Eagle River Chain of Lakes

Vilas County, Wisconsin

2023 EWM Management and Monitoring Report

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Created by: Todd Hanke, Eddie Heath, and Tim Hoyman
Onterra, LLC
De Pere, WI

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1.0 INTRODUCTION

The Eagle River Chain of Lakes is comprised of ten contiguous waterbodies that spans nearly 4,000 acres. The Lower Eagle River Chain is managed by two entities: the Eagle River Chain of Lakes Association (ERCLA) and the Unified Lower Eagle River Chain of Lakes Commission (ULERCLC). ERCLA offers educational initiatives focused on topics relevant to the chain and its associated rivers while the ULERCLC largely focuses on the management of Aquatic Invasive Species (AIS). Although each organization has distinct responsibilities, they collaborate closely to protect and enhance the chain.

The ULERCLC has been the successful recipient of several Wisconsin Department of Natural Resources (WDNR) AIS Control Grants since 2007. These grants have been used to assist with monitoring and managing the Eurasian watermilfoil (*Myriophyllum spicatum*; EWM) population in the Eagle River Chain of Lakes (Figure 1.0-1) since its discovery in 2004. This report specifically discusses the monitoring and control activities conducted during 2023. The chain-wide results will be presented first, followed by results from each lake individually. Additional information regarding the management and monitoring actions completed from 2008-2023 can be found in their respective annual reports.

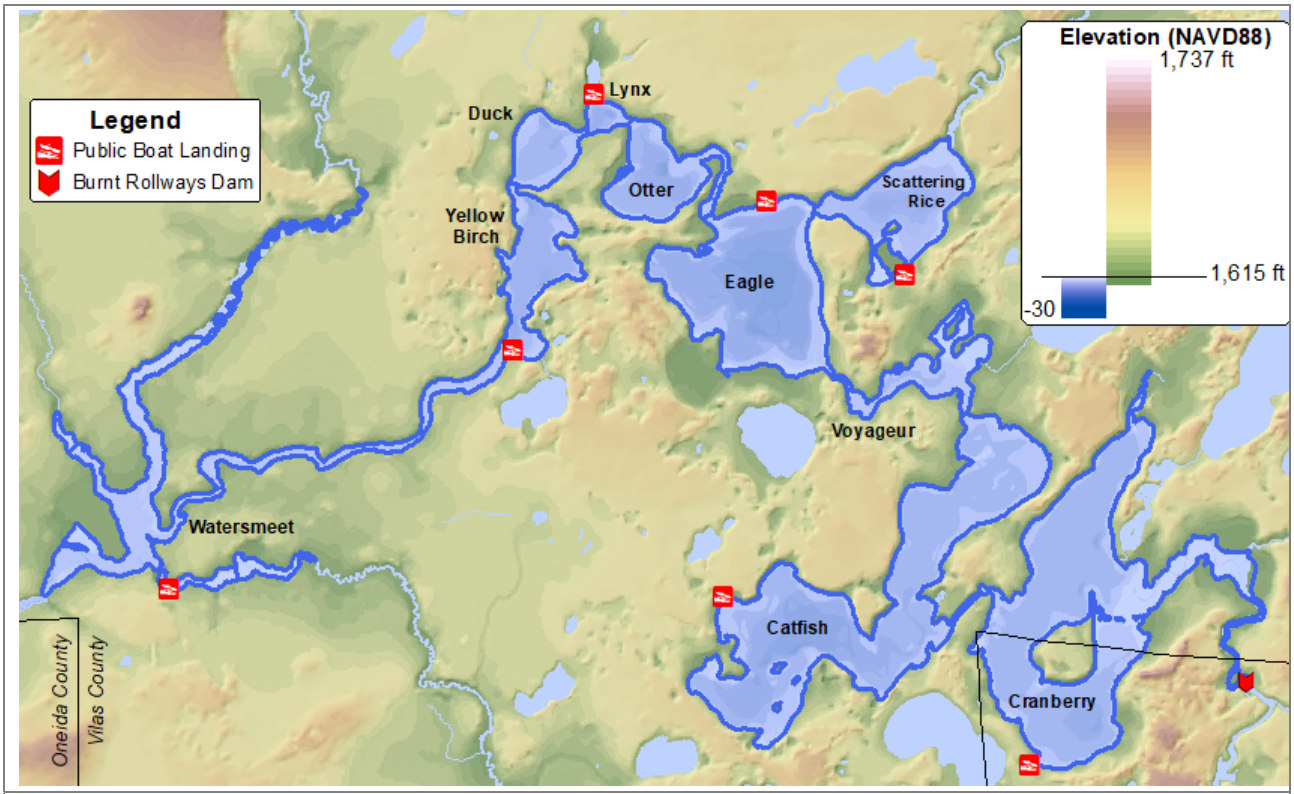


Figure 1.0-1 Lower Eagle River Chain of Lakes, Vilas-Oneida Counties.

1.1 Chain-wide Historic EWM Management

Starting in 2007, late-season EWM mapping surveys commenced on the Eagle River Chain of Lakes using a consistent density rating system (Figure 1.1-1). Please note that this figure only represents the acreage of mapped EWM polygons, not EWM mapped with point-based methodologies (*single or few plants, clumps of plants,* or *small plant colonies*). In other words, EWM marked with point-based mapping methods do not contribute to the colonized acreage shown in Figure 1.1-1.

