

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

2015 Smoky Lake Control and Prevention of Eurasian Watermilfoil

Rapid Response Project

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

Final Reporting

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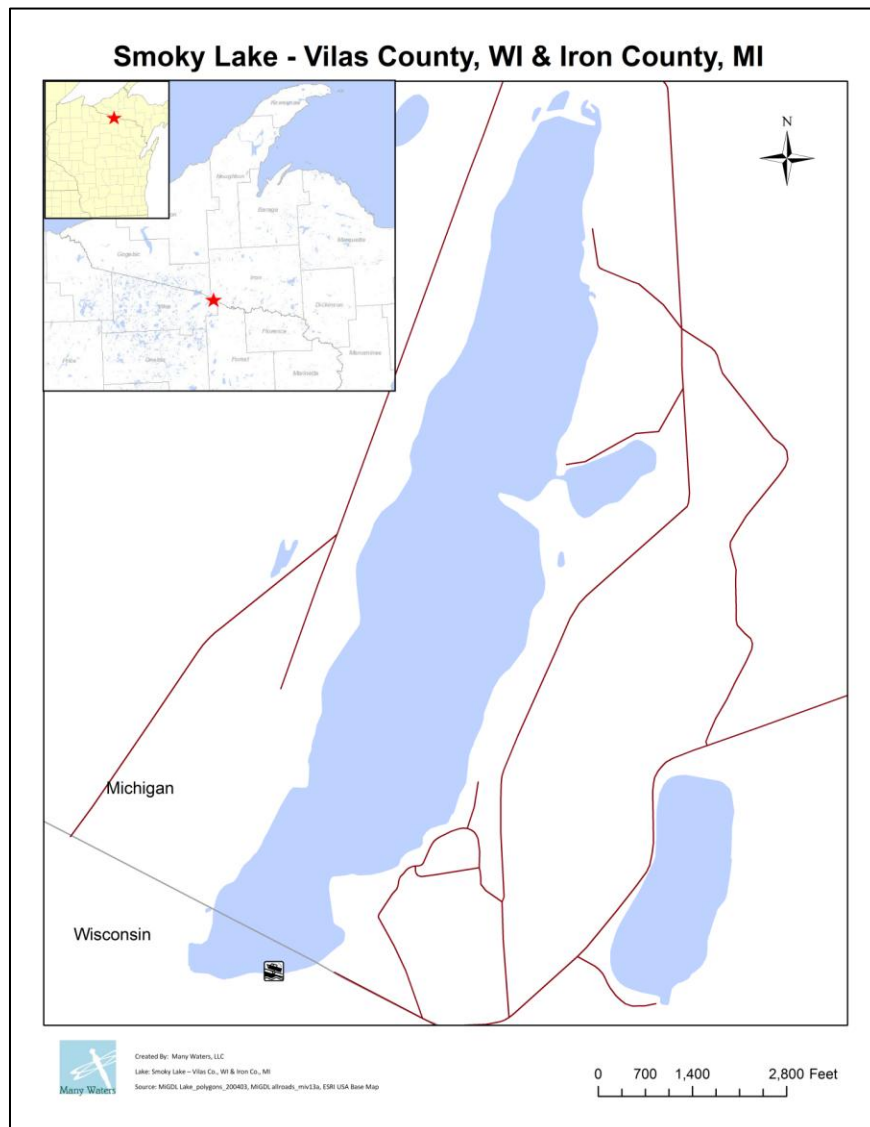
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This report is a final summary of activities and efforts in part to fulfill requirements for the current WDNR Aquatic Invasive Species Grant # AIRR-166-14. Specifically this report is a synthesis of (1) Eurasian watermilfoil (EWM) monitoring efforts and findings, (2) EWM management strategies and efforts, (3) overview of project highlights including a discussion on next steps moving forward and (4) a summary of lake stewardship and AIS prevention activities.

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, Michigan and Wisconsin riparians.

Project Location



OVERVIEW

Aquatic invasive species monitoring efforts by the USFS Ottawa National Forest resulted in the discovery of EWM on Smoky Lake in 2013. On August 15th 2013, the USFS contracted surveyor documented EWM within the southwest most bay of Smoky Lake, west of the boat launch. This survey did not detect EWM elsewhere on 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. Results of this survey, again, 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 assisted in management efforts for the proposed project period of 2014 and 2015. Additional funding was raised by SLPOA in 2015 to further management efforts in addition to the WDNR grant funds. These funds were specifically used to continue management efforts (hand removal) beyond the original budgeted scope of the grant.

SEASONAL MONITORING EFFORTS AND FINDINGS

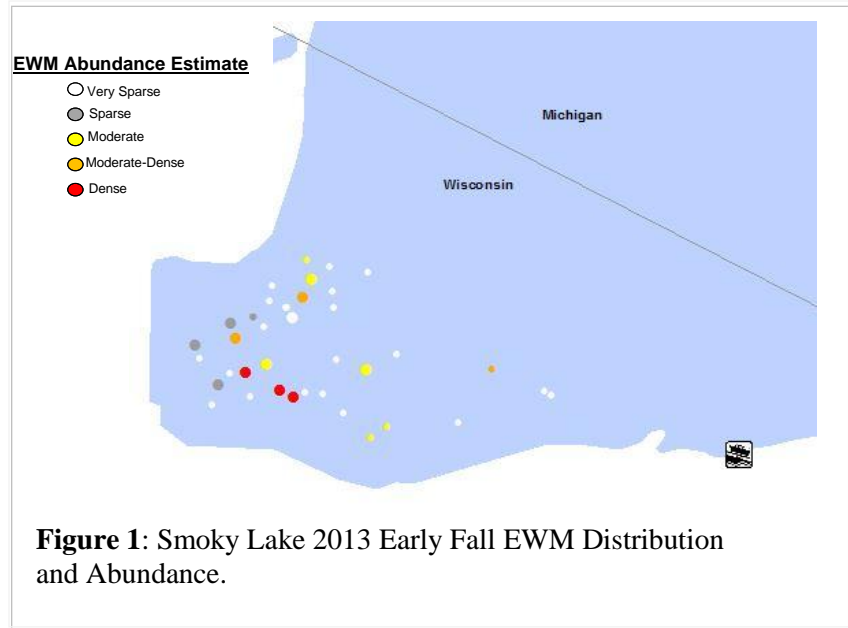
Monitoring surveys are primarily completed using visual observations, but also include the use of rake tosses and underwater cameras. Monitoring efforts are qualitative in nature, meaning that information collected describes the condition of EWM rather than using measured or quantitatively derived values. For example, Table 1 describes the observed abundance estimate of EWM found during each survey. Observations are recorded with a GPS. Smaller sites are geo-referenced with a GPS point and extent is determined by using a visually estimated circumference converted to acres. On average, these sites are less than a 0.10 of an acre. Larger sites, typically greater than a 0.10 of an acre are circumnavigated and extent in acres is calculated and represented by a polygon.

