

Wisconsin Department of Natural Resources
Aquatic Invasive Species Grant Program
Grant # AIRR-166-14

2014 Smoky Lake Control and Prevention of Eurasian Watermilfoil

Rapid Response Project

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

Annual Reporting

Submitted To:

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Smoky Lake Property Owners Association

Wisconsin Department of Natural Resources
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Submitted By:

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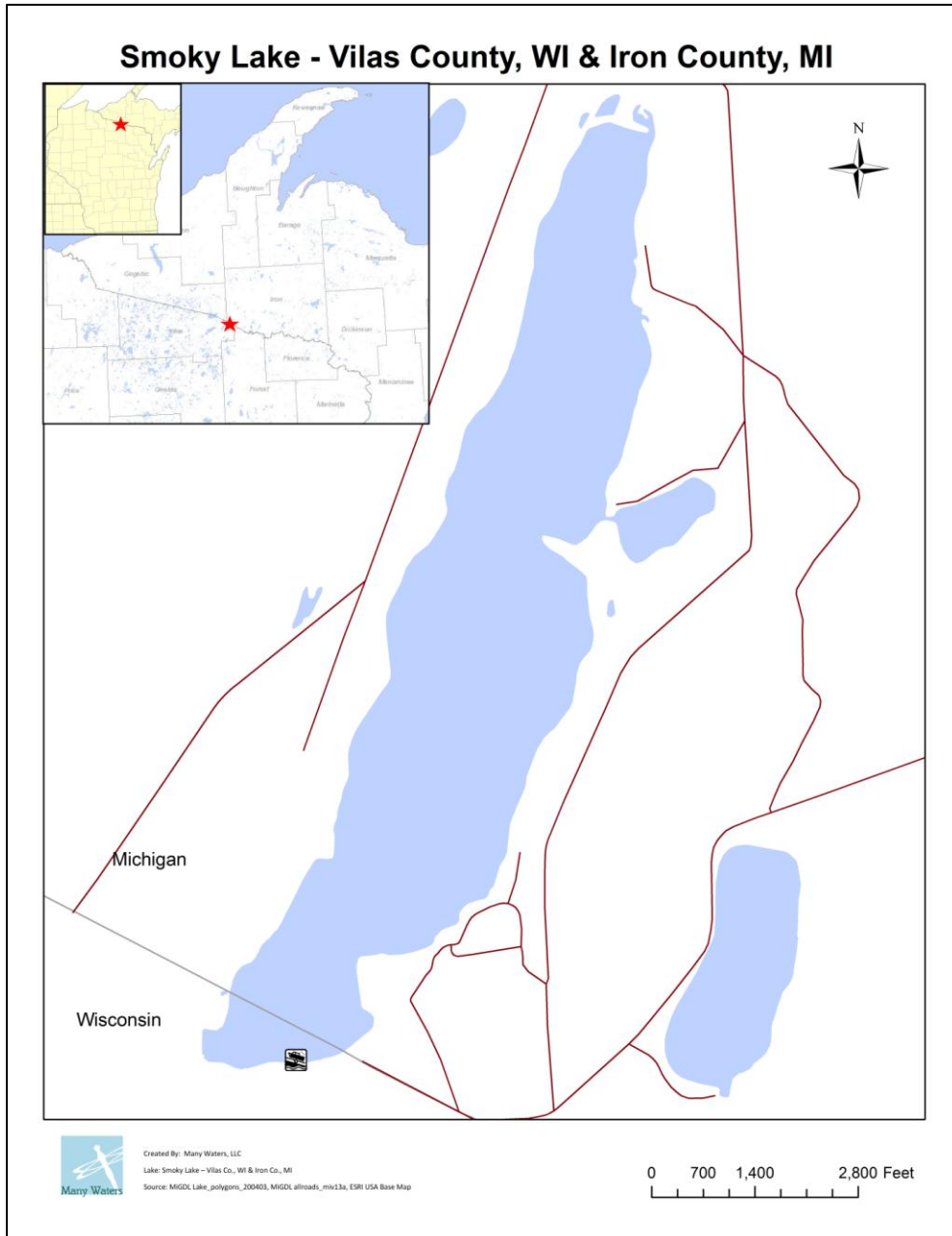
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PROJECT AREA

Smoky Lake is a 590-acre seepage lake located in Vilas County, WI and Iron County, MI (MDNR). A boat launch and recreational area owned by the Town of Phelps, WI is located at the southern end of the lake. Riparian ownership includes the Town of Phelps, State of Wisconsin and Wisconsin and Michigan riparians.

Project Location



OVERVIEW

In August of 2007, the Great Lakes Indian Fish and Wildlife Commission (GLIFWC) during an aquatic invasive species (AIS) survey of Smoky Lake found two Eurasian watermilfoil (EWM) fragments along the southern shore of Smoky Lake at the boat landing. One fragment was partially dried and the other had a flowering shoot. A thorough survey of the lake did not detect any rooted EWM plants. GLIFWC reported



these findings to the Vilas County AIS Coordinator (GLIFWC, 2007). In September of 2011, a USFS surveyor, contracted with the USFS Ottawa National Forest, conducting an AIS survey of Smoky Lake found one stem of EWM within the southwestern bay just west of the boat launch. The plant was removed and no other rooted plants were found during the remainder of the survey. In August 2013, a USFS surveyor, also contracted with the USFS Ottawa National Forest, documented EWM again within the southwestern bay of Smoky Lake. This survey did not detect EWM elsewhere in the lake. This discovery initiated efforts by the WDNR with assistance from the Vilas County Land and Water Conservation Department to complete an aquatic plant survey using the WDNR point intercept methodology (WDNR, 2010). Results of this survey did not find EWM elsewhere on the lake.

In 2014, the Town of Phelps, sponsoring the Smoky Lake Property Owners Association, applied for and successfully received a Wisconsin Department of Natural Resources (WDNR) Aquatic Invasive Species Early Detection and Response Grant to manage for EWM on Smoky Lake. These funds will assist in management efforts for the proposed project period of 2014 and 2015. This report is an update of progress and work completed as detailed under the proposed project scope for 2014. Specifically this report is a synthesis of (1) EWM monitoring efforts and findings, (2) EWM management strategies and efforts, (3) watermilfoil hybridity testing results (4) and summary of lake stewardship and AIS prevention activities.

Prior to applying for the WDNR grant, a EWM assessment on October 13th completed by Many Waters, LLC found the distribution, and density of EWM in Smoky Lake consistent of a small-scale population with several isolated dense to moderate dense locations and several low density areas with scattered plants. Using this information, the proposed strategy for management in 2014 was hand removal using both divers alone and Diver Assisted Suction Harvesting (DASH). To determine whether hand removal remained the most appropriate management action, a spring survey in June 2014 returned to the proposed hand harvesting area and re-evaluated any change seen between 2013 and 2014. Based on the spring 2014 assessment, hand removal was still an appropriate strategy using divers and DASH.

