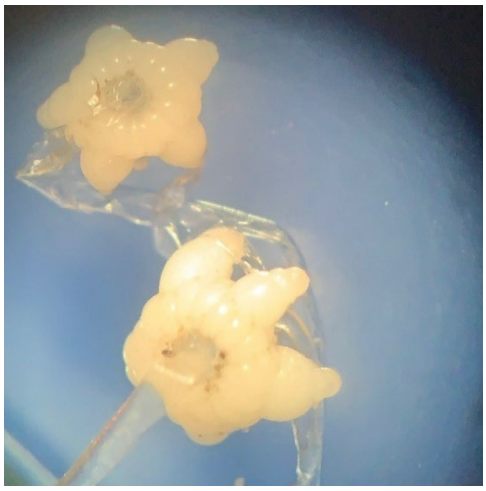
1.0 INTRODUCTION

The Cloverleaf Lakes are a chain of three spring lakes: Round Lake, Grass Lake, and Pine Lake in Shawano County. Eurasian water milfoil (*Myriophyllum spicatum*; EWM) was first documented in the Cloverleaf Lakes in 1992. It was later confirmed via DNA analysis to be a hybrid between EWM and the indigenous northern water milfoil (*M. sibiricum*). Research has indicated that hybrid EWM (HWM) may have a higher tolerance to some aquatic herbicides which presents complications for its management. Herbicide treatments have been periodically conducted on the Cloverleaf Lakes to manage EWM/HWM, with the most recent being a 2021 ProcellaCOR spot treatment on Grass Lake that had short-term results but relatively quick rebound.

Curly-leaf pondweed (CLP, (*Potamogeton crispus*), is also present in the system and was periodically the target of active management. In instances where CLP has an established presence in a system, lake managers and regulators question whether repetitive annual herbicide management activities may be imparting more strain on the environment than the existence of the CLP. Despite being present in the system for almost three decades, CLP has not been observed at population levels that impact navigation/recreation, nor threatening the integrity of the ecosystem. No targeted management activities have been conducted towards CLP since 2010.

Starry stonewort (*Nitellopsis obtusa*; SSW) is a non-native, invasive macroalgae that was first observed in the United States in 1978 within the St. Lawrence River. The species has a distinct star-shaped reproductive structure called a bulbil which forms during late-summer or fall and is deposited into the lake sediments (Photo 1.0-1). Interestingly, this species receives special protections in its native range due to low population numbers. Starry stonewort was discovered in a southeastern Wisconsin lake in 2014, and has now been verified within over 40 inland lakes within at least ten counties. Starry stonewort was also found in Sturgeon Bay in 2016 and subsequent investigations indicate this species is present in coastal areas of Lake Michigan and Green Bay.

Starry stonewort was located during the 2021 point-intercept survey of Pine Lake. Specimens were confirmed by WDNR staff and later sent to the New York Botanical Garden for additional genetic confirmation and understanding. This finding represents the first known population of this species in Shawano County.



Photograph 1.0-1 Starry stonewort documented from Cloverleaf Lakes. Non-native, invasive macroalgae. Photo credit Onterra.

Like other non-native species, starry stonewort has been shown to dominate aquatic plant communities, in some cases growing to nuisance levels and hindering recreation. However, this species does not act invasively in all situations. Preliminary data from surveys in Wisconsin indicate that frequency can vary across lakes, with some lakes experiencing rapid increase in SSW frequency after discovery, while other lakes have seen a much slower rate of expansion. To date, there have not been any effective chemical management strategies for SSW. Copper-based algaecides can temporarily suppress SSW populations (months), but have been ineffective at long-term population control. While control methods attempted to date in Wisconsin have demonstrated a lack of control efficacy, the WDNR and other lake managers are working towards developing and testing new management strategies.

The WDNR encourages monitoring of all SSW populations on inland lakes through the point-intercept survey methodology. The point-intercept survey is a plot-based inventory characterizing relative frequency of all plants, native and exotic, and is performed at the height of the growing season. The Cloverleaf Lakes Protection Association (CLPA) received a second Aquatic Invasive Species Early Detection & Response (AIS-EDR) grant to fund point-intercept survey on all three waterbodies during 2025-2027. This project is built on an AIS-EDR grant-funded project that occurred from 2022-2024.

During the fall/winter following the 2025 and 2026 surveys, an email narrative will be provided summarizing select data – especially in regards to SSW. During the fall/winter following the 2027 survey, a formal report with expanded text and discussion will be created to serve as the final report deliverable for AIRR-279-23. The data summary provided here marks the first of the three annual deliverables discussed above.

2.0 SURVEY METODS

The point-intercept survey method as described by the Wisconsin Department of Natural Resources Bureau of Science Services, PUB-SS-1068 2010 (Hauxwell, et al., 2010) was used to complete the whole-lake point-intercept surveys on the Cloverleaf Lakes. The sampling location spacing (resolution) and resulting total number of locations varied by lake and were created based upon guidance from the WDNR (Table 2.0-1).

Table 2.0-1. Cloverleaf Lakes point-intercept resolutions.

Lake	Distance Between Sampling Points (meters)	Number of Sampling Locations
Round	25	174
Grass	40	233
Pine	47	398

The point-intercept survey of the Cloverleaf Lakes was conducted on July 28, 2025 by multiple Onterra crews. Surface water temperatures were recorded to be 85°F during the survey. These data are provided to the WDNR for inclusion within their database.

Any species not already vouchered from previous point-intercept surveys would be sent to the UW-Stevens Point Robert Freckmann Herbarium for verification. During the 2025 surveys, no new species were encountered that required vouchering.

3.0 STARRY STONEWORT

Starry stonewort was first located at six point-intercept survey sampling locations within Pine Lake during the 2021 survey. Since its discovery within Pine Lake, starry stonewort has steadily increased. The 2025 survey found SSW to be present at 38 sampling locations in Pine Lake representing a littoral frequency of occurrence of 15.1%. The 2025 findings included 18 repeat point locations from past surveys and 20 new locations around Pine Lake.