Table 1: Estimated qualitative density rankings

| | |
|----------------------------|--|
| Very Sparse | 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. |
| Sparse to Scattered | 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. |

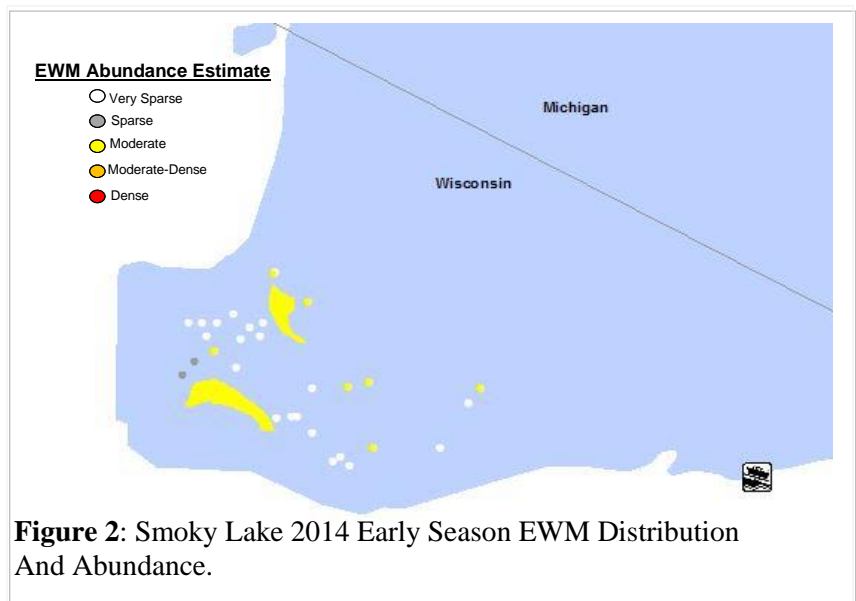
2013

A early fall survey of the most southwest bay of Smoky Lake was completed. This survey found scattered sparse to dense EWM colonies. Since two lake wide surveys, one completed by the USFS contractor and one completed by the WDNR, the intent of this survey was not to survey the entire lake, but rather focus on the known areas of EWM occurrence in order to determine appropriate management strategies.



2014

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 new locations consisted of very sparse EWM of a few individual plants.

2015

Early season monitoring detected EWM within the southwest most bay, along the southern portion of the western shore (north of the previously known area) and east of the boat launch. Minus, one contiguous area of low density EWM along the far southwest end of the lake, all locations of EWM detected at that time consisted of scattered plants to small isolated colonies. (Note: Map depicting final proposed DASH strategy shares results of the early season monitoring efforts.)

Mid-late season monitoring efforts found additional locations of EWM farther north along the western shore, additional locations in front of and east of the boat launch and one location at the far north end of the lake. All new discoveries consisted of very sparse EWM consisting of single to few plants. (Note: Maps depicting mid-late season monitoring efforts includes those locations found during the early season.)

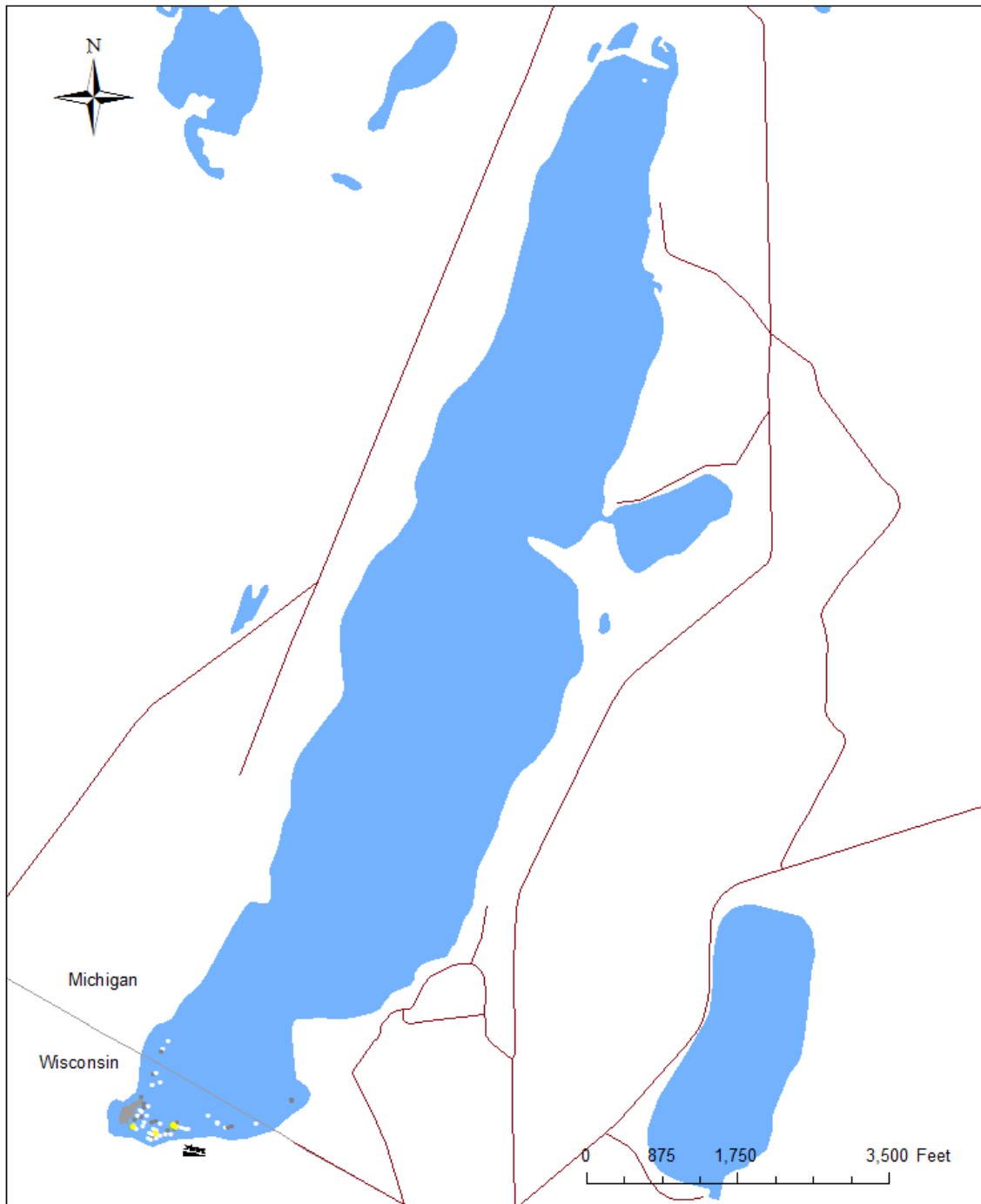


Lake: Smoky - Vilas County, WI & Iron County, MI
 Map Date & Creator: 10.30.2015, Many Waters, LLC
 Source: WDNR, MiGDL Lake_polygons_200403,
 ESRI Base Maps
 File: SmokyLakeEOY_2015

EWM Abundance Estimate

- Very Sparse
- Sparse
- Moderate
- Moderate Dense (none)
- Dense (none)

