

Wisconsin Department of Natural Resources
Aquatic Invasive Species Grant Program
Grant # AIRR23319

Smoky Lake Eurasian Watermilfoil Control Project

Smoky Lake - Vilas County, WI and Iron County, MI

Final Reporting 2018-2019

Submitted To:

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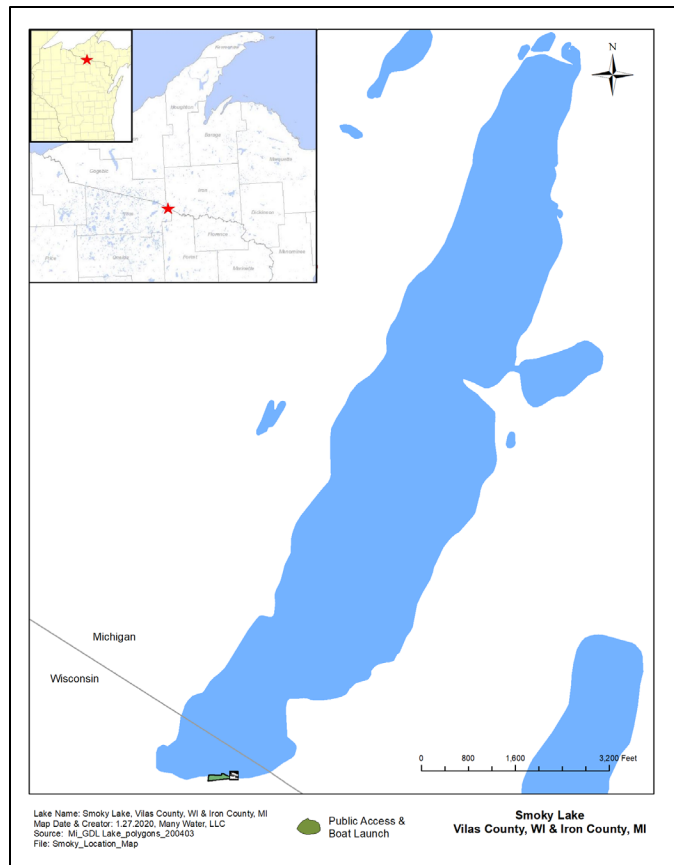
Submitted By:

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PROJECT OVERVIEW

Smoky Lake, located in Vilas County, WI and Iron County, MI, is a 612-acre two-story lake with a max depth of approximately 70 feet. The Wisconsin Department of Natural Resources (WDNR) considers Smoky Lake's general condition excellent for recreational use, fish and aquatic life, and fish consumption. Located in the Deerskin River watershed, land cover consists primarily of forests and wetlands. The Town of Phelps, WI owns and operates a public boat launch and recreational facility at the southern end of the lake. Riparian ownership includes the Town of Phelps, State of Wisconsin (Hwy Right of Way), Wisconsin, and Michigan riparians. Based on the most recent plant survey, Smoky Lake has a floristic quality index of 32.80, above the State and Northern Lakes and Forests Eco-Region mean values. Aquatic invasive species known to occur in Smoky Lake include Eurasian watermilfoil, Chinese mystery snails, rainbow smelt, and rusty crayfish. Freshwater jellyfish were observed in September 12th 2019 during DASH efforts. Samples were not collected nor has this observation been verified by the WDNR.



AQUATIC INVASIVE SPECIES MONITORING

AIS monitoring includes annual Eurasian watermilfoil population monitoring and early detection monitoring for other invasive aquatic and wetland species. The first survey, timed during the first half of the growing season, emphasizes reconfirming known EWM locations to refine management strategies and monitor for EWM and curly leaf-pondweed (CLP), mainly in shallow waters. The second survey, timed to capture EWM plants at or near the greatest growth potential, occurs during the second half of the growing season and includes deeper waters and off shore locations where vegetation grows.

Population monitoring surveys are qualitative and use a meander approach documenting visual observations, but also include the use of rake tosses and underwater cameras. A meander search focuses on traversing the littoral zone, in a zig-zag or "meander" fashion, emphasizing regions of the lake where aquatic plants grow and known areas for early colonization (eg. boat

landings). For a meander search to be effective, relatively low wind and no precipitation is required because visual identification is the primary method used. When necessary, aqua scopes, underwater cameras, and rake tosses are used to verify visual observations. At each location, a GPS point geo-references each site. On average, these sites are small, approximately 40 feet in diameter or less. For sites greater than 40 feet in diameter, the extent of coverage is determined by circumnavigating the perimeter. Polygons rather than GPS points graphically represent these sites. Each site is given an abundance estimate on a five part scale starting at very sparse to dense (surface matted).

2018

Early season monitoring took place on June 22nd 2018 (Appendix A). Mainly sparse to very sparse point based locations of EWM were detected within the far southwest bay, along with one single plant found within a private cove located along the far northeastern portion of the lake. Mid-late season monitoring took place on September 6th 2018. These surveys detected several deep-water colonies along the west shore between depths of 10 to 13 feet. Most colonies detected were sparse to very sparse, but a few small yet moderate density EWM colonies were observed. All locations of EWM occurred within the southwest bay and the southwestern shore. One small colony of about five plants was detected along the west shore about a half mile north of Wisconsin/Michigan boarder.

2019

Early season monitoring took place on June 27th and 28th, 2019 (Appendix A). This survey detected very little EWM, with most sites consisting of sparse to very sparse locations. Visual observations were supplemented with underwater camera work, which detected a few deeper locations up to 12.5 feet of water. Mid-late season monitoring took place on August 12th and 17th 2019. These survey efforts occurred after Aquatic Plant Management had conducted shallow water EWM removal within the southwestern portion of the lake. Most EWM detected occurred between 10 to 12 feet of water, with several moderate density colonies found both within the far southwest bay and western shoreline. Poor weather conditions during the second half of September, primarily wind and rain, pushed the post management evaluation back to October 7th 2019. This survey included the far southwest bay, along the southwestern shore to the first point about a half a mile north up the shoreline. EWM locations were congregated within a few regions of the lake. One single plant was found along the west shore, just south of the point in the same vicinity of the location identified in 2018. The remaining locations were in deeper water regions within the far southwest bay.

EWM MANAGEMENT

2018

From July 16th to 19th 2018, Aquatic Plant Management conducted hand harvesting on Smoky Lake with the use of snorkel gear (Appendix B). These efforts focused in waters up to approximately 8 feet deep within the southwest bay. Hand harvesting priorities included removing all plants within higher traffic areas, primarily along the west end (of the southwest

bay), working shallow to deep and removing the single plant within the private cove along the far northeast shore. Efforts removed 64.3 cubic feet of EWM from Smoky Lake. During these efforts, lake volunteers provided skimming support of EWM fragments from the surface. Based on volunteer observations, skimming was warranted and effective at removing numerous fragments during snorkel efforts.

DASH efforts with the use of divers intended to prioritize deeper water colonies, where bottom time is limited with snorkel pullers. Unfortunately, substantial, non-repairable issues to the DASH boat pump occurred during scheduled dive time at the beginning of September. This resulted in no DASH work taking place on Smoky Lake in 2018. Limited dive efforts focused on removing the farthest northern colony along the western shore. Divers removed seven plants weighing 2 pounds. In addition, the divers swam transects to the north and east along the cove out to the drop off along the rock point.

2019

On August 8th, 9th, and 14th Aquatic Plant Management conducted hand harvesting on Smoky Lake with the use of snorkel gear (Appendix B). As in the past, most efforts took place within the shallow water regions of the far southwest bay. In three days, a total of 43.5 cubic feet of EWM was removed. Again, lake volunteers provided skimming support of EWM fragments from the surface.

DASH efforts focused on deeper water colonies located within the far southwest bay and along the west shore. Sites were in both Michigan and Wisconsin, requiring WDNR (#NO-2019-64-5212M) and EGLE (WRP017294 v.1) permits. In 38.75 dive hours, a total of 796 pounds of wet weight EWM was removed (Appendix C).

Table 1: Summary of 2019 DASH Efforts.

Date	Location	Size (acres)	Diving Depth Range (ft)	DASH Boat Location		DASH Time (hrs)	EWM (lbs*)	Non-Target Harvest (lbs*)	% Incidental Harvest of Native Species	Total (lbs*)
				Lat (NAD 83)	Long (NAD 83)					
9/8/2019	MI	2.0	11 to 13	46.08371	88.95449	1.25	15.00	0.25	2%	15.25
9/9/2019	MI	2.0	11 to 13	46.08363	88.95446	12.00	221.25	2.00	1%	223.25
9/10/2019	MI	2.0	11 to 13	46.08363	88.95441	11.00	62.25	0.50	1%	62.75
	WI	8.1	9 to 15	46.08053	88.95476		125.75	1.25	1%	127.00
9/12/2019	WI	8.1	9 to 15	46.08062	88.95476	8.00	206.50	2.50	1%	209.00
9/14/2019	WI	8.1	9 to 15	46.08084	88.95553	6.50	165.50	0.25	0%	165.75
						38.75	796.25	6.75	AVE 1.5%	803.00

* wet weight

FUTURE MANAGEMENT OF AQUATIC INVASIVE SPECIES

Eurasian watermilfoil can potentially alter native aquatic plant ecosystems and cause recreational use and impairment issues. However not all lakes may experience high populations of Eurasian watermilfoil, particularly in Northern Wisconsin (Nault, 2016). Recent WDNR research suggests that across the State of Wisconsin, many lakes do not reach lake-wide high densities, as previously once thought. Nonetheless, it is important to recognize that aquatic ecosystems are dynamic. Annual variation does occur and further research is needed to understand how lake ecology and climate may play a role in EWM population variability.