Starry stonewort was found at one sampling location for the first time in Grass Lake during the 2023 survey, making this the first documented occurrence in the system outside of Pine Lake. Since then, the SSW population in Grass Lake has had a similar population trajectory as occurred in Pine Lake. The 2025 survey found SSW to be present at 12 sampling locations in Grass Lake representing a littoral frequency of occurrence of 9.8%. The 2025 findings included three repeat point locations from past surveys and nine new point locations around Grass Lake. Starry stonewort has not been located within Round Lake to date. Figure 3.0-1 displays all locations for which SSW has been identified during the 2021-2025 point-intercept surveys.

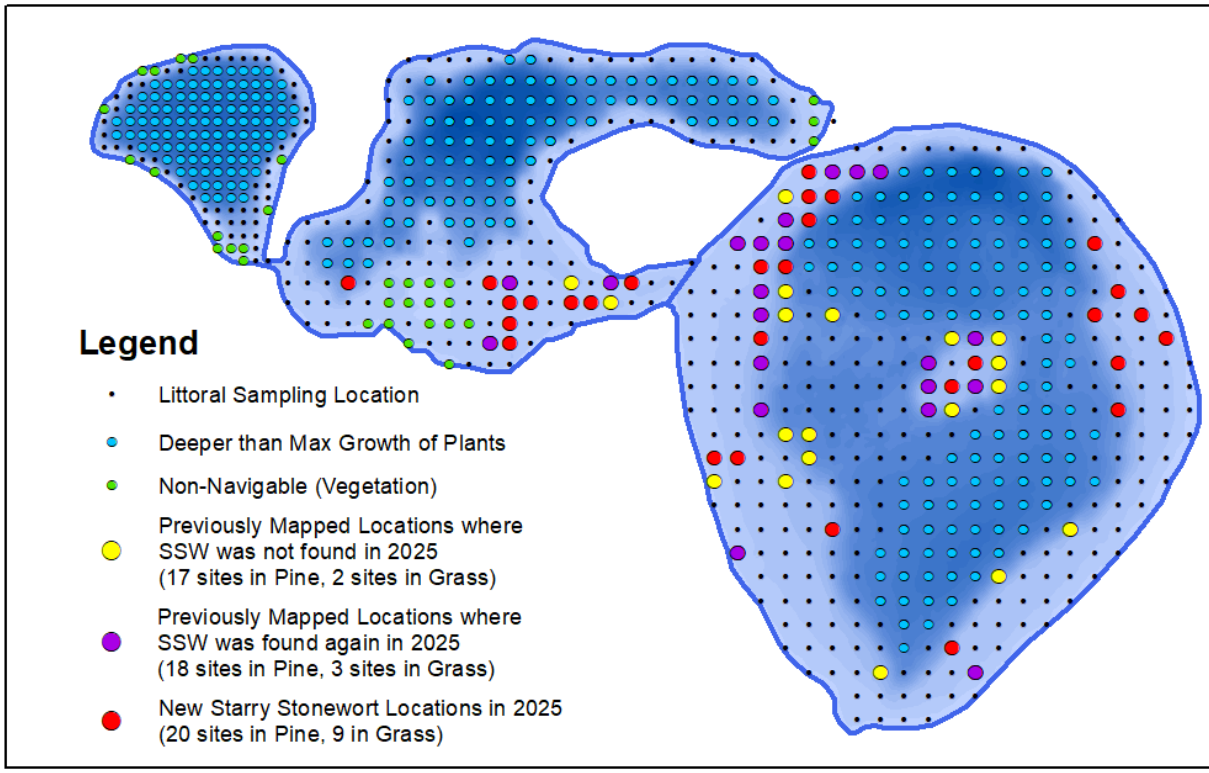


Figure 3.0-1. Locations of Starry stonewort from 2021-2025 point-intercept surveys.

4.0 EURASIAN/HYBRID WATERMILFOIL

The Cloverleaf Lakes have a history dating back to at least 2004 during which HWM control included nearly annual 2,4-D herbicide treatments. Whole-lake 2,4-D treatments occurred in each lake between 2012 and 2013, with HWM rebound occurring within Grass and Pine Lakes within 2-3 years. Subsequent whole-lake fluridone treatments took place in Grass and Pine Lakes in 2016 and in Round Lake in 2018. In the years since the fluridone treatments, the CLPA has enacted an Integrated Pest Management (IPM) strategy of follow-up efforts largely utilizing professional hand harvesting and a 2021 trial ProcellaCOR spot treatment in Grass Lake.

HWM populations began naturally regressing in the Cloverleaf Lakes starting in 2022, likely in response to natural factors as opposed to directed management activities. In the summer of 2025, HWM populations were again found at lower populations compared to 2022 and 2023. Independent of and separately funded from this project, a chain-wide late-season HWM mapping survey conducted in 2025 identified only low-density HWM occurrences (see attached map).

