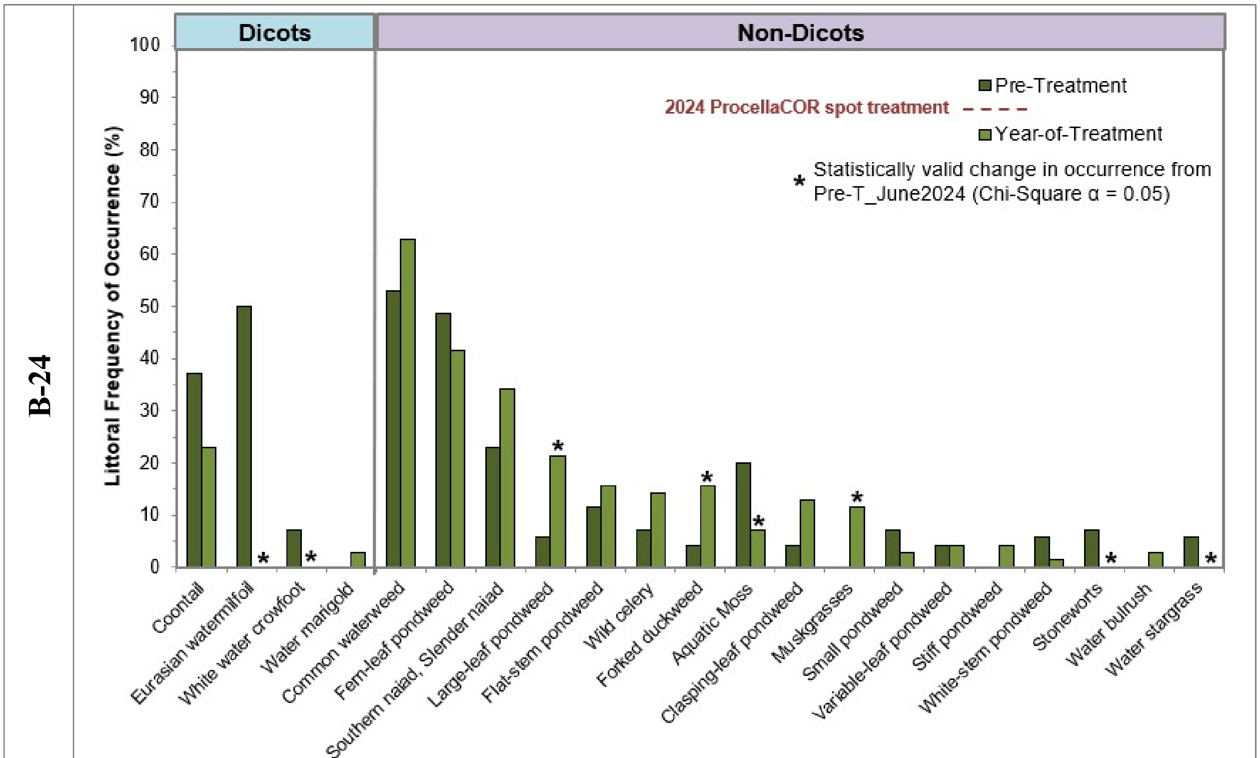


Figure 3.2-3. Frequency of occurrence of aquatic plants in site B-24 from June 2024 (Pretreatment) and August 2024 (Post treatment). n=70

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.

ProcellaCOR Herbicide Treatment Site A-23

Figure 3.3-1 highlights the EWM population from late-summer 2022 (*pretreatment*), late-summer 2023 (*year of treatment*) and late-summer 2024 (*year after 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, top 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, top right frame). These data show initial EWM control was high during the *year of treatment*. In the year following treatment, rebounding colonized EWM was observed within the site, all of which was *highly scattered* density, as well as a number of *single or few plants* and several *clumps of plants* (Figure 3.3-1, bottom left frame). The EWM reductions have been maintained for two summers post treatment.

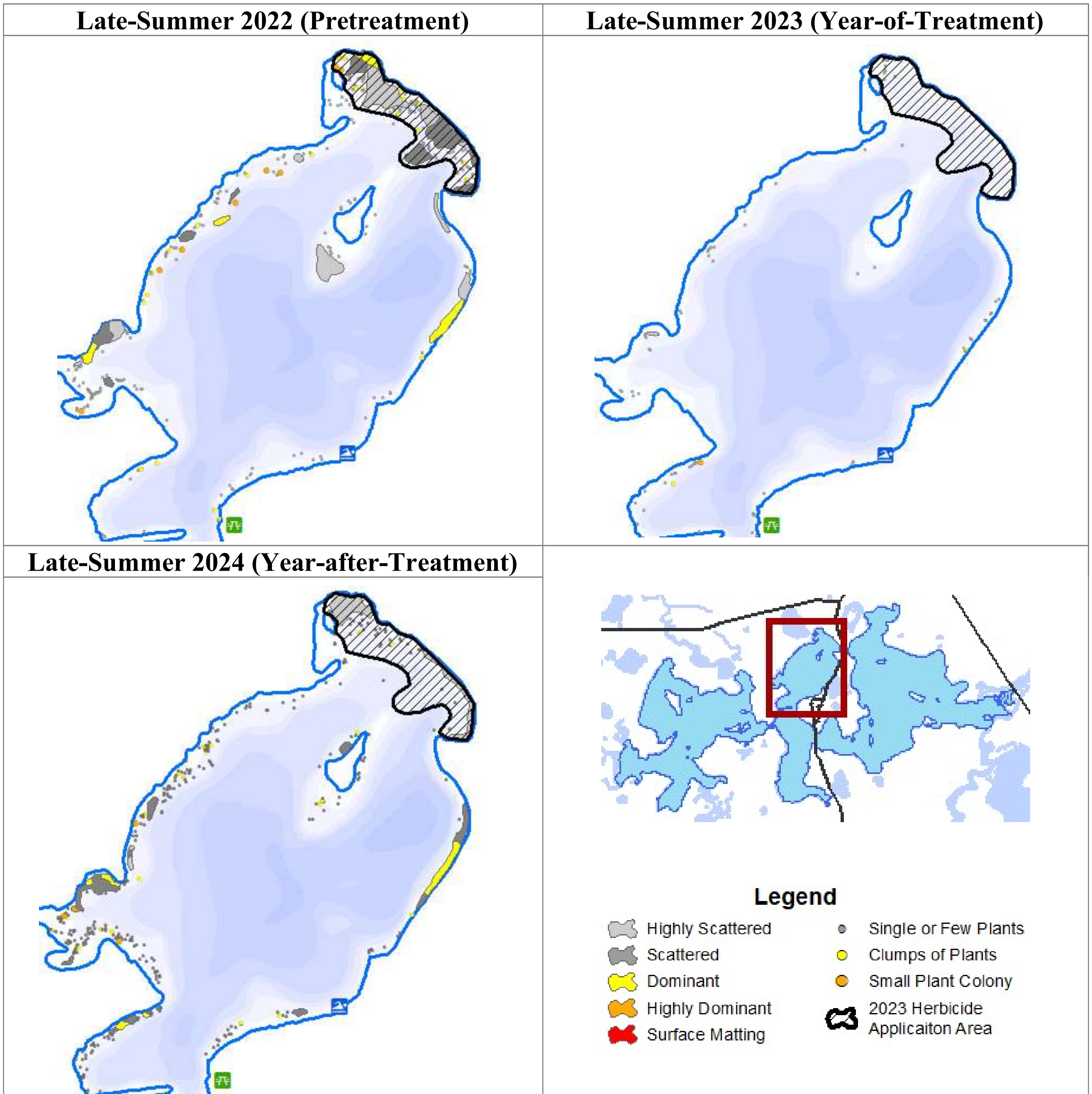


Figure 3.3-1. EWM population in managed basin of Minocqua Lake in 2024. Herbicide application area displayed in black outline.

ProcellaCOR Herbicide Treatment Site A-24

Figure 3.3-2 highlights the EWM population from early-summer 2024 (*pretreatment*) and late-summer 2024 (post *year of treatment*) for the herbicide treatment site A-24. Prior to treatment, a large portion of the site contained colonized EWM including *highly scattered*, *scattered*, *dominant,* and *highly dominant* densities along with a number of *single plants*, *clumps*, and *small plant colonies* (Figure 3.3-2, left frame). After treatment, there was no EWM found within the entirety of the application area (Figure 3.3-2, right frame). These data show initial EWM control was very high during the *year of treatment*.

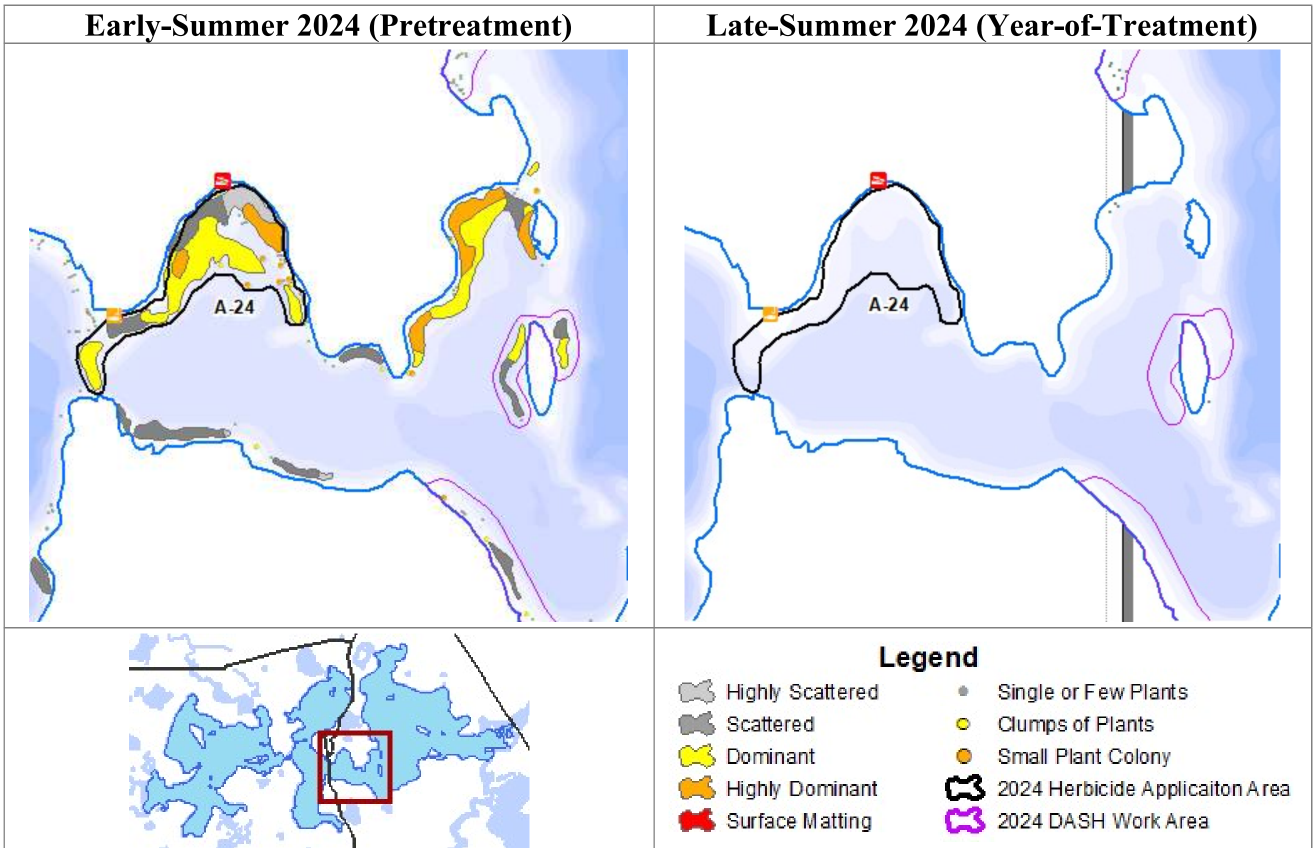


Figure 3.3-2. EWM population in managed basin of Minocqua Lake in 2024. Herbicide application area displayed in black outline. Hand-harvesting areas displayed in purple outline.

ProcellaCOR Herbicide Treatment Site B-24

Figure 3.3-3 highlights the EWM population from early-summer 2024 (*pretreatment*) and late-summer 2024 (post *year of treatment*) for the herbicide treatment site B-24. Prior to treatment, a large portion of the site contained colonized EWM including *highly scattered*, *scattered*, *dominant,* and *highly dominant* densities along with a number of *single plants*, *clumps*, and *small plant colonies* (Figure 3.3-3, left frame). After treatment, the only remaining EWM present in the site was several *single or few plants* occurrences located in the northeastern end of the application area (Figure 3.3-3, right frame). These data show initial EWM control was very high during the *year of treatment*.