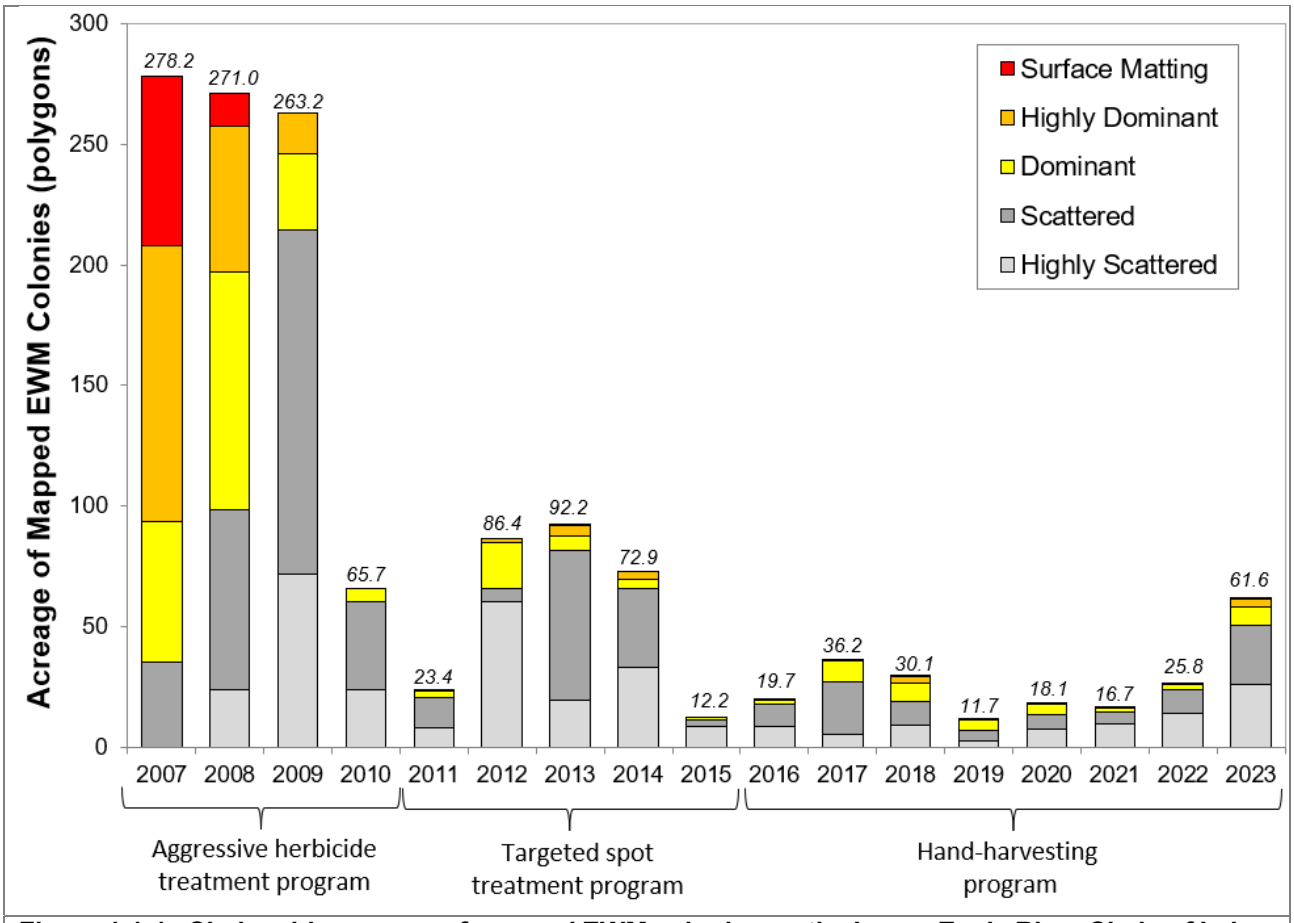


Figure 1.1-1. Chain-wide acreage of mapped EWM colonies on the Lower Eagle River Chain of Lakes from 2007-2023.

Aggressive Herbicide Treatment Program (2007-2010)

Over this same timeframe, the ULERCLC has coordinated active management of EWM. From 2007 to 2010, an aggressive herbicide treatment program occurred consisting of strategically targeted herbicide spot treatments and a few whole-lake or whole-basin herbicide treatments.

Targeted Spot Treatment Program (2011-2015)

A more directed herbicide spot treatment strategy occurred from 2011 to 2015. During this timeframe, the ULERCLC was an active participant in a Cooperative Research and Development Agreement (CRADA) between the WDNR and U.S. Army Corps of Engineers Research and Development Center that coupled field-collected herbicide concentration data with professional monitoring to understand efficacy, selectivity, and longevity of chemical control strategies. During

this project, the ULERCLC found that as the spot treatments targeted increasingly smaller areas of EWM, they were not as effective as previous control strategies.

Ongoing studies stemming from this project indicate that in small spot treatments, the herbicide dissipates too rapidly to cause EWM mortality if traditional weak-acid auxin systemic herbicides like 2,4-D are used. Even in some cases where larger treatment areas can be constructed, their narrow shape or exposed location within a lake may result in insufficient herbicide concentrations and exposure times for long-term control. With this knowledge, more effective herbicide spot treatment strategies were implemented in the latter years of this phase of management. In 2015, the EWM population of the Eagle River Chain of Lakes was at its lowest levels in over a decade, with just over 12 acres of colonized EWM being documented chain-wide (Figure 1.1-1).