Currently EWM makes up very small portion of the aquatic plant community on Smoky Lake. Between 2013 to 2019, EWM lake-wide ranged from .24 acres in 2016 to 1.09 acres in 2015, with an average of .65 acres since monitoring began in 2013 (Figure 1 & Table 2). Total acreage fell slightly below the 6-year average at 0.62 acres in 2019. Since seasonal monitoring began in 2013, the greatest increase in EWM acreage occurred from 2016 to 2017, and the greatest decrease in acreage occurred from 2015 to 2016. Level of hand removal efforts, seasonal weather patterns, and water levels may all contribute to the historical ebb and flow of EWM documented to date on Smoky Lake. Maintaining EWM at current low levels may require continued seasonal control with hand removal using a blend of snorkeling, diving, and DASH. With increases in water levels, it may become less and less practical to use snorkel pulling as a feasible option in the near future.

Figure 1: EWM abundance and acreage estimate 2013 to 2019 – Smoky Lake.

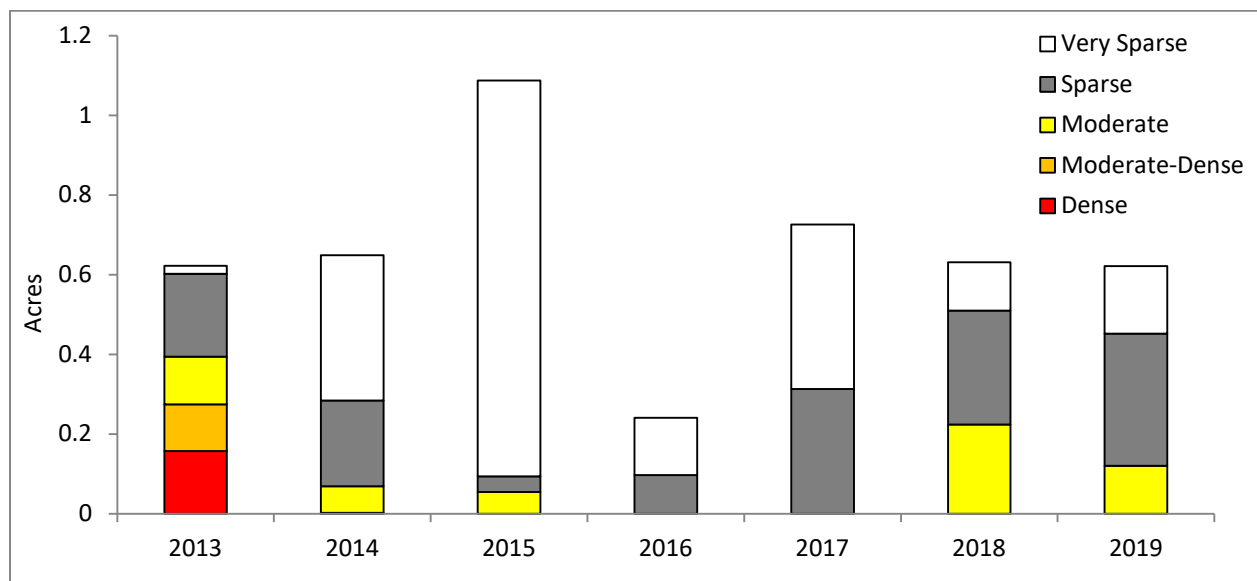


Table 2: EWM abundance and acreage estimate 2013 to 2019 – Smoky Lake.

	2013	2014	2015	2016	2017	2018	2019
Dense	0.16	0.00	0.00	0.00	0.00	0.00	0.00
Moderate-Dense	0.12	0.00	0.00	0.00	0.00	0.00	0.00
Moderate	0.12	0.07	0.05	0.00	0.00	0.22	0.12
Sparse	0.21	0.22	0.04	0.10	0.31	0.29	0.33
Very Sparse	0.02	0.36	0.99	0.14	0.41	0.12	0.17
TOTALS (acres)	0.62	0.65	1.09	0.24	0.73	0.63	0.62
Change (acres)	0.00	+0.03	+0.44	-0.85	+0.49	-0.10	-0.01
% Change	0%	+5%	+40%	-77%	+67%	-10%	-2%

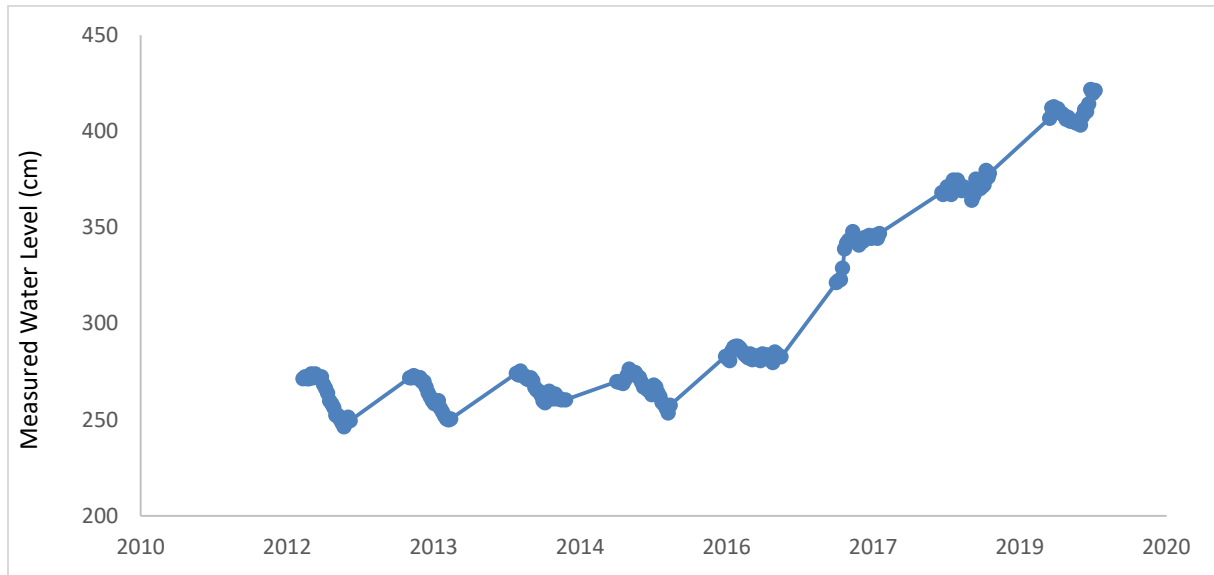
Continuing to map the abundance and distribution of EWM lake-wide helps to gauge current and future management needs and estimate annual efforts to maintain or control the population over time. At this low level, increases in resources above current levels may not result in a comparable decrease in EWM for the additional resources expended. In other words, there may be a point in management where no matter how much time or fiscal resources are dedicated; the results may not be rewarded with the extended investment. Smoky Lake finalized a Lake Management Plan in 2019. This plan outlines guiding principles and framework for the future of EWM management. An action item detailed in the plan includes developing data to track long-term trends in EWM with more quantitative methods. A scope of work proposed to the WDNR for funding includes beginning to track EWM and the native plant community over time in the region where most of the hand removal efforts and fiscal resources have been dedicated to since 2013. This data will provide ecological information over time on the native and invasive plants and data to make decisions on resources, efforts, and projected results.

Smoky Lake is a deep, clear oligotrophic lake. It is common for surface water temperatures to remain in the low seventy's to high sixties well into the summer months. Aquatic plants (and many other aquatic organisms) do use water temperatures, in addition to other weather and climate factors, to trigger dormancy and growth. For the past several years, early season surveys have been timed a week or two later than typically performed to account for cooler waters and delayed spring conditions. If these late spring patterns continue, the rationale for lake-wide early season surveys may need to be adapted to changing weather patterns.

Water levels on Smoky have steadily risen over the past several years (Figure 2). Being a seepage lake, this is an expected pattern over time. Since volunteer lake level monitoring began, from October 2012 to October 2019, Smoky Lake has recorded a change (+) in 172.9 cm, which is 5.67 feet. From 2016 to 2019, average depth of EWM plants detected rose from 5 feet in 2016 to 11.25 feet in 2019. Since most monitoring is done visually, increasing depths does make visual monitoring more challenging, even with Smoky's exceptionally clear water. Underwater cameras are a good tool to supplement visual observations; however, they do have their limitations, even for those that use them regularly to map EWM. The view from the

camera is limited, which may under estimate the distribution of plants, but may capture individual plants not easily visible from the surface. For scattered plants, such as the case for Smoky, EWM may be missed due to the limited field of vision. For volunteers, identification need to occur quickly before the camera moves on, and this may be a frustration. In this case, a better option may be a good sonar that can detected bottom structure and supplementing with rake tosses. Many sonar units today have the ability to show general shapes of leaf structure and height of vegetation. Rake samples can be used to identification species in these deeper waters.

Figure 2: Smoky Lake Water Level Monitoring, 2012-2019.