Early-Summer 2024 (Pretreatment)	Late-Summer 2024 (Year-of-Treatment)

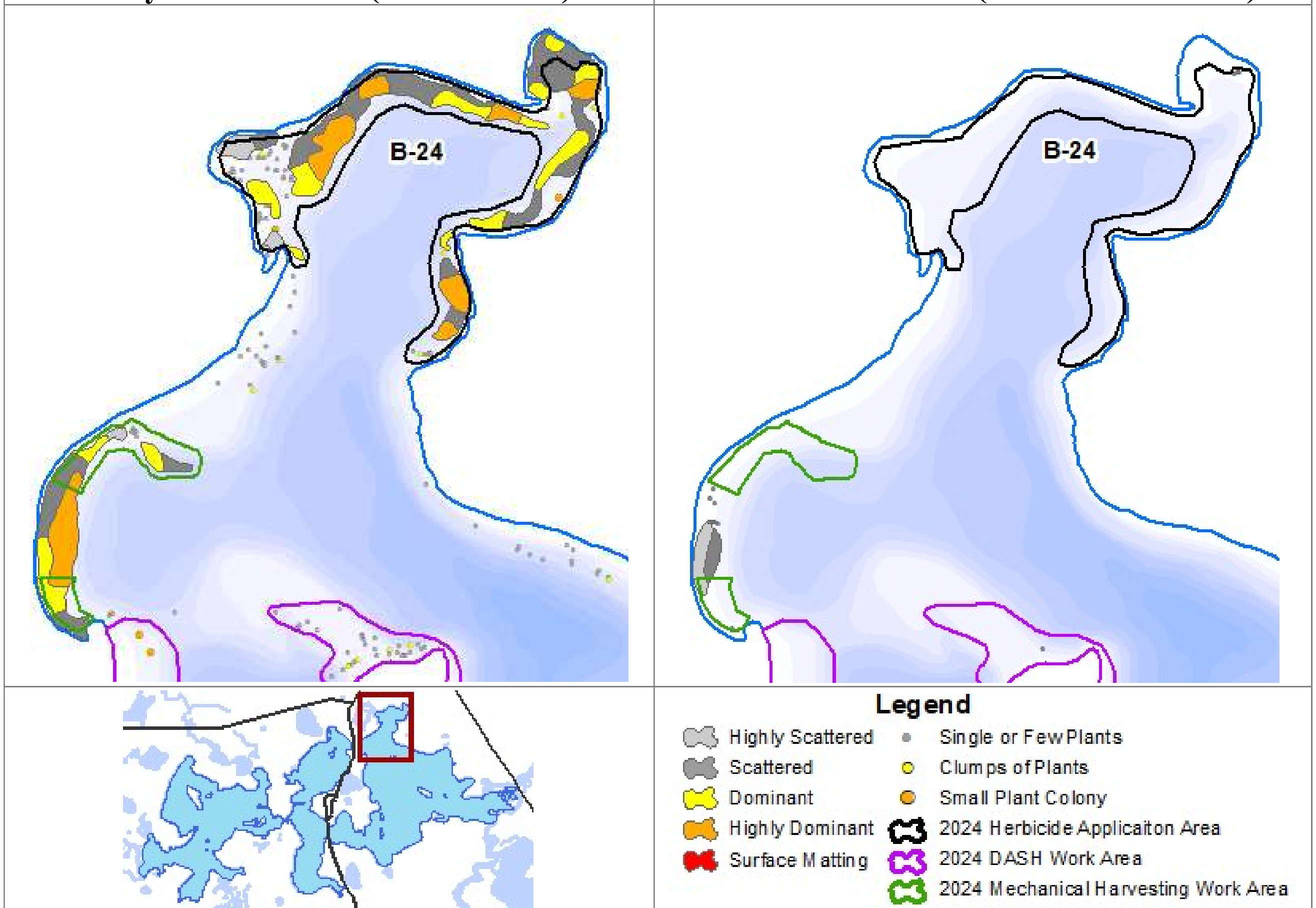


Figure 3.3-3. EWM population in managed basin of Minocqua Lake in 2024. Herbicide application area displayed in black outline. Hand-harvesting areas displayed in purple outline. Mechanical harvesting sites displayed in green outline.

System-Wide EWM Population

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. 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 and mechanical harvesting also occurred within sites located within the bays of the lake and outside the extents of the herbicide treatment areas, particularly along the western shoreline site near site B-24 and around the island to the east of site A-24. The late-summer 2024 EWM mapping survey shows reduced EWM populations throughout the entire bays of the lake (Figures 3.3-2-3). The combination of hand harvesting efforts, mechanical harvesting, and herbicide treatment contributed to the EWM control in these areas of the lake in 2024.

Map 3 displays an overview of the 2024 Late-Season EWM Mapping Survey, with the subsequent 7 maps (Maps 4-11) showing a zoomed-in perspective of an area on the system. Following more aggressive EWM management starting in the spring of 2020, EWM populations have fluctuated from 4.3 to 51.8 colonized acres. The 2024 Late-Season EWM Mapping Survey delineated 28.7 acres of colonized EWM, the lowest amount in the past few years.

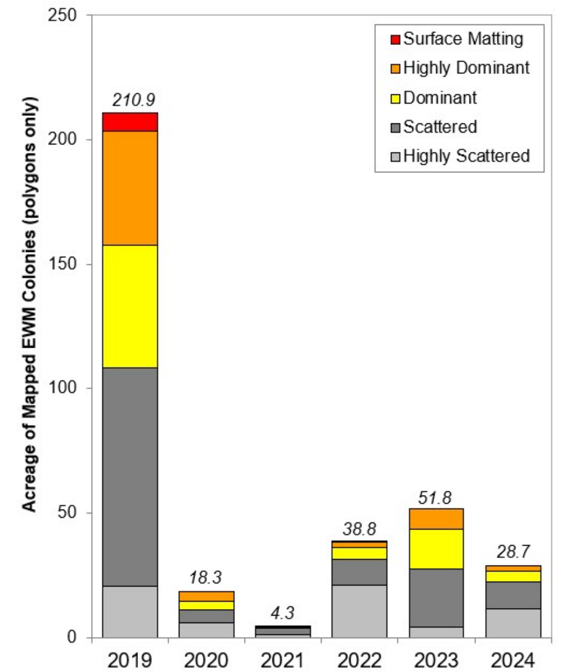


Figure 3.3-2. Acres of EWM Mapped in Minocqua & Kawaguesaga Lakes from 2019-2024. Data from Onterra Late-Summe EWM Mapping Surveys.

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 addition of mechanical harvesting methods in 2024 provided useful information for the MKLPA as it considers this technique moving forward.

The results of the 2023 herbicide treatment have shown some EWM population rebound within the site, but this activity is trending toward meeting overall control goals of having reduced EWM for 3 or more summers post treatment. The results of the 2024 herbicide treatments appear highly successful, but continued monitoring in 2025 and beyond is warranted to fully evaluate this management event.

The late-summer 2024 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 2025 EWM Management & Monitoring Strategy Development

The MKLPA applied for a WDNR Surface Water Planning Grant during the fall 2024 cycle which was successful and provides funding assistance towards the monitoring of the system in 2025. Please note that unlike past years when the MKLPA was awarded AIS Control Grants, the new grant does not allow for funding of active management activities such as herbicide treatment or manual removal. With AIS Control Grants becoming increasingly more competitive, the MKLA made a strategic decision to apply in the Surface Water Planning category to increase their likelihood of securing funding for monitoring, as opposed to the gamble of applying for an AIS Control Grant and potentially not being awarded any state assistance.

Consistent with the recent management strategy, the 2025 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 early February 2025, discussions about the preliminary 2025 herbicide treatment strategy. The MKLPA originally entertained two (2) sites that met the trigger defined in their APM Plan for considering herbicide treatment (Map 12). Both of these sites (A-25 and B-25) are located within the southeastern part of the southwest basin of Lake Kawaguesaga near Camp Kawaga,

4.2 EWM Management Strategy

Herbicide Spot-Treatment

The proposed 2025 herbicide treatment strategy targets EWM occurrences in areas of high riparian presence in the southwest basin of Kawaguesaga Lake. These two treatment sites are likely to dissipate together and have an impact on the entire eastern half of this bay. Because of their relatively small size on their own, a modified dosing strategy is likely needed if the WDNR wishes to only permit one of the sites and not the other.

Manual Removal and Mechanical Harvesting

The MKLPA, Onterra, and APM are currently working on a prioritization system based on strategic location, riparian need, past management history, size, and density of the EWM population in the area. The preliminary. Map 13 outlines this preliminary strategy for manual removal and mechanical harvesting, with a prioritized strategy forthcoming.

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 specifics (e.g. average depth and 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 2025, depending upon the progression of the plant community.

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.

Aquatic Plant Monitoring

Quantitative monitoring of the 2025 treatment sites includes a sub-sample point-intercept survey which will be collected immediately prior to treatment in 2025 (i.e. early/mid-June) and replicated in late-summer 2025, and late-summer 2026 as a post treatment comparative survey. The subsample monitoring plan would be created following an approved WDNR herbicide application permit.

Herbicide Concentration Monitoring

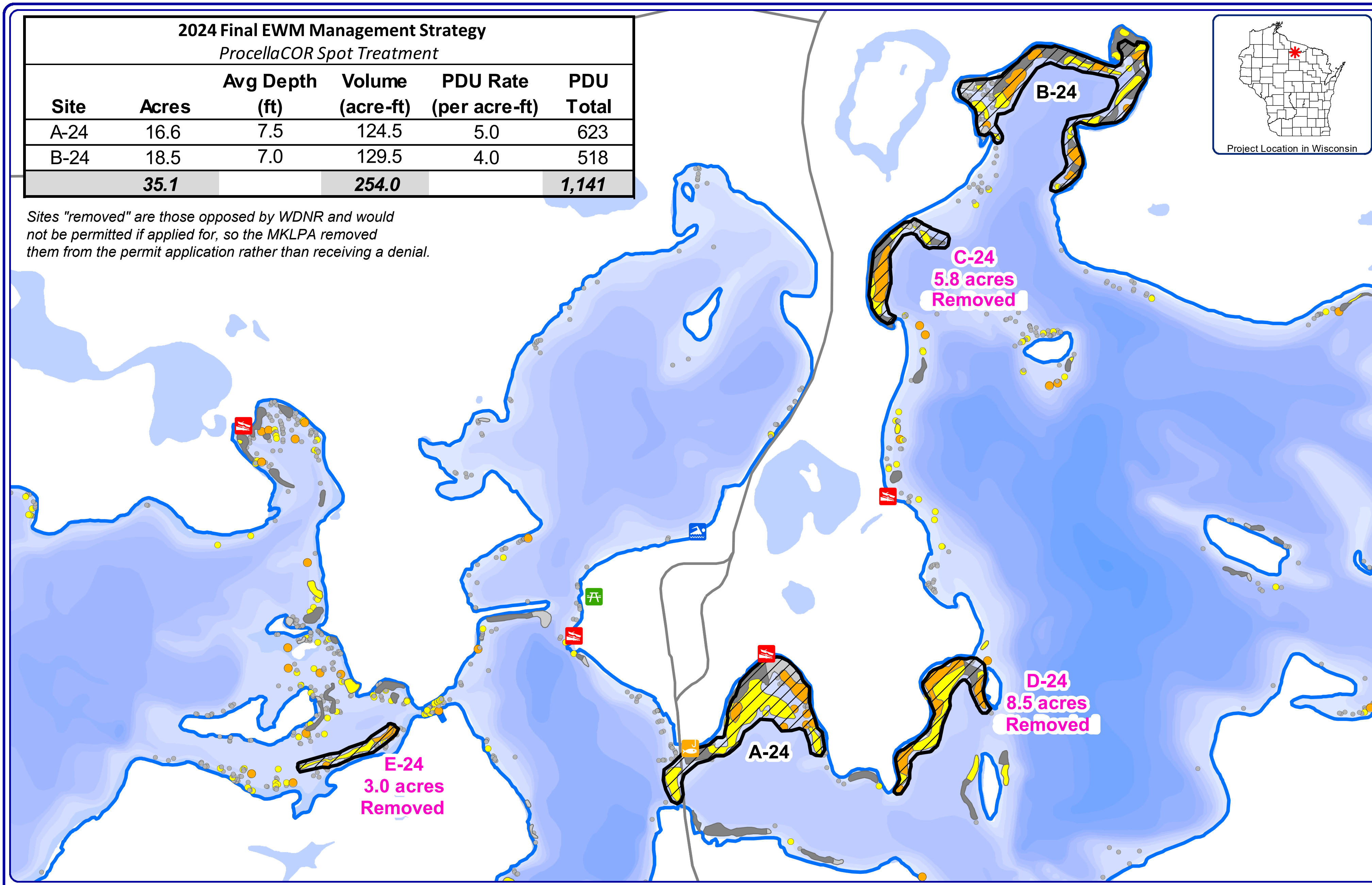
MKLPA volunteers would collect herbicide concentration monitoring during the hours/days following treatment following a sampling regime that will be created through collaborative efforts of the WDNR and Onterra. Samples would be collected at specified time intervals and locations within and outside the 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 the Wisconsin Laboratory of Hygiene where the herbicide analysis is conducted.

2024 Final 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***

Sites "removed" are those opposed by WDNR and would not be permitted if applied for, so the MKLPA removed them from the permit application rather than receiving a denial.



1,300

Feet

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 Herbicide Application Area
- Proposed Herbicide Site Denied by WDNR
- Public Boat Landing
- Bearskin Trailhead Park
- Beach
- Fishing Pier