Smoky Lake
EWM Distribution - 2015
Southern Extent



Lake: Smoky - Vilas County, WI & Iron County, MI
 Map Date & Creator: 10.30.2015, Many Waters, LLC
 Source: WDNR, MiGDL Lake_polygons_200403,
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 File: SmokyLakeEOY_2015

EWM Abundance Estimate

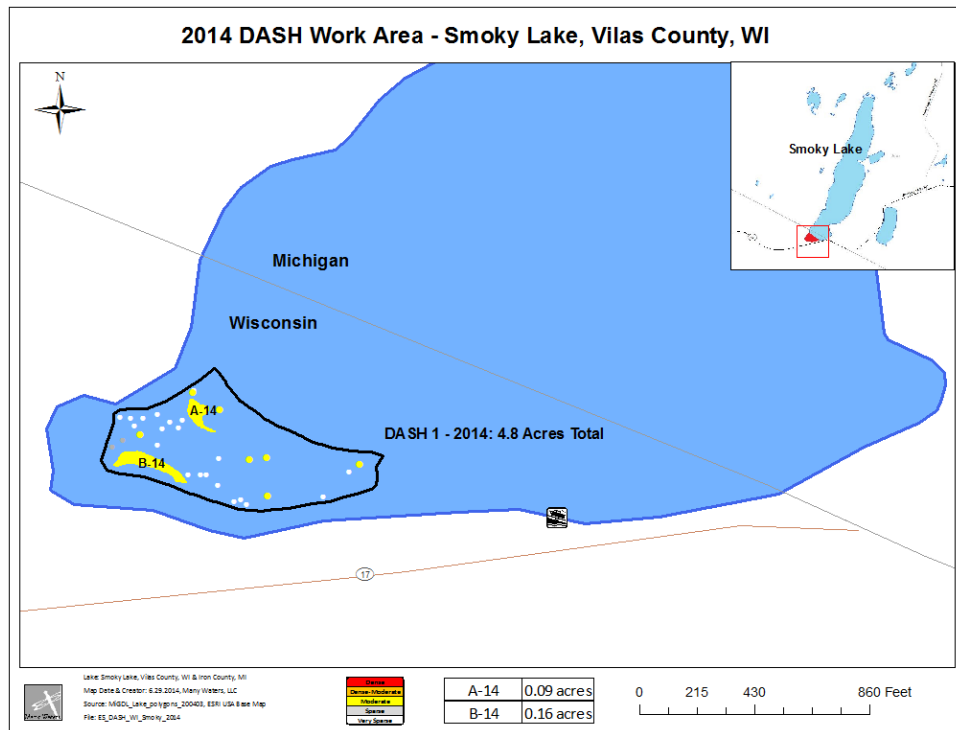
- Very Sparse
- Sparse
- Moderate
- Moderate Dense (none)
- Dense (none)

**Smoky Lake
 EWM Distribution - 2015
 Overview**

MANAGEMENT STRATEGIES

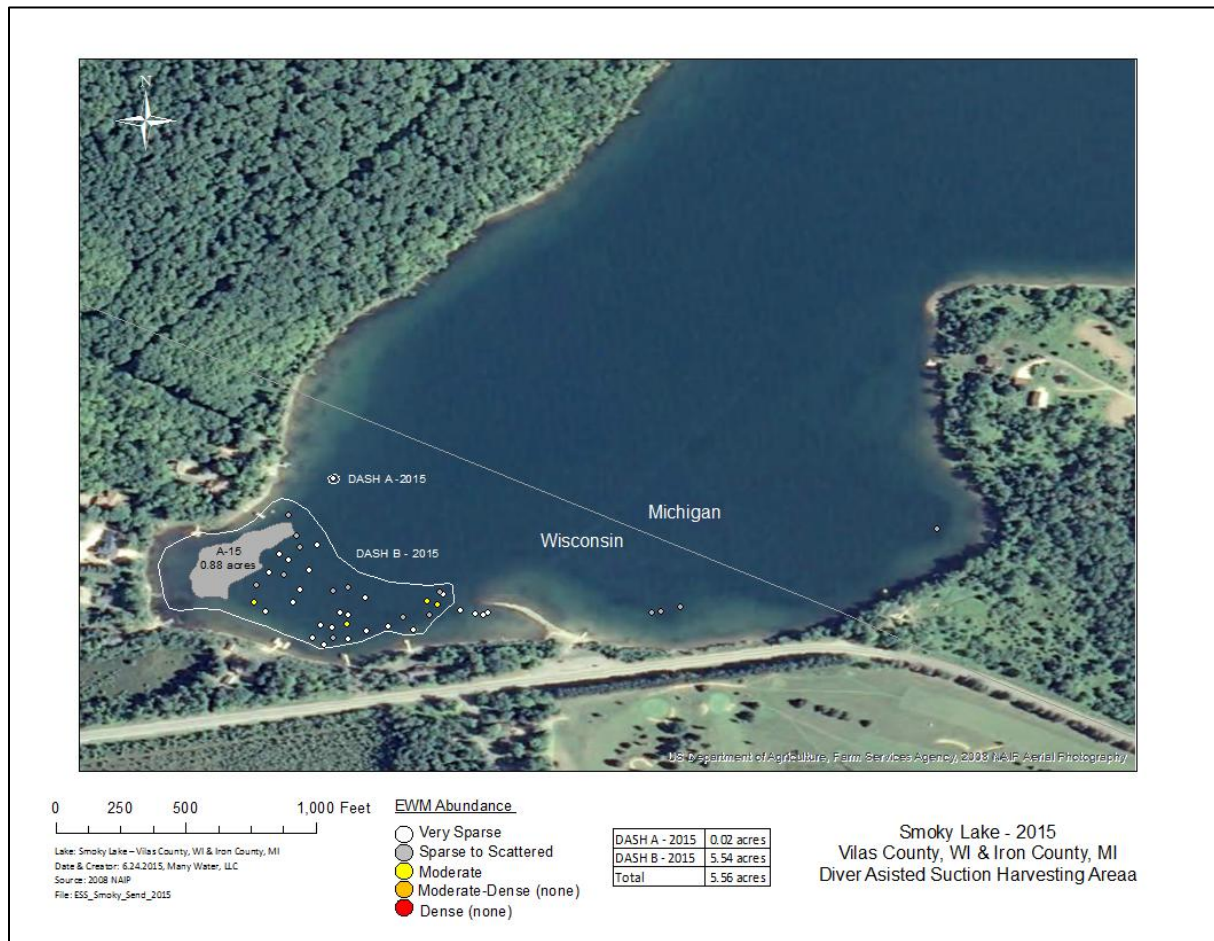
2014

Based on the 2013 fall mapping, the original program proposed for Smoky in 2014 was to hand remove (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 towed 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.



2015

Based on the 2014 end of the year evaluation, the abundance and distribution of EWM consisted of varying degrees of moderate to mostly sparse EWM, with a distribution relatively limited to the far southwest most bay of the lake. Using this information, no change to the management strategy that focused on hand removal was made for 2015. This decision to continue hand removal was confirmed by a pre-management survey on June 22nd of 2015. Hand removal consisted of three levels and included DASH, using divers alone and volunteer snorkel pulling.