Because Smoky Lake is located in both Michigan and Wisconsin, two sets of rules and regulations apply regarding AIS management. For example, hand removal alone, does not require a permit from the State of Wisconsin, however requires a joint MDEQ/USACE permit from the State of Michigan. The use of DASH requires a joint MDEQ/USACE permit from the State of Michigan and a Mechanical Harvesting permit from the State of Wisconsin. Furthermore, hand removal in the State of Michigan cannot take place until after the second week of July to protect nesting loons, whereas Wisconsin will place a seasonal restriction when DASH activities take place within 330 feet of a bald eagles nest. Riparian ownership and rights also vary from Wisconsin to Michigan. Under Wisconsin’s Public Trust Doctrine, waters of the State are public resources, owned by all Wisconsin’s citizens. This includes ownership of bottomland beneath the water. In Michigan, Michigan’s citizens commonly own waters however, riparians many times have ownership of the bottomlands. This difference between Wisconsin and Michigan generally has limited influence on how riparians and visitors recreate on a boundary waters. However, differences in these riparian rights do play an important role when it comes to the management of aquatic invasive species. Management of aquatic invasive species in Michigan does require permission from the adjacent riparian property where the management work is to occur.

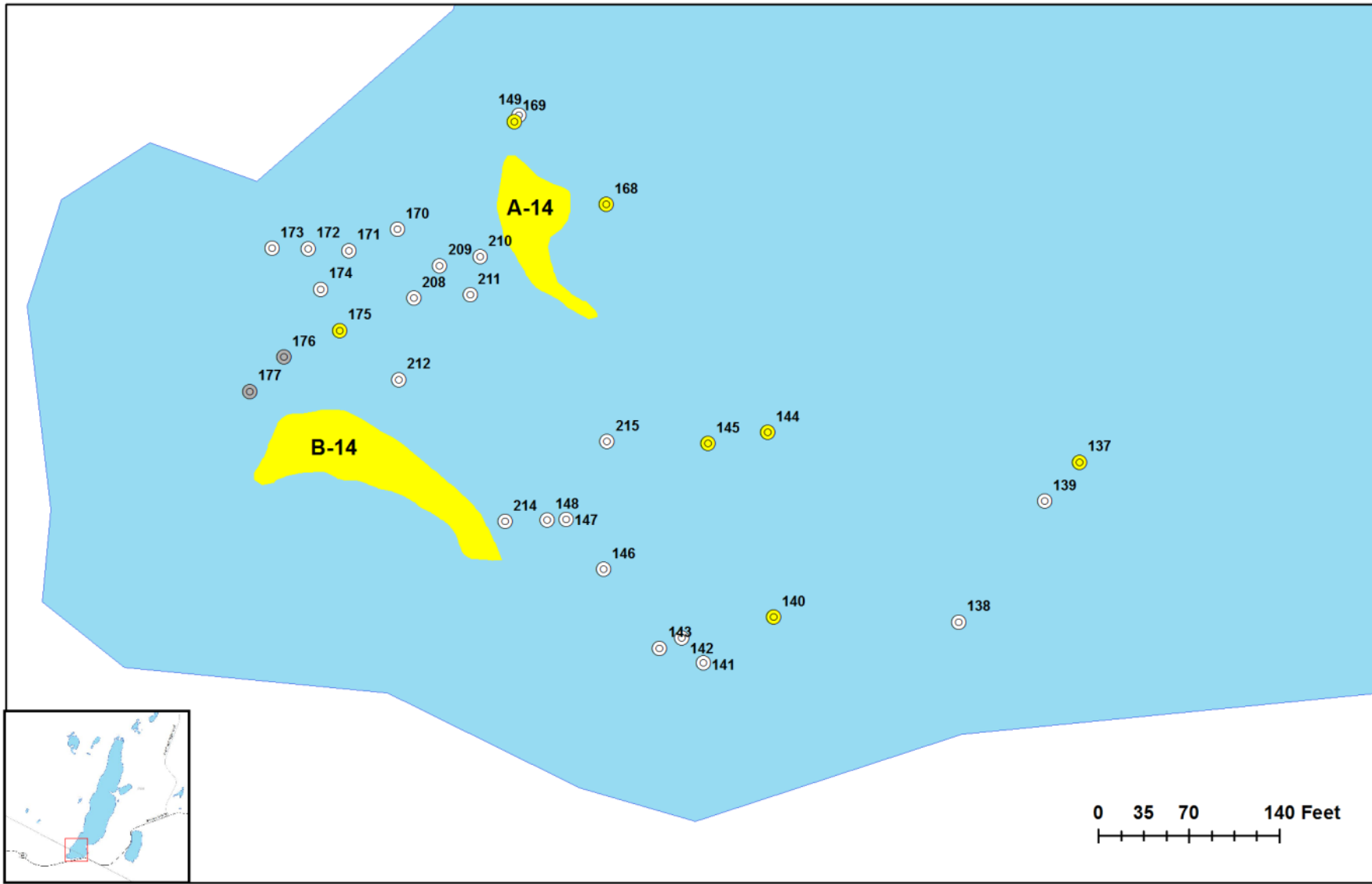
MONITORING

Early season monitoring efforts took place on Smoky Lake on June 27th 2014 . This survey found EWM within the previously known southwest bay west of the boat launch, all within Wisconsin waters. Some of the isolated colonies or clusters of plants found the previous year had grown into small contiguous beds. Yet, the only area on the lake identified with EWM remained within the southwest bay.

Mid-late season monitoring efforts found EWM within the southwest bay and a new location east of the boat launch along the eastern shore, just into MI. These locations consisted of very sparse EWM of a few individual plants.

Table 1: Estimated qualitative density rankings

Very Low	Typically consists of less than 10 plants visually observed, unless otherwise noted. Extent varies and is estimated visually for smaller locations and noted. Larger locations are delineated using GPS to calculate area.
Low	Typically consisted of 10-20 plants visually observed, unless otherwise noted. Extent varies and is estimated visually for smaller locations and noted. Larger locations are delineated using GPS to calculate area.
Moderate	Typically consists primarily of EWM with some native vegetation visually observed to be intermixed. Extent varies and is estimated visually for smaller locations and noted. Larger locations are delineated using GPS to calculate area.
Moderate-Dense	Typically consists of dominant EWM with little observed native vegetation intermixed. Extent varies and is estimated visually for smaller locations and noted. Larger locations are delineated using GPS to calculate area.
Dense	Dominant EWM, with little to no native vegetation observed. Dense locations may or may not have surface matting depending on the time of year. Extent varies and is estimated visually for smaller locations and noted. Larger locations are delineated using GPS to calculate area.