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, 2023

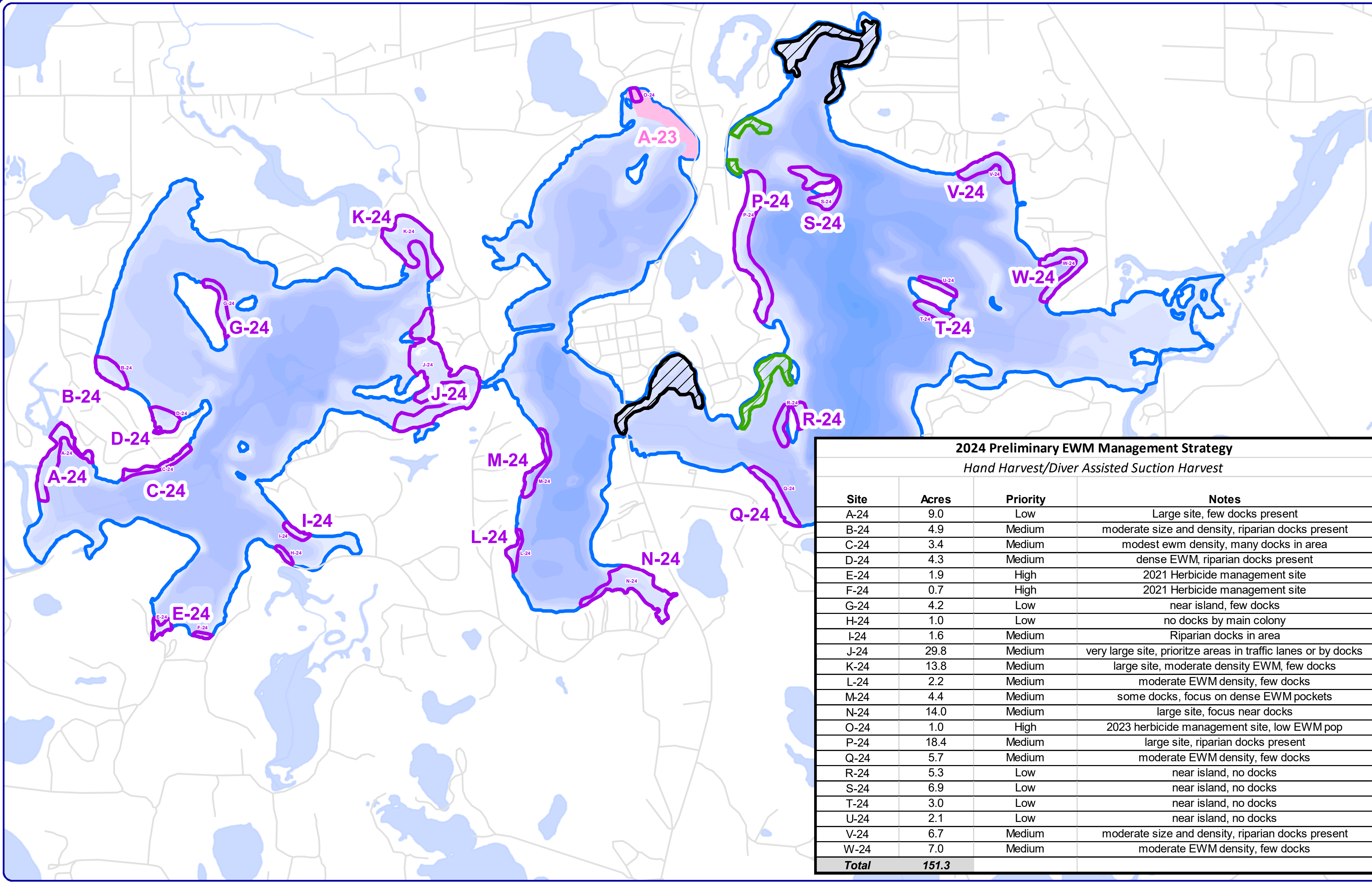
Map Date: February 26, 2024 - SCD

Map 1

Minocqua & Kawaguesaga Lakes

Oneida County, Wisconsin

Final 2024 Herbicide Treatment Strategy



2024 Preliminary EWM Management Strategy

Hand Harvest/Diver Assisted Suction Harvest

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

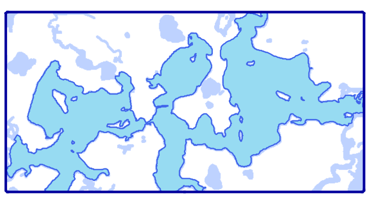
N W E S

2,500

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,1972 - digitized by Onterra
Orthophoto: NAIP, 2022
Aquatic Plants: Onterra, 2023
Map Date: February 26, 2025 - SCD



Legend

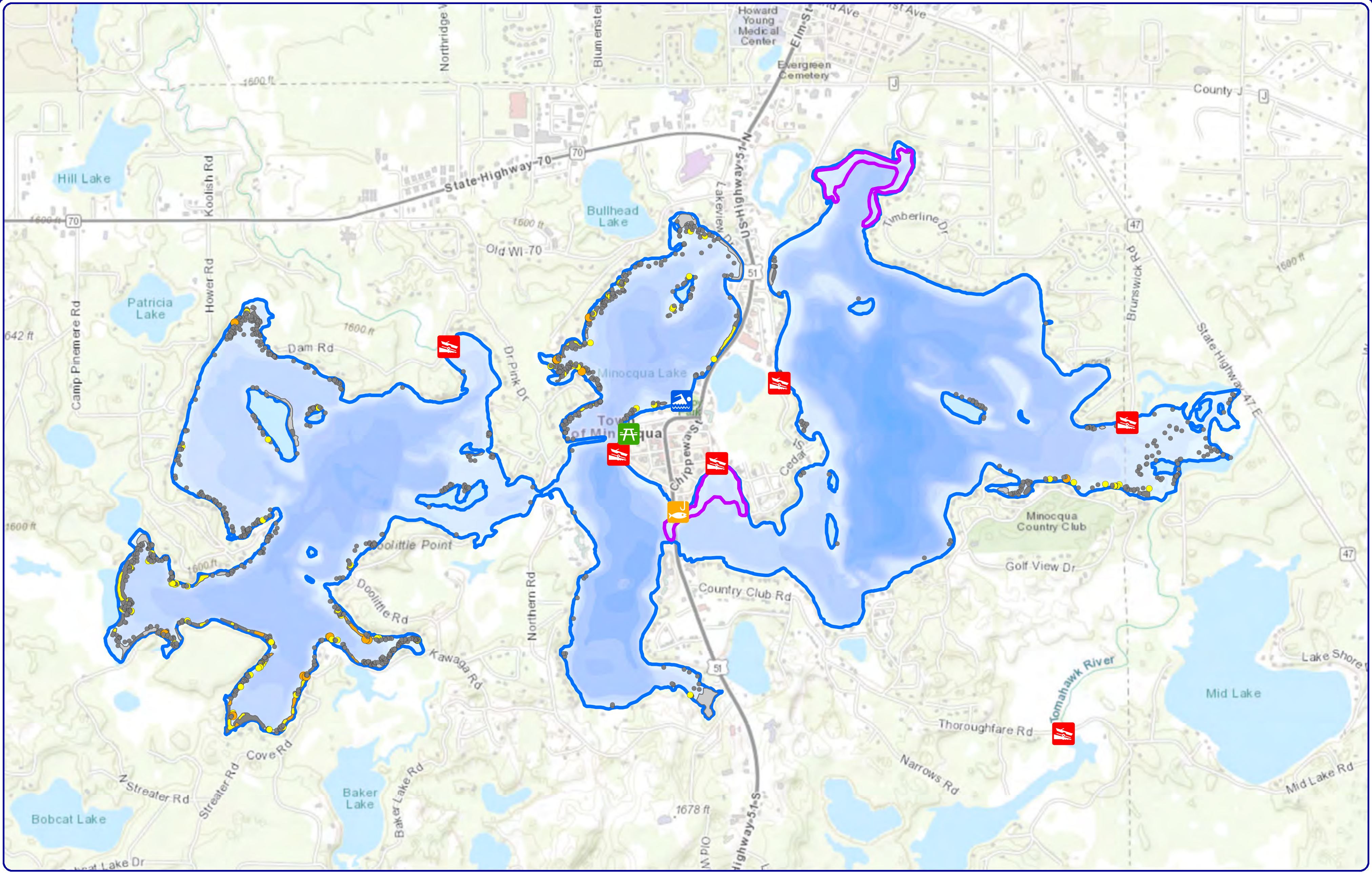
- 2024 Preliminary DASH Location
- 2024 Herbicide Application Area
- 2024 Mechanical Harvesting Area
- 2023 Herbicide Application Area

Map 2

Minocqua & Kawaguesaga Lakes

Oneida County, Wisconsin

Preliminary 2024 DASH Locations



N
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2,600

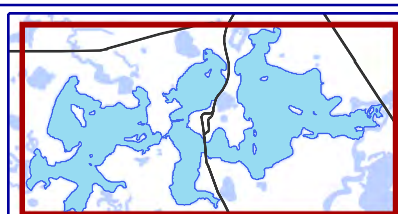
Feet

Onterra LLC
Lake Management Planning

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

Sources:
Basemap: ESRI AGOL
Bathymetry: WDNR,1972 - digitized by Onterra
Aquatic Plants: Onterra, 2024

Map Date: October 8, 2024 - RMF



Legend

EWM Survey Results (September 3 & 4, 2024)

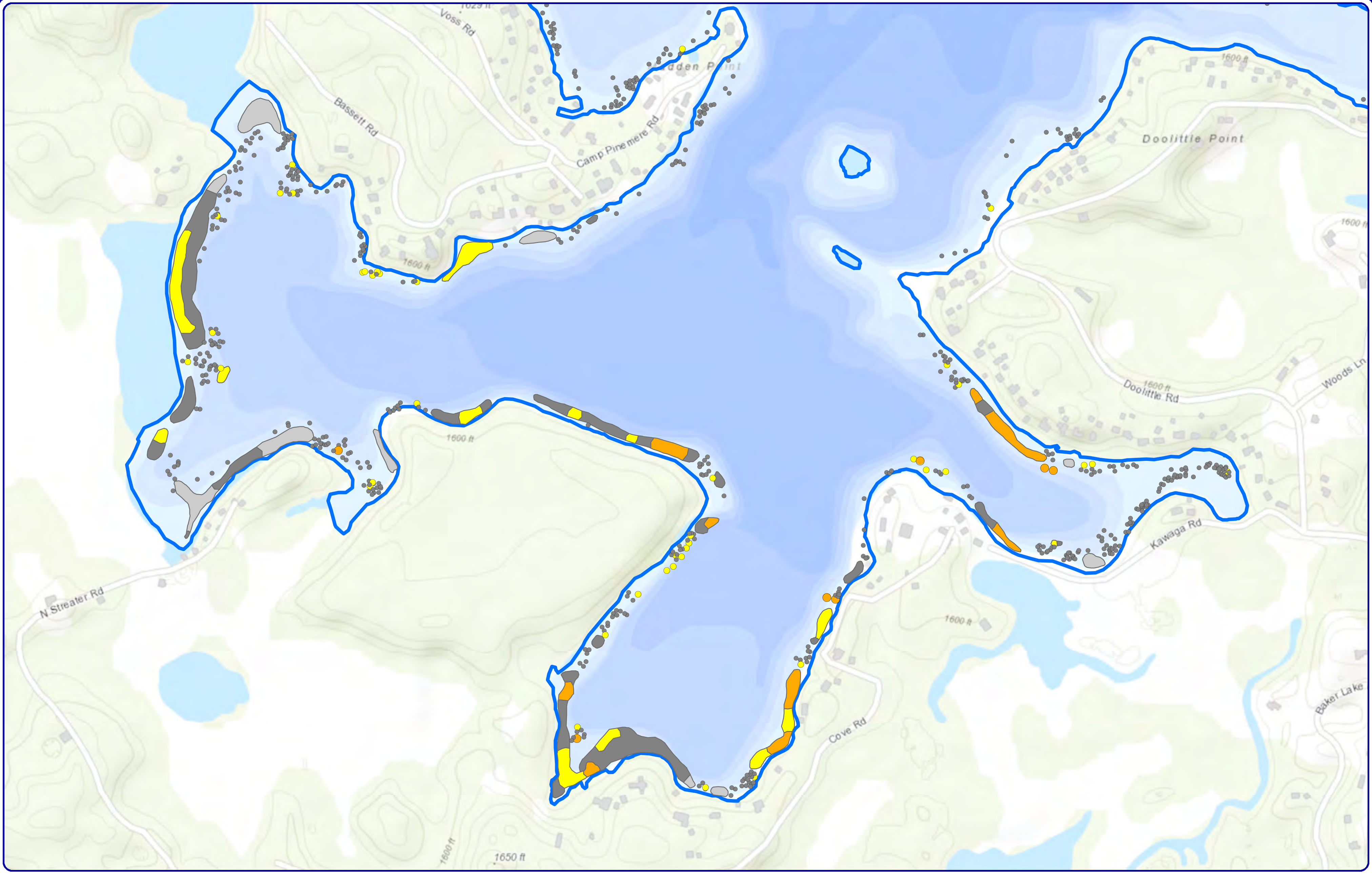
- Highly Scattered
- Scattered
- Dominant
- Highly Dominant
- Surface Matting *(None)*
- Single or Few Plants
- Clumps of Plants
- Small Plant Colony
- 2024 Herbicide Applicaiton Area

Map 3 (overview)

Minocqua & Kawaguesaga

Oneida County, Wisconsin

Late-Season 2024 EWM Survey Results



760

Feet

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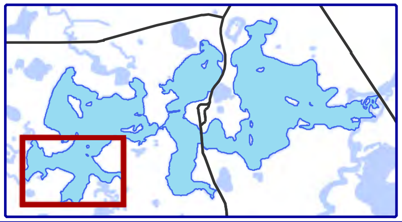
815 Prosper Road
De Pere, WI 54115
920.338.8860
www.onterra-eco.com

Sources:
Basemap: ESRI AGOL
Bathymetry: WDNR,1972 - digitized by Onterra
Aquatic Plants: Onterra, 2024

Map Date: October 8, 2024 - RMF



Legend

EWM Survey Results (September 3 & 4, 2024)

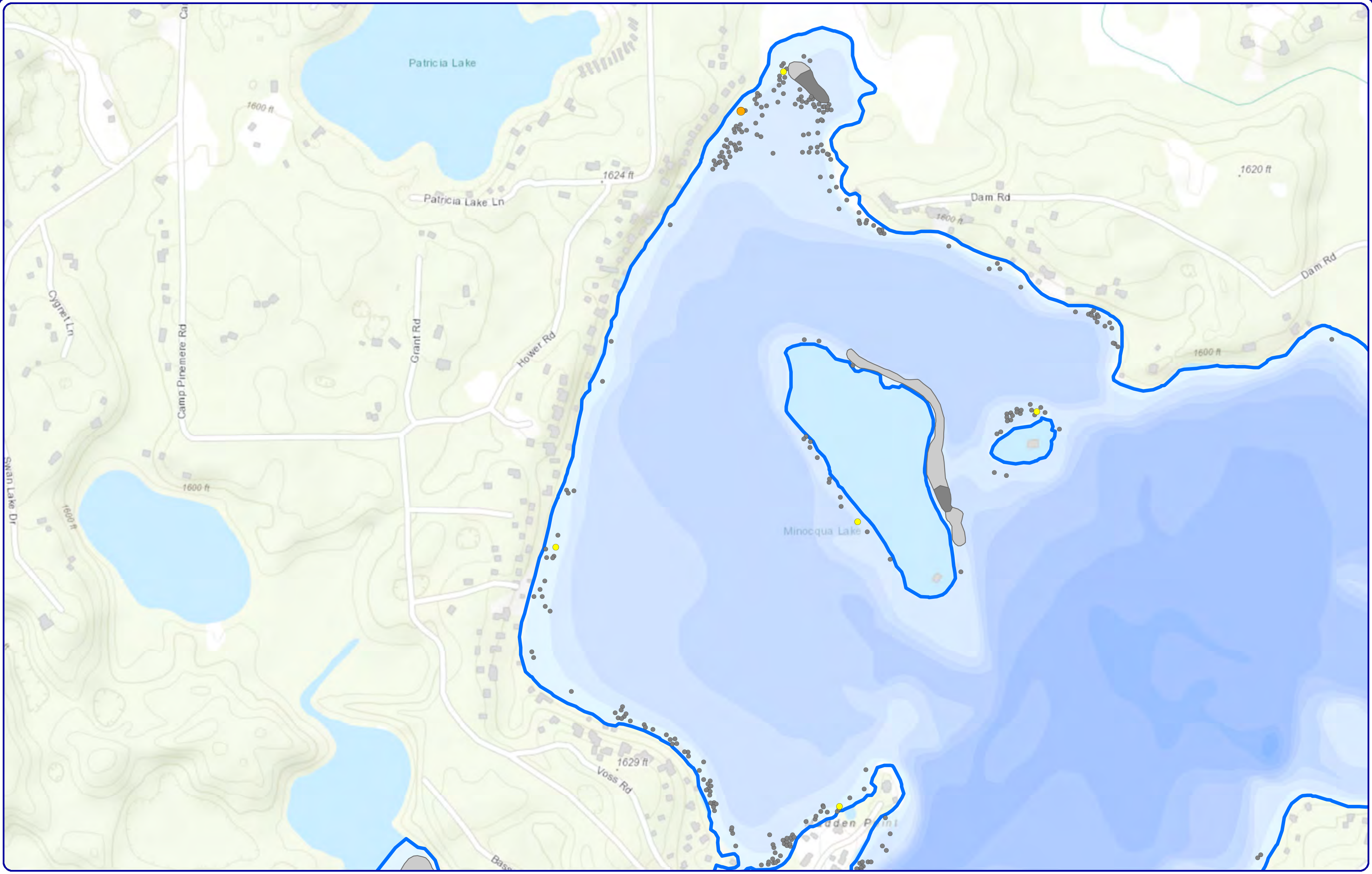
- Highly Scattered
- Scattered
- Dominant
- Highly Dominant
- Surface Matting *(None)*
- Single or Few Plants
- Clumps of Plants
- Small Plant Colony
- 2024 Herbicide Applicaiton Area