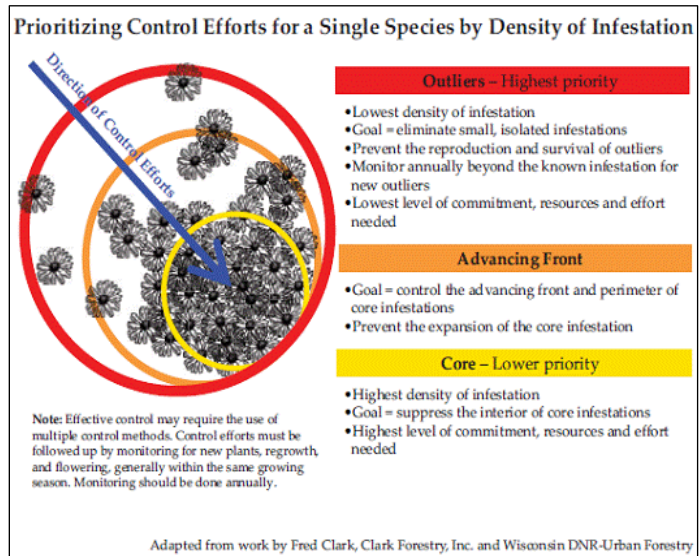


To determine whether a site is controlled using hand removal alone versus DASH, several factors are considered. DASH improves the efficiency of hand removal at locations when multiple large to very large EWM plants exist (especially later in the season) and when patches or continuous beds of EWM exist. 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 2015 management strategy consisted of both hand removal and the use of DASH. A DASH work area (DASH B-2015) was created within the most southwest bay that encompassed all known locations based on the 2015 pre-management survey. One additional isolated colony of EWM north of the larger work was also designated for DASH, DASH A-2015. The reason to include a large portion of the southwest bay under DASH B-2015 was based on several factors including the ease or mobility of the DASH unit and also the distribution of EWM as such that isolating several specific DASH work areas would have been difficult. Including the entire extent, did not add an unrealistic amount to permitting fees. Furthermore, based on the previous year's observations, areas detected earlier in the season that were initially planned to be hand removed with divers grew to a degree where DASH ended up being the chosen method. Isolated locations of EWM found along the western shore, in front and east of the launch and along the far northern end of the lake were managed with the use of scuba divers alone.

As the season progressed, it was evident that the most southwest portion (A-15) of DASH B-2015 had grown in extent and density since the initial pre-management survey. This may be indicative of the timing of pre-management surveys, where observations used to finalize management and permitting maps may be more based on emerging EWM or overwintering EWM condition versus the peak growth observed and surveyed for later in the season.

Although DASH was used within the entire DASH B-2015 work area, most efforts focused within and adjacent to the 0.88 acre area A-15. To make the most efficient use of resources and time an adaptation of prioritization of control efforts using Best Management Practices typically used for terrestrial invasive species was used. This designated the core area of infestation within the southwest most bay and prioritized work towards managing or eliminating small outlier infestations with the intent to minimize spread or reproduction outside of the known infested area. This strategy primarily used divers and volunteers to manage outlying sites along the west shore, in front and east of the launch and also at the far north end of the lake.



SUMMARY OF MANAGEMENT EFFORTS

2014

DASH efforts worked within DASH-1 over 6 days from July 17th 2014 to 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 wet weight EWM in 30 dive hours. Diver Assisted Suction Harvesting was only used in Wisconsin (WI Permit # MNOR-64-14-01).

2015

Diver Assisted Suction Harvesting

DASH efforts worked primarily within DASH B-2015 over 9 days from July 7th 2015 to September 24th 2015. DASH efforts primarily focused on A-15 identified during the spring survey, but also worked across the entire work area focusing on problematic areas primarily along the western half of



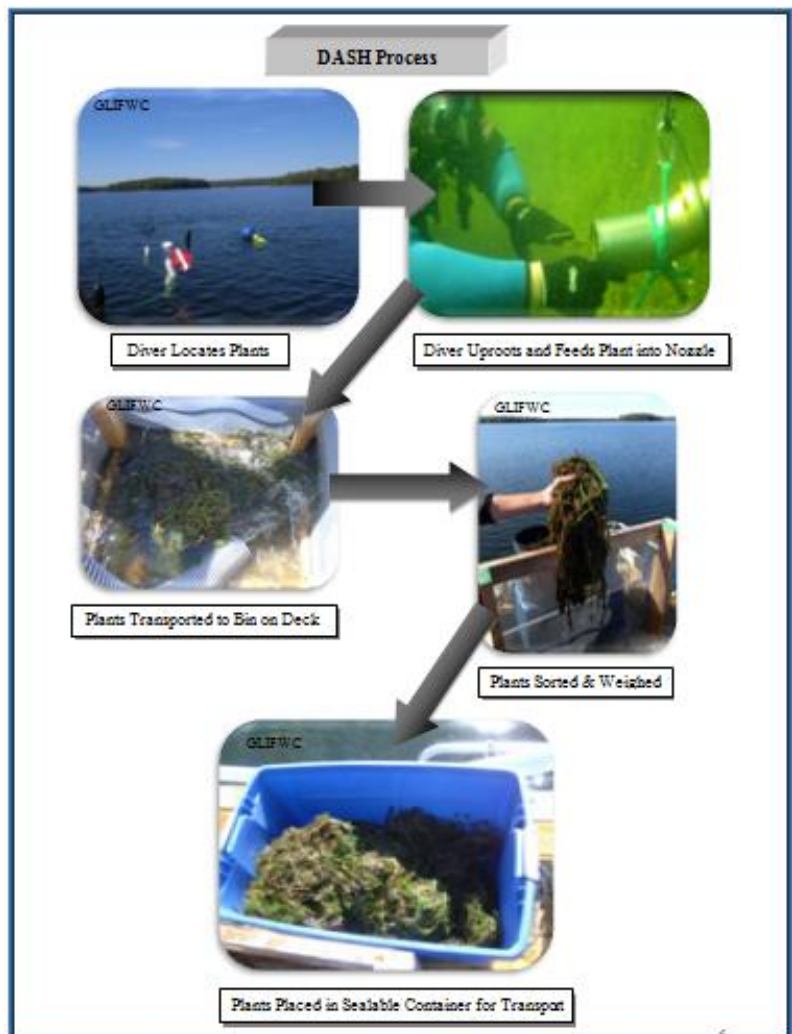
Divers Using DASH to Remove EWM

the bay. DASH removed a total of 865 pounds of wet weight EWM in 37.5 dive hours. Diver Assisted Suction Harvesting was only used in Wisconsin (WI Permit # NO-2015-64-97M).

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 of the suction hose. 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. We feel 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 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.