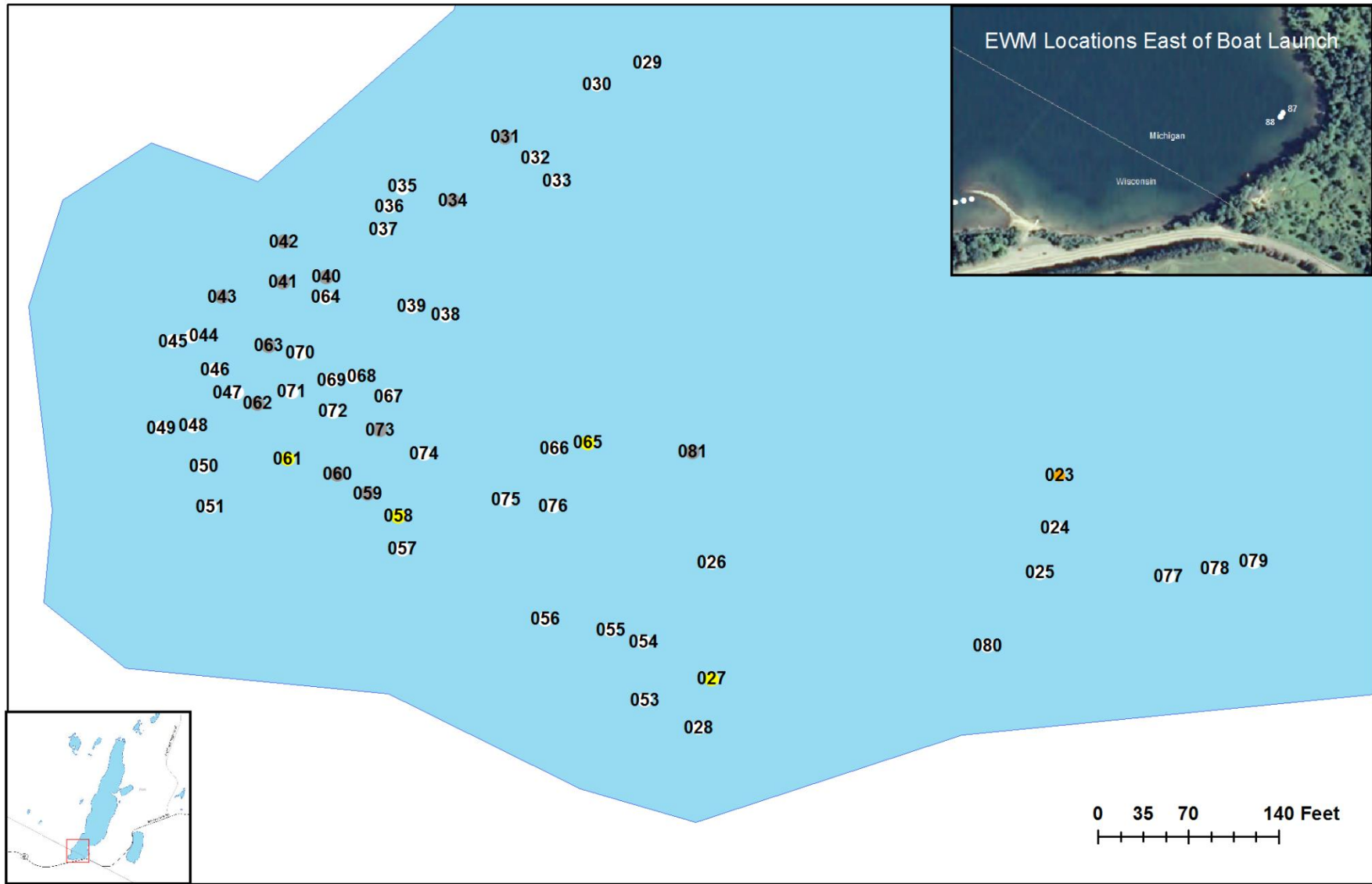
Lake: Smoky Lake, Vilas County, WI & Iron County, MI
 Source: 2008 NAIP
 File: ES_EOYE_Com_Smoky_2014
 Map Date & Creator: 2.22.2015, Many Waters, LLC

Early Season Survey

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



**Smoky Lake
 2014 EWM Locations
 Early Season Survey**



Lake: Smoky Lake, Vilas County, WI & Iron County, MI
 Source: 2008 NAIP
 File: ES_EOYE_Com_Smoky_2014
 Map Date & Creator: 2.22.2015, Many Waters, LLC

EWM Density

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



**Smoky Lake
 2014 EWM Locations
 End of the Year Evaluation**

2014 MANAGEMENT STRATEGIES

To determine whether a site is controlled using hand removal alone versus DASH, several factors are considered. DASH improves the efficiency of hand removal at locations when multiple large to very large EWM plants exist (especially later in the season) and when larger patches or continuous beds of EWM exist. Hand removal is preferred when locations consist of isolated individual or low-density EWM plants, when low-density plants are scattered over a larger area and swimming with divers is more efficient, and when set up and break down of the DASH boat is more effort than the actual time using DASH.

The original program proposed for Smoky in 2014 was to hand removal without DASH individual to small clusters of plants and use DASH for larger more dense areas. However, as the summer progressed, the level of need within the southwestern bay exceeded the efficiency of hand removal alone. Because the overall work area permitted for DASH in Wisconsin was relatively small, moving the DASH equipment from location to location did not require substantive amount of set up and break down time. Pumps and hoses could be dragged with the diver remaining in the water from location to location. Therefore, minus hand removal days by volunteers and training days with Many Waters, all hand removal efforts consisted of the use of DASH. We felt that this decision improved efficiency in efforts and resources than if divers were used alone.

Diver Assisted Suction Harvesting

DASH efforts worked within DASH-1 over 6 days between July 17th 2014 and September 5th 2014. DASH sites initially focused on the moderate larger colonies (A-14 & B-14) identified during the spring survey, but also worked across the entire work area focusing on problematic areas primarily along the western half of the bay. DASH removed a total of 851.5 pounds of EWM in 30 dive hours. Diver Assisted Suction Harvesting was only used in Wisconsin (WI Permit # MNOR-64-14-01).

While using DASH, a diver typically begins by locating a EWM plant from the surface, and then descends next to the plant while 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. Divers 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 observes plants fed into the nozzle for fragmentation and will catch any fragments and feed them into the nozzle.

Work sites that have dense and contiguous EWM beds, 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 dismantled, 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