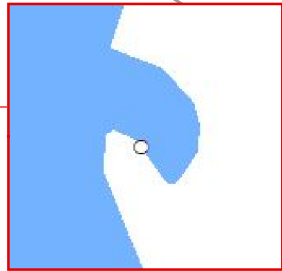
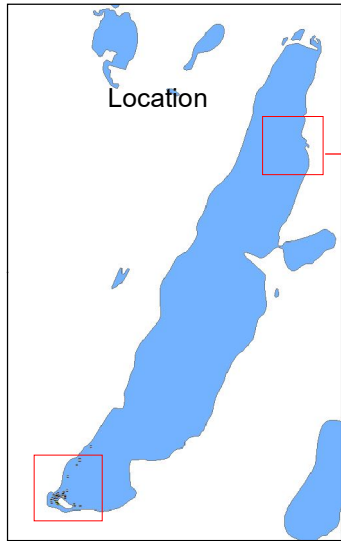


Nault, M. 2016. The science behind the “so-called” super weed. Wisconsin Natural Resources 2016: 10-12.

Wagner, K., Hauxwell, J. Knight, S., Mikulyuk, A., & Ridgely, D. 2006. Establishing a scientific framework for Eurasian watermilfoil management in Wisconsin. (<https://dnr.wi.gov/lakes/sayyestolakes/EWM2006Results.pdf>)

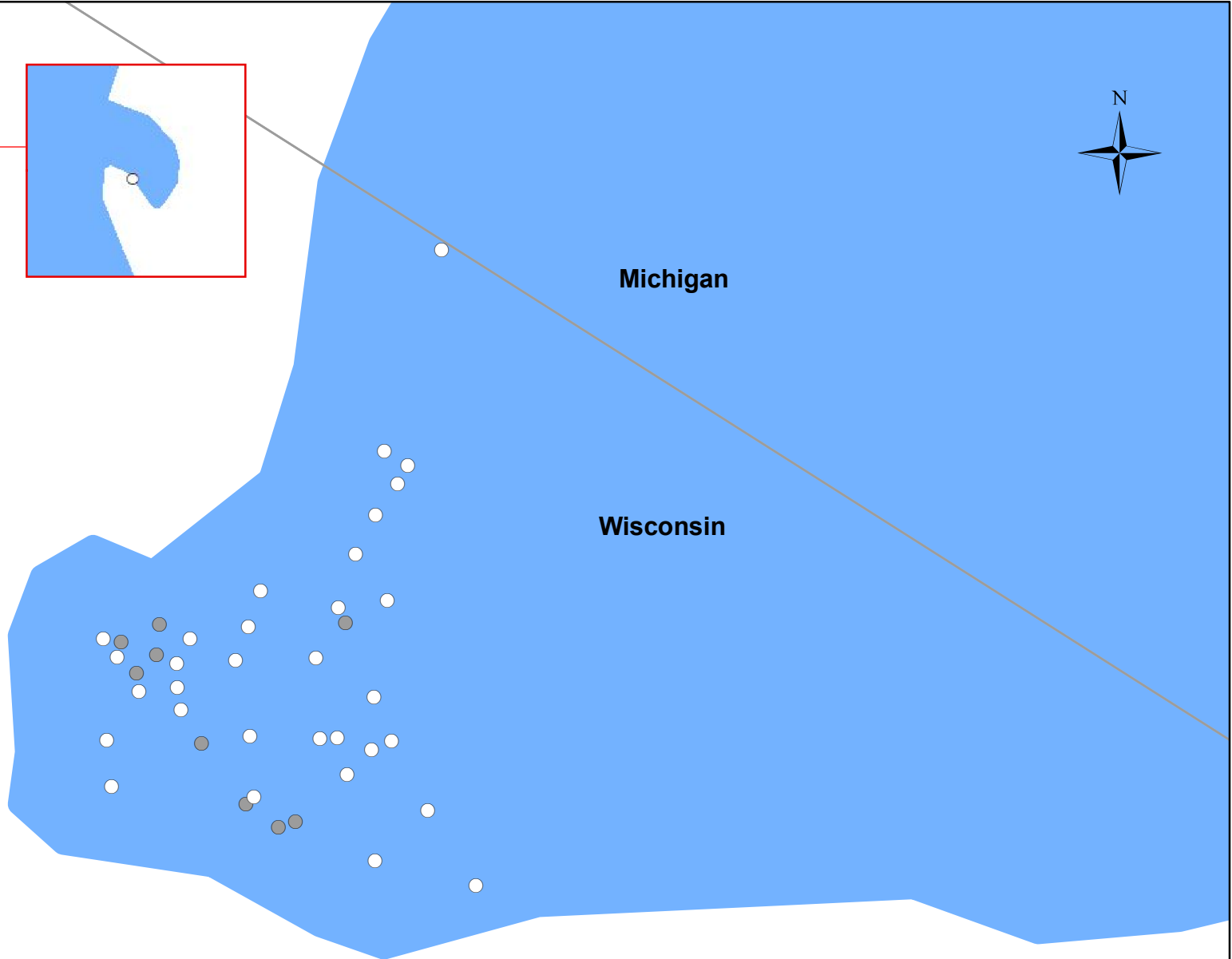
Appendix A

2018 & 2019 EWM Location Maps



Michigan

Wisconsin



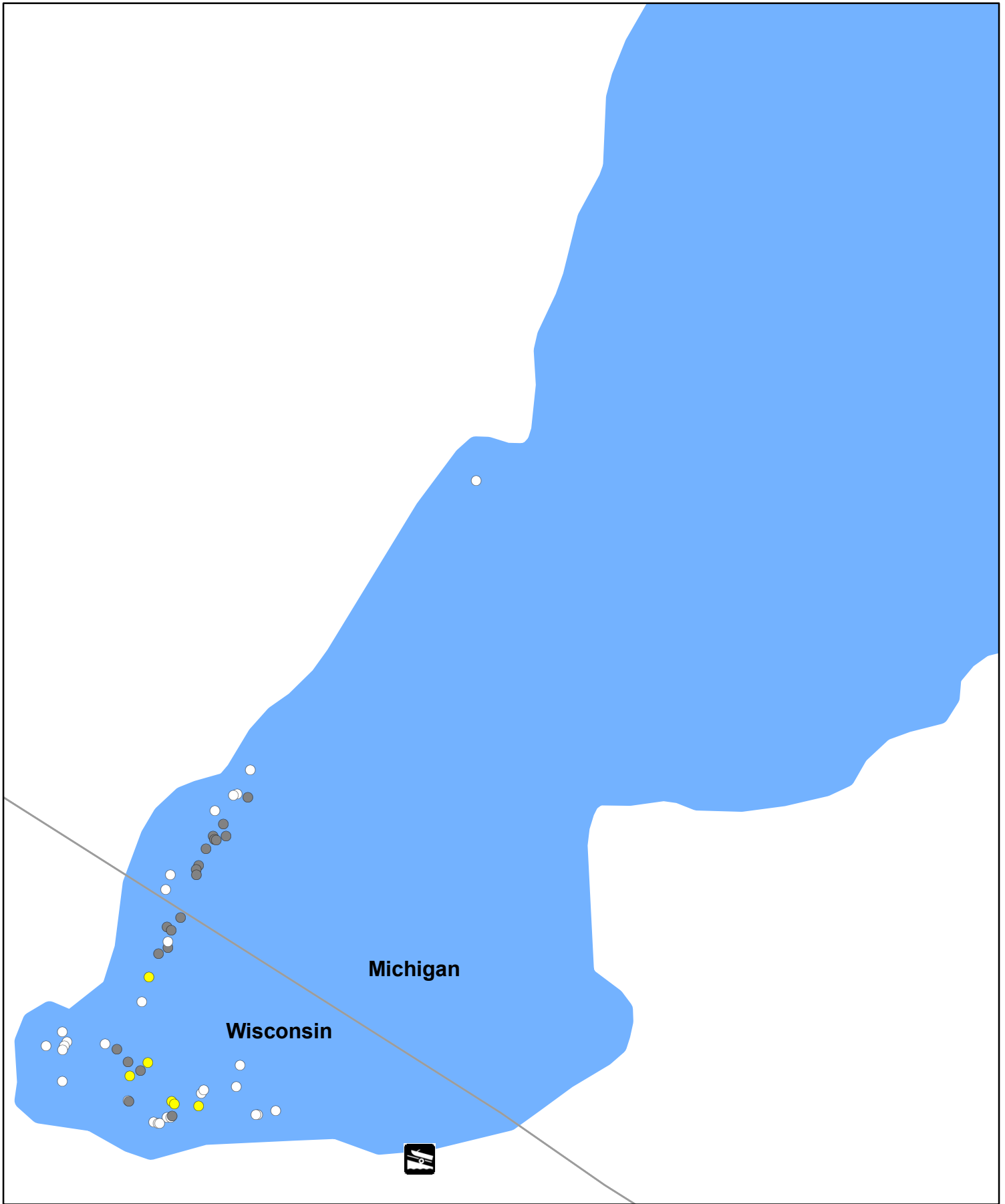
0 125 250 500 Feet

Lake Name: Smoky Lake
Map Date & Creator: 7.11.2018, Many Water, LLC
Source: EWM-Many Waters, Mi_GDL Lake_polygons_200403
File: ES_Smoky_2018