Table 2: 2014 Summary of DASH 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% (average) | 868.8 |

Table 3: 2015 Summary of DASH Efforts.

| Date | Location | Size (acres) | DASH Boat Location | | Dive Time (hrs) | EWM (lbs*) | Native (lbs*) | Incidental Native Plant Harvest (%) | Total (lbs*) |
|-----------|-------------|--------------|--------------------|---------------|-----------------|--------------|---------------|-------------------------------------|--------------|
| | | | Lat (NAD 83) | Long (NAD 83) | | | | | |
| 7/7/2015 | DASH B-2015 | 5.54 | 46.081315 | 88.955964 | 3.75 | 102.0 | 1.0 | 1% | 103.0 |
| | | | 46.081249 | 88.955918 | | | | | |
| 7/8/2015 | DASH B-2015 | 5.54 | 46.080950 | 88.956010 | 2.50 | 120.5 | 3.0 | 2% | 123.5 |
| 7/10/2015 | DASH B-2015 | 5.54 | 46.080932 | 88.956106 | 3.25 | 104.5 | 3.0 | 3% | 107.5 |
| 7/15/2015 | DASH B-2015 | 5.54 | 46.081033 | 88.956265 | 5.25 | 154.0 | 2.0 | 1% | 156.0 |
| 7/16/2015 | DASH B-2015 | 5.54 | 46.081152 | 88.956018 | 5.00 | 99.5 | 2.5 | 3% | 102.0 |
| | | | 46.081315 | 88.956116 | | | | | |
| 7/19/2015 | DASH B-2015 | 5.54 | 46.080695 | 88.955167 | 3.25 | 44.5 | 1.5 | 3% | 46.0 |
| | | | 46.080803 | 88.955577 | | | | | |
| 9/16/2015 | DASH B-2015 | 5.54 | 46.080790 | 88.954230 | 4.50 | 62.0 | 1.5 | 2% | 63.5 |
| 9/18/2015 | DASH A-2015 | 0.02 | 46.082062 | 88.955238 | 1.25 | 15.0 | 0.5 | 3% | 15.5 |
| | DASH B-2015 | 5.54 | 46.081710 | 88.955570 | 3.25 | 63.0 | 1.5 | 2% | 64.5 |
| | | | 46.081480 | 88.955500 | | | | | |
| 9/24/2015 | DASH B-2015 | 5.54 | 46.081600 | 88.955860 | 5.50 | 100.0 | 1.0 | 1% | 101.0 |
| | | | 46.081520 | 88.955960 | | | | | |
| | | | 46.081210 | 88.956260 | | | | | |
| | | | | | 37.50 | 865.0 | 17.5 | 2% (average) | 882.5 |

2014 Daily Dive Log

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.



2015 Daily Dive Log

July 7th 2015 Weather- partly sunny, 53°F, strong north wind with +15mph gusts
DASH efforts focused along the east-central portion of A-15. Three and three quarter dive hours removed 102 pounds of EWM. Incidental harvest of native plant species remained similar to previous year's efforts. Species consisted of slender naiad (*N. flexilis*), *Nitella* sp., fern pondweed (*P. robbinsii*), slender waterweed (*E. nuttallii*) clasping leaf pondweed (*P. richardsonii*) and small pondweed (*P. pusillus*).

July 8th 2015 Weather- clear, 67°F, light south wind
DASH efforts focused along the southeastern portion of A-15. Two and a half dive hours removed 120.5 pounds of EWM. Incidental harvest of native plant species remained similar to previous efforts. It appears that the EWM had expanded along the southeastern portion of A-15 since initial 2015 surveys.

July 10th 2015 Weather- mostly sunny, 70°F, WSW winds 5-10 mph, gusts to 15 mph
Returning to the southeastern portion of A-15, three and a quarter dive hours removed 104.5 pounds of EWM. Incidental harvest of native plant species remained similar to previous efforts but also included quillworts (*Isostes* sp.), bur-reed species (*Sparganium* sp. and needle spikerush (*E. acicularis*).

July 15th 2015 Weather- sunny, 68°F, winds light and variable
DASH efforts focused again along the southeastern portion of A-15. Five and a quarter dive hours removed 154 pounds of EWM. Incidental harvest of native plants remained similar to previous efforts.

July 16th 2015 Weather- sunny with increasing clouds, 70°F, SSW winds 5-10 mph, gusts to 15 mph
DASH efforts returned to the central-eastern portion of A-15. Five dive hours removed 99.5 pounds of EWM. Incidental harvest of native plants remained similar to previous efforts.

July 19th 2015 Weather- sunny 75°F, west wind 10-15 mph
DASH efforts shifted focus from A-15 and worked along the central portion of DASH-B-15. Relocating the boat twice, 3.25 hours of dive time removed 44.5 pounds of EWM. Incidental harvest of native plants remained similar to previous efforts.

September 16th 2015 Weather- cloudy, rain 65°F, winds SSW 10-15 mph
DASH efforts focused along the far northeastern corner of DASH-B-2015. Four and a half dive hours removed 62 pounds of EWM. Incidental harvest of native plants remained similar to previous efforts.

September 18th 2015 Weather- cloudy, rain, 60°F, winds NNW 5-10 mph
DASH efforts focused on DASH-A-2015 and along the northern portion of A-15. Four and a half dive hours removed 78 pounds of EWM. Incidental harvest of native plants remained similar to previous efforts.

September 24th 2015 Weather- cloudy, 62°F, light SSE winds
DASH efforts focused along the north central and central portion of A-15. Five and a half hours of diving removed 100 pounds of EWM. Incidental harvest of native plants remained similar to previous efforts.