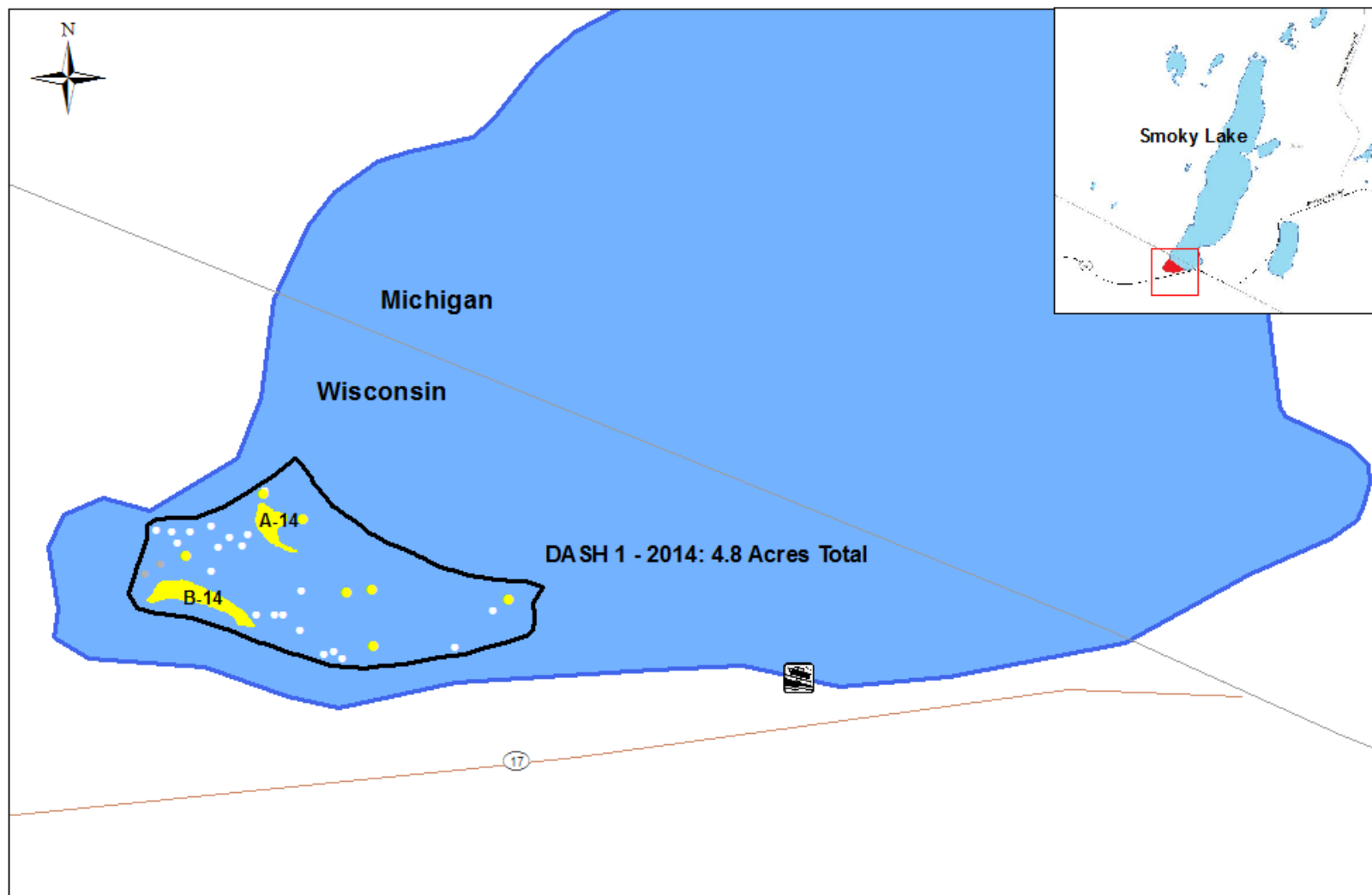


Diver using DASH to Remove EWM

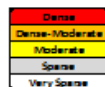
continue to work perpendicular to the boat until reaching the end of the suction hose. The diver then works back to the boat on a new transect line. Distance between each transect is dictated by visibility, density of plants, and obstructions. This process is repeated on the opposite side and in front of the boat. Depending on the site, once the diver has adequately covered the area which the suction hose can reach, the diver 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. The person on deck sorts plants into two categories: the targeted invasive plant and incidentally harvested native vegetation. Two wet weights taken include one weight of the target invasive plant and one weight for all native species combined. Plants are then 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.

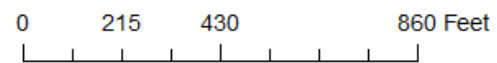
2014 DASH Work Area - Smoky Lake, Vilas County, WI



Lake: Smoky Lake, Vilas County, WI & Iron County, MI
 Map Date & Creator: 6.29.2014, Many Waters, LLC
 Source: MGD_Lake_polygons_200403, ESRI USA Base Map
 File: ES_DASH_WI_Smoky_2014



A-14	0.09 acres
B-14	0.16 acres



DASH Process



GLIFWC

Divers Locate Plants



Diver Uproots and Feeds Plant into Nozzle



GLIFWC

Plants Transported to Bin on Deck



GLIFWC

Plants Sorted & Weighed



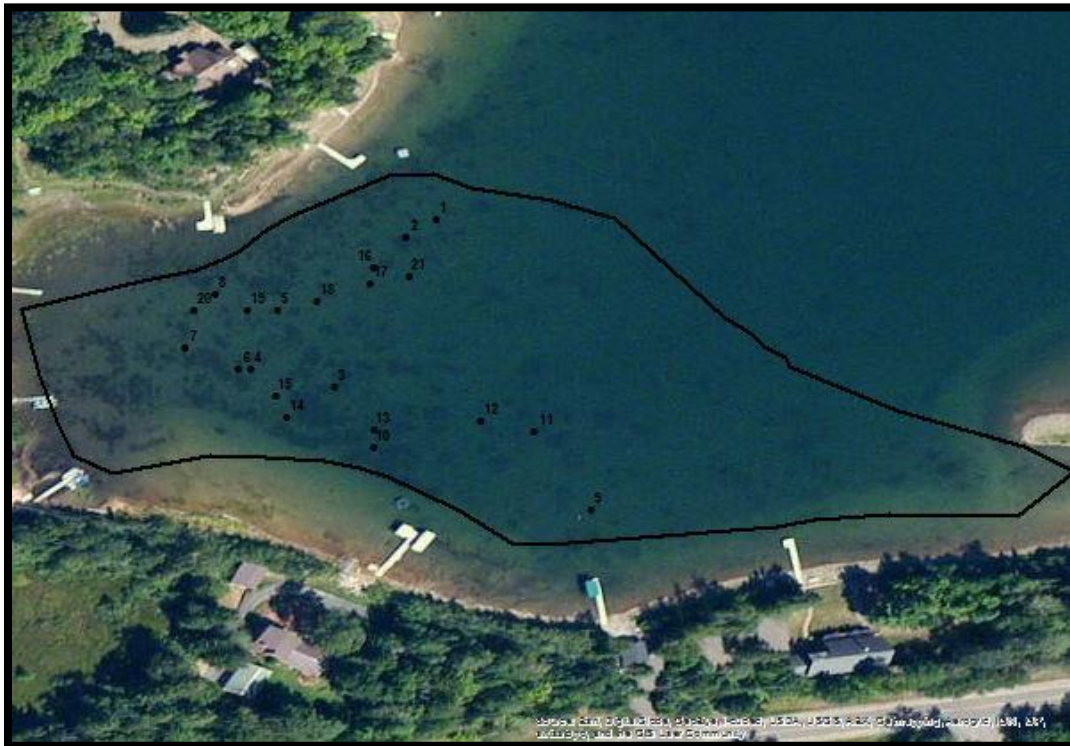
GLIFWC

Plants Placed in Sealable Container for Transport

Table 2: Summary of diver assisted suction harvesting efforts.