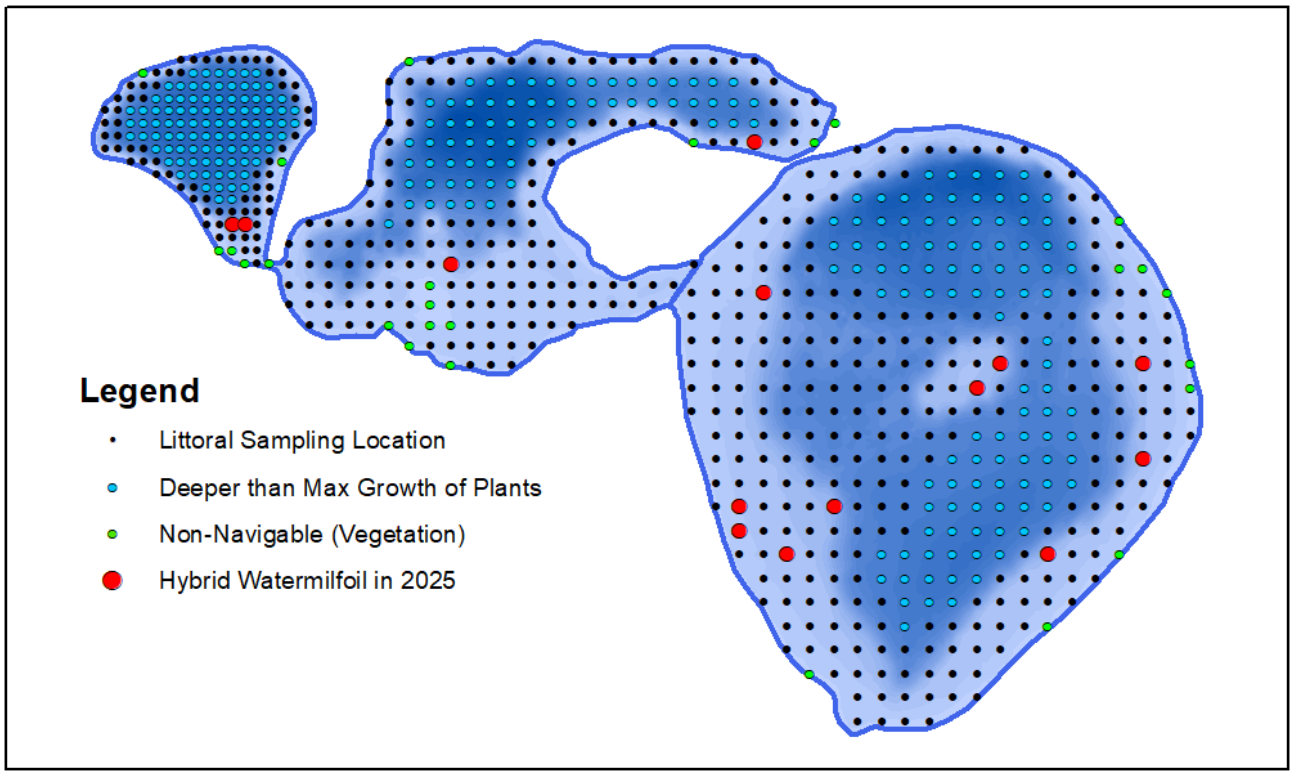


Figure 4.0-1. Locations of hybrid watermilfoil from 2025 point-intercept surveys.

Table 4.0-1. Littoral Frequency of occurrence of HWM in the Cloverleaf Lakes

Cloverleaf Lakes (Shawano County) Hybrid Watermilfoil Littoral Frequency of Occurrence (%)																
	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Round Lake	18.8	*no survey*	9.1	7.0	*no survey*	40.6	*no survey*	48.2	*no survey*	3.5	9.8	15.7	31.1	22.0	9.8	3.5
Grass Lake	53.5	*no survey*	0.0	1.3	*no survey*	41.9	*no survey*	0.0	5.2	10.6	30.4	1.4	12.9	34.0	9.9	7.3
Pine Lake	14.5	*no survey*	*no survey*	1.9	*no survey*	19.4	*no survey*	0.0	0.5	1.5	4.4	11.1	16.5	17.2	1.4	4.0

7.0 PINE LAKE DATA

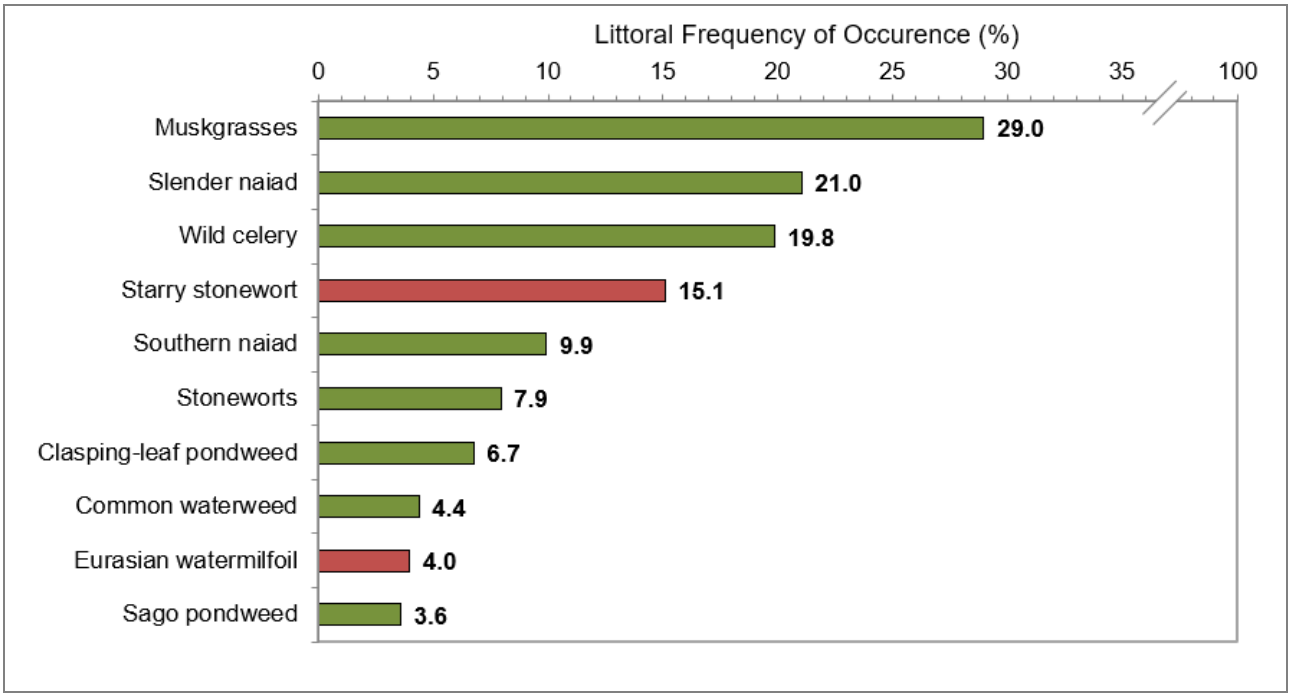


Figure 7.0-1. 2025 littoral frequency of occurrence of select Pine Lake Aquatic Plants. Chart includes the top most frequently encountered species only.