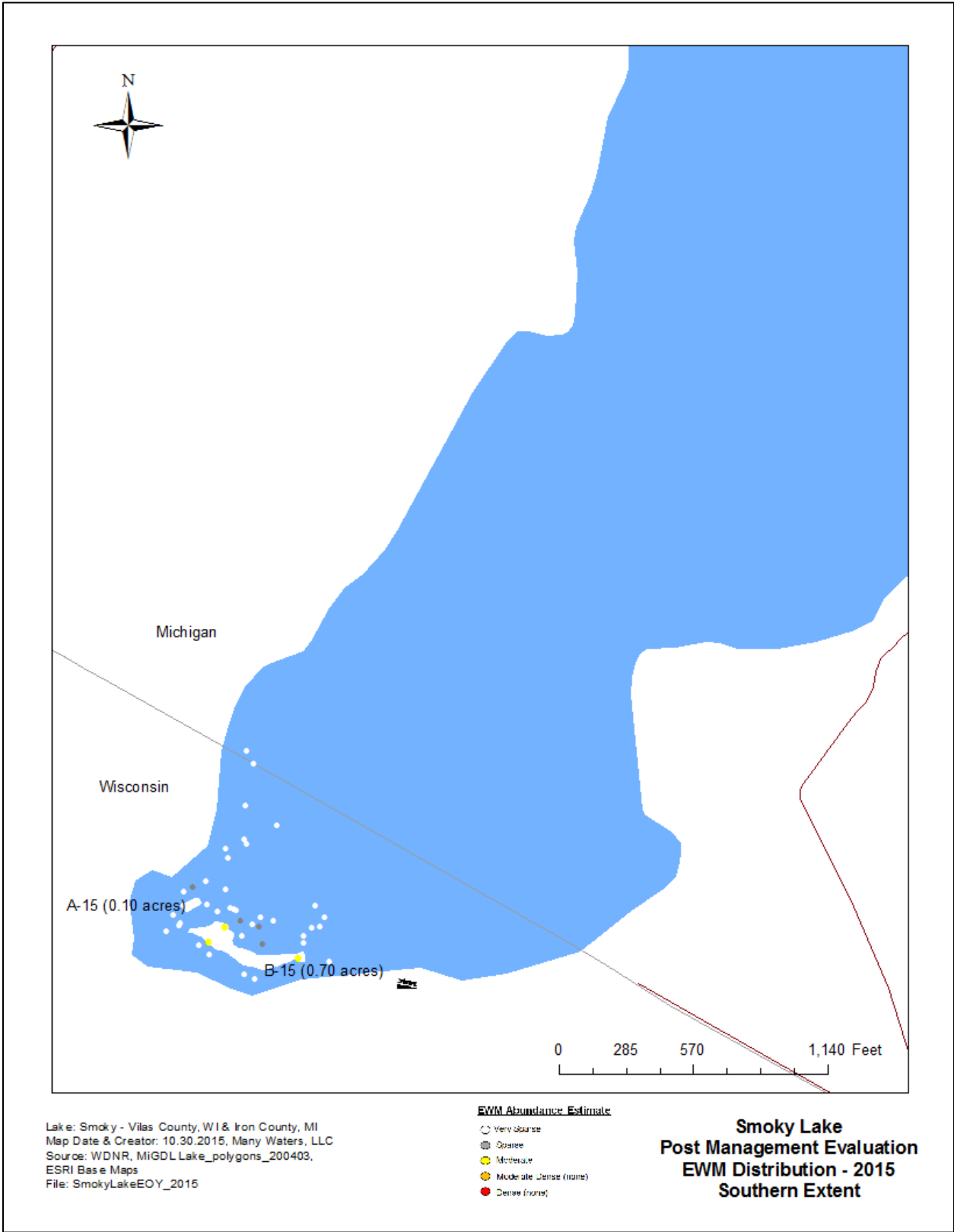
2015 Diving Efforts

Diving efforts focused on scattered low density EWM locations, primarily north of DASH B-2015 and also in front and east of the boat launch along the south shore. In 18.5 dive hours, 58 pounds of EWM was removed. During diving efforts, additional single to scattered plants were observed between previously documented locations. Mainly these plants were in 10-12 feet of water and were very short in stature. Due to these additional observations, the entire area from the boat launch east was swam with one pass along shallower water and an additional pass along the deeper water searching for and removing EWM.

2015 POST MANAGMENT EVALUATION & DISCUSSION

An end of the year survey evaluating management efforts took place on October 11th 2015. The purpose of the end of year evaluation was to visit all known managed sites, not survey for additional EWM locations. Evaluation methods collected information on the abundance and distribution of EWM using qualitative methods similar to those used during the lake wide monitoring surveys.

Eurasian watermilfoil continues to exist within the southwest most bay and a few locations just north of the original DASH B-2015 work area. No EWM was detected in front and east of the launch, nor at the single location along the north end. Overall management efforts reduced the density of EWM in Smoky Lake compared to 2014, furthermore, A-15, which was a continual area of sparse density EWM was reduced in both extent and abundance. In light of this reduction, the overall extent of EWM in Smoky Lake has grown in 2015 compared to 2014. This is primarily due to the very sparse area of contiguous growth (B-15) found along the central portion of the southwest most bay.



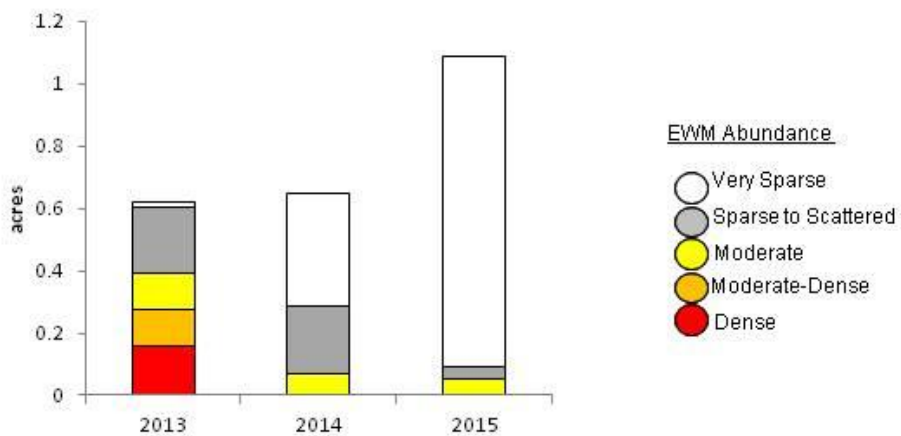
Smoky Lake 2014 EWM Distribution and Abundance



Smoky Lake 2015 EWM Distribution and Abundance



Change in EWM Abundance from 2013-2015



2016 PROPOSED APPROACH

Continuing monitoring efforts in 2016 at levels completed in 2015 will improve the likelihood of detecting new EWM locations on Smoky Lake. This approach includes two lake wide surveys, one completed during the first half of the summer and the second completed during the second half of summer. 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 at the north end of the lake, extra attention by volunteers in this area is encouraged.

Between 2013 to 2015 the abundance of EWM in Smoky Lake has decreased. Nevertheless, the distribution of EWM in Smoky Lake based on the 2015 end of the year evaluation survey, has grown since 2013. 2015 hand removal efforts reduced low-density outliers found outside of the southwest bay; however, 67.5 dive hours using DASH have not been able to reduce overall extent of EWM in the southwest most bay.

The rate of harvest over the control period using DASH reflected in pounds of EWM/dive hour was slightly more in 2014 than in 2015. On average, the rate of effort in 2014 was 31 pounds per hour of dive versus 24 pounds per hour of dive in 2015 (Figure 3). This is roughly a 23% reduction in average biomass harvest per hour of dive effort. Furthermore, when DASH efforts are teased out to only include the areas in and adjacent to A-15, which would be considered the core or most abundant region, the average biomass harvest per hour of dive effort decreased by roughly 20% between 2014 to 2015 (Figure 4). Interpreting these results in terms of results per unit of effort indicate progress in reducing the overall abundance (or biomass) of EWM in Smoky Lake. The challenge is predicting whether continued reductions using a hand harvest method may occur, or if the rate of growth from EWM will surpass any fiscally reasonable approach using hand harvesting as the primary management method. As stated earlier, regardless of any management approach, EWM will more than likely not be eradicated from Smoky Lake, and this should not be a feasible or realistic endpoint in EWM management.

Figure 3: Rate of all DASH Harvesting Over the 2014 & 2015 Management Period.