Date	Location	DASH Work Area (acres)	Ave. Depth (ft)	Work Direction	Map ID	DASH Boat Location		Dive Time (hrs)	EWM (lbs*)	Native (lbs*)	Percent Incidental Native Plant Harvest	Total (lbs*)
						Lat (NAD 83)	Long (NAD 83)					
7/17/2014	DASH-1 2014	4.8	5	South	1	46.08155	88.95571	2.00	91.0	2.0	2.2%	93.0
7/18/2014	DASH-1 2014	4.8	5	South	2	46.08149	88.95581	3.50	23.0	0.8	3.3%	23.8
7/18/2014	DASH-1 2014	4.8	6	South	3	46.08099	88.95605		218.0	4.3	1.9%	222.3
7/18/2014	DASH-1 2014	4.8	4	South	4	46.08105	88.95633	1.00	53.0	0.5	0.9%	53.5
7/26/2014	DASH-1 2014	4.8	5	West	5	46.08125	88.95624	1.75	26.5	0.3	0.9%	26.8
7/26/2014	DASH-1 2014	4.8	4	West	6	46.08108	88.95637	2.50	106.0	2.0	1.9%	108.0
8/15/2014	DASH-1 2014	4.8	3	Southwest	7	46.08112	88.95655	2.25	49.0	1.5	3.1%	50.5
8/15/2014	DASH-1 2014	4.8	3	West, NW	8	46.08130	88.95645	0.75	14.0	0.5	3.6%	14.5
8/15/2014	DASH-1 2014	4.8	6	West, NW	9	46.08058 (beginning)	88.95519 (beginning)	1.00	40.0	0.3	0.6%	40.3
8/15/2014	DASH-1 2014	4.8	6	West, NW	10	46.08779 (end)	88.95592 (end)	0.75	18.0	0.3	1.4%	18.3
8/25/2014	DASH-1 2014	4.8	6	Southwest	11	46.08084	88.95538	1.00	14.0	0.3	1.8%	14.3
8/25/2014	DASH-1 2014	4.8	6	West	12	46.08088	88.95556	0.50	5.0	0.0	0.0%	5.0
8/25/2014	DASH-1 2014	4.8	5	Southwest	13	46.08085	88.95592	1.00	12.0	0.5	4.2%	12.5
8/25/2014	DASH-1 2014	4.8	4	South, SW	14	46.08089	88.95621	2.00	31.0	0.3	0.8%	31.3
9/3/2014	DASH-1 2014	4.8	4	South	15	46.08096	88.95625	2.50	42.0	1.5	3.6%	43.5
9/3/2014	DASH-1 2014	4.8	5	South	16	46.08139	88.95592	0.75	22.0	1.0	4.5%	23.0
9/5/2014	DASH-1 2014	4.8	5	South, SW	17	46.08134	88.95593	2.00	26.0	0.5	1.9%	26.5
9/5/2014	DASH-1 2014	4.8	5	South, SW	18	46.08128	88.95611	0.75	12.0	0.3	2.1%	12.3
9/5/2014	DASH-1 2014	4.8	4	West	19	46.08125	88.95634	0.50	10.0	0.0	0.0%	10.0
9/5/2014	DASH-1 2014	4.8	3	West	20	46.08125	88.95652	1.75	13.0	0.3	1.9%	13.3
9/5/2014	DASH-1 2014	4.8	6	West	21	46.08136	88.95580	1.75	26.0	0.5	1.9%	26.5
								30.00	851.5	17.3	2.0% (ave.)	868.8

Figure 1: Anchored DASH locations.



July 17th 2014 Weather – 70° F, sunny, light west wind
After demonstrating our DASH equipment and hand removal process to some representatives from the Lake Association, DASH efforts focused on a denser contiguous area of EWM located at the northwest portion of DASH-1. Two hours of dive time removed 91 pounds of EWM.

July 18th 2014 Weather – 70° F, partly cloudy, SSW winds at 10-15 mph
Returning to the denser contiguous areas of EWM located at the northwestern and southwestern portions of the work area, five and a half dive hours removed 294 pounds of EWM.

July 26th 2014 Weather – 74° F, Sunny, W wind 5 – 10 mph
Working intermittent clusters and individual EWM plants, 3.75 hours of dive time removed 132.5 pounds of EWM.

August 15th 2014 Weather – 72° F, Sunny, SW wind 5 – 10 mph
DASH efforts continued along the southwestern and southern portion of the work area. A good portion of dive time was spent searching out clusters of plants of which many were very small in stature (<12”). Four and three quarter dive hours removed 121 pounds of EWM.

August 25th 2014 Weather – 70° F, Mostly Sunny, SW wind 5 – 10 mph
Working along the southern portion of the work area at four sites, 4.5
dive hours removed 62 pounds of EWM. Search time to locate
plants greater than in previous efforts.

September 3rd 2014 Weather – 71° F, Sunny, S wind 10+ mph
Diving focused on individual and intermittent small clusters of EWM
plants located in shallow water. Three and a quarter dive hours
removed 64 pounds of EWM.

September 5th 2014 Weather – 60° F, Overcast, NW N wind 10+ mph
Diving efforts focused on shallow water plants and revisiting some
previous work areas from throughout the summer. Positioning the
boat at five locations, 6.75 hours of dive time removed 87 pounds of
EWM.