EWM Abundance Estimate

- Very Sparse
- Sparse
- Moderate
- Moderate-Dense
- Dense

**Early Season EWM Survey
Smoky Lake - Vilas County, WI
& Iron County, MI
2018**

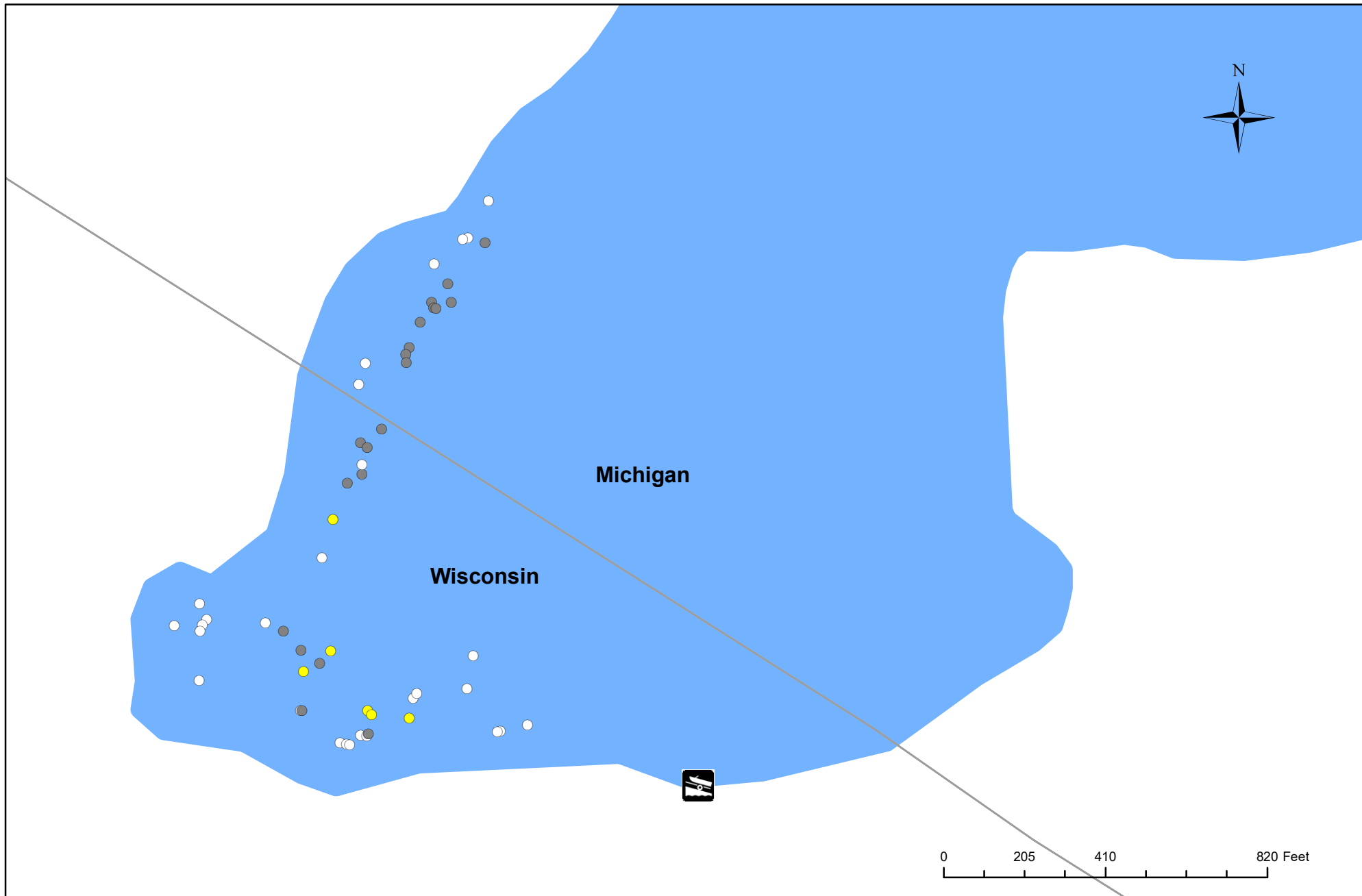


Lake Name: Smoky Lake
 Map Date & Creator: 1.30.2019, Many Water, LLC
 Source: EWM-Many Waters, Mi_GDL Lake_polygons_200403
 File: MLSS_Smoky_2018

EWM Abundance Estimate

- Very Sparse
- Sparse
- Moderate
- Moderate-Dense
- Dense

**Mid-Late Season EWM Survey
 Smoky Lake - Vilas County, WI
 & Iron County, MI
 2018**

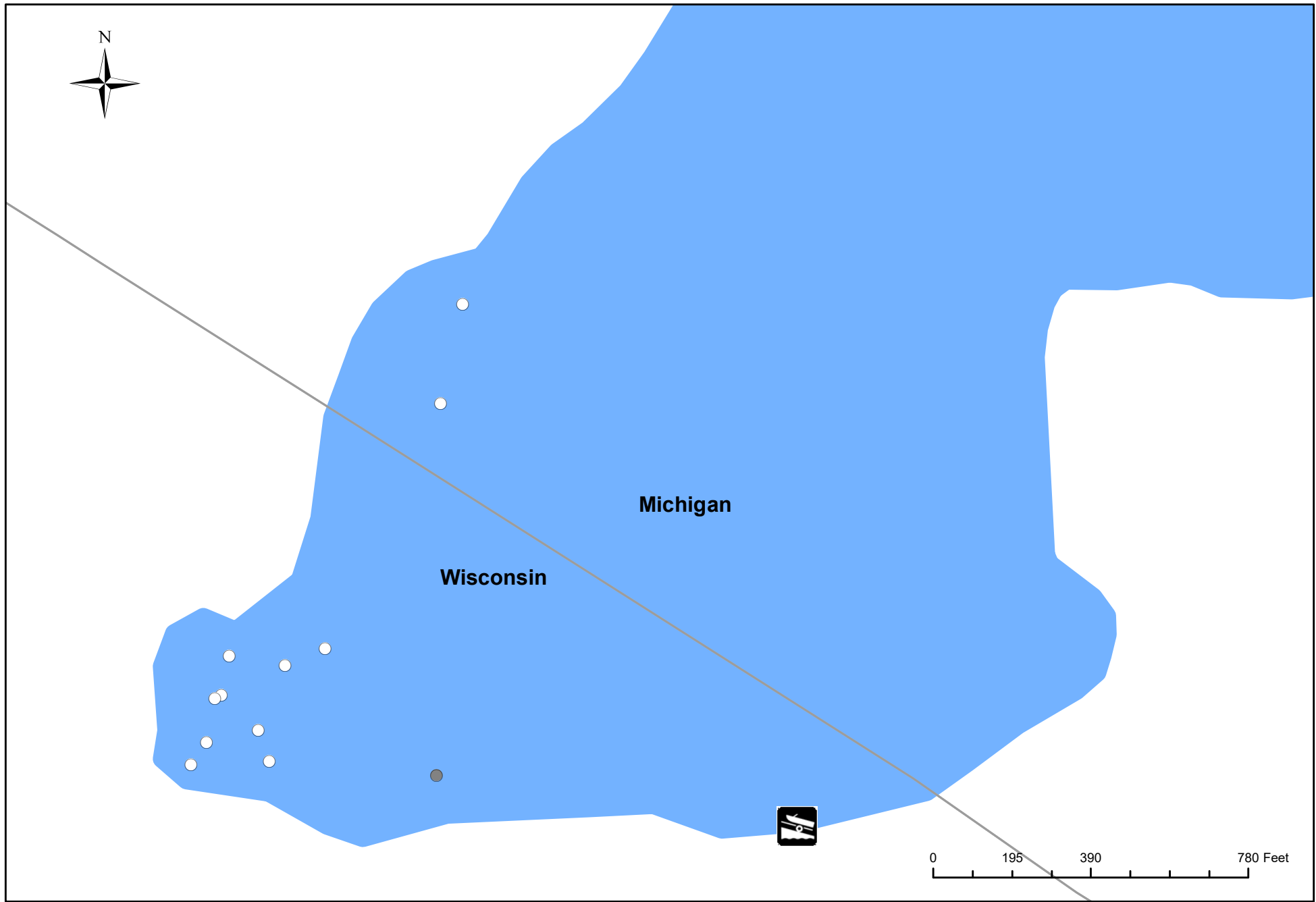


Lake Name: Smoky Lake
 Map Date & Creator: 1.30.2019, Many Water, LLC
 Source: EWM-Many Waters, Mi_GDL Lake_polygons_200403
 File: MLSS_Smoky_2018