Correlation analysis between precipitation data and average summer Secchi disk depth revealed that total growing season precipitation (April-September) had the strongest negative correlation with average summer Secchi disk depth (Figure 1.1-1. This means that as precipitation increases, water clarity decreases. The increase in precipitation may have resulted in increased phosphorus loading to the chain, increasing algal production and reducing water clarity. The increased precipitation may have also increased the amount of dissolved humic substances within the chain, increasing the stained appearance and decreasing water clarity.

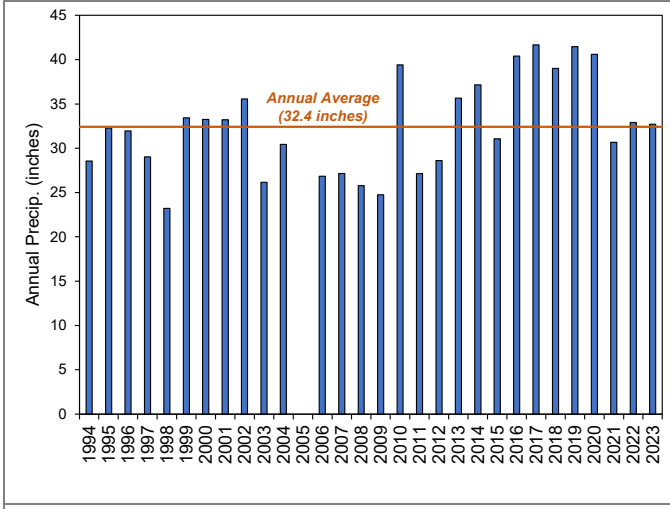


Figure 1.1-1. Eagle River station average annual precipitation. https://mrcc.purdue.edu/

It is clear that the management program reduced the EWM population within the Eagle River Chain. But it is also important to note the role of the reduced water clarity in the system this past decade. When EWM is targeted with an herbicide treatment, and also has the added environmental stress of low water clarity, it is more difficult for the plants to rebound. The darker water has likely helped the treatments be more effective and last longer. Said another way, if the chain had clearer water during the years of treatment, the results may not have been as positive. Annual precipitation in 2021-2023 were back to normal compared to higher than normal levels seven out of the prior 8 years (2013-2020).

In 2015, the ULERCLC developed a working treatment strategy where consideration for herbicide application would be given to areas of EWM if they met a specific threshold (i.e., trigger). This trigger was further revised as part of the *Eagle River Chain of Lakes Comprehensive Management Plan (Dec 2019)*. If the following trigger is met, the ULERCLC would initiate pretreatment monitoring and begin discussions, including consultation with WDNR staff, regarding conducting herbicide spot treatments:

> Colonized (polygons) areas of EWM, with preference to areas of *dominant* or greater densities, that have a size/shape/location where management is anticipated to be effective.

Based upon this established herbicide treatment strategy, no areas of EWM in the Lower Eagle River Chain of Lakes have met this threshold since 2015. The late-season EWM mapping survey in 2023 contained the highest acreage since 2014, approaching levels that would meet this trigger.

Hand-Harvesting Program (2016-current)

Following the herbicide management period, the EWM managed areas within the chain had diminished to the extent that herbicide spot treatment methods were no longer needed. The ULERCLC recognized the necessity of maintaining active management instead of discontinuing and waiting for EWM populations to return to a level suitable for herbicide control. The ULERCLC enacted a strategy that balanced a level of EWM population tolerance while targeting other locations with a coordinated hand-harvesting approach.

Many lake groups initiate a large-scale management strategy with the intention of implementing smaller-scale control measures when EWM begins rebounding. This use of multiple control practices in a strategy that focuses on long-term control is referred to as Integrated Pest Management (IPM). With Onterra's assistance, the ULERCLC successfully secured a WDNR Established Population Control Grant (ACEI-240-20) to assist with funding a continued IPM strategy as outlined by: 1) a 3-year EWM monitoring and hand-harvesting project and 2) completion of chain-wide point-intercept surveys in 2022 as outlined within the ERCLA's *Comprehensive Management Plan*. This report discusses the management and monitoring activities that took place during the fourth year of this project (2023).

A series of EWM mapping surveys were used to coordinate and monitor the hand-harvesting efforts. During the EWM mapping survey, the entire littoral area of the lake is surveyed through visual observations from the boat (Photo 1.1-2). A preliminary hand harvesting strategy is developed over the fall/winter based on the results of the previous year's Late-Summer EWM Mapping Survey. In late-spring/early summer, an Early Season Aquatic Invasive Species Survey (ESAIS) is completed from which the hand-harvesting strategy was finalized. After the professional hand-harvesting activities are completed, Onterra completes the Late-Summer EWM Mapping Survey, the results of which serve as a post-harvesting assessment of the hand-removal efforts. The hand-removal program would be considered successful if the EWM population within the targeted areas was found to have been reduced and inhibited from expanding between the year before and year after Late-Summer EWM Mapping Surveys.

Photo 1.1-2. EWM mapping survey on a WI lake. Photo credit Onterra.

Diver Assisted Suction Harvest (DASH) is a form of hand-removal which involves divers removing target plants (i.e., EWM) and feeding them into a suctioned hose for delivery to the deck of the harvesting vessel. The DASH system is thought to be more efficient than manual removal alone as the diver does not have to go to the surface to deliver the pulled plants to someone on a boat. The DASH system also is believed to cause less fragmentation, as the plants are immediately transported to the surface using the pumping mechanism.