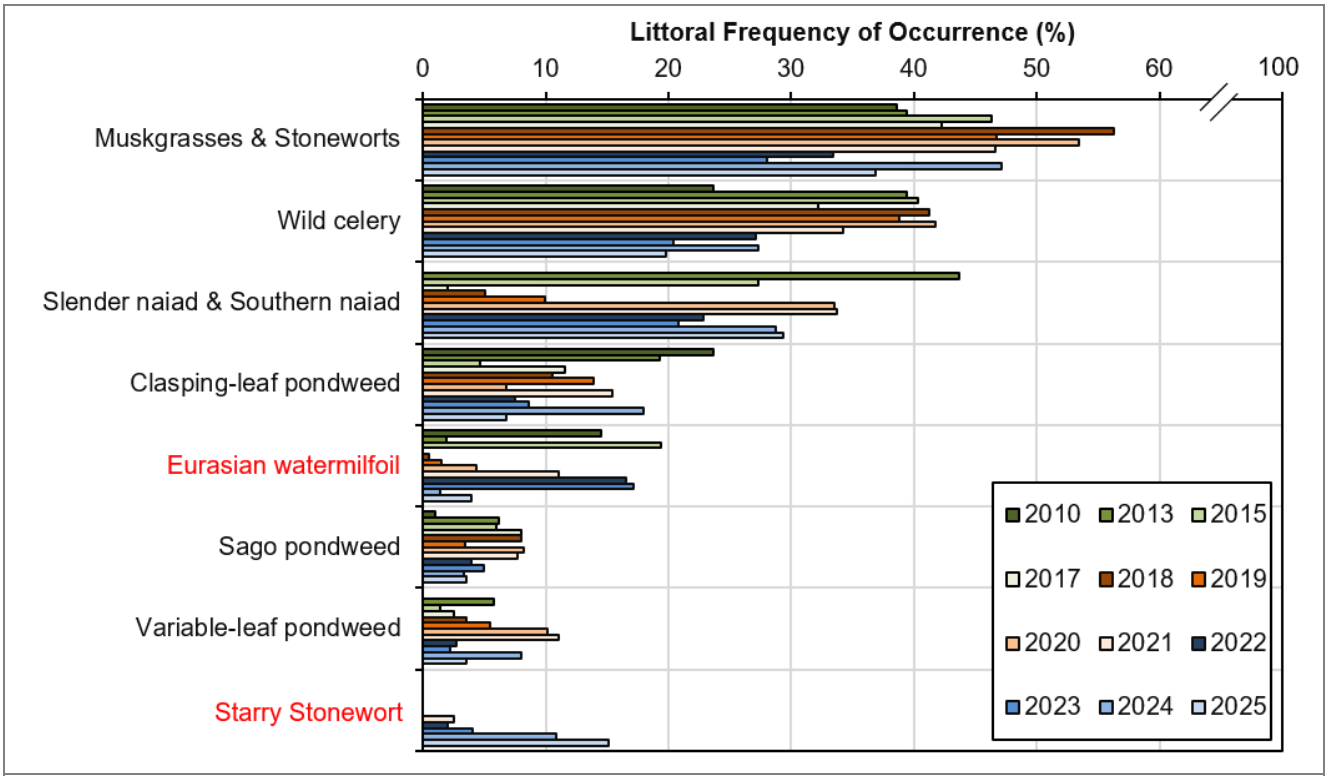


Figure 7.0-2. Pine Lake aquatic plant littoral frequency of occurrence analysis. Chart includes the top most frequently encountered species only.

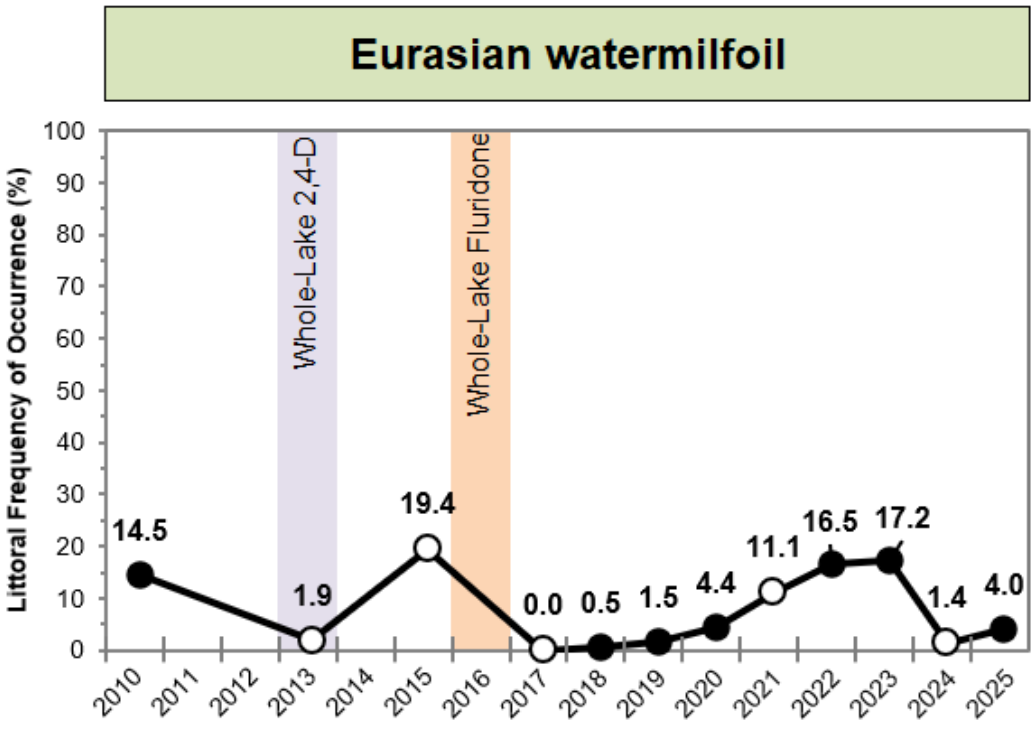


Figure 7.0-3. Pine Lake HWM littoral frequency of occurrence from 2010-2025. White circles indicate changes in occurrence that are statistically valid; black circles indicate changes in occurrence that are not statistically valid.