EWM Abundance Estimate

- Very Sparse
- Sparse
- Moderate
- Moderate-Dense
- Dense

**End of the Year - EWM Locations
 Smoky Lake - Vilas County, WI
 & Iron County, MI
 2018**

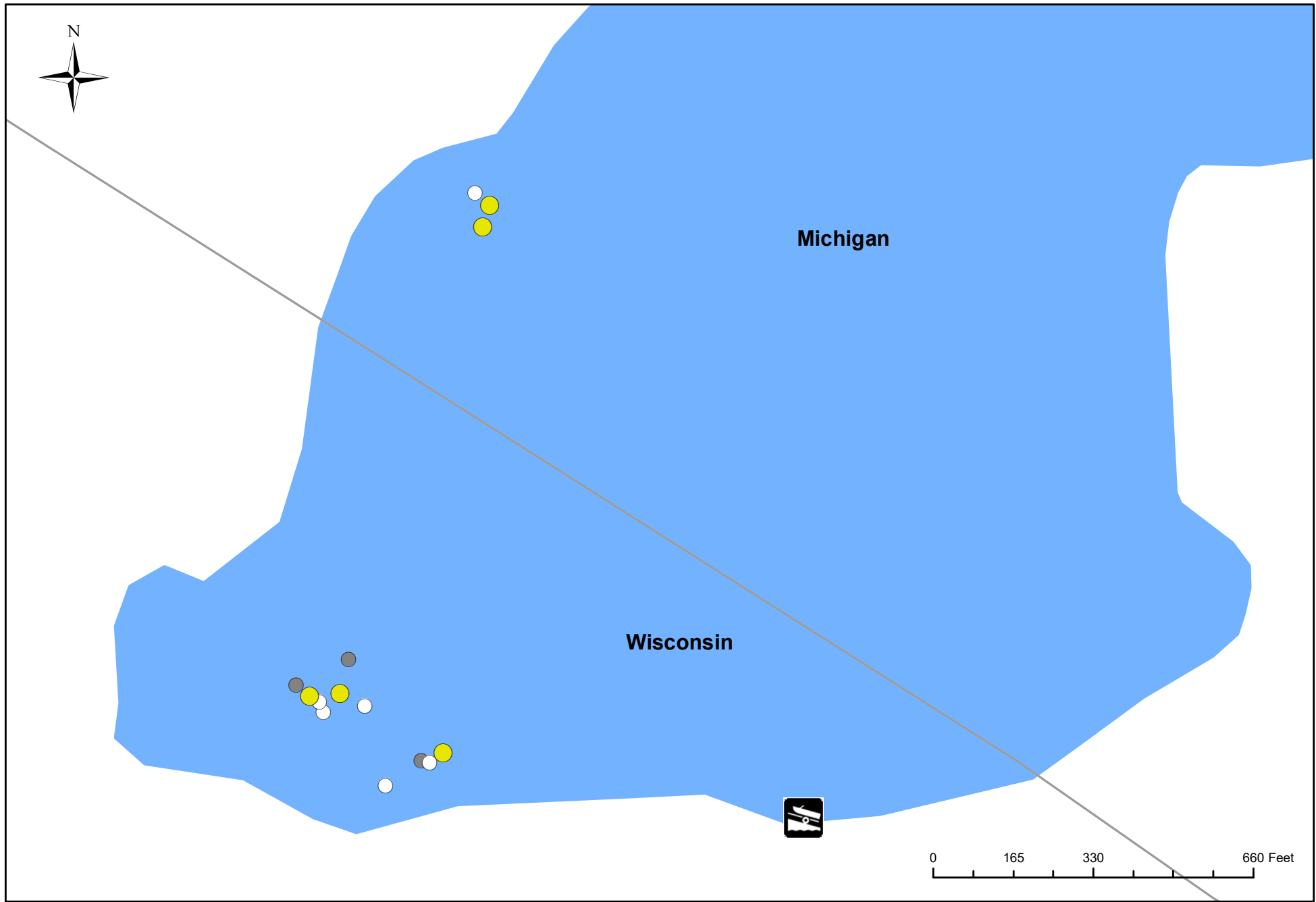


Lake Name: Smoky Lake
 Map Date & Creator: 1.9.20 Many Water, LLC
 Survey Dates: 6.27 & 28 2019
 Source: EWM-Many Waters, Mi_GDL Lake_polygons_200403
 File: ES_Smoky_2019

EWM Abundance Estimate

- Very Sparse
- Sparse
- Moderate
- Moderate-Dense
- Dense

Early Season AIS/EWM Survey
Smoky Lake - Vilas County, WI
& Iron County, MI
2019



Lake Name: Smoky Lake
 Map Date & Creator: 1.9.20, Many Water, LLC
 Survey Dates: 8.12. & 17. 2019
 Source: EWM-Many Waters, Mi_GDL Lake_polygons_200403
 File: Smoky_MLSS_2019

EWM Abundance Estimate

- Very Sparse
- Sparse
- Moderate
- Moderate-Dense
- Dense

**Mid/Late Season AIS/EWM Survey
 Smoky Lake - Vilas County, WI
 & Iron County, MI
 2019**



Lake Name: Smoky Lake
Map Date & Creator: 1.9.20, Many Water, LLC
Survey Dates: 10.7.2019
Source: EWM-Many Waters, Mi_GDL Lake_polygons_200403
File: Smoky_EOY_2019

EWM Abundance Estimate

- Very Sparse
- Sparse
- Moderate
- Moderate-Dense
- Dense

**End of the Year - EWM Locations
Smoky Lake - Vilas County, WI
& Iron County, MI
2019**

Appendix B

Aquatic Plant Management Dive Reporting – 2018 & 2019



Smoky Lake EWM Treatment Report 2018

PO Box 1134 Minocqua, WI 54548



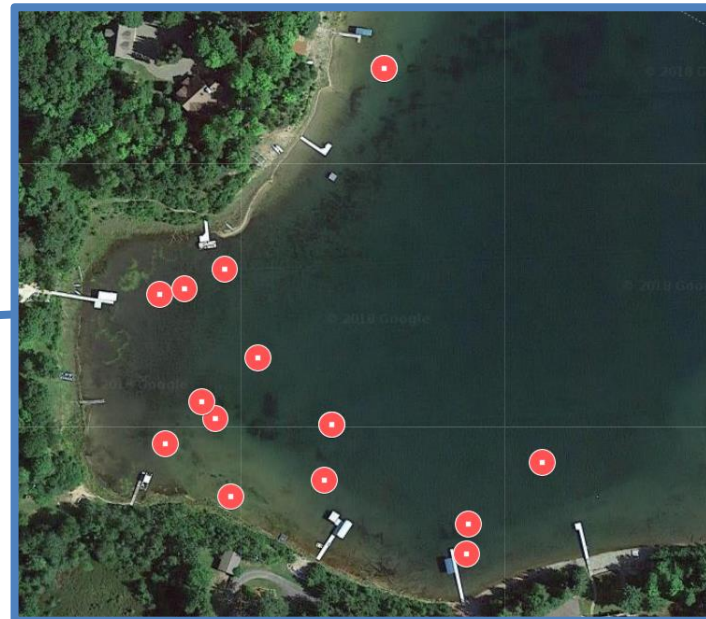
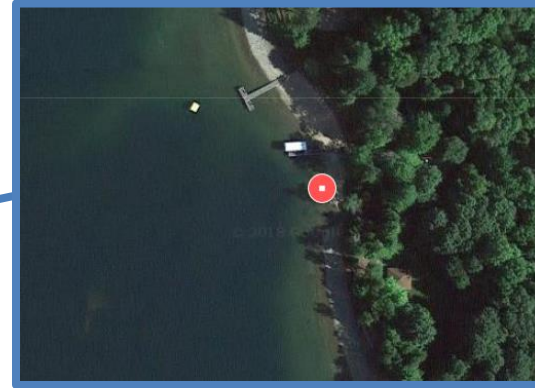
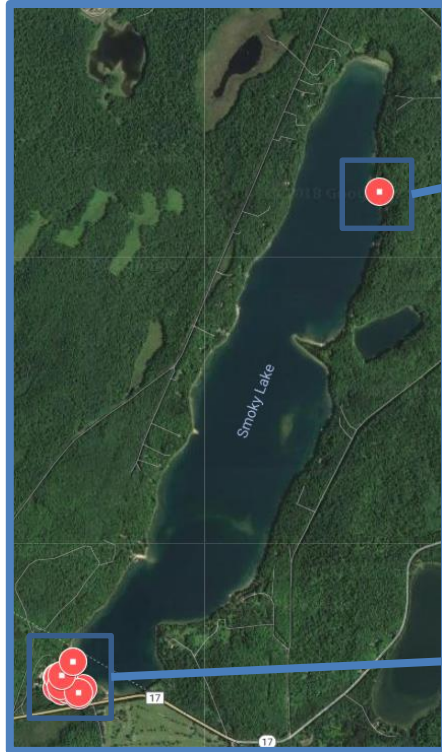
Smoky Lake EWM Treatment Summary 2018

Summary: On July 16th, 17th, 18th, and 19th, Aquatic Plant Management LLC (APM) Conducted hand-harvesting services of Eurasian Watermilfoil (EWM) on Smoky Lake in Vilas County, WI. Our divers were able to successfully remove 64.3 cubic feet of EWM from the lake. On July 16th and 17th, we focused our efforts on the EWM along the shoreline of the southwest bay. We also were able to remove the few EWM occurrences from the northeastern shoreline of the lake. On July 18th and 19th, we then focused on removal of EWM growing at depths between 6' and 12' along the same shoreline.

Conditions: Conditions on 7/16/18 were ideal for hand-harvesting. Mostly sunny skies and mild-high winds persisted throughout the day. An air temperature of 80 degrees was recorded, while the water temperature was recorded at 74 degrees. Conditions on 7/17/18 were also ideal for hand-harvesting. Partly cloudy skies and mild winds persisted throughout the day. Air and water temperatures were recorded at 70 degrees and 74 degrees, respectively. Conditions on 7/18/18 were ideal, with partly cloudy skies and mild winds. An air temperature of 79 was recorded, while the water temperature was recorded at 74 degrees. Conditions on 7/19/18 were ideal for hand-harvesting, with partly cloudy skies and mild winds persisting throughout the day. Air and water temperatures were recorded at 78 degrees and 74 degrees.

Recommendations: While we were able to remove all visible EWM from the 2018 control area, continued monitoring and management efforts are vital to preventing proliferation of EWM throughout Smoky Lake.