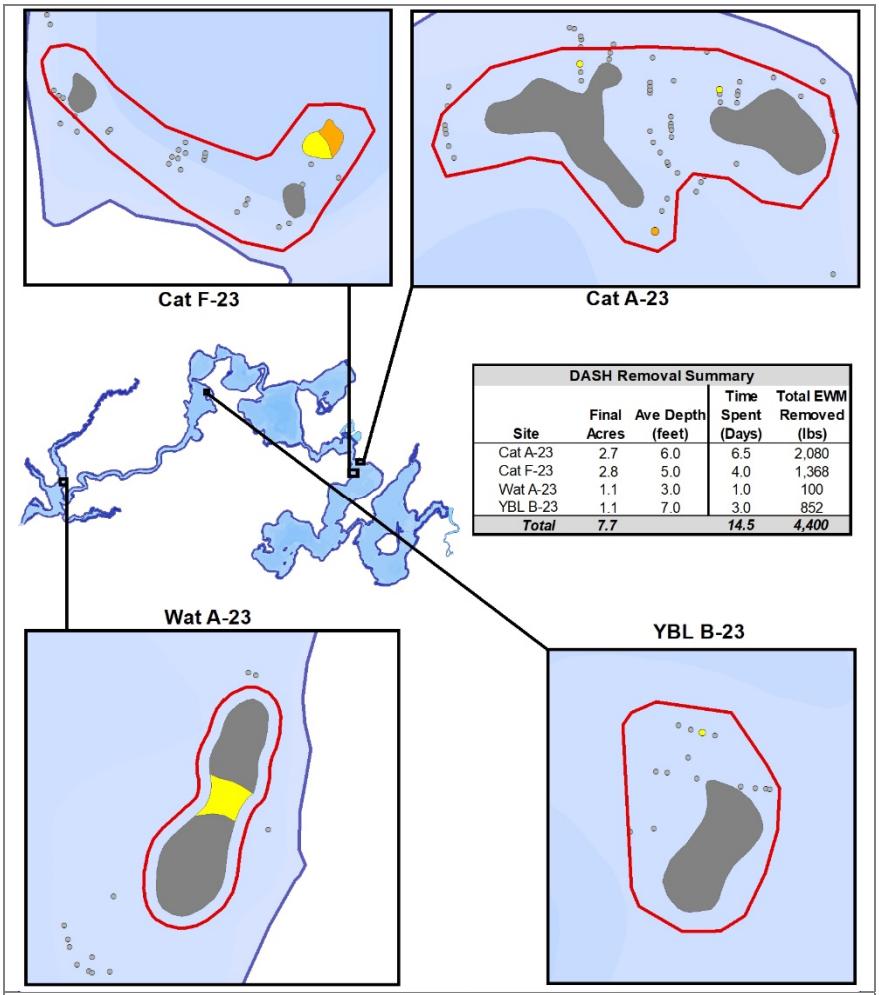
2.0 2023 EWM MONITORING & MANAGEMENT ACTIVITIES

Based on the results of the 2022 Late-Season AIS Survey, a preliminary DASH strategy was designed for areas of Catfish, Watersmeet, and Yellow Birch lakes for 2023. During the 2023 Early-Season AIS Survey (ESAIS), the extents of EWM within the proposed hand-harvesting areas were refined and a final hand-harvesting strategy was determined. Onterra provided the contracted professional hand-harvesting firm with the spatial data from the ESAIS to coordinate the removal efforts.

2.1 Chain-wide Professional Hand-Harvesting Activities

Based upon the ESAIS, modifications were made to the preliminary manual removal strategy. The ULERCLC EWM Committee created a site prioritization methodology that considered EWM density from the 2023 Early-Season EWM Mapping Survey, high-use areas, and other factors.

Over the course of about 14 days, approximately 4,400 lbs of EWM were removed from the Eagle River Chain in 2023 (Figure 2.0-1). Further details of hand-harvesting efforts and amount of EWM removed on a site-by-site basis is discussed within the Individual Lake Sections (4.0) below. The ULERCLC contracted with DASH Aquatic Services, LLC in 2023 to provide professional hand-harvesting services using Diver-Assisted Suction Harvesting (DASH) methodologies. DASH methodologies involve divers removing plants from the sediment and then feeding them into a suctioned hose for delivery to the deck of the harvesting vessel. The DASH methodology is considered a form of mechanical harvesting and thus requires a WDNR-approved permit. DASH is thought to be more efficient in removing target plants than divers alone and is believed to limit fragmentation during the harvesting process.



DASH Removal Summary

Site	Final Acres	Ave Depth (feet)	Time Spent (Days)	Total EWM Removed (lbs)
Cat A-23	2.7	6.0	6.5	2,080
Cat F-23	2.8	5.0	4.0	1,368
Wat A-23	1.1	3.0	1.0	100
YBL B-23	1.1	7.0	3.0	852
Total	*7.7*		*14.5*	*4,400*

Figure 2.0-1 2023 Hand-harvest summary. Summarized from Appendix A

2.2 Volunteer EWM Surveillance Monitoring

In recent years, a team of dedicated ULERCLC volunteers have conducted EWM monitoring efforts during the summer months. These efforts have been instrumental in aiding professional monitoring efforts through searching the Chain for new EWM infestations. Volunteers use a dedicated GPS unit that is loaded with the most recent professional EWM mapping survey results. The volunteer team focuses on searching for EWM in other areas of the Chain outside of where known EWM populations have been recently documented in the professional mapping surveys. If volunteers encounter a new suspected occurrence of EWM, a waypoint is taken on the GPS unit. All volunteer data is ultimately provided to Onterra prior to the next scheduled professional mapping survey. This allows the professional surveyors to visit the volunteer locations to confirm the presence of EWM. In 2023, ULERCLC volunteer monitoring efforts identified suspected EWM within all waterbodies with the exception of Scattering Rice Lake (Figure 2.2-1).