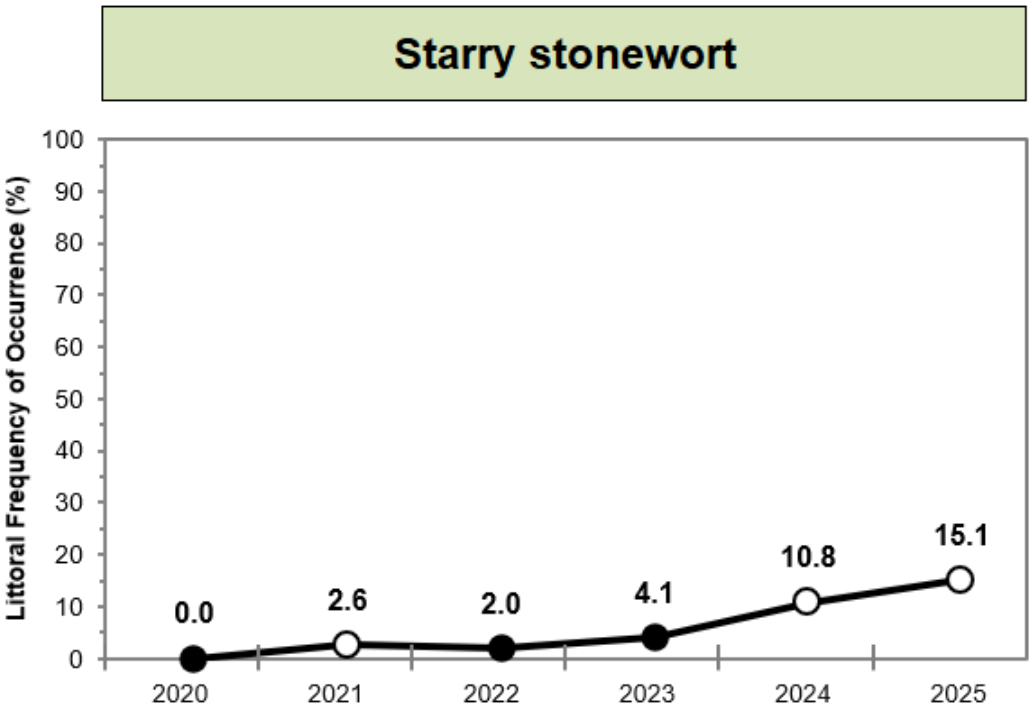


Figure 7.0-4. Pine Lake Starry Stonewort littoral frequency of occurrence from 2020-2025. White circles indicate changes in occurrence that are statistically valid; black circles indicate changes in occurrence that are not statistically valid.

6.0 GRASS LAKE DATA

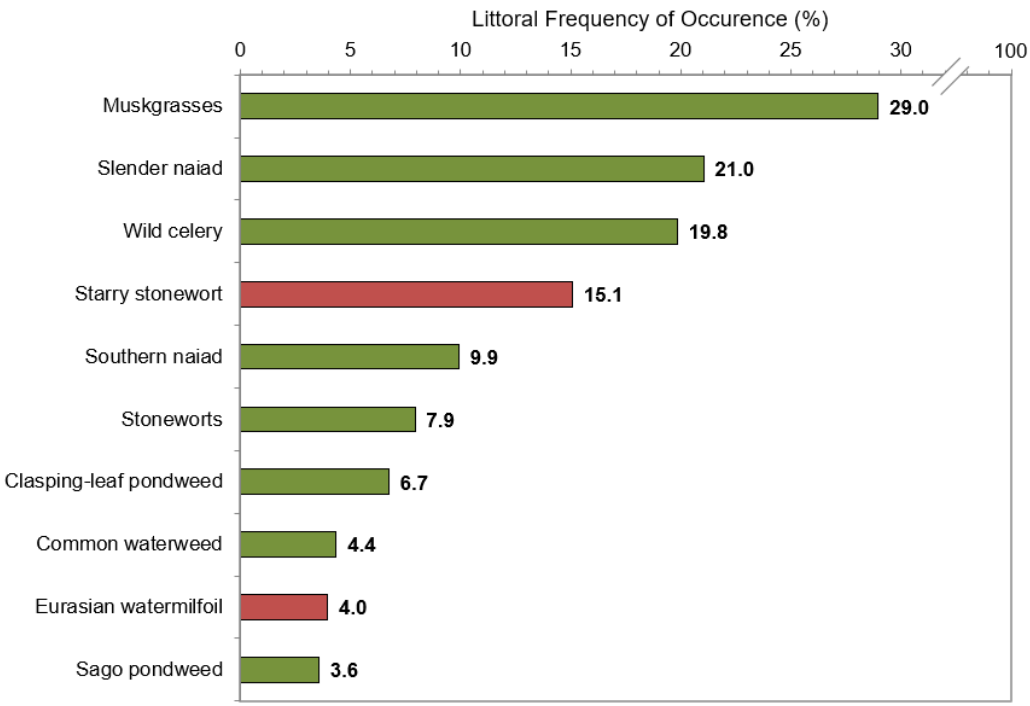


Figure 6.0-1. 2025 littoral frequency of occurrence of select Grass Lake Aquatic Plants.