Map of Smoky Lake Dive Sites



 Dive Site



Detailed Diving Activities

EWM Treatment Results:

Date	Latitude	Longitude	Time Underwater (Hrs)	Water Depth	Substrate Type	Plant Condition	Native Growth	Estimated EWM Removed (Cubic Feet)
7/16/2018	46.10722	-88.93204	0.33	6.0	Organic	Brittle	Abundant	0.3
7/16/2018	46.08133	-88.95673	1.08	8.0	Organic	Brittle	Abundant	12.0
7/16/2018	46.08086	-88.95583	1.42	9.0	Organic	Brittle	Sparse	9.0
7/16/2018	46.08086	-88.95583	1.83	9.0	Organic	Brittle	Sparse	18.0
7/17/2018	46.08079	-88.95670	1.50	4.0	Sandy	Intermediate	Abundant	1.5
7/17/2018	46.08088	-88.95644	1.42	8.0	Sandy	Intermediate	Abundant	2.0
7/17/2018	46.08060	-88.95636	0.83	9.0	Sandy	Intermediate	Sparse	2.5
7/17/2018	46.08066	-88.95587	1.25	9.0	Sandy	Intermediate	Sparse	2.0
7/18/2018	46.08039	-88.95513	1.42	9.0	Sandy	Intermediate	Sparse	4.5
7/18/2018	46.08072	-88.95473	1.67	9.5	Sandy	Intermediate	Sparse	3.5
7/18/2018	46.08135	-88.95660	0.83	7.0	Organic	Intermediate	Abundant	4.0
7/18/2018	46.08110	-88.95622	1.08	9.0	Organic	Intermediate	Abundant	1.0
7/19/2018	46.08094	-88.95651	1.00	6.0	Organic	Healthy	Sparse	1.0
7/19/2018	46.08050	-88.95512	0.75	6.0	Organic	Healthy	Abundant	1.0
7/19/2018	46.08215	-88.95556	0.75	6.0	Organic	Healthy	Abundant	1.0
7/19/2018	46.08142	-88.95639	0.92	6.0	Organic	Healthy	Abundant	0.5
7/19/2018	46.08215	-88.95556	0.67	6.0	Organic	Healthy	Abundant	0.5
Total								64.3



Smoky Lake EWM Treatment Report 2019

PO Box 1134 Minocqua, WI 54548

Smoky Lake EWM Treatment Summary 2019

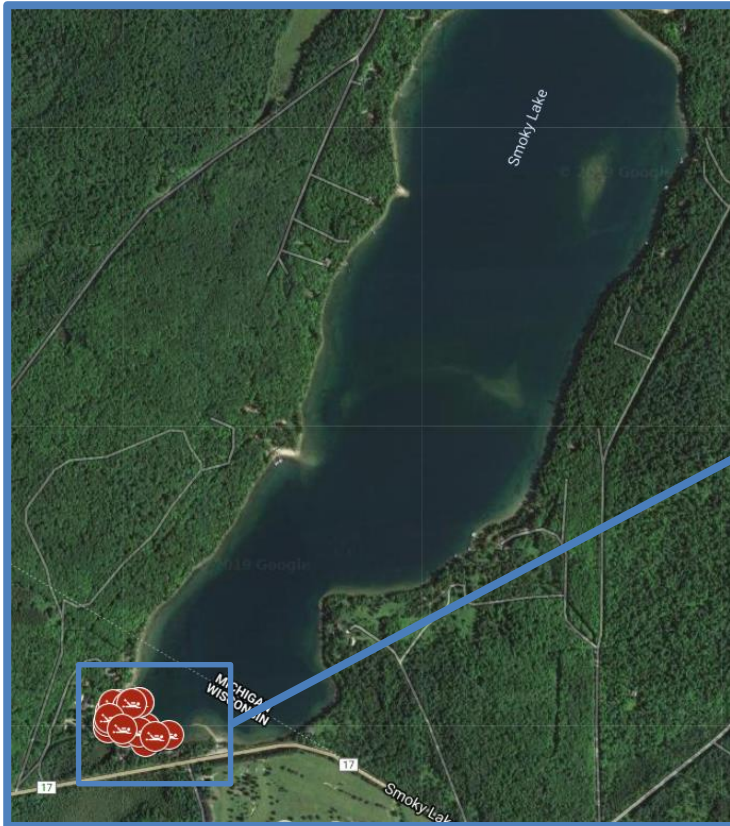
Summary: On August 8th, 9th and 14th Aquatic Plant Management LLC (APM) conducted traditional Hand Harvesting of Eurasian Watermilfoil (EWM) on Smoky Lake in Vilas County, WI. Utilizing GPS coordinates provided by Many Waters LLC, the dive team focused their efforts on the scattered plants in the southeastern end of the lake. There were some scattered plants along the shoreline under some downed trees that were targeted, but not included on the original map. In total, the dive team was able to remove **43.5 cubic feet of EWM** from the lake over the course of 3 days.

Conditions:

- 6/25/19: Weather was cloudy with an air temperature of 74 degrees; water temperature was 64 degrees with an 12.0 foot clarity reading from the Secchi disk
- 6/26/19: Weather was sunny with an air temperature of 77 degrees; water temperature was 65 degrees with an 11.0 foot clarity reading from the Secchi disk
- 8/15/19: Weather was sunny with an air temperature of 72 degrees; water temperature was 74 degrees with an 12.5 foot clarity reading from the Secchi disk

Recommendations: The EWM on the southern end of Smoky Lake was scattered and hand harvesting was an effective method of removal. However, the dive location on the eastern end of the bay at a depth of over 15 would a good area for Diver Assisted Suction Harvesting (DASH) due to the depth and density of the EWM. The Smoky Lake Association should continue to closely monitor the EWM population in order to evaluate the effectiveness of the removal efforts.

Map of Smoky Lake Dive Sites



Detailed Diving Activities

Date	Latitude	Longitude	Time Under-water	AIS CF Removed	AIS Density	Avg Water Depth	Native By-Catch (CF)	Native Species	Native Density	Substrate Type
8/8/19	46.08079	-88.95548	0.92	3.0	Low	7.5	<0.5	Elodea	Medium	Sand
8/8/19	46.08079	-88.95684	1.08	2.5	Low	8	0.00	None	Medium	Sand
8/8/19	46.08084	-88.95625	1	5.0	Medium	18	<0.5	Pondweeds	Medium	Organic/Sand
8/8/19	46.08044	-88.95547	0.92	2.5	Medium	16	<0.5	Pondweeds	Medium	Organic/Sand
8/8/19	46.08138	-88.95648	1	2.5	Low	8	<0.5	Pondweeds	Medium	Organic/Sand
8/8/19	46.0812	-88.95679	1	3.0	Low	9	<0.5	Pondweeds	Medium	Organic/Sand
8/9/19	46.08062	-88.95463	0.42	1.0	High	16	0.00	None	Low	Sand
8/9/19	46.08138	-88.95670	1.08	3.0	Medium	14	<0.5	Pondweeds	Medium	Organic/Sand
8/9/19	46.08146	-88.95576	0.92	3.0	Medium	17	<0.5	Pondweeds	Medium	Organic/Sand
8/9/19	46.08133	-88.95615	0.92	2.0	Medium	15	0.00	None	Medium	Organic/Sand
8/9/19	46.08068	-88.95626	0.83	2.0	Medium	15	0.00	None	Medium	Organic/Sand
8/9/19	46.08146	-88.95576	0.83	2.0	Medium	10	0.00	None	Medium	Organic/Sand
8/14/19	46.08093	-88.95687	0.83	0.5	Low	8	0.00	None	Medium	Organic/Sand
8/14/19	46.08066	-88.95575	0.92	2.5	Medium	14	0.00	None	Medium	Organic/Sand
8/14/19	46.08141	-88.95601	1.17	3.0	Medium	16	0.00	None	Medium	Organic/Sand
8/14/19	46.08102	-88.95680	1.08	1.5	Low	7.5	0.00	None	Medium	Organic/Sand
8/14/19	46.08057	-88.95512	0.92	4.0	High	16.5	0.00	None	Medium	Organic/Sand
8/14/19	46.08075	-88.95633	0.67	0.5	Low	3.5	0.00	None	Medium	Organic/Sand
Total				43.5						

Appendix C

WDNR DASH Reporting - 2019



2527 Lake Ottawa Road
Iron River, MI 49935
906.284.2198

Summary of Diver Assisted Suction Harvesting Efforts

Smoky Lake – Vilas County, WI & Iron County, MI

2019 WDNR Mechanical Harvesting Permit Annual Report

WDNR Permit ID: NO-2019-64-5212M

Submitted To:

Smoky Lake Preservation Corporation, Inc.
and
Wisconsin Department of Natural Resources

Submitted By:

Many Waters, LLC
2527 Lake Ottawa Road
Iron River, MI 49935

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Figure 1: 2019 DASH Work Area - WI