Map 4 (Inset 1 of 8)

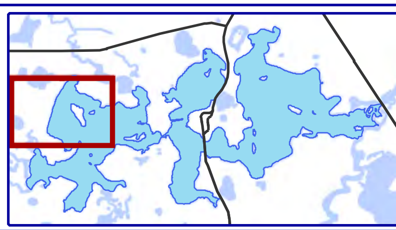
Minocqua & Kawaguesaga

Oneida County, Wisconsin

Late-Season 2024 EWM Survey Results



760
Feet



Legend

EWM Survey Results (September 3 & 4, 2024)

- Highly Scattered
- Scattered
- Dominant
- Highly Dominant
- Surface Matting *(None)*
- Single or Few Plants
- Clumps of Plants
- Small Plant Colony
- 2024 Herbicide Applicaiton Area

Map 5 (inset 2 of 8)

Minocqua & Kawaguesaga

Oneida County, Wisconsin

Late-Season 2024 EWM Survey Results

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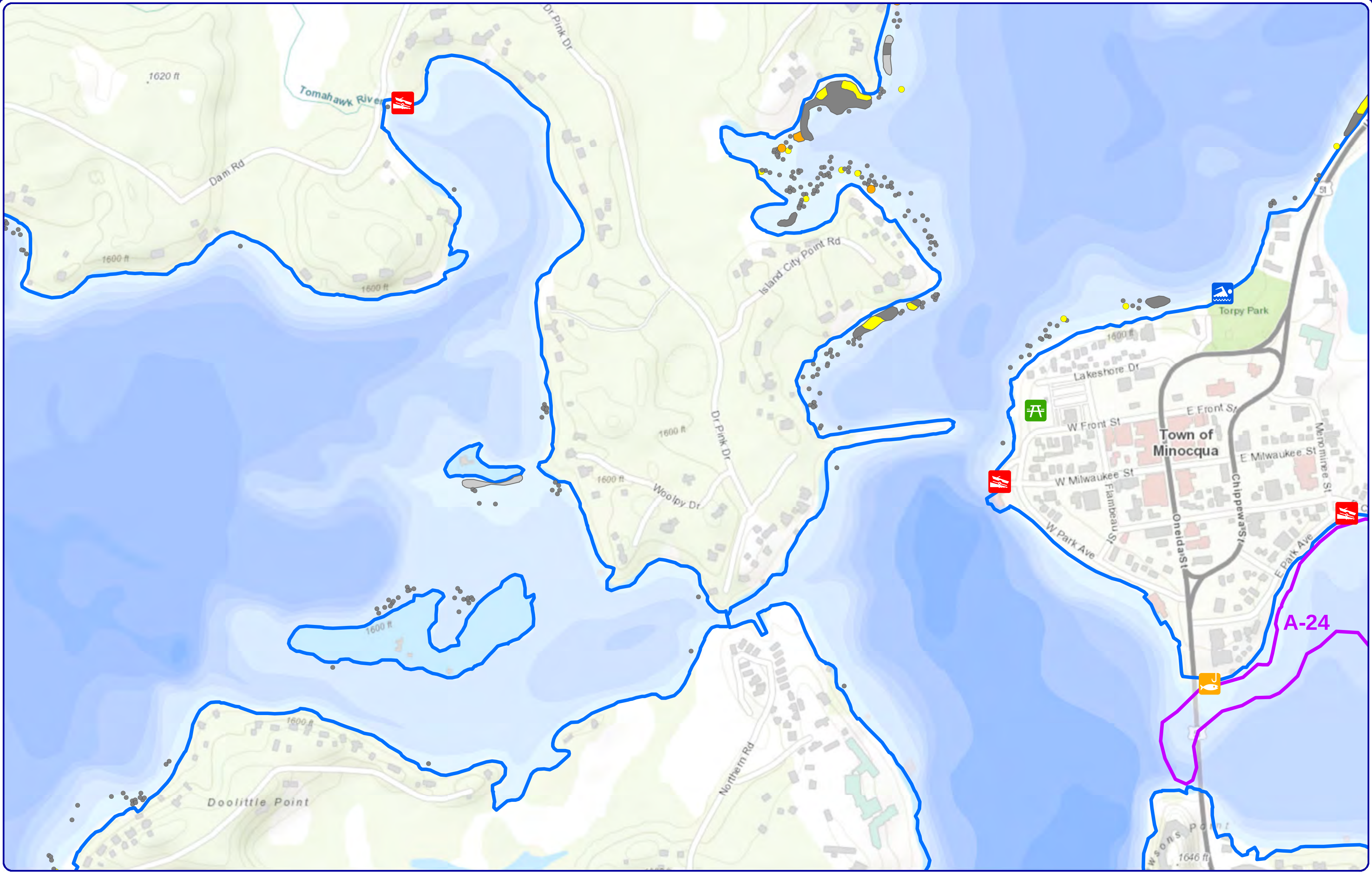
920.338.8860
www.onterra-eco.com

Sources:
Basemap: ESRI AGOL
Bathymetry: WDNR,1972 - digitized by Onterra
Aquatic Plants: Onterra, 2024

Map Date: October 8, 2024 - RMF



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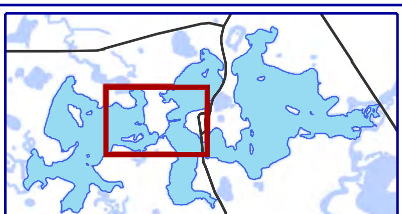
Feet

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

Sources:
Basemap: ESRI AGOL
Bathymetry: WDNR,1972 - digitized by Onterra
Aquatic Plants: Onterra, 2024

Map Date: October 8, 2024 - RMF



Legend

EWM Survey Results (September 3 & 4, 2024)

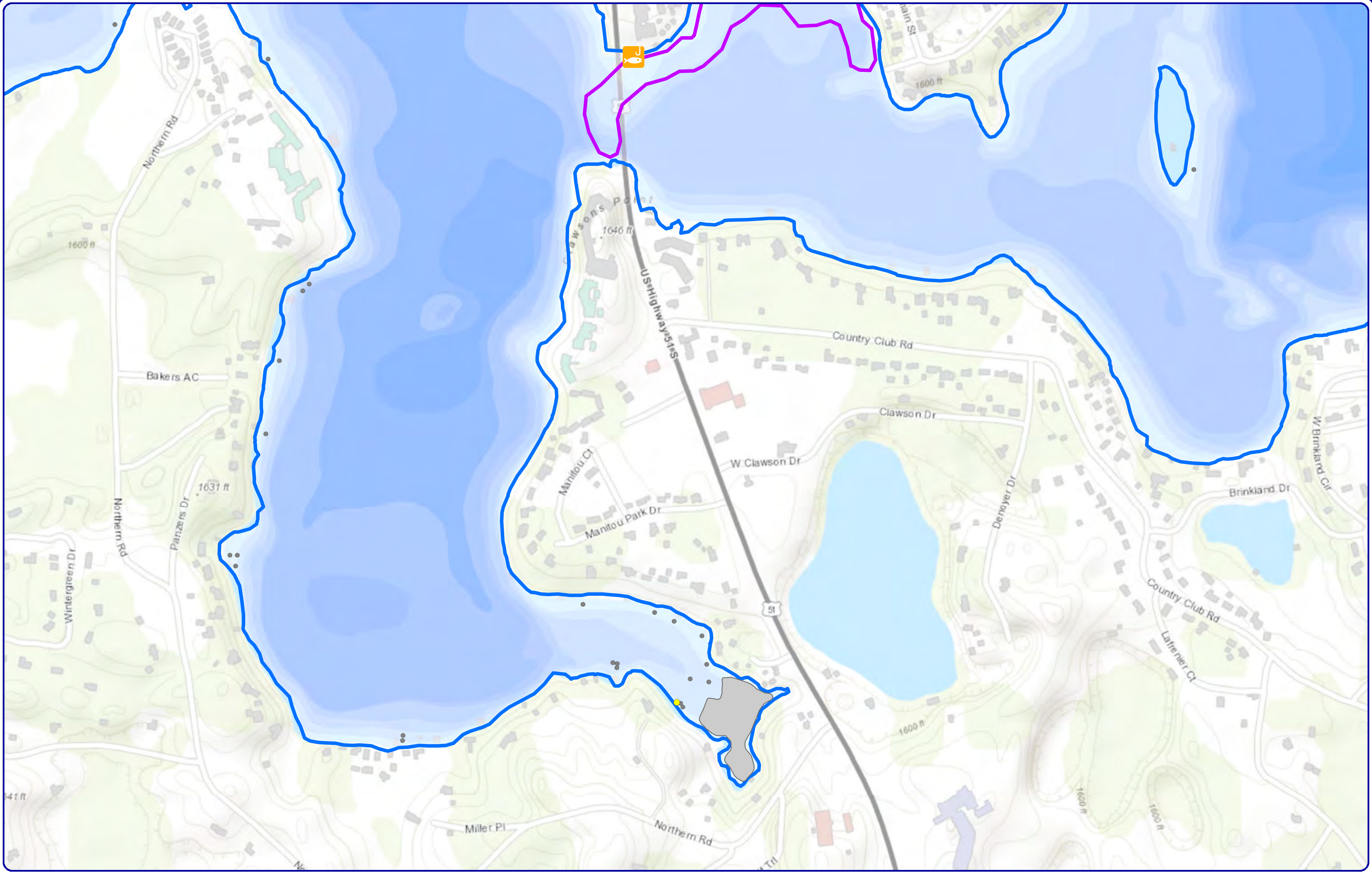
- Highly Scattered
- Scattered
- Dominant
- Highly Dominant
- Surface Matting *(None)*
- Single or Few Plants
- Clumps of Plants
- Small Plant Colony
- 2024 Herbicide Applicaiton Area

Map 6 (inset 3 of 8)

Minocqua & Kawaguesaga

Oneida County, Wisconsin

Late-Season 2024 EWM Survey Results



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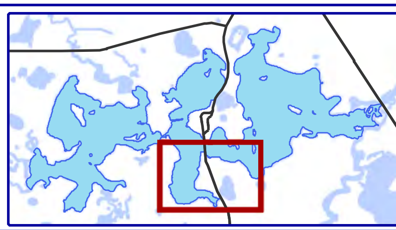
760
Feet

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

Sources:
Basemap: ESRI AGOL
Bathymetry: WDNR,1972 - digitized by Onterra
Aquatic Plants: Onterra, 2024

Map Date: October 8, 2024 - RMF



Legend

EWM Survey Results (September 3 & 4, 2024)