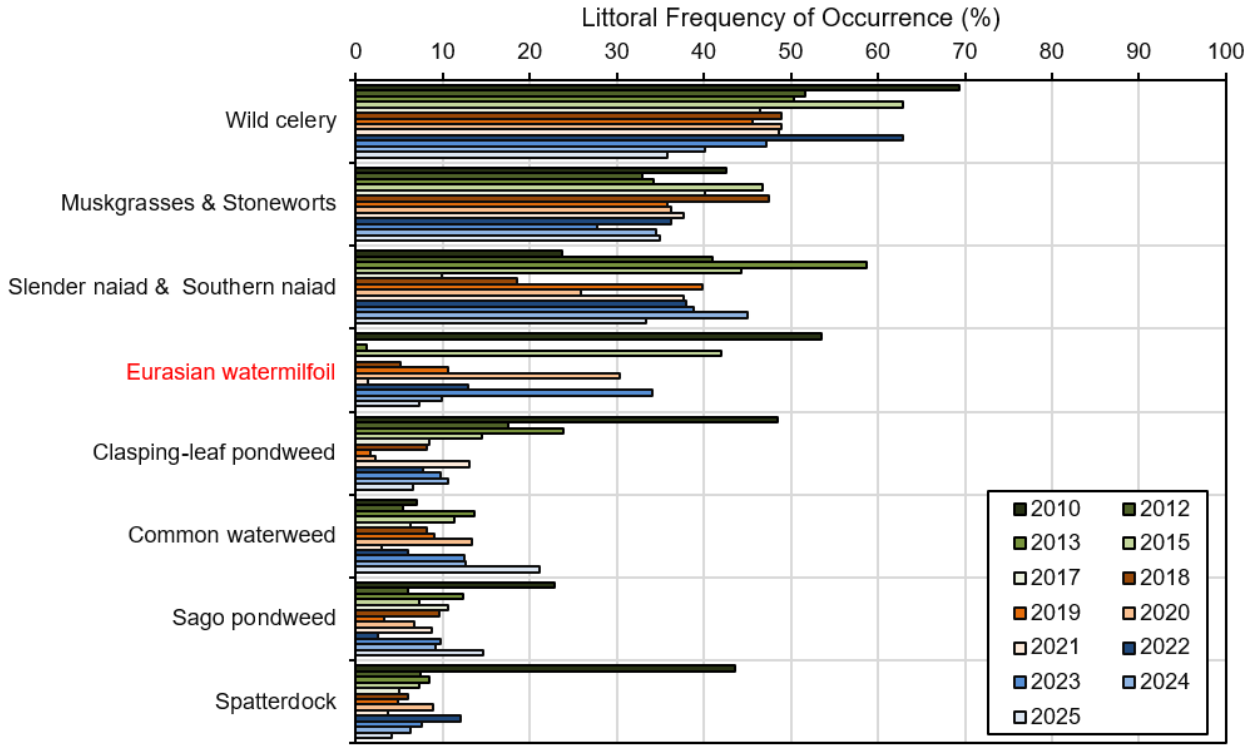


Figure 6.0-2. Grass Lake aquatic plant littoral frequency of occurrence analysis. Chart includes the top most frequently encountered species only.

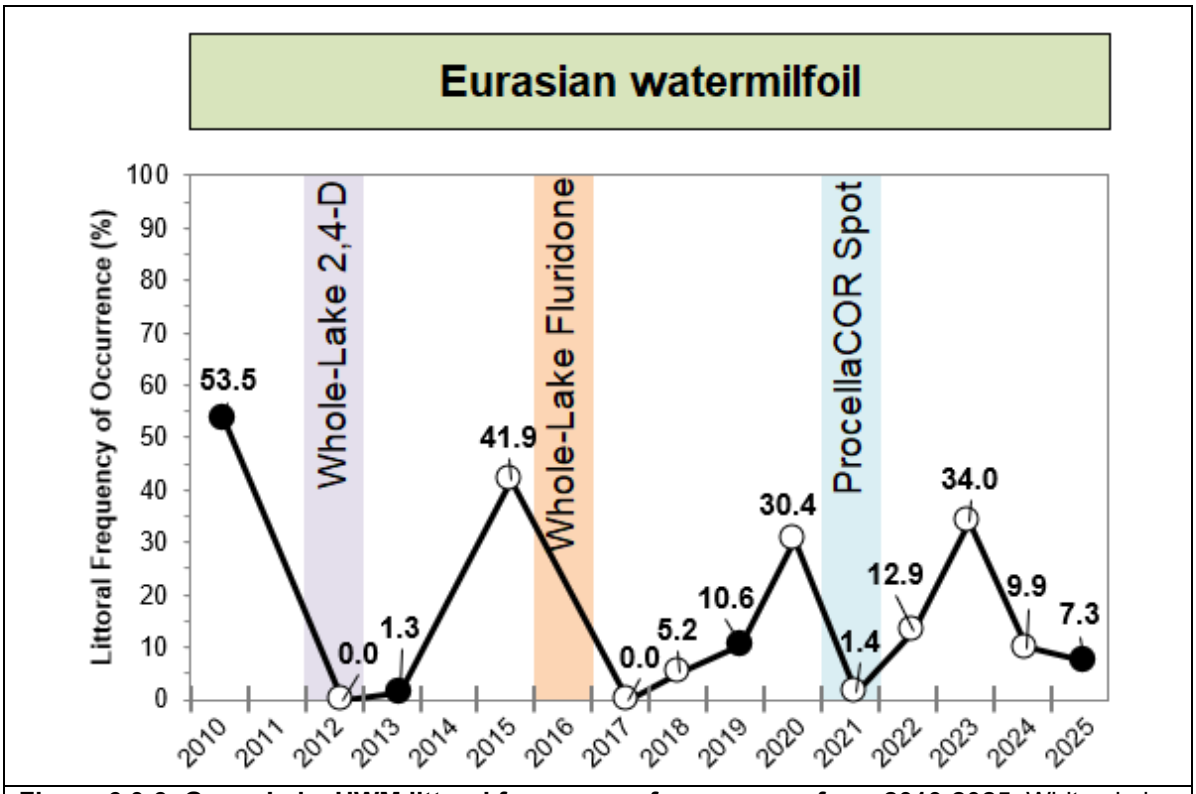


Figure 6.0-3. Grass Lake HWM littoral frequency of occurrence from 2010-2025. White circles indicate changes in occurrence that are statistically valid; black circles indicate changes in occurrence that are not statistically valid.