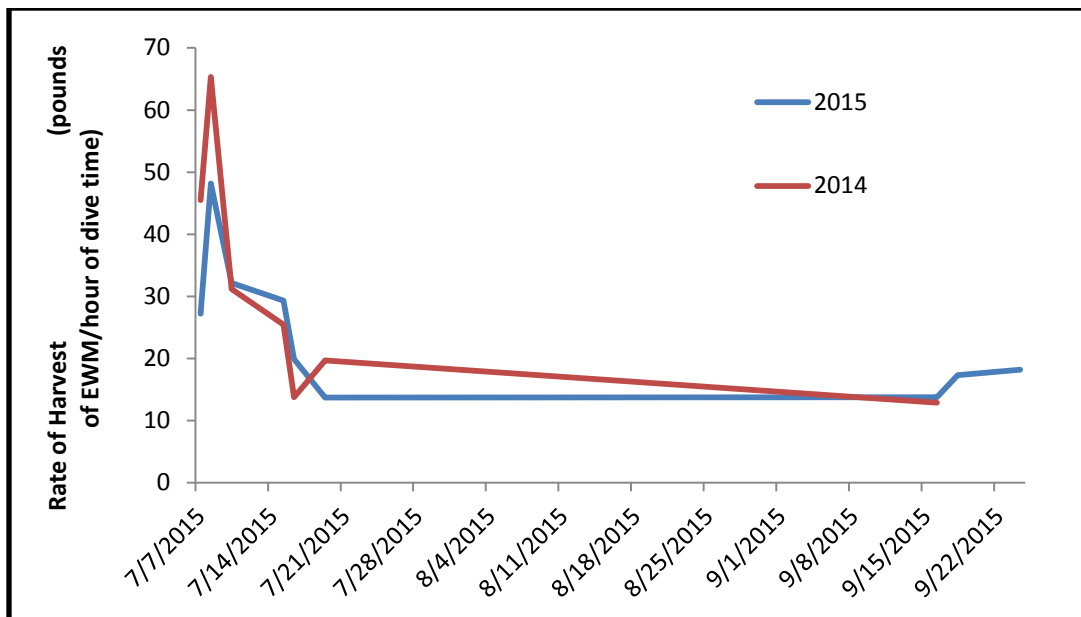
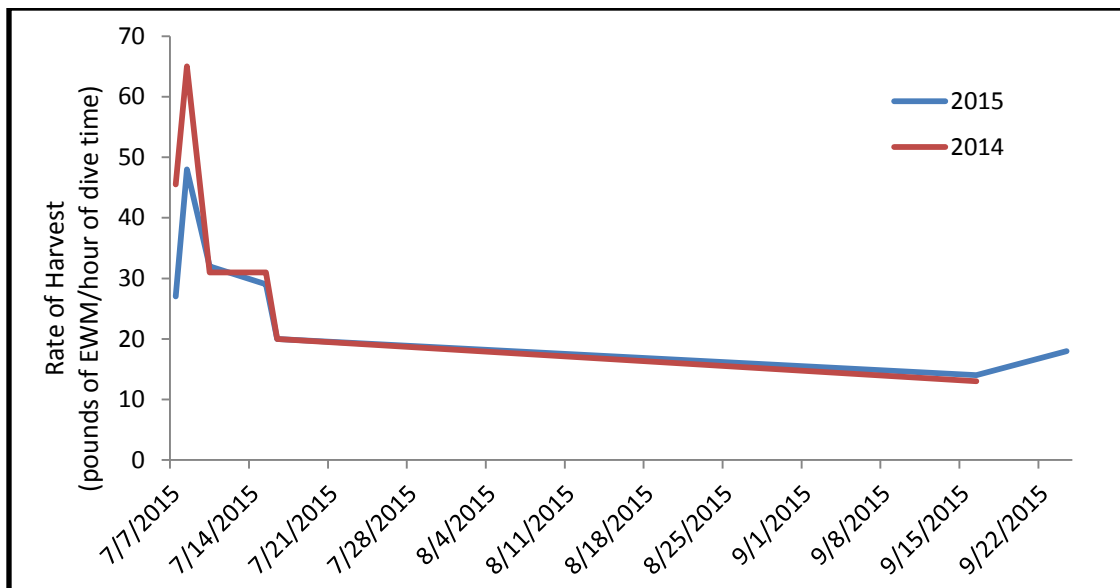


Figure 4: Rate of DASH Harvesting Efforts Within and Adjacent to A-15 Over the 2014 & 2015 Management Period.



A two-pronged management approach is proposed for Smoky Lake in 2016. This includes an adaptive “wait and see approach” for the southwest bay, which may include the continued use of hand removal coupled with a possible herbicide treatment. For this region, final management decisions will be dependent on the results of a pre-management survey, availability of fiscal resources and input from the WDNR, SLPOPA and SLOPA’s sponsor. Currently, SLPOA is soliciting input from their lake residents regarding the use of herbicides and collecting as much information possible about the benefits and costs of herbicide use with respects to short and long-term efficacy and known and unknown non target impacts. Herbicide use will have to

occur early in the growing season (late May/early June), when water temperatures are relatively cool (less than 60°F). Timing treatments early minimizes non-target impacts to other aquatic native plant species that according to the WDNR may still be dormant at the time of treatments. Proposing an herbicide treatment will require fulfilling all WDNR herbicide use permitting requirements and foresight in preparation, even in the event that no herbicide treatment takes place. In the event that an herbicide treatment does not take place in 2016, management will consider the continued use of DASH.

The second of the two-pronged approach outside of the southwest most bay again depends on funding however, will focus on hand removal. The abundance of EWM at this time is too low to consider herbicide use based on 2015 survey results. These locations and additional locations found in 2016 will be the focus of hand removal efforts both professional and volunteer. Many locations dove along the southern bay from the boat launch east are relatively too deep for snorkel pulling, averaging depths from 10-12 feet of water. If new locations are found, these can be the focus for volunteer divers; however, currently there are limited volunteers that are dive certified and available for these efforts. In the event that new locations that arise in 2016 cannot be handled by volunteers, efforts can be augmented with professional hand harvesting.

The alternative to the suggested management strategy for Smoky Lake is to propose no management. This would cease all management efforts and only include monitoring annual change. The benefit to this approach is that no fiscal short-term costs would be incurred in management, any unknown non-target or harmful effects to Smoky Lakes ecosystem that may result from certain management practices would be sustained and over the long term monitoring data may support the fact that EWM may never become a nuisance on Smoky Lake. With this in mind, waiting and seeing may be the best approach, however, there is the risk that certain riparian access may be impaired, and if nuisance levels of EWM do occur, desired management at that time may be at a larger scale than the current situation. At this time, no nuisance level of EWM that impedes recreational use of Smoky Lake exists. Large-scale management would more than likely include the use of aquatic herbicides and in some cases the use of those herbicides at a lake wide level, meaning the entire water body would be managed for EWM. Lake wide or whole lake management of EWM would be a challenge on Smoky Lake due to State laws that govern how aquatic plants can be managed in Michigan and Wisconsin. For example, liquid 2,4-D, a product used in whole lake applications in Wisconsin would not be an option due to listing of all liquid 2,4-D products in Michigan as being prohibited. It is not known whether EWM in Smoky Lake may reach nuisance levels, however, at this time the tools used to control EWM at a large scale are not as straight forward if operating strictly under one set of jurisdictional rules. Further discussions are warranted on this strategy before considering it practical.