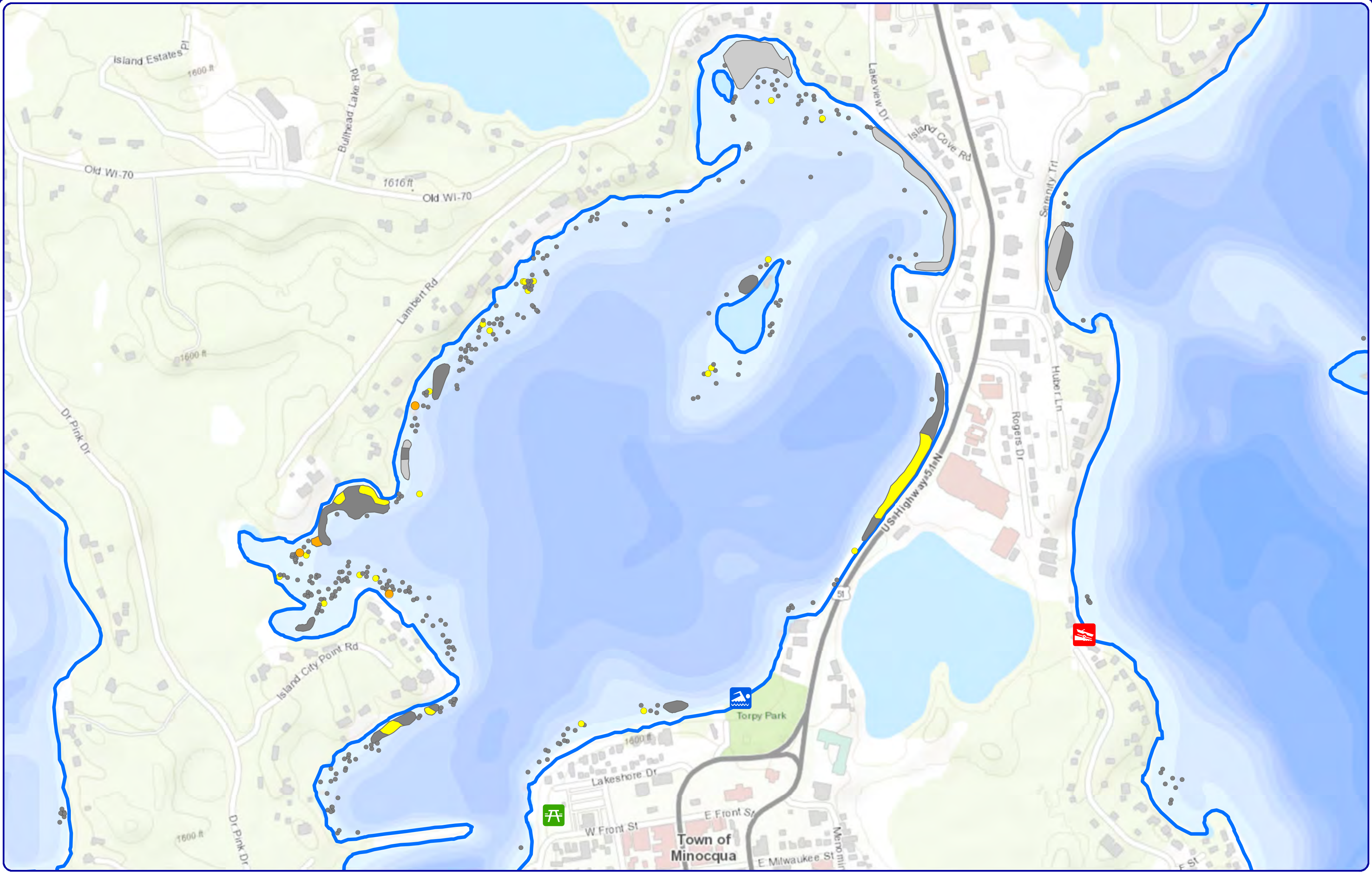
- Highly Scattered
- Scattered
- Dominant
- Highly Dominant
- Surface Matting *(None)*
- Single or Few Plants
- Clumps of Plants
- Small Plant Colony
- 2024 Herbicide Applicaiton Area

Map 7 (inset 4 of 8)

Minocqua & Kawaguesaga

Oneida County, Wisconsin

Late-Season 2024 EWM Survey Results



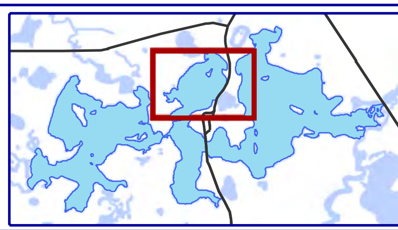
760

Feet

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

Sources:
Basemap: ESRI AGOL
Bathymetry: WDNR,1972 - digitized by Onterra
Aquatic Plants: Onterra, 2024

Map Date: October 8, 2024 - RMF



Legend

EWM Survey Results (September 3 & 4, 2024)

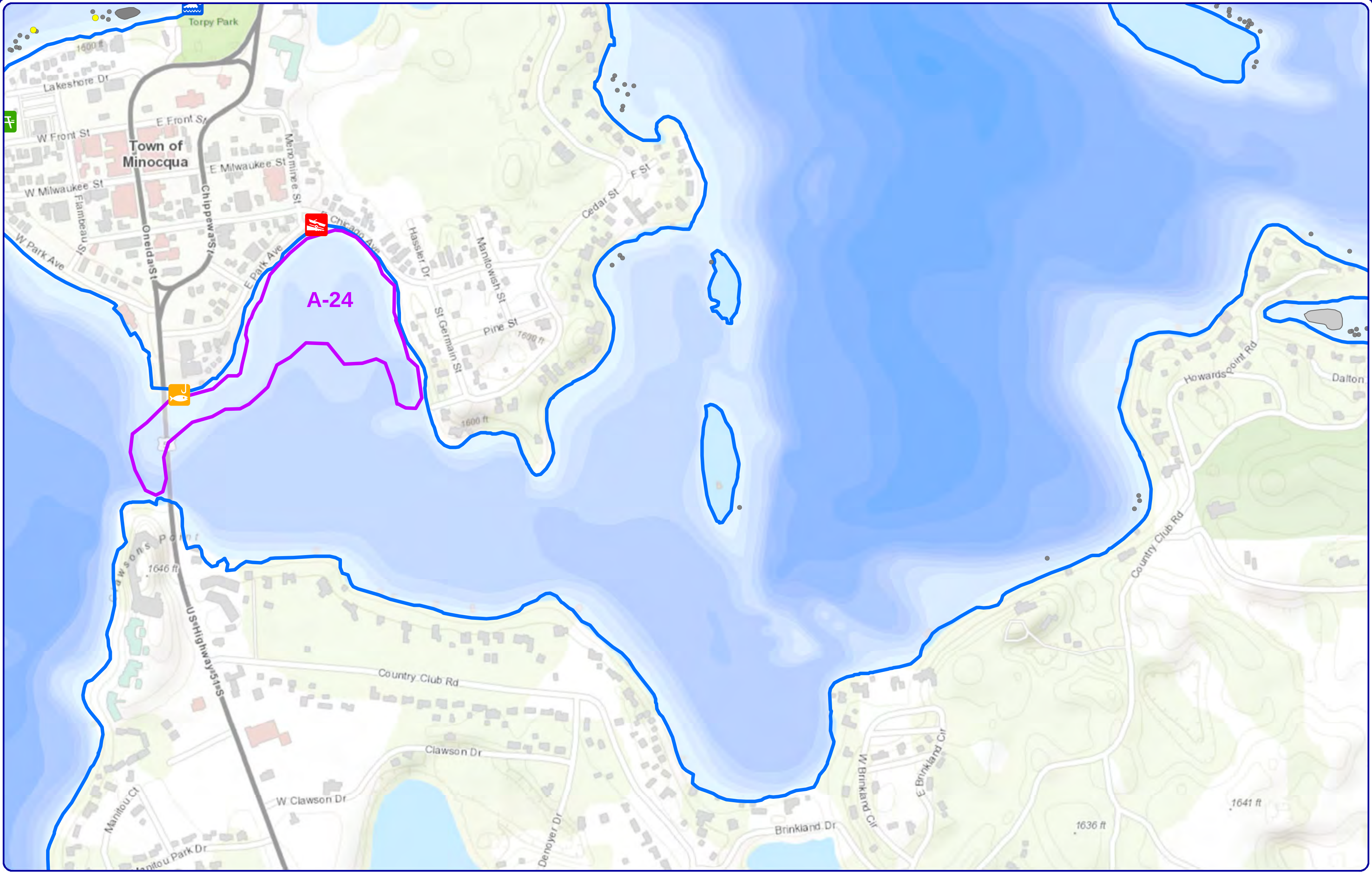
- Highly Scattered
- Scattered
- Dominant
- Highly Dominant
- Surface Matting *(None)*
- Single or Few Plants
- Clumps of Plants
- Small Plant Colony
- 2024 Herbicide Applicaiton Area

Map 8 (Inset 5 of 8)

Minocqua & Kawaguesaga

Oneida County, Wisconsin

Late-Season 2024 EWM Survey Results



N
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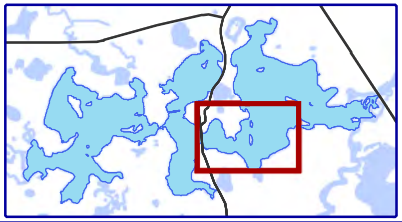
760

Feet

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

Sources:
Basemap: ESRI AGOL
Bathymetry: WDNR,1972 - digitized by Onterra
Aquatic Plants: Onterra, 2024

Map Date: October 8, 2024 - RMF



Legend

EWM Survey Results (September 3 & 4, 2024)

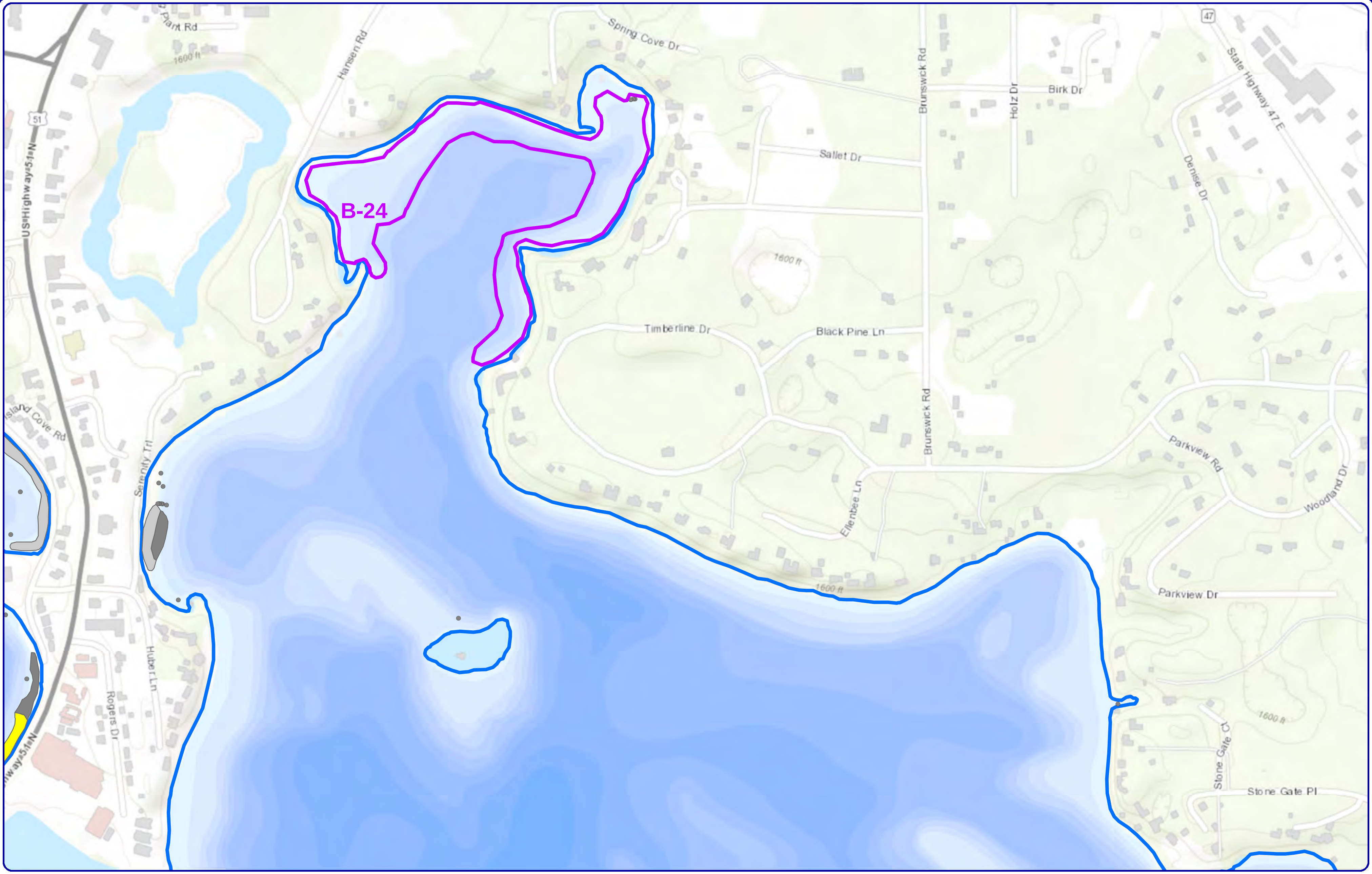
- Highly Scattered
- Scattered
- Dominant
- Highly Dominant
- Surface Matting *(None)*
- Single or Few Plants
- Clumps of Plants
- Small Plant Colony
- 2024 Herbicide Applicaiton Area

Map 9 (inset 6 of 8)

Minocqua & Kawaguesaga

Oneida County, Wisconsin

Late-Season 2024 EWM Survey Results



N
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S

760

Feet

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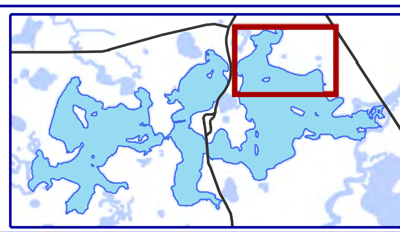
Lake Management Planning
815 Prosper Road
De Pere, WI 54115
920.338.8860
www.onterra-eco.com

Sources:
Basemap: ESRI AGOL
Bathymetry: WDNR,1972 - digitized by Onterra
Aquatic Plants: Onterra, 2024

Map Date: October 8, 2024 - RMF



Legend

EWM Survey Results (September 3 & 4, 2024)