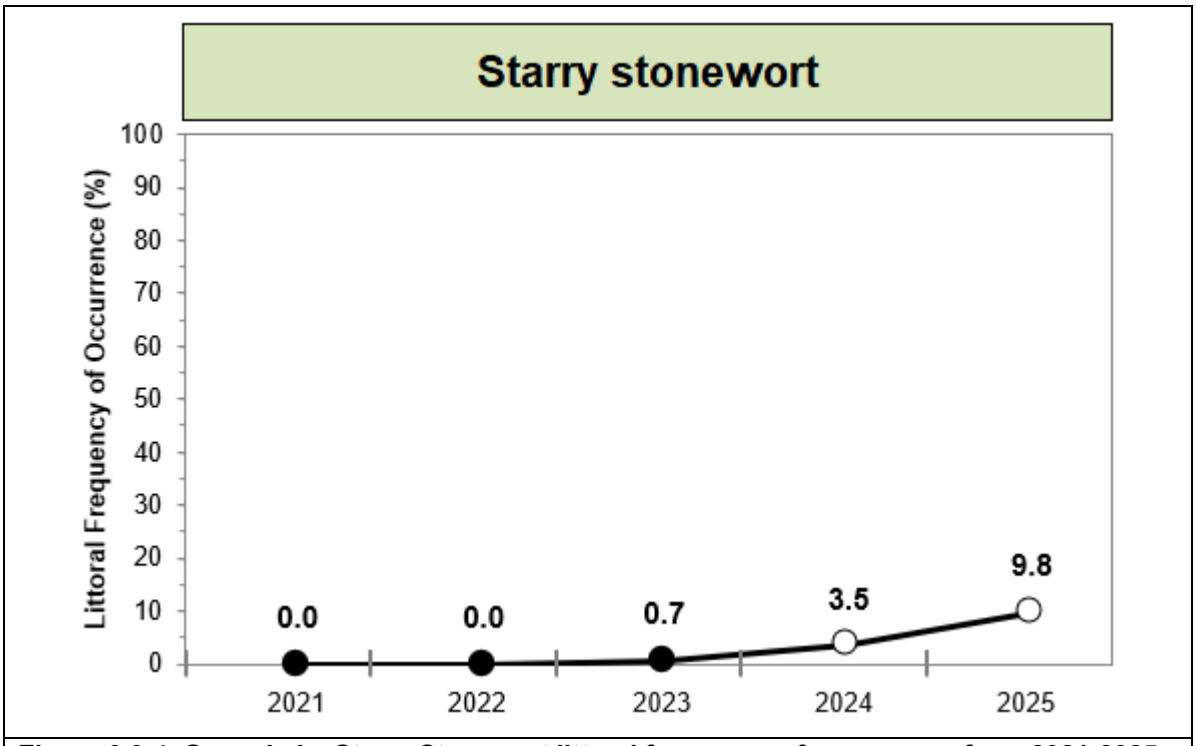


Figure 6.0-4. Grass Lake Starry Stonewort littoral frequency of occurrence from 2021-2025. White circles indicate changes in occurrence that are statistically valid; black circles indicate changes in occurrence that are not statistically valid.

5.0 ROUND LAKE DATA

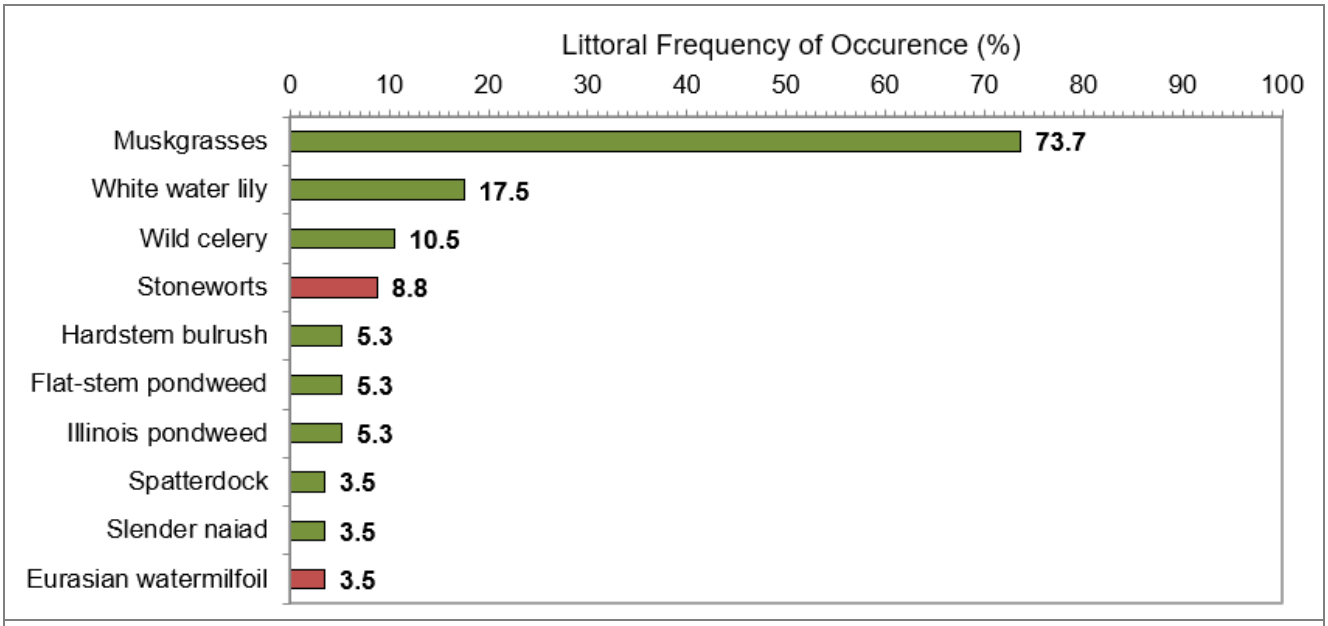


Figure 5.0-1. 2025 littoral frequency of occurrence of select Round Lake Aquatic Plants. Chart includes the top most frequently encountered species only.