The management of EWM, regardless of strategy is many times framed in short term approaches, typically reviewed annually and adapted based on need or desired goals. Given the complexity of aquatic ecosystems, short-term management should be underpinned by a long-term holistic approach. This includes the development of long term planning that characterizes the health of the system and identifies strategies on how to maintain or improve upon this health. SLPOA has been proactive and resolved to work towards a holistic long-term approach to sustaining and improving the health of Smoky Lake by moving forward in developing a comprehensive lake management plan. SLPOA will be applying in December 2016 for a WDNR Surface Water Grant to assist fiscally in this process.

Appendix A

Summary of AIS Prevention and Lake Stewardship Activities

AIS Committee Report - 2015

Summer 2014 Remediation Efforts

Many Waters, the professional AIS consultant, had logged approximately 56 dive hours over 15 days and had removed approximately 923 pounds of milfoil. Other volunteer efforts reported removal of about 75 pounds. The association contracted for \$3000 in extra time beyond the DNR budget in this. Efforts were concentrated on the large trapezoidal area, located at the southwest end of the lake as documented in the early season surveys, but also included some new growth to the east of the boat landing and two plants discovered at the far northern part of the lake.

Volunteer Efforts

The focus of the Smoky Lake AIS Committee volunteer effort this summer was to continue to expand the volunteer base and to improve communication and reporting with existing volunteers. Smoky Lake volunteers have taken responsibility for training and gathering reporting hours for lake volunteers serving as lake monitors and for the hands on, water-based, diving, snorkeling and shallow water hand removal efforts and those who assist in boats with this process. Volunteers contributed and documented just over 400 hours in these combined efforts

The committee has had good success in attracting volunteer lake monitors willing to serve as volunteers. The lakeshore is divided up into parcels and assignments are communicated to lake monitors at the beginning of the season. Member volunteers have been very good about monitoring the assignments and reporting back on findings and hours spent. Bob Virgil and Lew Raker co-chair this effort and Mary Lou Raker assists with documenting the hours for DNR reporting. Lew Raker has also stepped forward to chair the Lake Management Planning Subcommittee.

The Smoky Lake Association continues to have a limited number of volunteers willing and able to go into the water but has reached out to other resources to bring non-resident volunteers into the process. Weather and schedules were a factor in the conducting water-based volunteer sessions but we did manage five volunteer sessions with folks in the water. We also have lake residents who conduct removal sessions independently once training is complete.

DNR Perspectives Current and Moving Forward – Lakes Coordinator Kevin Gauthier

We met with Kevin Gauthier in early November to discuss directions for the AIS remediation program. Our consultants Many Waters attended this meeting and provided several survey maps reporting on AIS presence at the start and end of the 2014 and 2015 seasons. Lydia Cooley, reported on the very positive volunteer efforts by lake stakeholders.

The use of herbicides for 2016 was discussed at this meeting but a decision was not reached. This final decision would entail a broader team review by the DNR. Kevin stressed that we be reasonable in our expectations and that remediation rather than eradication is more realistic. He expressed caution and a change in DNR policies with the repeated use of herbicides in small-scale applications.

It was agreed that the Smoky Lake Property Owners Association, working with the Town of Phelps as sponsor, would pursue a second Rapid Response Grant in the winter of 2016 and in December 2016. Kevin would look for resolutions from the Association and the Town to be tendered to him by February 2016 as an indication of commitment to the long-term lake planning.

Communications with Lake-Owners

A steady effort has been made by the AIS committee to keep lake-owners abreast of information. Written communications have been provided to lake-owners twice a year apprising them of progress and providing information on treatment options. AIS reports are also provided at the annual meeting and members are afforded time to ask questions. In November 2015, a brief survey was shared with lake-owners to gather their comments regarding the use of herbicides and inquired about other issues related to the organization. The survey results did not produce any objection to the use of herbicides and members felt they were being well-informed on the issues.

An informational session was also scheduled in early January where Kevin Gauthier was present. It is hoped that an additional session might be scheduled during the summer when more lake owners are present.

Watercraft Inspections - Clean Boats Clean Waters Program

The Clean Boats Clean Waters program is viewed favorably as a tool to inform lake users on AIS and techniques to prevent spread. Eurasian water milfoil is just one of several species to be concerned about. Curly Pondweed, Spiny water fleas and zebra mussels are also a concern.

Smoky Lake Property Owners contracted for 100 hours of time with the DNR for Clean Boats Clean Waters program for the summer of 2015. This was paid for directly by the association. A worker was assigned to the landing in the afternoons, general on Thursdays. An application was made to participate in the program in 2016 and the Association is requesting that a worker be assigned at times more consistent with lake landing activity.

Cooperative Efforts

The Association has made an effort to establish collaborative relationships. It has worked with Iron County Lakes and Streams Partnership in remediation efforts and has lake owners participating at various levels. The Association has also participated in efforts sponsored by WePIC (Western Peninsula Invasives Coalition) including a recent grant application. In researching issues Association members have reached out to gather information regarding varied methods from other lake organizations in both Michigan and Wisconsin. This networking will build strengths and provide ongoing information regarding AIS issues.

The Association has a long and positive relationship with the Town of Phelps. The Town has long maintained a boat landing and picnic area at the south end of the lake and Association members have been supportive of many causes in the area. Community relationships are quite positive and the Town of Phelps has expressed its willingness to help where needed in our efforts, including the continued sponsorship on WDNR grants.

Long-Term Management Plan

The Association is taking pro-active steps to work on a Long-term Management Plan. A new subcommittee, headed by Lewis Raker, has been formed to oversee this process as it works with

the Town of Phelps as sponsor and with Many Waters, LLC. as consultant and contractor. This effort is expected to take three years to complete the research and data-collection and to articulate a plan for good stewardship of Smoky Lake. The goal will again be to recruit volunteers into this project. A WDNR grant will be submitted in December 2016 and it is hoped that funds will be available to subsidize the costs of this effort.

Early Detection and Response Grants

The funds from the first Early Detection and Response Grant will be depleted with the work in 2015. The intention is to apply for a second Early Detection and Response Grant in the winter of 2016, for work to be completed in 2016-17. The Town of Phelps has offered to again serve as Sponsor.

Summary Strategies:

- 1 - Continue to make an effort to communicate on issues and be realistic in setting expectations. Eurasian milfoil will continue to be a presence in Smoky. It can be managed but not eliminated.
- 2 – Work to develop both short-term and long-term management strategies.
- 2 - Hand harvesting is the option open to Smoky at this level of infestation. A permit will be sought for a small scale herbicidal treatment for 2016 to supplement the hand harvesting.
- 3 – Continue to educate lake owners regarding the issues and encourage the ongoing active involvement of lake owners as volunteers.