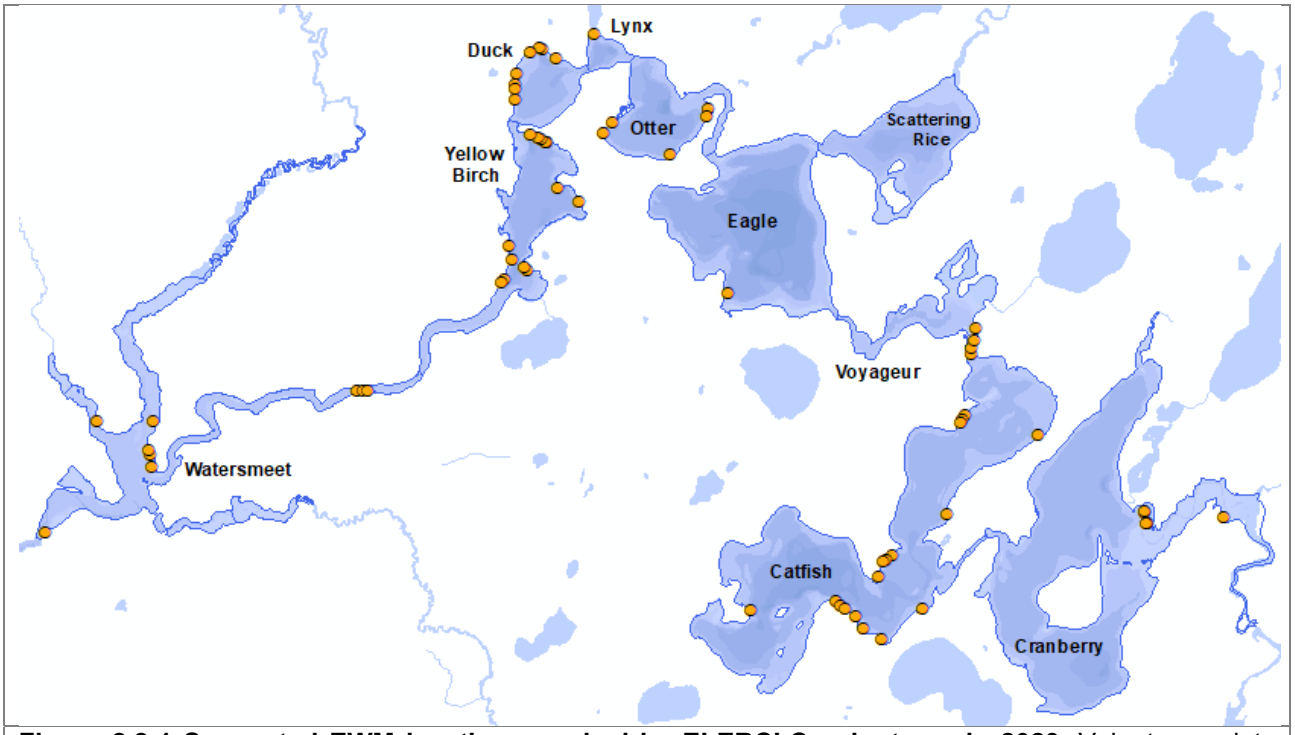


Figure 2.2-1 Suspected EWM locations marked by ELERCLC volunteers in 2023. Volunteer points displayed as orange circles.

2.3 Late-Season EWM Mapping Surveys

As shown on Figure 2.3-1, 61.6 acres of EWM was located during the 2023 Late-Season EWM Mapping Survey on the Chain. This is an increase compared to the 25.8 acres mapped in 2022 and is aligned with acreages of colonized EWM documented annually from 2011-2015. The majority of the EWM acreage mapped in the Eagle River Chain of Lakes was in Catfish, Cranberry, and Watersmeet Lakes. The EWM within Watersmeet is largely located in channelized areas where water flow is higher. Past herbicide treatments conducted in this area revealed it is difficult to achieve the needed concentration and exposure time to achieve EWM mortality. All lakes within the chain, with the exception of Lynx Lake, experienced an increase in EWM during 2023 when compared to 2022.