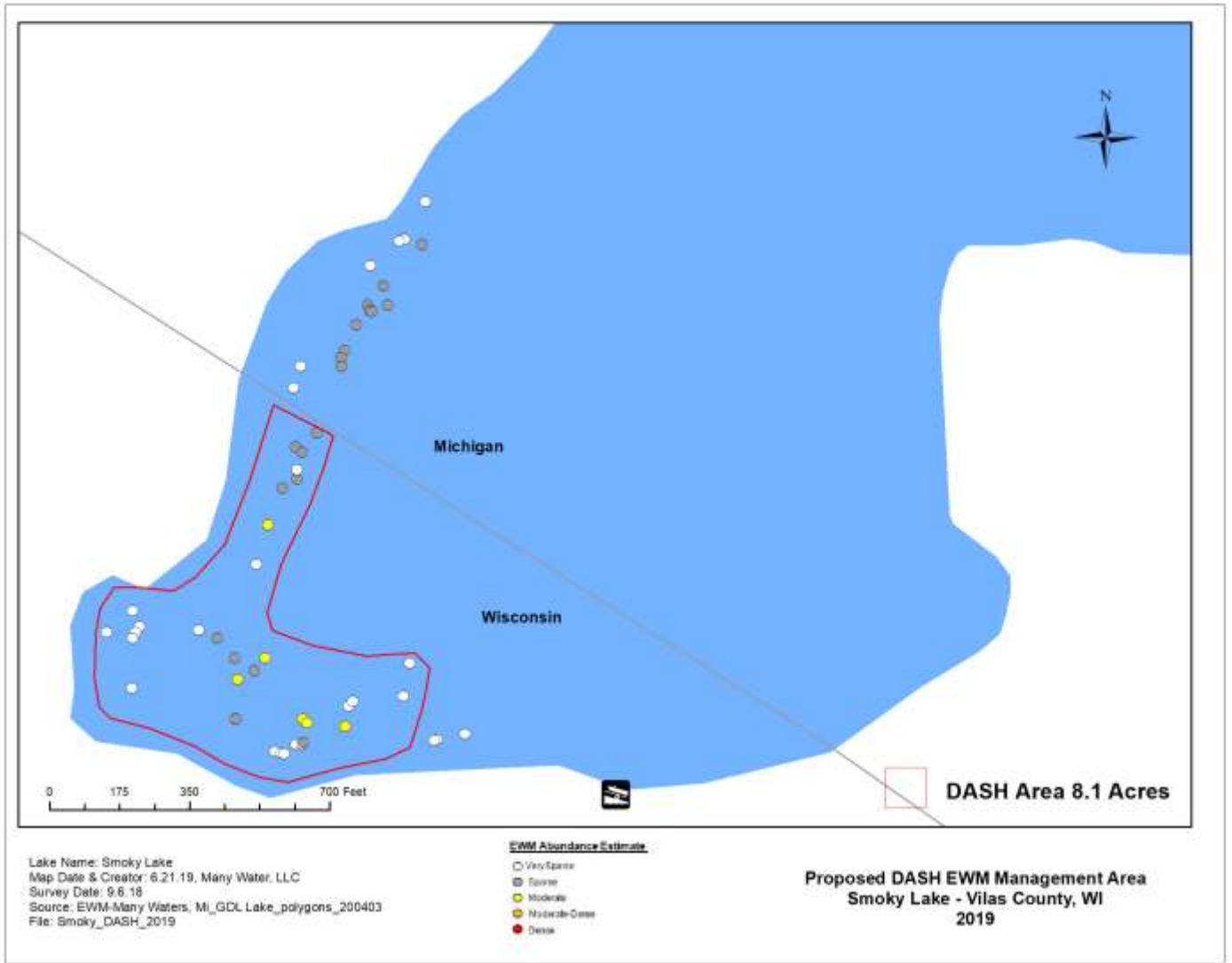
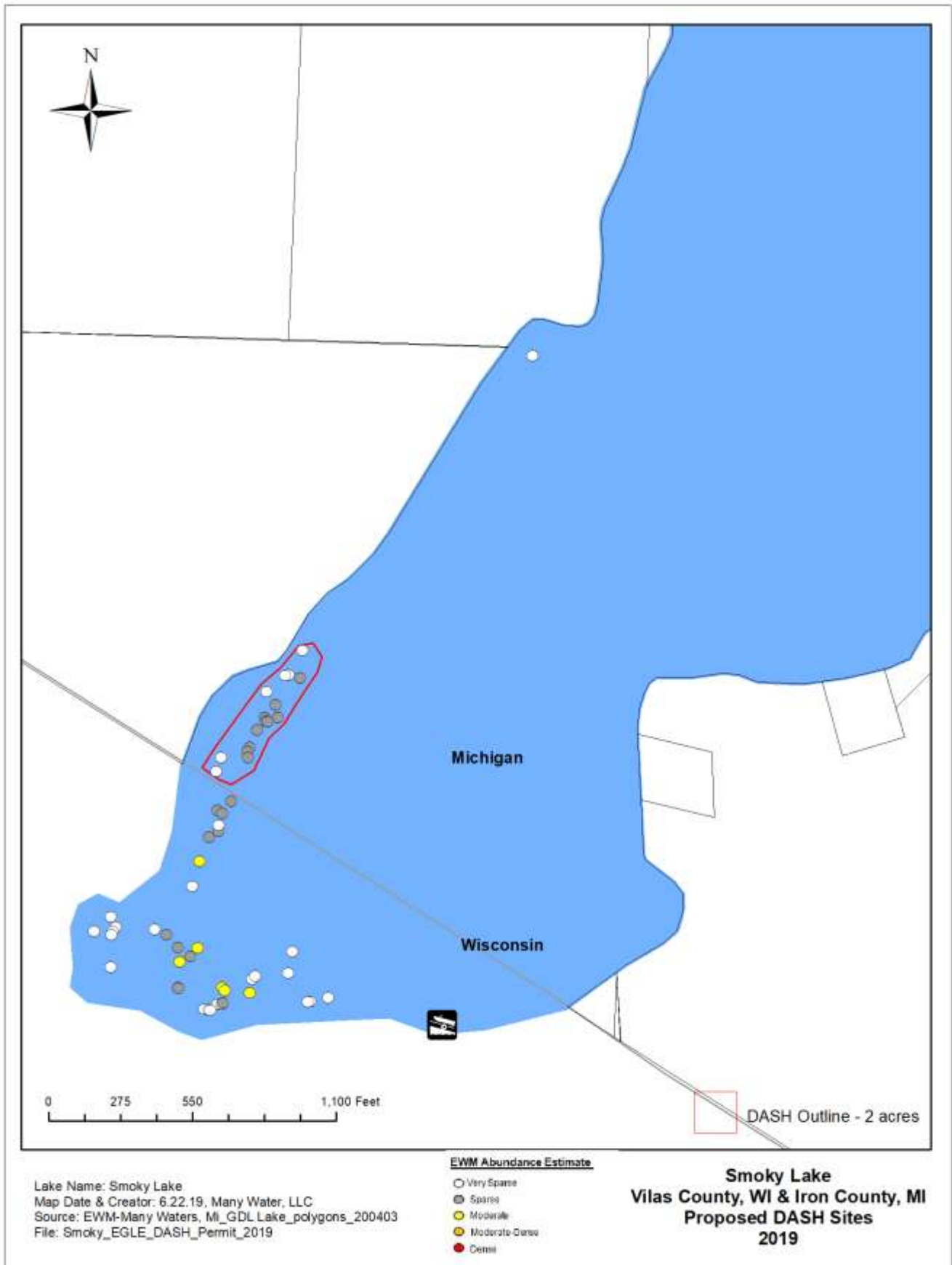


Figure 2: 2019 DASH Work Area – MI



Summary

Table 1: Summary of DASH Efforts

Date	Location	Size (acres)	Diving Depth Range (ft)	DASH Boat Location		Dive Time (hrs)	EWM (lbs*)	Non-Target Harvest (lbs*)	% Incidental Harvest of Native Species	Total (lbs*)
				Lat (NAD 83)	Long (NAD 83)					
9/8/2019	MI	2.0	11 to 13	46.08371	88.95449	1.25	15.00	0.25	2%	15.25
9/9/2019	MI	2.0	11 to 13	46.08363	88.95446	12.00	221.25	2.00	1%	223.25
9/10/2019	MI	2.0	11 to 13	46.08363	88.95441	11.00	62.25	0.50	1%	62.75
	WI	8.1	9 to 15	46.08053	88.95476		125.75	1.25	1%	127.00
9/12/2019	WI	8.1	9 to 15	46.08062	88.95476	8.00	206.50	2.50	1%	209.00
9/14/2019	WI	8.1	9 to 15	46.08084	88.95553	6.50	165.50	0.25	0%	165.75
						38.75	796.25	6.75	AVE 1.5%	803.00

* wet weight

Daily Log

September 8th 2019

Weather- Heavy overcast, 60°F, ENE winds 5-10 mph

Water clarity was good. However, diving depths and dark overcast skies reduced diver visibility somewhat. DASH efforts focused on the denser EWM colonies along the western shore in Michigan. Approaching weather limited water time, and DASH efforts. One and a quarter dive hours removed 15 pounds of EWM.

September 9th 2019

Weather- Cloudy, 58°F, SE winds 5-10 mph

Water clarity remained good. Divers worked deeper EWM colonies along the western shore in Michigan. Twelve dive hours (2 divers) removed 221.25 pounds of EWM. Incidental harvest of native plant species included clasping-leaf pondweed, fern pondweed, and slender naiad.

September 10th 2019

Weather- Overcast, 69°F, W wind 10-20 mph, light drizzle

Water clarity was good, but again poor weather conditions, with on and off rain/drizzle and diving depths decreased diving visibility. Incidental harvest of native plant species remained similar to previous DASH efforts. Efforts were split between the deeper water colonies worked in the previous days in Michigan along the west shore and the southeast portion of the Wisconsin DASH permit area. Eleven dive hours (2 divers) removed a total of 188 pounds of EWM.

September 12th 2019

Weather- Overcast, 54°F, ENE winds 10-15 mph, light mist

Overcast and misty/rainy weather conditions continued. Divers continued to work deeper EWM colonies along the southeastern portion of the Wisconsin DASH permit area. The soft substrate of the southern bay required diver to maintain minimal contact with the bottom to avoid creating plumes that reduces visibility. Incidental harvest of native plant species remained similar to previous DASH efforts. Eight dive hours (2 divers) removed 206.5 pounds of EWM.

September 14th 2019

Weather- Sunny, 60°F, light west winds

Water clarity was good and mostly sunny skies improved diver visibility, especially when working deeper water. Divers continued to work deeper EWM colonies along the central portion of the Wisconsin DASH permit area. Incidental harvest of native plant species remained similar to previous DASH efforts, however divers noted fresh water jellyfish. Six and a half dive hours removed 165.5 pounds of EWM.