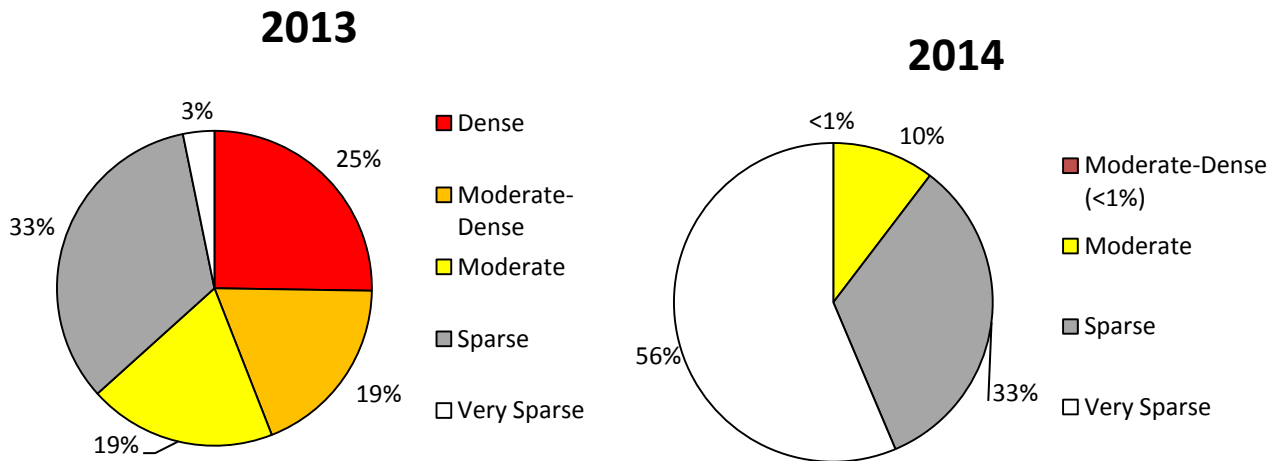


EWM Plant Hand Removed

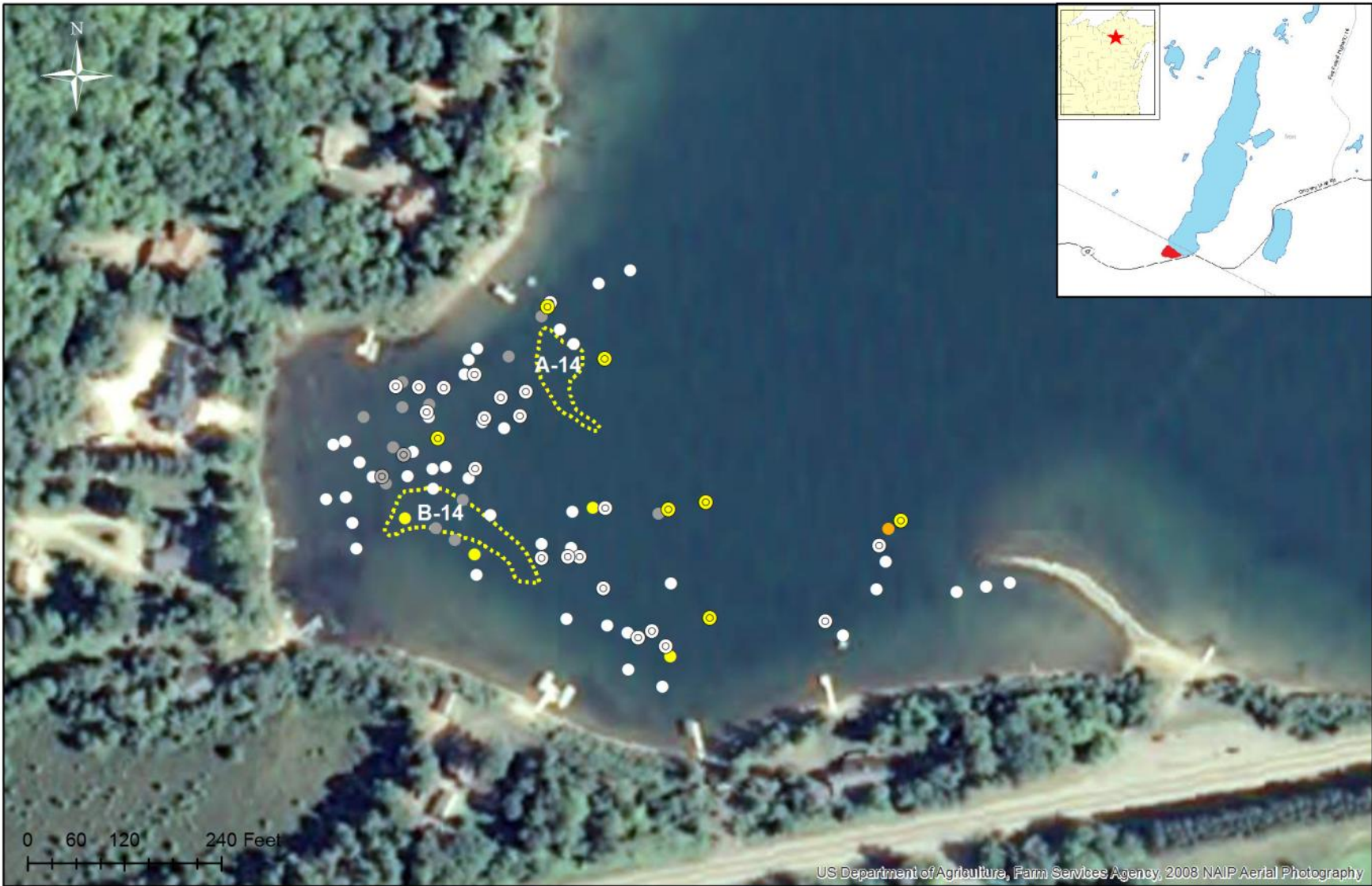
EVALUATION

An end of the year survey evaluating management efforts took place on September 15th 2014. The purpose of the end of year evaluation was to visit all known managed sites, not survey for additional EWM locations.

Figure 2: 2013 and 2014 EWM population abundance estimate, Smoky Lake.



Percentages determined by proportion of estimated abundance/density to total extent for each abundance category. Extent determined by calculated GPS delineated EWM beds (polygons) and estimated extents or coverage for all remaining known EWM sites (points).



Lake: Smoky Lake, Vilas County, WI & Iron County, MI
 Source: 2008 NAIP
 File: ES_EOYE_Com_Smoky_2014
 Map Date & Creator: 2.22.2015, Many Waters, LLC

Early Season Survey

- ⊙ Very Sparse
- ⊖ Sparse
- ⊙ Moderate
- ⊙ Moderate-Dense
- ⊙ Dense

Mid-Late Season Survey

- Very Sparse
- ⊖ Sparse
- ⊙ Moderate
- ⊙ Moderate-Dense
- Dense



A-14: 0.09 Acres
 B-14: 0.16 Acres

**Smoky Lake
 2014 EWM Locations**

WATER MILFOIL HYBRID TESTING

Samples of milfoil taken from within the southwestern bay prior to management analyzed by the Annis Water Resource Institute at Grand Valley State University determined pure strain Eurasian watermilfoil.

2015 PROPOSED MANAGEMENT STRATEGIES

Continuing monitoring efforts in 2015 at levels completed in 2014 will improve the likelihood of detecting new EWM locations on Smoky Lake. This will include two lake wide surveys by Many Waters, one completed during the first half of the summer and the second completed during the second half of summer into early fall. If either survey identifies the extent of EWM expanding to a level of concern, a dialog with the Association and Many Waters may adapt monitoring strategies to reflect the expansion or reduction of EWM at that time. This may be additional surveying, changing timing or focus areas of the surveys or prioritizing coverage of volunteer monitoring efforts. Furthermore, with the addition of citizen lead monitoring, full season coverage will improve the ability to capture new locations between surveys and aid in guiding management efforts. With the new location of EWM identified east of the boat landing, extra attention by volunteers to the southern end of the lake east of the launch is encouraged.

Overall, EWM within Smoky Lake consists of isolated low to moderate density locations contained primarily to the southwest bay of the lake. Currently, the number and size of the location are small and management with hand removal is resource reasonable and has minimum non-target impacts to Smoky Lake's native flora and fauna. Because the extent and distribution of known EWM is primarily within the most southwestern bay, most of the 2015 professional lead hand harvesting efforts will initially focus in this area. Because these waters are within Wisconsin, it is not necessary to obtain written permission to remove plants, only to have a WDNR Mechanical Harvesting Permit when using DASH. There are EWM sites that are nearing the Michigan boarder along the western shore, and in the event that plants are located just across the board, written permission of adjacent property owners will be required prior to any hand removal work by Many Waters. For volunteers, a suggestion would be to have landmarks on shore to reference the boarder on both the east and west side of the lake. For example, shore stations, houses, or docks. Volunteer hand removal efforts with snorkel and scuba gear are encouraged. To make volunteer efforts more efficient and improve benefit and positive results to the project, Many Waters may prioritize volunteer hand removal areas based on EWM density, extent, sediment type and depth.