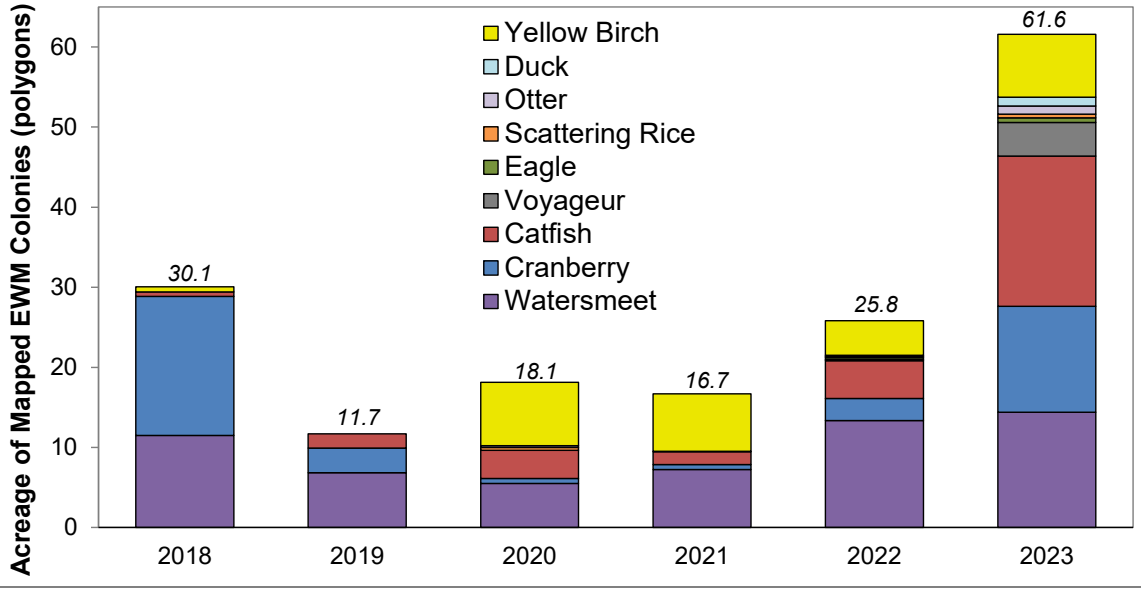


Figure 2.3-1. Distribution of acreage of mapped EWM colonies by lake in 2018-2023.

3.0 CHAIN-WIDE CONCLUSIONS & DISCUSSIONS

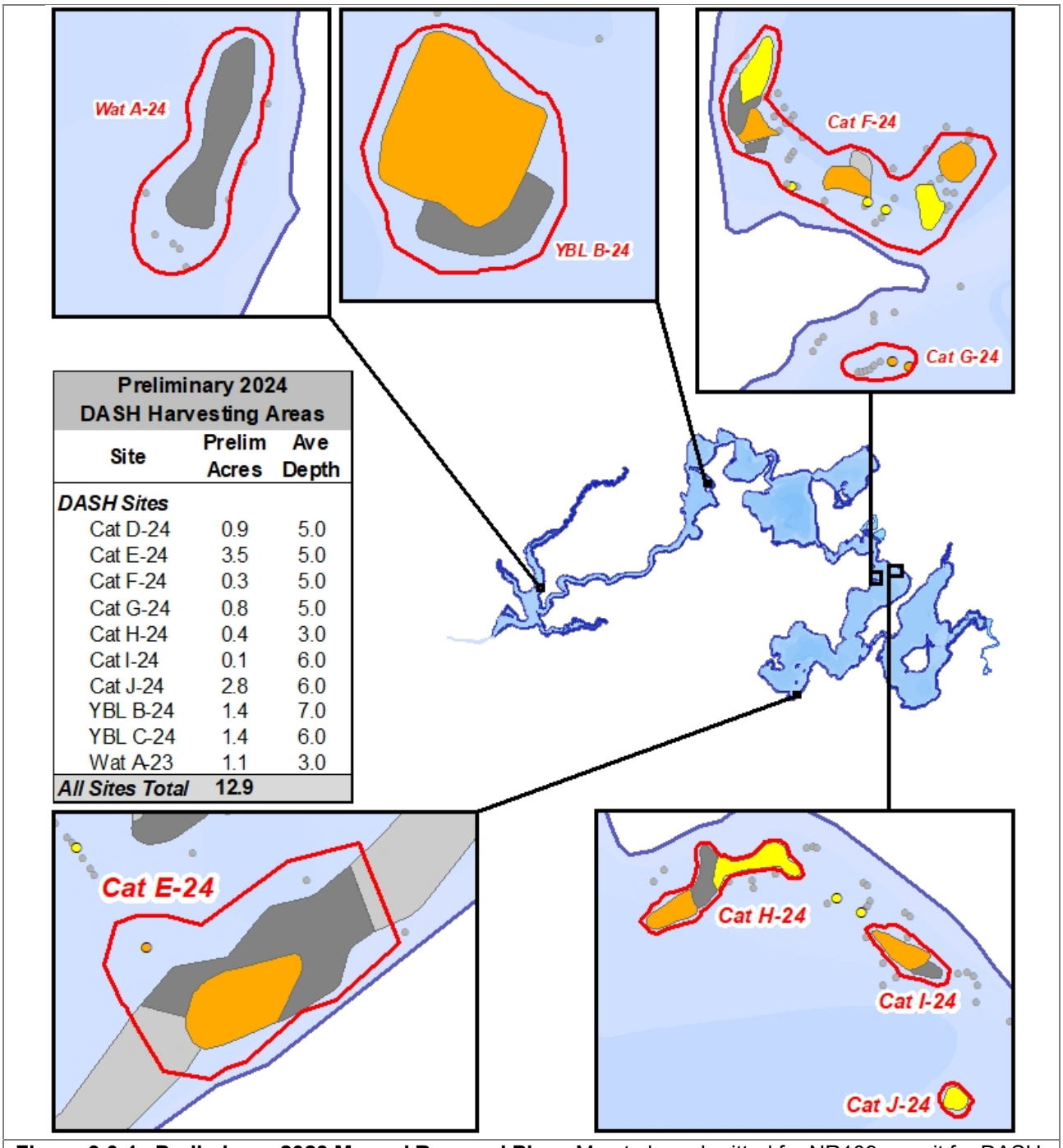
Overall, there has been a significant reduction of EWM in the Eagle River Chain since the start of the management program in 2007. The 2023 EWM population of the Eagle River Chain of Lakes continues to mostly consist of locations mapped with point-based methods or mapped with low-density colonies. Higher density EWM populations have recently been documented in Catfish Lake, Cranberry Lake, and in river portions of Watersmeet Lake. During the November 2023 EWM Information Meeting, discussion about considering herbicide treatment in 2024 occurred. At this time, the ULERCLC believes the EWM population does not warrant herbicide management, resulting in nine consecutive years (2016-2024) without herbicide management.