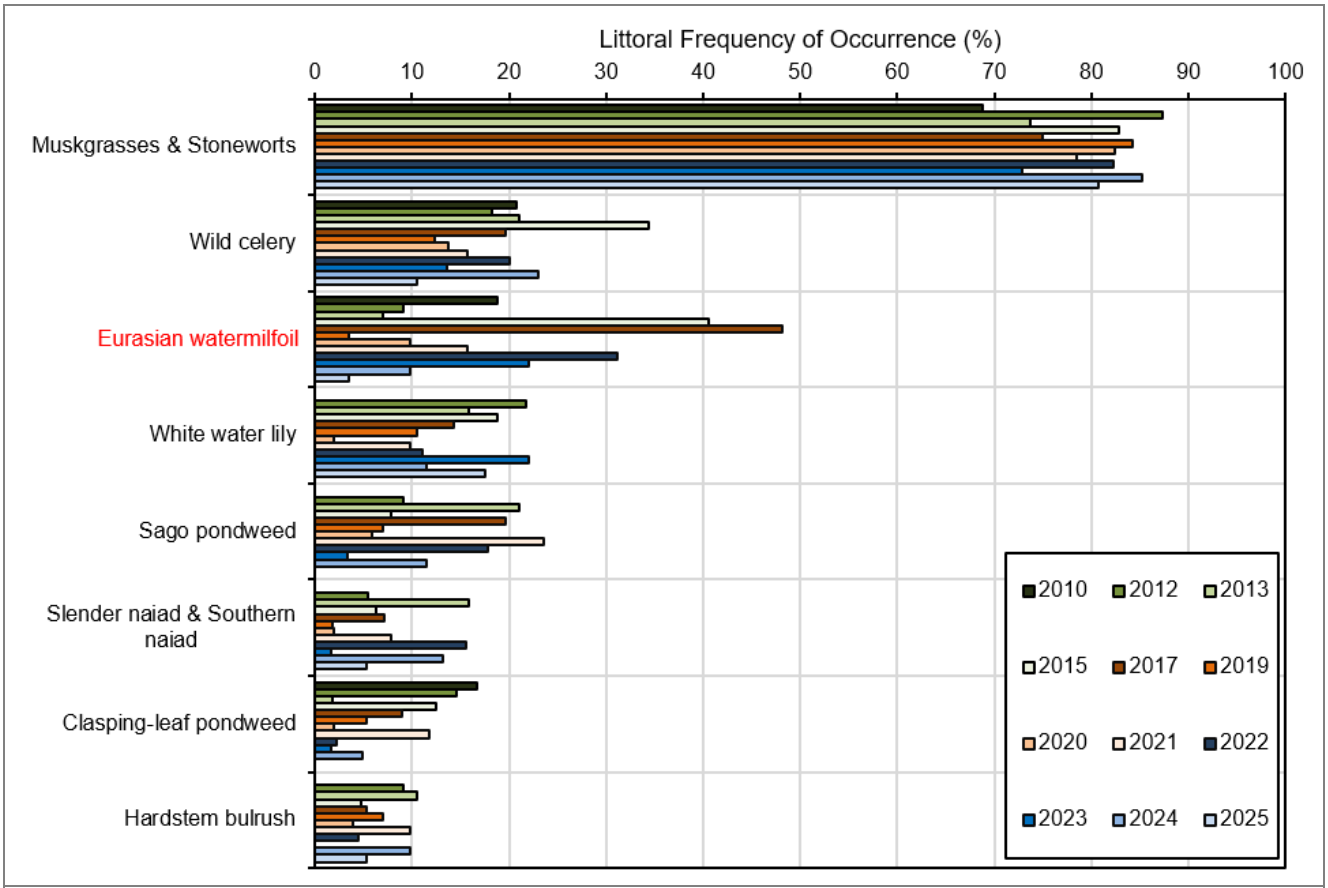


Figure 5.0-2. Round Lake aquatic plant littoral frequency of occurrence analysis. Chart includes the top most frequently encountered species only.

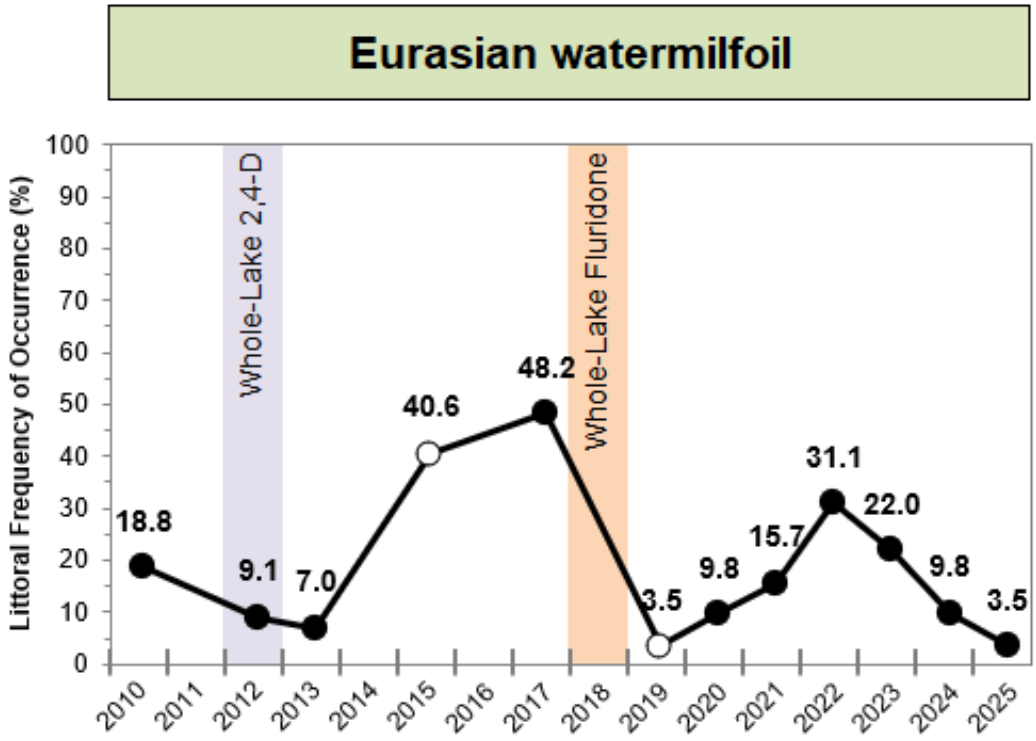


Figure 5.0-3. Round Lake HWM littoral frequency of occurrence from 2010-2025. White circles indicate changes in occurrence that are statistically valid; black circles indicate changes in occurrence that are not statistically valid.

N
W E
S

720
Feet

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

Sources:
Basemap: ESRI
Bathymetry: WDNR, Digitized by Onterra
Aquatic Plants: Onterra, 2025
Map Date: September 25, 2025 - RMF

Project Location in Wisconsin

Legend

HWM Survey Results (Septemeber 15, 2025)

- Highly Scattered *(none)*
- Scattered *(none)*
- Dominant *(none)*
- Highly Dominant *(none)*
- Surface Matting *(none)*
- Single or Few Plants
- Clumps of Plants
- Small Plant Colony
- Floating-leaf and/or Emergent Plant Colony *(2020)*

Cloverleaf Lakes

Shawano County, Wisconsin

2025 Late-Season HWM Survey Results