Management efforts will continue with seasonal use of hand removal and DASH. Hand removal spread throughout the growing season we feel will improve the likelihood of successful long-term control. This strategy allows flexibility to address new locations and re-visit problematic areas. DASH was primarily used in 2014 and will be used in the southwest bay again in 2015. However, the location east of the boat launch based on the mid-late season survey, will be more efficient to remove with the use of divers alone. This can be done professionally or with volunteer divers. The intent will be to have the plants removed early in the season and continue to the monitor the area for the remaining of the year and follow up with additional hand removal

if necessary. If volunteer divers are not available earlier in the season, Many Waters, will remove those plants. However, if additional plants found during the season, volunteer monitors, available divers/snorkelers, and Many Waters can determine the best strategy. Volunteer diving/snorkeling is encouraged, however, efforts by volunteers should be feasible and within reason. In 2014, volunteer efforts removed approximately 52 pounds of wet weight EWM during training events. This does not include efforts by volunteers throughout the summer months. To gauge effectiveness and/or limitations to volunteer efforts, it will be useful to keep track of location and also either the individual number of plants removed when working in low-density areas and/or the total wet weight of plants removed.

Adoption of legislature by the State of Michigan in 2014 will allow hand removal (without auxiliary power) of nuisance species in Michigan waters without a permit. (Senate Bill 444, Section 30103 (o).) Furthermore, hand removal alone will no longer have seasonal restrictions that reduce the hand removal season. Obviously if sites are adjacent to a loon's nest, those sites must be avoided until the nest is no longer in use. DASH in Michigan still requires a permit and is restricted to after the second week of July to protect nesting loons. Written permission for hand removal in Michigan is still required for both hand removal alone and DASH.

SUMMARY

In 2013, over half of the known EWM locations consisted of dense to moderate-dense abundances, whereas in 2014 roughly three quarters of all known location consisted of sparse to very sparse abundances. These observations suggest a reduction in density of EWM from 2013 to 2014. There is still moderate and moderate-dense EWM abundances known on Smoky Lake, however, comparing this to 2013, it is evident that hand removal has made a positive impact, not only to the overall abundance of EWM on Smoky Lake but also by minimizing the potential for spread. A decline in EWM is likely a positive result of active management, however, can include natural annual variation. Cool weather and water temperatures and extended winter conditions including ice and snow pack can potentially influence observed annual variation. Eurasian watermilfoil is an aggressive aquatic invasive plant, it is unlikely that this plant will be eradicated, nor should eradication be a feasible management goal. Using monitoring and management efforts that are resource reasonable and adaptive to annual needs will be the best strategy to provide long-term control.

Smoky Lake is a very clear water body. Visibility remains excellent for most of the growing season, which also allows plants to grow to deeper depths, because light is able to penetrate to the bottom. Limiting factors for plant growth includes light penetration but also nutrients such as phosphorous. Based on data collected from lake volunteers, Smoky Lake is considered an oligotrophic lake and overall productivity remains lower compared to other lakes in the region. These factors may limit the ability for EWM to colonize large portions of the littoral area, however, as seen EWM has been able to take root and colonize regions of Smoky Lake that are conducive to plant growth. Volunteer monitoring efforts have identified areas of Smoky Lake that support aquatic plant growth which includes EWM, however, visual monitoring to depths that can support plant growth may be challenging. Furthermore, bathometric information on Smoky Lake is outdated (1938, MDNR). To benefit volunteer and professional lead monitoring

efforts, detecting suitable substrate and regions of current plant growth not easily detected visually a sonar-based survey of Smoky Lake is recommended. This survey uses sonar to transect the entire lake collecting information on depth, sediment type and bio-volumes (areas of plant growth). Information from this survey can be useful to guide volunteer and professional level monitoring efforts by detailing specific areas on Smoky Lake that have appropriate substrate and existing beds of aquatic vegetation.

To support current efforts of the Smoky Lake Homeowners Association continued expansion of opportunities to seek additional resources, support and partners is sought. Smoky Lake is unique in that it shares jurisdiction in two States, each of which have strengths and limitation to guidance and resources necessary to manage for AIS. The ability to collaborate with known groups on both sides of the boarder will facilitate information sharing and expand available resources to protect the ecological stability of this highly desired and aesthetic water body.

Hauxwell, J., S. Knight, K. Wagner, A. Mikulyuk, M. Nault, M. Porzky and S. Chase. 2010. Recommended baseline monitoring of aquatic plants in Wisconsin: sampling design, field and laboratory procedures, data entry and analysis, and applications. Wisconsin Department of Natural Resources Bureau of Science Services, PUB-SS-1068 2010. Madison, Wisconsin, USA.

Falck, M., Olson, D., and Garske, S. 2007. Administrative Report 08-06. Great Lakes Indian Fish and Wildlife Commission Biological Services Division.

Appendix A

Details of Early Season Survey

Map ID	EWM Estimate (# plants)	EWM Density Estimate	~ Size (ft-cir)	~Size (acres)	Notes
137	>10	Moderate	<5	0.002	2 x 2 foot clump
138	<10	Very Sparse	<5	0.002	
139	<10	Very Sparse	<5	0.002	2 x 2 foot clump
140	>10	Moderate	<5	0.002	2 x 2 foot clump
141	<10	Very Sparse	<5	0.002	
142	<10	Very Sparse	<5	0.002	
143	<10	Very Sparse	<5	0.002	2 plants 1 foot apart
144	>10	Moderate	<5	0.002	3 foot circle
145	>20	Moderate	<10	0.007	6 foot circle
146	<10	Very Sparse	<5	0.002	3 foot circle
147	<10	Very Sparse	<5	0.002	2 foot circle
148	<10	Very Sparse	<5	0.002	3 foot circle
149	<10	Very Sparse	<5	0.002	
168	20	Moderate	10	0.007	
169	20	Moderate	10	0.007	
170	<10	Very Sparse	<5	0.002	1 plant
171	<10	Very Sparse	<5	0.002	1 plant
172	<10	Very Sparse	<5	0.002	1 plant
173	<10	Very Sparse	20	0.029	
174	<10	Very Sparse	10	0.007	
175	>30	Moderate	20	0.029	
176	>10	Sparse	20	0.029	
177	20	Sparse	>20	0.029	
179	>10	Very Sparse	10	0.007	one to five plants
208	<10	Very Sparse	<5	0.002	2 plants 3 feet apart
209	<10	Very Sparse	<5	0.002	1 plant
210	>20	Very Sparse	20	0.029	
211	>20	Very Sparse	20	0.029	
212	>10	Very Sparse	>15	0.016	
215	>10	Very Sparse	10	0.007	
A-14		Moderate		0.09	
B-14		Moderate		0.16	
				0.516	