Appendix D

Summary of AIS Prevention and Lake Stewardship Activities

2018- 2019

Overview of Smoky Lake Organization AIS Efforts:

Since the discovery of Eurasian water milfoil (EWM) in 2013, the Smoky Lake Property Owners Association (SLPOA) and the newly incorporated Smoky Lake Preservation Association have worked to educate members about proper identification and control methods, proper remediation techniques, and to identify available financial resources. It has worked to gather volunteers to offer their time, talents, and financial resources to help diminish the impact in pristine Smoky Lake. There is an established Aquatic Invasive Species Committee, now renamed the Conservation Committee, that has worked to oversee issues, develop planning strategies and assure compliance with WDNR grant deadlines and reporting requirements. A Lake Management Planning Steering Committee was formed to coordinate the efforts needed to develop a WDNR approved Lake Plan and the Smoky Lake Comprehensive Lake Management Plan was approved in December 2019. The Board of Directors for the Smoky Lake Preservation Association is currently developing an organizational overview plan and supporting document to assure implementation of the Action Plan reflected in the plan.

Lake Association History Affecting WNDR Funding.

Smoky Lake Property Owners Association (SLPOA) is the long-standing Michigan lake-owners association for this border lake. It has worked with the Town of Phelps as the sponsor to submit WDNR grants for the benefit of Smoky Lake.

In October of 2016 a new Wisconsin Corporation, Smoky Lake Preservation Association, Inc. was filed with the State of Wisconsin and is dedicated to conservation and preservation efforts for the lake. A fundraising appeal to lake-owners continues with a positive response. This corporation was approved as a Qualified Lake Organization in December 2017, which now permits direct funding requests to the WDNR without the need for sponsorship.

WDNR Grants and Program Participation:

WDNR Sponsored Grants with Town of Phelps:

The Wisconsin DNR has awarded two \$20,000 Aquatic Invasive Species Early Detection and Response grants for remediation work on Smoky Lake. These first two grants were sponsored grants working with the Town of Phelps. The first grant funds were fully utilized in 2014-15 and the second grant was utilized in 2016-17. A sponsored grant application for a WDNR Lake Planning Grant was submitted in December 2016 and awarded in the spring of 2017, with a lake plan developed and approved by the WDNR in December 2019.

WDNR Grants Awarded to SLPA

A third \$20,000 Early Detection and Response Grant application was submitted by the Smoky Lake Preservation Association and awarded in July 2018, which approved expenses for the grant period beginning in May 1, 2018 and through December 2019.

Clean Boats Clean Waters Program

In 2016 and 2017, SLPOA at its own expense contracted for 100 hours with the University of Wisconsin-Oshkosh to participate in the Clean Boats Clean Waters program to provide boater AIS education and observations at the Smoky Lake Boat Launch. Volunteers also attended the

regional training sessions offered by Cathy Higley and worked to establish contact with the student volunteers over the summer.

The Smoky Lake Preservation Association, Inc., applied directly for a WDNR grant for the summer of 2018 having completed the one-year waiting period following incorporation, and was awarded a grant for 200 hours of contracted time. A grant of \$2,955 was awarded for 2019 and again in 2020.

EWM Remediation Efforts:

Remediation has consisted of hand removal methods during the first two years of control efforts. In early 2016, after considerable study and research with other regional lakes, SLPOA met with the WDNR to discuss the possible use of herbicides. The WDNR determined that the extent and density of EWM did not justify the issuance of a permit and so hand pulling efforts have continued during the summer of 2016, 2017, 2018, and 2019. The extent and density did not change dramatically in 2018 or 2019. The presence of milfoil continues, largely in the southwest bay, but the population continues to spread in isolated clusters north across the state boundary along the western shore. A few stray plants discovered on the far northern parts the lake, and with a colony growing in a private inlet on the northeast shore, but these colonies were removed following discovery.

Changing Lake Conditions:

Lake levels rose close to 2.5 feet between the winter of 2016 and the fall of 2017. Lake levels continued to rise by 9 inches in both 2018 and again in 2019. Early survey work found far less milfoil at shallow depths and more at deeper depths in the summers of 2017, 2018, and 2019. This made volunteer removal sessions less feasible, and so reliance on professional remediation through hand removal was essential.

2018 and 2019 Professional Contracting:

During the summer of 2018 professional program oversight and survey efforts was provided by Many Waters using grant funding. Though deeper water remediation was intended using the DASH boat, Many Waters experienced an equipment failure during its scheduled late summer work period and diving efforts were limited. The Many Waters of \$4,282.92 primarily reflected consulting and scheduled survey work.

In 2019 the decision was made increased DASH deeper water remediation earlier in the summer of 2019. Efforts were concentrated on the deeper sections of the southwest bay and along the west shore with sites located in Michigan and Wisconsin. Contracted services provided by Many Waters, LLC totaled \$11,890.61.

SLPA also continued to contract directly for additional 3 days of professional snorkel removal sessions with Aquatic Plant Management. Cost for these remediation efforts for Aquatic Plant Management Services totaled \$5,775.70

Lake Association Monitor Volunteer Program:

Though volunteers provided less remediation efforts SLPOA and SLPA continue to rely on its dedicated group of lake volunteers to visually monitor assigned areas. This program is

coordinated by Lew Raker and is assisted in data collection by Mary Lou Raker. In 2018 a successful effort was made to increase the number of volunteer lake monitors, with a training session held for volunteers in June of 2018. Volunteers are asked to track their time, boat usage and report observations. The goal is to identify areas of established weed growth and to look for the spread of EWM throughout the lake so that new outgrowth can be immediately attacked. These volunteers were key in identifying the new colony on the northeastern shore. A team of volunteers also worked to assist the Aquatic Plant Management snorkelers during their work, with the volunteer hours contributing to offset the cash match for the current WDNR grant.

SLPOA volunteers reported volunteer time with a reporting value of \$2,326.92 and donated watercraft time (pontoon boats, outboard motor boats, kayaks, canoes and rowboats) with a value of \$836.17. Many Waters also donated professional time in the amount of \$179.90. The total volunteer hours value of \$3,342.99 will be available toward the cash match.

Outreach Efforts

SLPOA as a Michigan lake association has continued to work on an ongoing basis with the Town of Phelps in its sponsored relationship for WDNR projects. This relationship continues with the recent WDNR Lake Planning Grant which concluded in 2019. Drafts of the Comprehensive Lake Management Plan, were submitted to a number of regional state and local regulatory offices and other area environmental groups. The goal will be to continue to foster and develop these relationships. The Town of Phelps has a boat launch on the lake and been consistently strong in supporting SLPOA efforts on remediation and conservation efforts. A SLPOA/SLPA representative sits on the Phelps Town Lakes Committee and SLPA was the recipient of \$1,366.66 in grants funds for remediation in 2019, following a pattern of awards since 2016.

Introduction

Diver Assisted Suction Harvesting (DASH) was part of Smoky Lake's 2019 program to manage for Eurasian watermilfoil. DASH is a mechanical process and requires a permit from the Wisconsin Department of Natural Resources (WDNR) and the Michigan Department of Environment, Great Lakes and Energy (EGLE). To maintain continuity in project reporting, this report includes DASH work completed in MI waters. The 2019 WDNR Permit ID is NO-2019-64-5212M and the 2019 EGLE Permit ID is WRP017294 v.1.

Dive Methods

While using DASH, a diver typically will begin by locating the invasive plant such as Eurasian watermilfoil from the surface, and then descend next to the plant while simultaneously lowering the nozzle. Divers works along the bottom by using fin pivots, kneeling on the bottom or hovering above the bottom at a distance where the root mass of the plant is within hands reach. The diver will either feed the top of the plant into the hose first and then uproot the plant or uproot the plant and feed it root wad first into the hose. It is very important that the diver shake as much sediment from the root wad before getting the root wad near the nozzle. Shaking the root wad away from the nozzle helps maintain visibility for the diver and minimizes debris and sediment in the holding bins. The diver carefully observes plants fed into the nozzle for possible fragments. Fragments are caught by hand and fed into the nozzle.

Work sites that have dense monotypic beds of EWM, the initial DASH efforts are quite simple. The diver will descend adjacent to the bed and begin hand pulling or harvesting systematically across the bed to dismantle the bed. Once the majority of the bed is removed, a more systematic approach follows to target remaining clustered, scattered or outlier plants in the work site. As part of our method for covering a work area while using DASH (or divers alone), a grid pattern is used. A diver will start at either the port or starboard side of the boat and work to and from the boat perpendicular to the direction the boat is facing. For example, with the boat facing north and the diver starting on the port side, the diver begins by heading west. The diver will continue to work perpendicular to the boat until reaching the end of the suction hose. The diver then works back to the boat on a new transect line. Distance between each transect is dictated by visibility, density of EWM, and obstructions. This process is repeated on the opposite side and in front of the boat. Depending on the site, once the diver has adequately covered the area, which the suction hose can reach, they will signal the deckhand to let out more anchor line or determine that the boat needs re-positioning.

Once plants reach the surface, a hose dispenses the plant material into a series of screened bins located on the deck of the boat. These bins capture plants and allow water to drain out back into the lake. Plants on deck are sorted into two categories: the targeted invasive plant and native vegetation. A wet weight of both the invasive plant and all native species combined is taken. Plants are placed in sealable containers or bags for transport to the dumping site. The dumping site is a pre-determined site upland, away from any water body.