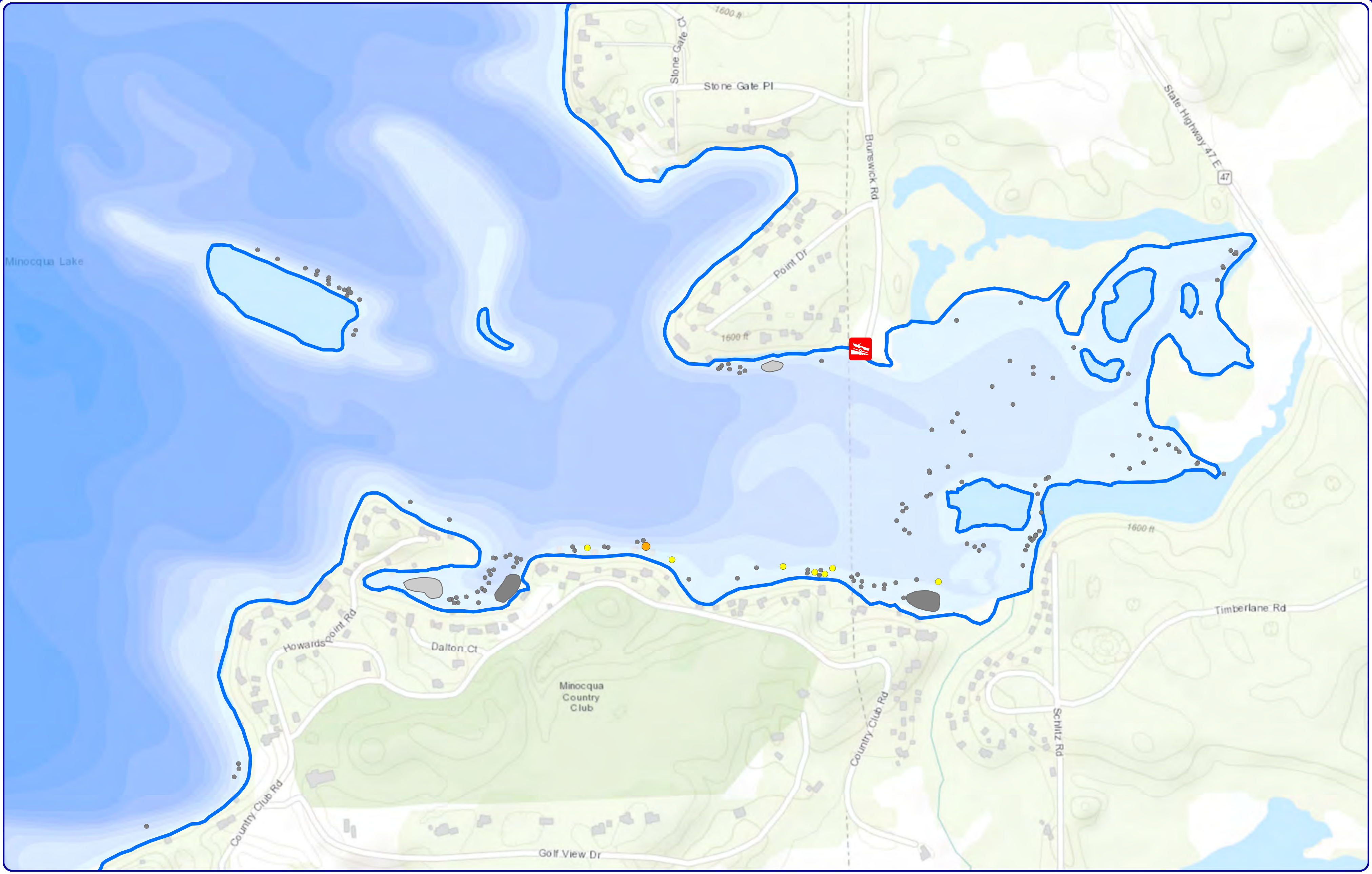
- Highly Scattered
- Scattered
- Dominant
- Highly Dominant
- Surface Matting *(None)*
- Single or Few Plants
- Clumps of Plants
- Small Plant Colony
- 2024 Herbicide Applicaiton Area

Map 10 (inset 7 of 8)

Minocqua & Kawaguesaga

Oneida County, Wisconsin

Late-Season 2024
EWM Survey Results



N
W E
S

760
Feet

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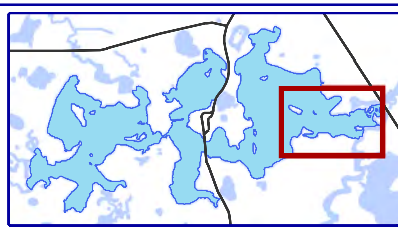
Lake Management Planning
815 Prosper Road
De Pere, WI 54115
920.338.8860
www.onterra-eco.com

Sources:
Basemap: ESRI AGOL
Bathymetry: WDNR,1972 - digitized by Onterra
Aquatic Plants: Onterra, 2024

Map Date: October 8, 2024 - RMF



Legend

EWM Survey Results (September 3 & 4, 2024)

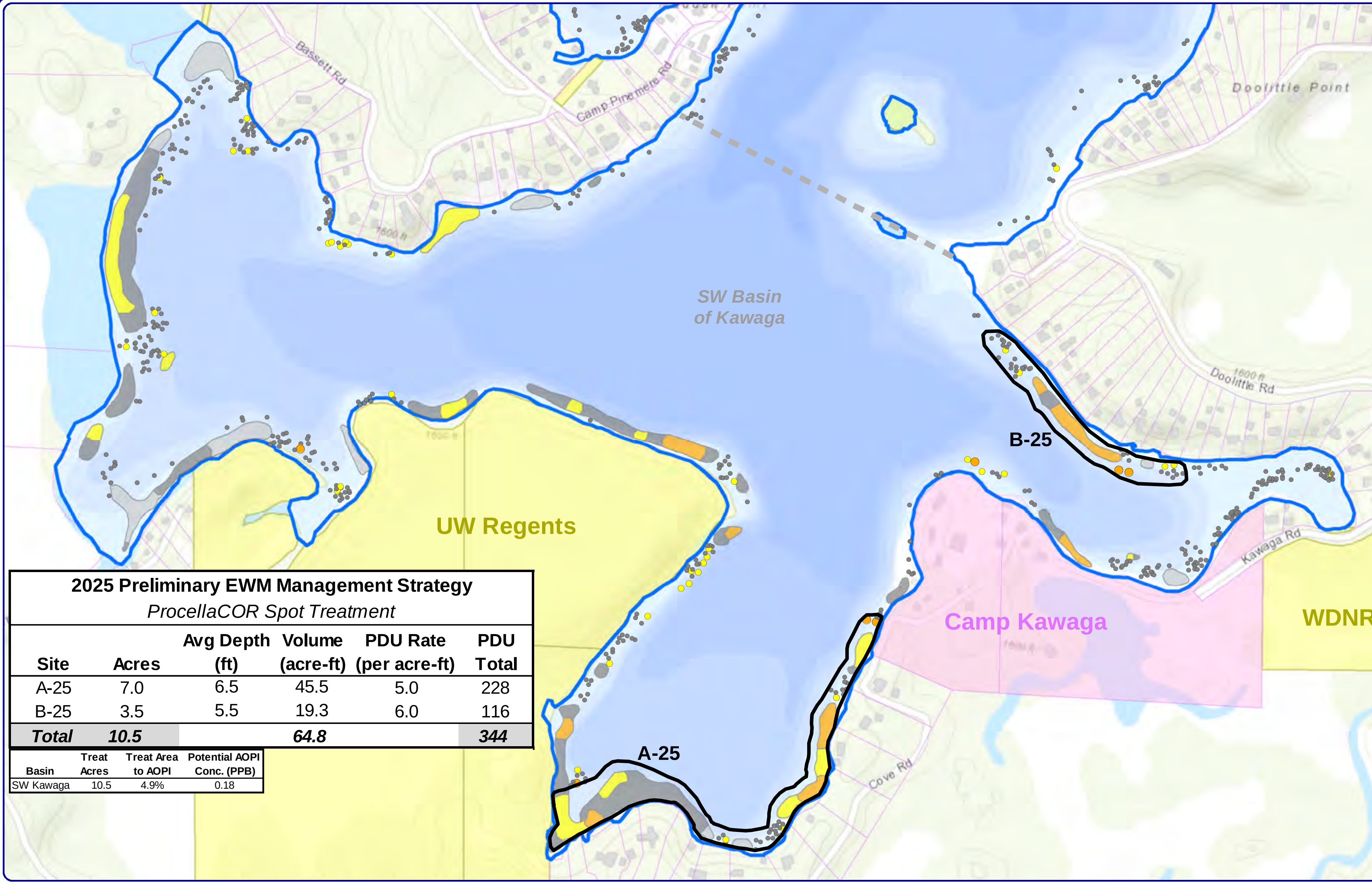
- Highly Scattered
- Scattered
- Dominant
- Highly Dominant
- Surface Matting *(None)*
- Single or Few Plants
- Clumps of Plants
- Small Plant Colony
- 2024 Herbicide Applicaiton Area

Map 11 (Inset 8 of 8)

Minocqua & Kawaguesaga

Oneida County, Wisconsin

Late-Season 2024 EWM Survey Results



2025 Preliminary EWM Management Strategy

ProcellaCOR Spot Treatment

Site	Acres	Avg Depth (ft)	Volume (acre-ft)	PDU Rate (per acre-ft)	PDU Total
A-25	7.0	6.5	45.5	5.0	228
B-25	3.5	5.5	19.3	6.0	116
Total	***10.5***		***64.8***		***344***

Basin	Treat Acres	Treat Area to AOPI	Potential AOPI Conc. (PPB)
SW Kawaga	10.5	4.9%	0.18

N E S W

660

Feet

Legend

EWM Survey Results (September 3 & 4, 2024)

- Highly Scattered
- Scattered
- Dominant
- Highly Dominant
- Surface Matting *(None)*
- Single or Few Plants
- Clumps of Plants
- Small Plant Colony
- Preliminary 2025 Applicaiton Area

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815 Prosper Road
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920.338.8860
www.onterra-eco.com

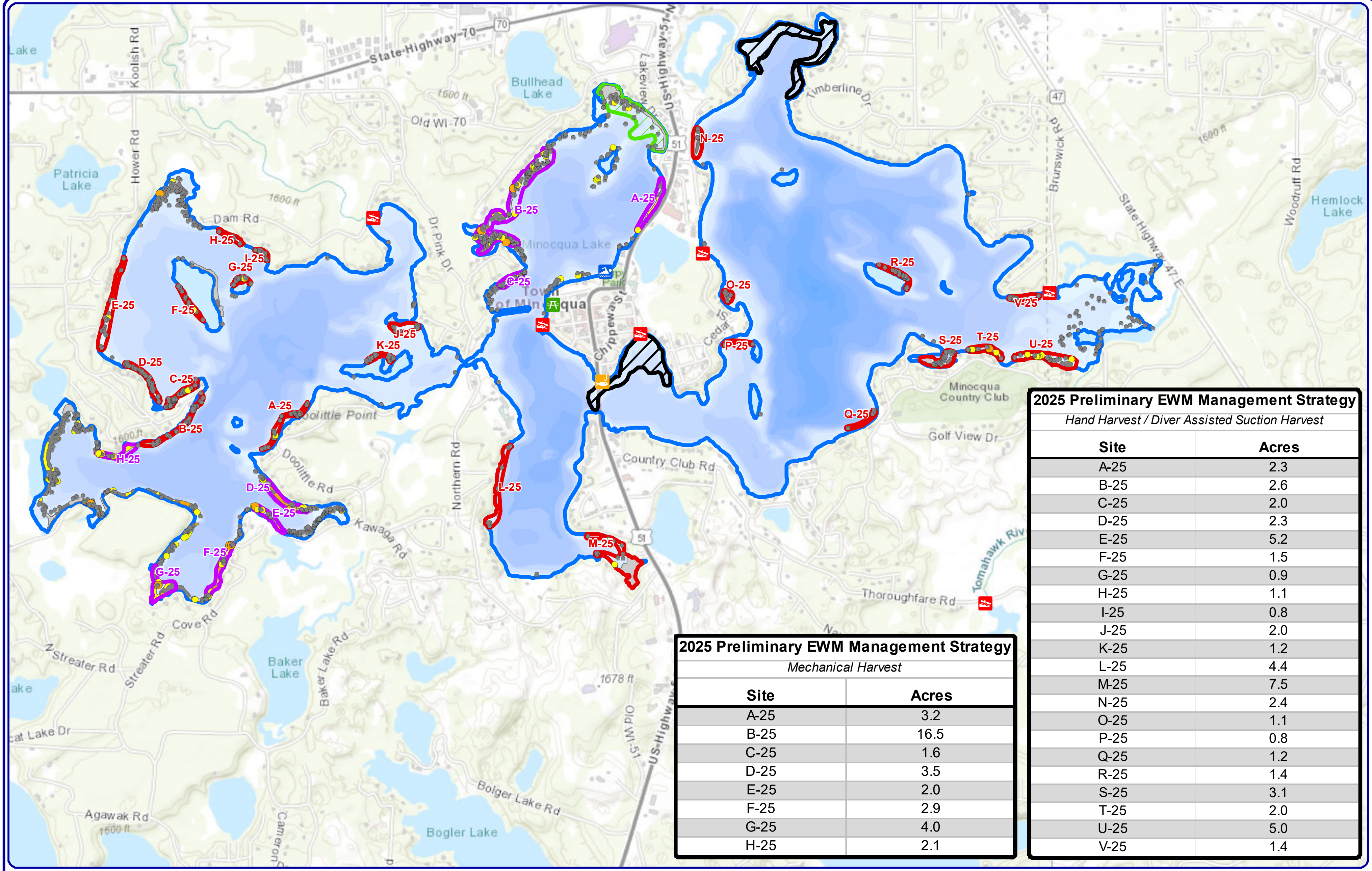
Sources:
Basemap: ESRI AGOL
Bathymetry: WDNR,1972
- digitized by Onterra
Parcels: V500 Parcel Initiative
Aquatic Plants: Onterra, 2024
Map Date: October 8, 2024 - RMF

Map 12

Minocqua & Kawaguesaga

Oneida County, Wisconsin

Preliminary 2025 EWM Herbicide Strategy v1



2025 Preliminary EWM Management Strategy

Mechanical Harvest

Site	Acres
A-25	3.2
B-25	16.5
C-25	1.6
D-25	3.5
E-25	2.0
F-25	2.9
G-25	4.0
H-25	2.1

2025 Preliminary EWM Management Strategy

Hand Harvest / Diver Assisted Suction Harvest

Site	Acres
A-25	2.3
B-25	2.6
C-25	2.0
D-25	2.3
E-25	5.2
F-25	1.5
G-25	0.9
H-25	1.1
I-25	0.8
J-25	2.0
K-25	1.2
L-25	4.4
M-25	7.5
N-25	2.4
O-25	1.1
P-25	0.8
Q-25	1.2
R-25	1.4
S-25	3.1
T-25	2.0
U-25	5.0
V-25	1.4

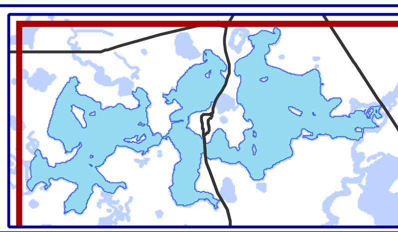
N / W / E / S

2,600

Feet

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

Sources:
Basemap: ESRI AGOL
Bathymetry: WDNR, 1972
- digitized by Onterra
Aquatic Plants: Onterra, 2024
Map Date: March 5, 2025 - SCD



Legend

EWM Survey Results (September 3 & 4, 2024)