Appendix B

Details of End of the Year Evaluation and Mid-Late Season Surveys

Map ID	EWM Estimate (# plants)	EWM Density Estimate	EWM Biomass Estimate	~ Size (ft-cir)	~Size (acres)	Notes
23	~20	Moderate-Dense	M	2	0.002	small clump
24	<5	Very Sparse	M	5	0.002	
25	<5	Very Sparse	M	5	0.002	
26	<5	Very Sparse	M	5	0.002	
27	~30	Moderate	S & M	10	0.007	
28	1	Very Sparse	S	<2	0.002	
29	<5	Very Sparse	M	5	0.002	
30	<5	Very Sparse	M	5	0.002	
31	~20	Sparse	M	15	0.002	
32	<5	Very Sparse	M	5	0.002	
33	5 to 10	Very Sparse	M	10	0.007	
34	10 to 20	Sparse	S & M	20	0.029	
35	<5	Very Sparse	M	10	0.007	
36	<5	Very Sparse	M	2	0.0002	
37	<5	Very Sparse	M	10	0.007	
38	<5	Very Sparse	S	5	0.002	
39	2	Very Sparse	S	<2	0.002	
40	10 to 20	Sparse	S & M	10	0.007	
41	10 to 20	Sparse	VS	10	0.007	
42	~20	Sparse	2 LG & S	10	0.007	2 large plants at surface
43	15 to 20	Sparse	S & M, 1 LG	20	0.029	
44	<10	Very Sparse	S	15	0.016	
45	<10	Very Sparse	S	10	0.007	
46	<10	Very Sparse	S	10	0.007	
47	<20	Very Sparse	S	15	0.016	
48	<10	Very Sparse	S	15	0.016	
49	<20	Very Sparse	S	20	0.029	
50	<20	Very Sparse	S	20	0.029	
51	<20	Very Sparse	S	30	0.064	
53	1	Very Sparse	M	<2	0.002	
54	<5	Very Sparse	M	5	0.002	
55	1	Very Sparse	L	<2	0.002	
56	1	Very Sparse	M	<2	0.002	
57	1	Very Sparse	VS	<2	0.002	
58	30+	Moderate	M	20	0.029	
59	<20	Sparse	S & M	15	0.016	
60	<20	Sparse	S & M	20	0.029	
61	30+	Moderate	S & M	20	0.029	
62	<20	Sparse	S & M	20	0.029	

Map ID	EWM Estimate (# plants)	EWM Density Estimate	EWM Biomass Estimate	~ Size (ft-cir)	~Size (acres)	Notes
63	<20	Sparse	S & M	20	0.029	
64	1	Very Sparse	M	<2	0.002	
65	20	Moderate	S & M	2	0.002	small clump
66	10	Very Sparse	M & L	20	0.029	
67	<5	Very Sparse	S	5	0.002	
68	<5	Very Sparse	S & M	5	0.002	
69	<5	Very Sparse	S & M	10	0.007	
70	<10	Very Sparse	S	15	0.016	
71	<10	Very Sparse	S	15	0.016	
72	<10	Very Sparse	S & M	15	0.016	
73	20 to 30	Sparse	S & M	20	0.029	
74	<5	Very Sparse	M	5	0.002	
75	<10	Very Sparse	M & L	15	0.016	
76	< 5	Very Sparse	L	5	0.002	
77	2	Very Sparse	VS & M	10	0.007	1 very small plant and 1 medium plant ~10ft apart
78	<5	Very Sparse	S	10	0.007	
79	<5	Very Sparse	S & M	10	0.007	
80	1	Very Sparse	S	<2	0.0002	
81	<20	4	M & L	5	0.002	
87	<5	Very Sparse	S & M	5	0.002	
88	<5	Very Sparse	S & M	5	0.002	
					0.6524	

Appendix C

Hybrid Watermilfoil Testing Results



Summary of DNA Data for Watermilfoil
Grand Valley State University's Robert B. Annis Water Resources Institute

Company/Entity	Many Waters, LLC
Total Samples Processed	3
Cost per Sample	\$45
Set up Fee (if applicable)	\$65
Total Cost	\$200

ATTN:

Send Invoice to:

Barb Gajewski
2527 Lake Ottawa Road
Iron River, MI 49935
skih2o@hotmail.com
715-817-4688

Send Results to:

Barb Gajewski (skih2o@hotmail.com)
Michelle Nault (michelle.nault@wisconsin.gov)

Result Details (By Lake):

Lake Name: Smoky
Date Received: 7/1/2014
Number of Samples Sent: 3
Number of Samples Processed: 3
Comments: NA

Genetic IDs:

Area/site	Sample #	ID
Smoky/ SW Bay, pt. 170	1	Eurasian watermilfoil (<i>Myriophyllum spicatum</i>)
Smoky/ SW Bay, pt. 181-1	2	Eurasian watermilfoil (<i>Myriophyllum spicatum</i>)
Smoky/ SW Bay, pt. 181-2	3	Eurasian watermilfoil (<i>Myriophyllum spicatum</i>)

Appendix D

Summary of AIS Prevention and Lake Stewardship Activities

Smoky Lake AIS Committee Report

The discovery of Eurasian Water Milfoil has been a central focus of the Smoky Lake Homeowners Association since its discovery in 2013. Members have been following the issue closely via communications and in their meetings. The association quickly retained the services of Many Waters, Inc. to assist with developing strategies to address the issue.

The Smoky Lake AIS Committee organized several training sessions for volunteers with a good showing of interest and support for remediation efforts. At the first session held July 17th 2014, Ted Ritter of the Vilas County Land and Water Conservation Department and Barb Gajewski from Many Waters provided information and methods to identify Eurasian Water Milfoil and other invasive species. Volunteers were taken by pontoon to affected sites and to other sites which might create favorable habitat in coming years.

In early August Many Waters offered additional in the water training to volunteers who would be working with hands-on removal efforts. Attendance at both sessions was very good. Weather and schedules were limiting factors in the number of sessions the group was able to have, but individual members did continue to pursue and document their remediation efforts.

Training lake monitors was also a key focus. A training session was offered by Many Waters in late August for volunteers serving as lake monitors. Leadership teams and volunteers are in place to oversee this in future years. The lakeshore has been divided into manageable areas and monitors have been assigned to provide coverage. Participants have already begun to document hours spent in these efforts.

The Association also worked with Ted Ritter on hiring boat landing watercraft inspectors. These inspectors logged 105 hours and contacted 170 people.

Members of the AIS Committee met with Kevin Gauthier from the DNR in October 2014 to consider remediation efforts at the end of our first year of grant management. He observed that the infestation was low in both acreage and biomass and recommended hand harvesting as the best means to address the problem for the foreseeable future. He asked lake owners to be realistic in their expectations and recommended that the focus should be on developing a plan to manage remediation efforts for the long-term.

Looking to the summer of 2015, the committee believes that it has identified strategies to supplement the work being conducted by Many Waters, LLC. This issue is seen as one requiring long-term objectives and focus. Continuing to work on a Long-term Management Plan will be the focus. In this two-year process requiring field collection of data and additional report writing, Many Waters will assist in developing the strategy to keep us on target.