The ULERCLC was able to extend their current AIS-Control Grant-funded project (ACEI-240-20) through the end of the 2024 annual management and monitoring program. This project will follow the same monitoring and planning strategy utilized during the history of this project, with the final deliverable report being completed by roughly the end of quarter 1, 2025.

Using the 2023 Late-Season EWM Mapping Surveys, a preliminary professional manual removal EWM control strategy for 2023 was developed targeting two sites in Catfish Lake, one site in Yellow Birch Lake, and one site in Watersmeet (Figure 3.0-1). Based upon the results of the 2023 Early-Season AIS Survey, areas could potentially be added, omitted, or revised. Onterra will provide the hand-harvesting firm with the spatial data from the early-season survey to aid in the removal efforts.

It is also important to note that each riparian owner can legally harvest EWM and native plant species in a 30-foot wide area of one's frontage directly adjacent to one's pier without a permit. A permit is only required if an area larger than the 30-foot corridor is being harvested or if a mechanical assistance mechanism, like DASH, is being used. Simply wading into the lake and removing EWM by hand with or without the aid of snorkeling accessories can be helpful in managing EWM on a small and individual property-based scale.

Following the hand-harvesting activities, a Late-Season EWM Mapping Survey will qualitatively assess the EWM removal efforts and be used to plan management and monitoring activities in 2024.



Preliminary 2024 DASH Harvesting Areas		
Site	Prelim Acres	Ave Depth
DASH Sites		
Cat D-24	0.9	5.0
Cat E-24	3.5	5.0
Cat F-24	0.3	5.0
Cat G-24	0.8	5.0
Cat H-24	0.4	3.0
Cat I-24	0.1	6.0
Cat J-24	2.8	6.0
YBL B-24	1.4	7.0
YBL C-24	1.4	6.0
Wat A-23	1.1	3.0
All Sites Total	**12.9**	

Figure 3.0-1. Preliminary 2023 Manual Removal Plan. Map to be submitted for NR109 permit for DASH.

The ULERCLC is currently developing a three-year project for a grant application in fall of 2024. This project would largely continue the current manual removal and monitoring strategy during 2025-2027.

The last phase of the ERCLA's *Comprehensive Management Plan* was finalized in December 2019. The administrative code (NR193) that regulates the WDNR's Surface Water Grant Program was revised in August 2020, after that project completed. This new code indicates that entities seeking cost-share for aquatic invasive species management projects need to have an Aquatic Plant Management (APM) Plan that is no less than 5 years old, along with some other restrictions relating to point-intercept survey timing. The ULERCLC and ERCLA are considering updating the aquatic plant management plan (*APM Plan*) portion of their Comprehensive Plan during 2026-2027. This updated APM Plan would align with current Best Management Practices for EWM management which have evolved in recent years. Therefore, the planning project would be completed at the same time the 3-year AIS Control Grant will be completed and the ULERCLC would be again eligible to apply for a grant for 2028 and beyond.

A

APPENDIX A

DASH Aquatic Services, LLC 2023 Harvesting Summary

DASH Aquatic Services LLC

2023 DASH Summary

Harvesting of Eurasian Water Milfoil using DASH took place on Watersmeet Lake , Catfish Lake, and Yellow Birch Lake for 14.5 days with 105 hours of dive/harvesting time.
A total of 4400 pounds were harvested between the lakes.

Watersmeet Lake Area A-23
One day was spent at this location and 100 pounds were harvested. There were small clumps of plants and scattered small plants mixed with native plants.

Catfish Lake Area F-23
Four days were spent at this location focusing on the two red areas from Onterras map.
1368 pounds were harvested over the four days with 5% native plants.
The milfoil plants were large and close to the surface growing in a large dense clump.

Catfish Lake Area A-23
Six and one half days were spent here and 2080 pounds were harvested.
Harvesting was focused on the large red area on Onterras map.
Plants were large and growing in dense clumps towards the middle of the area and scattered and mixed with native plants moving outward.

Yellow Birch Lake Area B-23
Three days were spent here and 852 pounds were harvested.
Plants were reaching the surface and growing in scattered large clumps mixed with native plants.

4.0 INDIVIDUAL LAKE SECTIONS

The remainder of this report will focus on the 2023 EWM monitoring and management activities on a lake-by-lake basis. Some of the text will seem redundant if one reads each lake section. However, this is intentional to ensure the information is portrayed to those who only read the chain-wide sections and their individual lake-specific section.

Professional EWM monitoring surveys took place on each lake twice during 2023. An early season AIS survey (ESAIS) was completed during June 29-July 5, and a Late-Season EWM Mapping Survey was completed on September 13-20 to map occurrences of EWM within the system.