- Highly Scattered
- Scattered
- Dominant
- Highly Dominant
- Surface Matting *(None)*
- Single or Few Plants
- Clumps of Plants
- Small Plant Colony
- 2025 DASH Treatment Area
- 2025 Mechanical Harvesting Area
- 2024 Herbicide Applicaiton Area
- 2023 Herbicide Applicaiton Area

Map 13

Minocqua & Kawaguesaga

Oneida County, Wisconsin

2025 DASH & Mechanical Harvesting Preliminary Areas

A

APPENDIX A

Minocqua Kawaguesaga Lakes 2024 EWM Manual Removal Report – ***Aquatic Plant Management LLC.***

EST. 2013

AQUATIC PLANT MANAGEMENT

MKLPA EWM Management Report 2024

PO Box 1134 Minocqua, WI 54548

Executive Summary

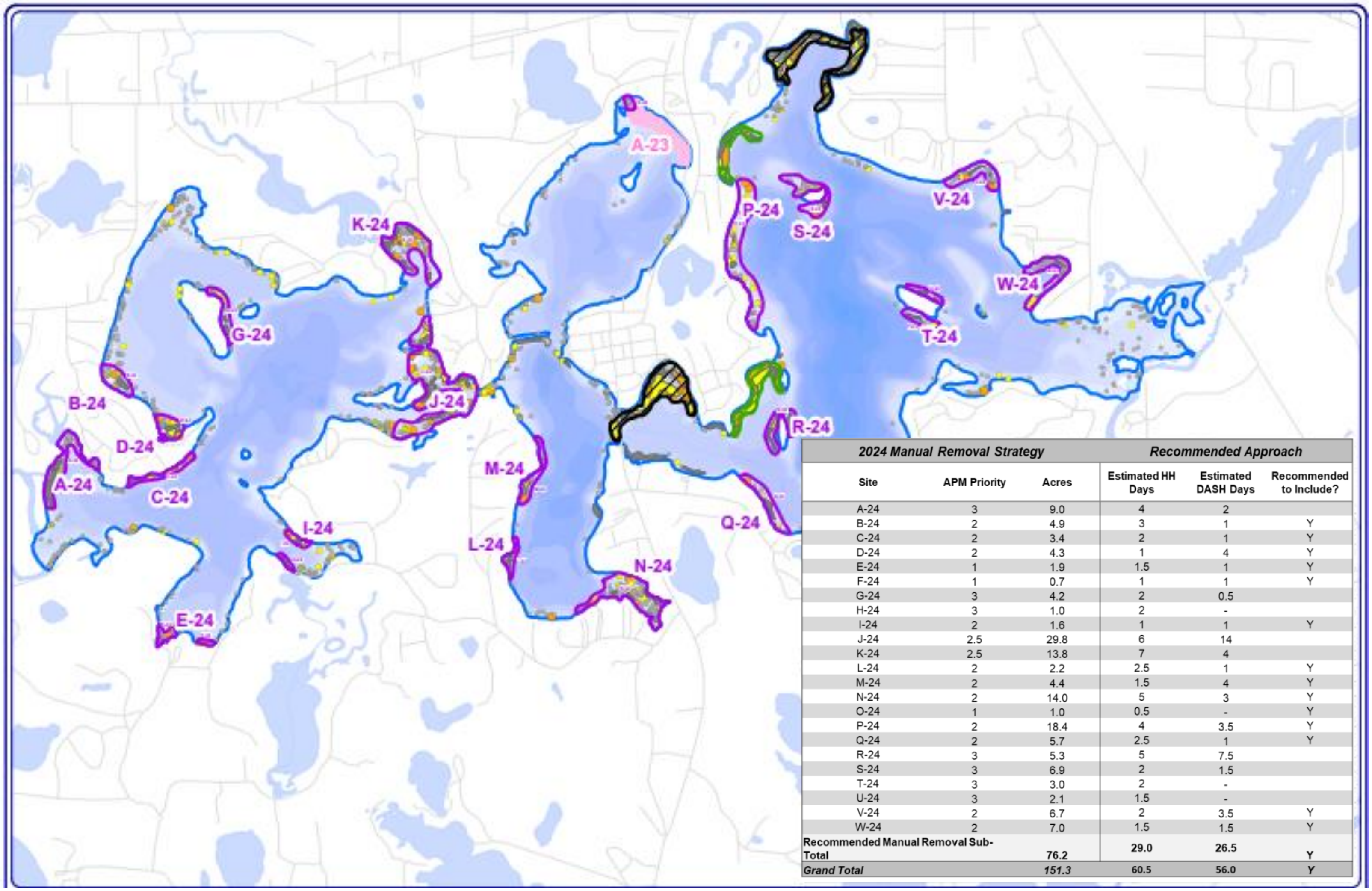
- Minocqua and Kawaguesaga Lakes in Oneida County, WI have an extensive population of Eurasian Watermilfoil (EWM) covering 200+ acres

- To address the EWM population, the Minocqua Kawaguesaga Lakes Protection Association (MKLPA) and Aquatic Plant Management (APM) have partnered on a program of mechanical harvesting, diver assisted suction harvesting (DASH), hand harvesting, and herbicide control

- In the 2024, APM completed
  - ~11.2 days of mechanical harvesting at 13 locations, removing 5,615 cubic feet
  - ~35.6 days of DASH at 12 locations, removing 2,052.5 cubic feet
  - ~24.5 days of Hand Harvesting at 11 locations, removing 1,410 cubic feet
  - 1 herbicide treatment with ProcellaCOR at two locations on Minocqua Lake

- In total, APM has removed 9,077.5 cubic feet of EWM from Minocqua and Kawaguesaga Lakes and treated 35.1 acres with herbicide

EWM Management Strategy Spring 2024



2024 Manual Removal Strategy			Recommended Approach		
Site	APM Priority	Acres	Estimated HH Days	Estimated DASH Days	Recommended to Include?
A-24	3	9.0	4	2	
B-24	2	4.9	3	1	Y
C-24	2	3.4	2	1	Y
D-24	2	4.3	1	4	Y
E-24	1	1.9	1.5	1	Y
F-24	1	0.7	1	1	Y
G-24	3	4.2	2	0.5	
H-24	3	1.0	2	-	
I-24	2	1.6	1	1	Y
J-24	2.5	29.8	6	14	
K-24	2.5	13.8	7	4	
L-24	2	2.2	2.5	1	Y
M-24	2	4.4	1.5	4	Y
N-24	2	14.0	5	3	Y
O-24	1	1.0	0.5	-	Y
P-24	2	18.4	4	3.5	Y
Q-24	2	5.7	2.5	1	Y
R-24	3	5.3	5	7.5	
S-24	3	6.9	2	1.5	
T-24	3	3.0	2	-	
U-24	3	2.1	1.5	-	
V-24	2	6.7	2	3.5	Y
W-24	2	7.0	1.5	1.5	Y
Recommended Manual Removal Sub-Total		**76.2**	**29.0**	**26.5**	**Y**
Grand Total		***151.3***	**60.5**	**56.0**	***Y***

Source: EWM Survey Completed by Onterra LLC; Site Selection & Prioritization by APM/MKLPA

ProcellaCOR Treatment Summary

Treatment Overview and Conditions

- APM treated Lake Minocqua **with ProcellaCOR at 2 sites** on June 21st, 2024
- The treatment occurred over a **~4.5 hour period** from 5:39 am to 10:10 am
- Ambient air temperature was 62 degrees with a **western wind** averaging 0.0 miles per hour at the beginning of treatment, and the water temperature was 65.6 degrees

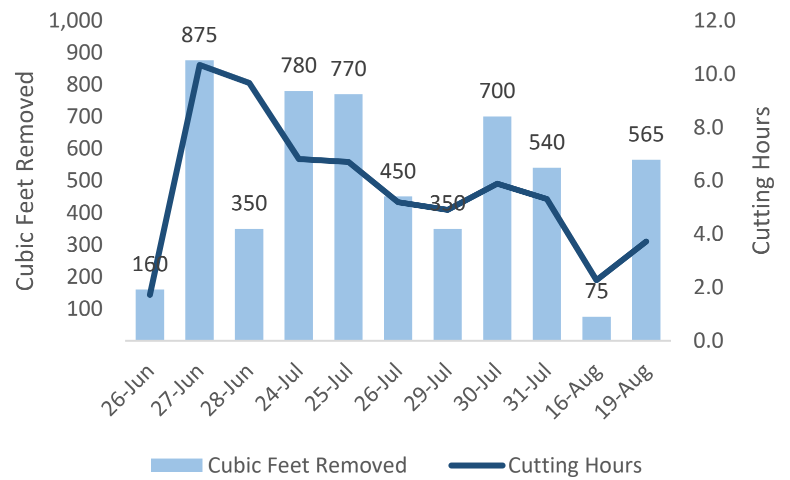
Site Name	Treated Acres	PDUs
A-24	16.6	664
B-24	18.5	555
Total	**35.1**	**1,219**

Summarized Harvesting Results

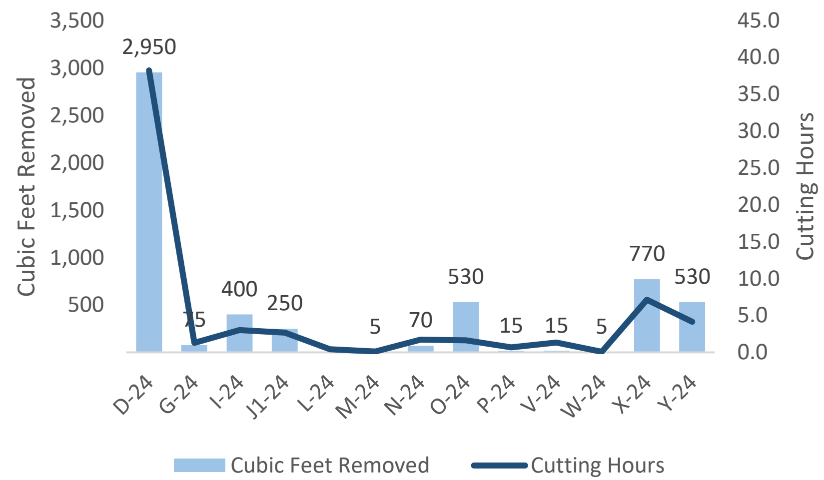
Mechanical Harvesting Commentary

- The bulk of the EWM harvest occurred in June and July when ~90% of the total biomass was removed
- Over 50% of the EWM was harvested from the highest priority zone, D-24 (Ruebentown)
- In August, the harvester operator noted much less density of EWM at the targeted sites
- The original plan of 18 days of harvesting was shortened to ~11 days based on visually seeing less nuisance EWM at the harvest zones in August and September
- In addition to harvesting, APM conducted fragment collection 3 times coinciding with each harvest

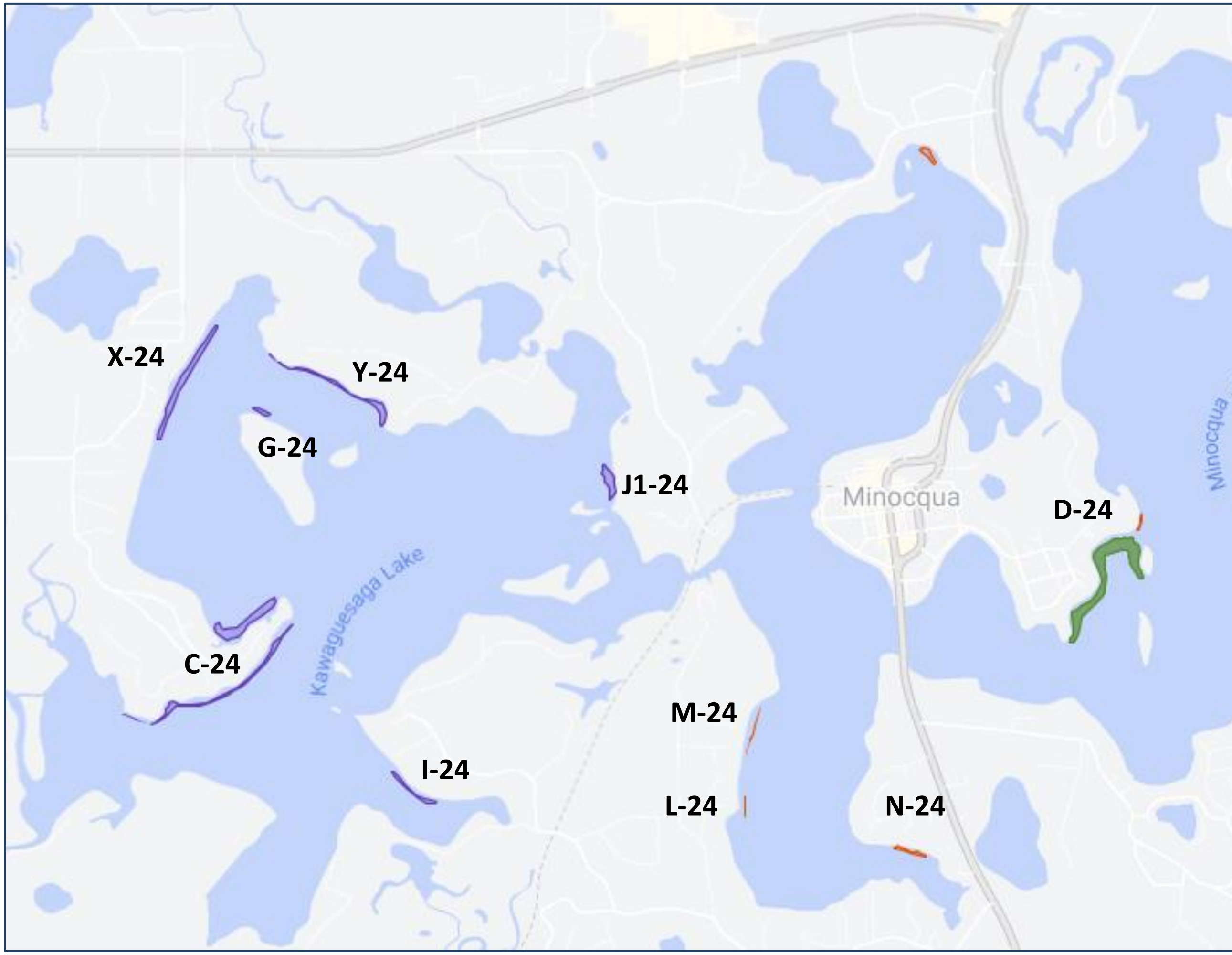
Harvest by Date



Harvest by Site



EWM Mechanical Removal Summary



Site	Cutting Hours	Cubic Feet Removed
D-24	38.2	2,950
G-24	1.3	75
I-24	3.0	400
J1-24	2.7	250
L-24	0.4	0
M-24	0.1	5
N-24	1.7	70
O-24	1.6	530
P-24	0.7	15
V-24	1.3	15
W-24	0.1	5
X-24	7.1	770
Y-24	4.1	530
Grand Total	**62.5**	**5,615**