4.1 Cranberry Lake

EWM Monitoring & Management

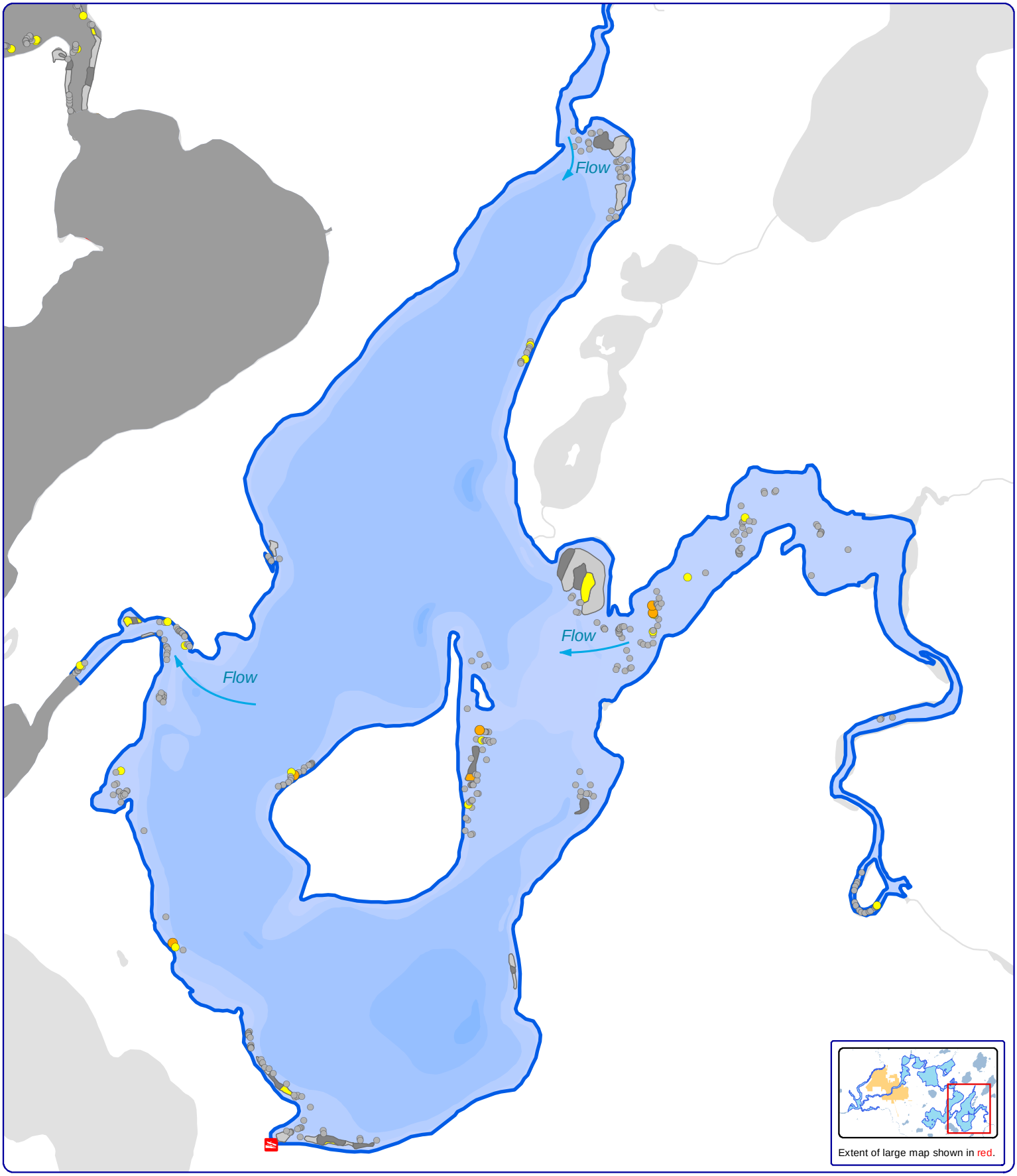
As in past years, the EWM population in Cranberry Lake was mapped professionally during Onterra's 2023 Early-Season AIS (ESAIS) and Late-Season EWM Mapping Survey (also called EWM Peak-Biomass Survey). During the ESAIS Survey, the entire littoral zone of the Eagle River Chain of Lakes was searched for EWM by Onterra field staff. Completion of an ESAIS Survey presents numerous advantages. Typically, the water is clearer during the early summer allowing for more effective viewing of submersed plants. While not at their peak growth stage (peak biomass), EWM plants are higher in the water column than most native plants during this time of year which increases the chances that even low-density and isolated EWM occurrences would be located.

The results from the ESAIS Survey were loaded onto specific ULERCLC GPS units, and trained volunteers were tasked with searching and mapping EWM in areas where Onterra did not locate it during the ESAIS Survey. Volunteers marked several locations of suspected EWM during the summer and shared the findings with Onterra in advance of the Late-Season Survey.

The majority of EWM in Cranberry Lake in 2023 was mapped in small protected bays and shallow nearshore areas (Map 1). The total acreage of contiguous EWM colonies mapped during the 2023 Late-Season EWM Mapping Survey was 13.2 acres, the most since 2018. While this was a higher year for EWM mapped, the majority of colonies were considered *highly scattered* or *scattered* colonies likely not impeding recreational opportunities. A low EWM population that consisted of mostly *single or few plants* and other point-based occurrences were located within the Cranberry Channel area where large contiguous colonies have been present in past years. The population in this area of the lake has declined significantly between 2019-2023 in the absence of management efforts.

The EWM population of Cranberry has increased in recent years, but largely consists of EWM mapped with point-based methods. An area of *dominant* EWM was observed in an isolated and shallow bay of the lake. Although this site technically meets the trigger for considering herbicide management, it is located in a low traffic area that is not impacting human use of the lake. Therefore, this site is not being considered for herbicide management.

During the late-summer of 2018, a large and dense area of EWM existed in the upstream channel of Cranberry Lake . This EWM population has continued to decline in recent years even though no herbicide management has occurred. The late-summer 2023 EWM population continues to be low in this part of the lake.



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1,500
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, Onterra digitized
Aquatic Plants: Onterra, 2023
Map Date: October 17, 2023 AMS

Legend
2023 EWMPB Survey (September 2023)

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

Map 1
Cranberry Lake
Vilas County, Wisconsin
2023 Late-Season EWM Survey Results