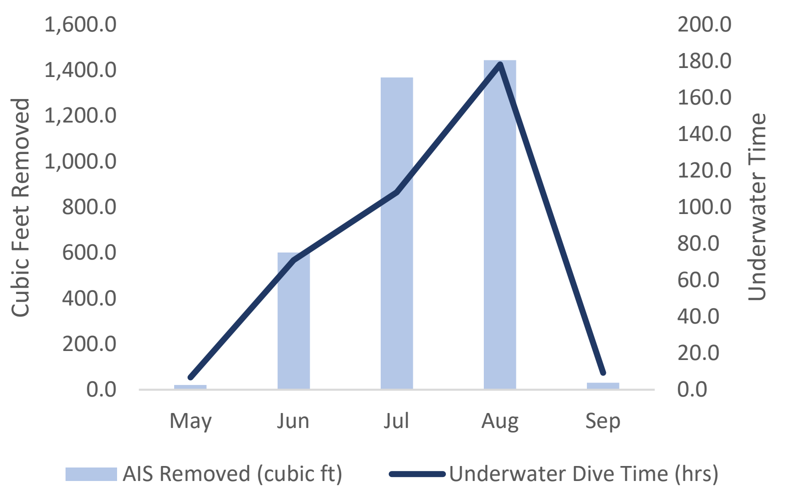
Legend Jun Jul Aug

Summarized Manual Removal Results

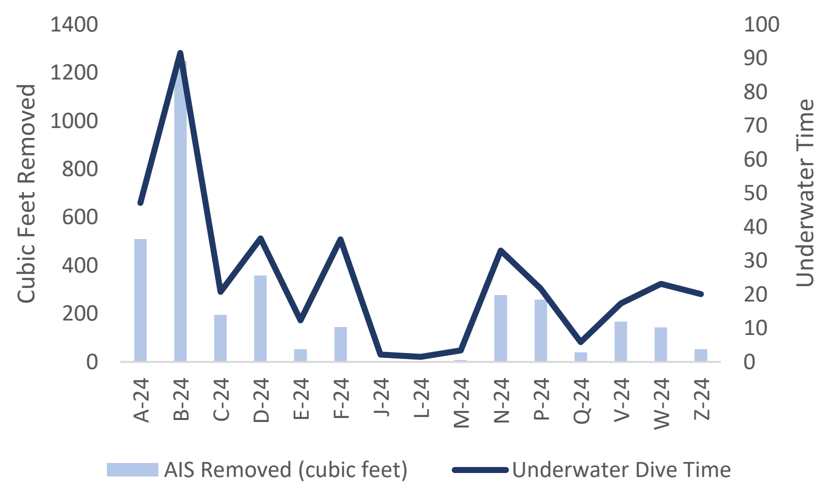
Manual Removal Commentary

- Over the course of the summer, APM conducted ~36 days of DASH and ~24 days of hand harvesting
- ~2,500 cubic feet (70%) was from 7 sites on Kawaguesaga Lake, and the remaining ~950 cubic feet was removed from 8 sites on Minocqua Lake
- The dive teams noticed in August that the amount of biomass being removed per underwater hour dropped significantly, especially for the hand harvesting teams

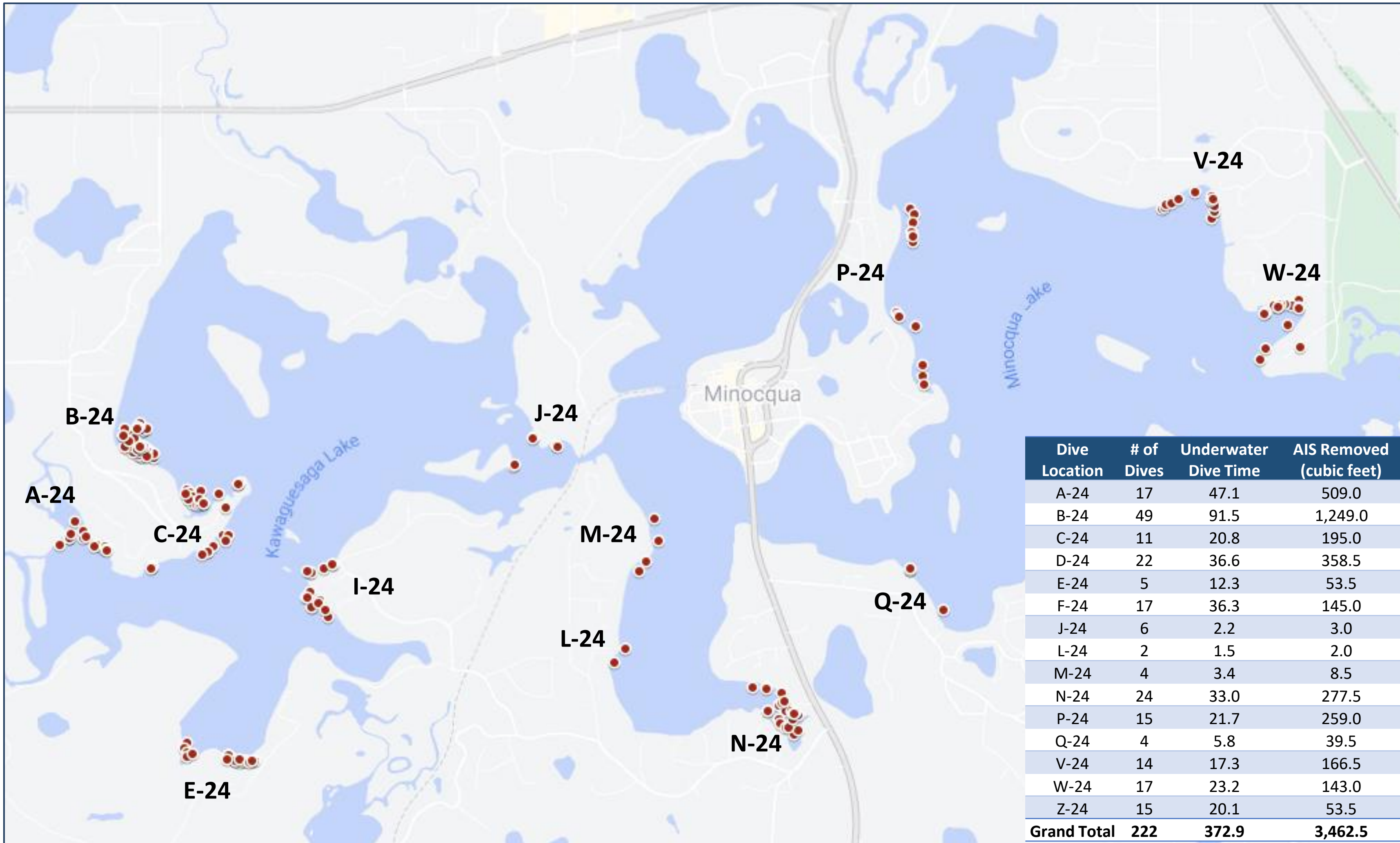
Summary by Month



Harvest by Site



EWM Manual Removal Summary



Dive Location	# of Dives	Underwater Dive Time	AIS Removed (cubic feet)
A-24	17	47.1	509.0
B-24	49	91.5	1,249.0
C-24	11	20.8	195.0
D-24	22	36.6	358.5
E-24	5	12.3	53.5
F-24	17	36.3	145.0
J-24	6	2.2	3.0
L-24	2	1.5	2.0
M-24	4	3.4	8.5
N-24	24	33.0	277.5
P-24	15	21.7	259.0
Q-24	4	5.8	39.5
V-24	14	17.3	166.5
W-24	17	23.2	143.0
Z-24	15	20.1	53.5
Grand Total	**222**	**372.9**	**3,462.5**

B

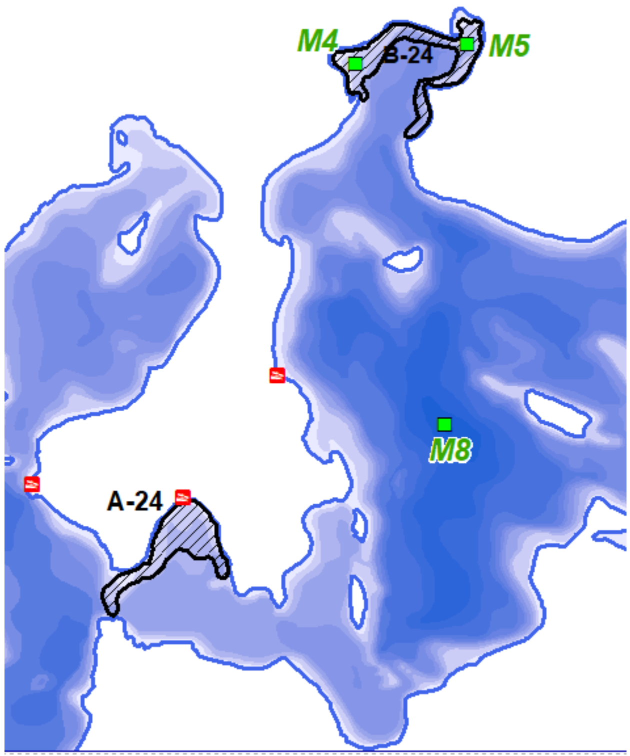
APPENDIX B

2024 Herbicide Concentration Monitoring Plan

Minocqua Lake, Oneida County (WBIC: 1542400)
2024 Herbicide Sample Plan
Onterra, LLC

Minocqua Lake, located in Oneida County, is a 1339-acre drainage lake that has a maximum depth of 60 feet. Florpyrauxifen-benzyl (commercially as ProcellaCOR™) is proposed to be applied to two sites totaling 35.1 acres in early-summer 2024 to control Eurasian watermilfoil. Treatment site B-24 (18.5 acres), located in the area locally known as "*Huber Bay*" will be the focus of this monitoring study. Herbicide concentration sampling will be conducted in order to monitor the herbicide concentrations in the days and weeks 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.



Minocqua Lake Herbicide Sample Sites					
Site Label	**Site Description**	**Station ID**	**Latitude**	**Longitude**	**Sample Depth**
M4	Application Area B-24	10058882	45.88560129	-89.69683271	Integrated (0-6 feet)
M5	Application Area B-24	10058883	45.88626922	-89.6910355	Integrated (0-6 feet)
M8	Center Basin	443134	45.87249407	-89.69223	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 at a time that is most convenient for the volunteer collector but as close to the treatment date as possible. After the herbicide application is completed, additional samples will need to be collected at nine 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	M4	M5	M8
Pre-Treatment	X		
3 HAT	X	X	
9 HAT	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	X	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

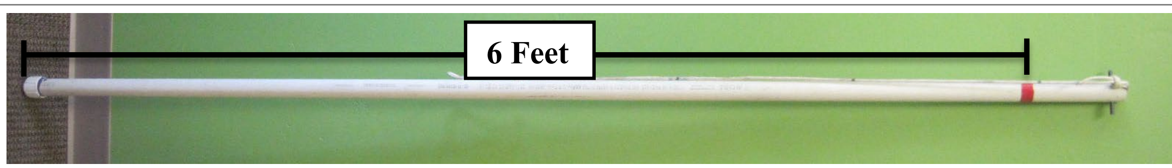


Photo 1. 6-foot Integrated sampling device constructed of PVC tubing.

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 (Photo 4). The final sample (in the brown bottle) as well as the emptied clear glass bottle should be carefully placed 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 limited 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.

The entries written on the Chain of Custody (COC) forms must be consistent with the label codes on the sample bottles so that the laboratory can clearly match each sample with its corresponding information on the COC forms. Please ensure that each sample that is collected is labeled consistently with entries listed on the COC form including "*client sample site I.D.*" Please fill out the following fields on the Chain of Custody forms (Photo 5):

- Sampler: (Volunteer Name)
- Client Sample ID: (example: M4, M5, or M8)
- Date sample is collected

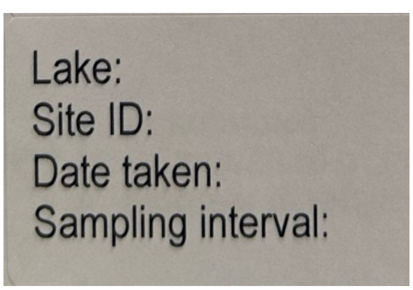
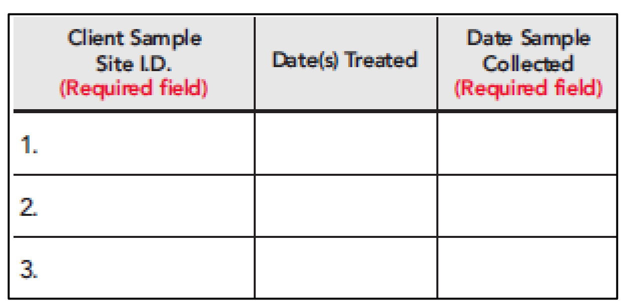


Photo 4. Sticker label on final brown sample bottle.



Client Sample Site I.D. (Required field)	Date(s) Treated	Date Sample Collected (Required field)
1.		
2.		
3.		

Photo 5. Extracted section of Chain of Custody Form that must be filled to match the bottle sticker label.

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

If you have any questions, please reach out to one of the contacts listed below.

Project specifics, logistics and sampling methods	
Todd Hanke **Onterra, LLC** **thanke@onterra-eco.com** **Office Phone (920) 338-8860**	
WDNR Support	
Scott Van Egeren **Water Resources Mgmt Specialist** **Scott.VanEgeren@wisconsin.gov** **Office (715) 471-0007**	