Wisconsin Department of Natural Resources
Surface Water Grants Program
Aquatic Invasive Species
Grant # AIRR-216-17

Buckatabon Lakes Eurasian Watermilfoil Control and Prevention Rapid Response Project

Upper and Lower Buckatabon Lakes - Vilas County, WI

2016 Annual Reporting

Submitted To:
Wisconsin Department of Natural Resources
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And

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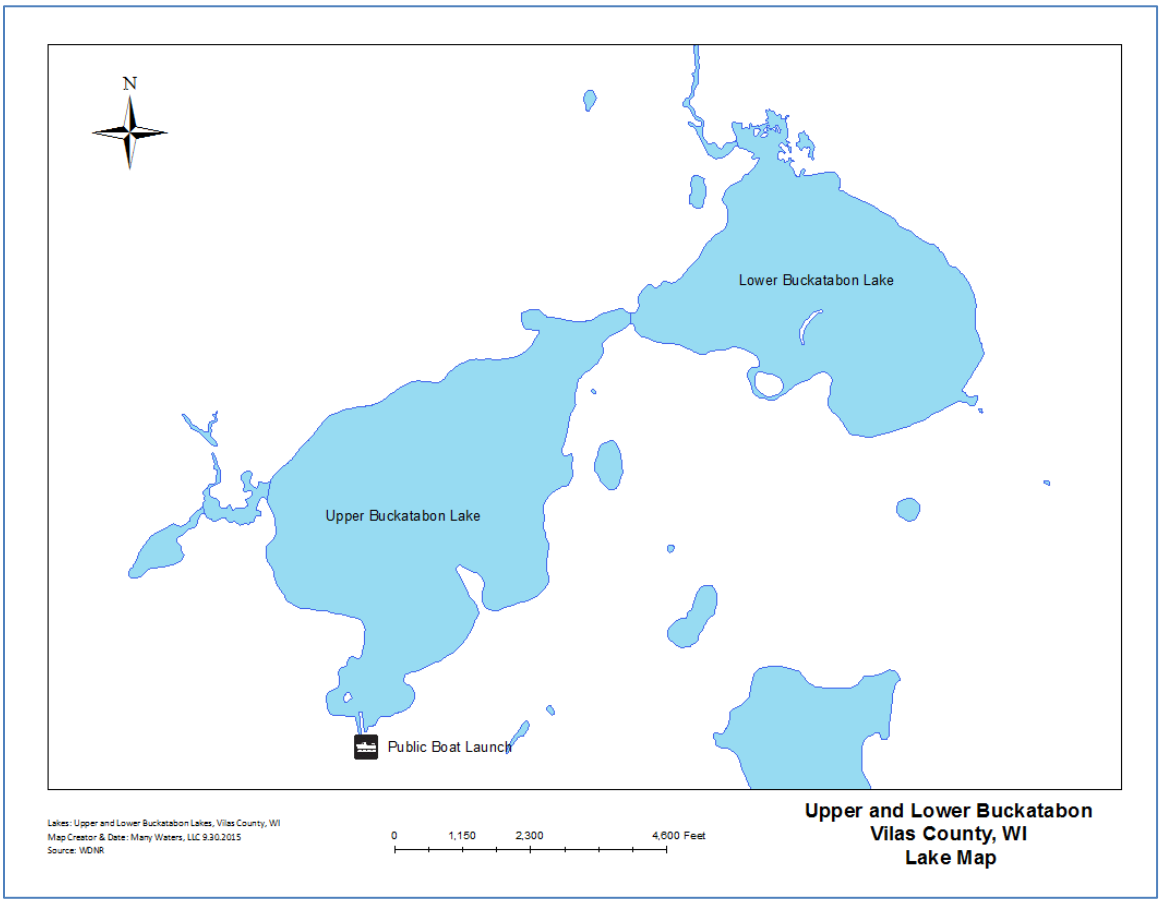
This report is a summary of activities completed in 2015 and 2016 under the WDNR Aquatic Invasive Species Grant # AIRR-216-17 for Eurasian watermilfoil (EWM). Specifically this report synthesizes (1) Eurasian watermilfoil (EWM) monitoring findings, (2) EWM management strategies and efforts, (3) overview of project highlights including a discussion of 2017 strategies and (4) a summary of lake stewardship and AIS prevention activities.

PROJECT AREA

Upper Buckatabon Lake and Lower Buckatabon Lake (WBIC 1621800 Upper & 1621000 Lower) are connected water bodies located in Conover Township, Vilas County, WI with 493 and 352 surface water acres respectfully. Buckatabon Creek flows into Upper Buckatabon Lake from the north. A dam owned and operated by Wisconsin Valley Improvement Company is located along the eastern end of Lower Buckatabon that drains Buckatabon Creek to the Wisconsin River. A public boat launch owned by Vilas County is located on Upper Buckatabon, whereas a channel between Upper Bucktabon and Lower Buckatabon provides public access to Lower Buckatabon. Lower Buckatabon is also accessed through private boat launches.

Project Location



OVERVIEW

In 2015, EWM, discovered by lake resident Dan Benson, initiated a response by the WDNR to complete an aquatic plant survey using the WDNR point intercept (PI) methodology (Hauxwell et al., 2010). Results of this survey found EWM near four sampling locations, two on Lower Buckatabon and two on Upper Buckatabon. Following the initial discovery, lake members began to formalize an official lake association, since one did not exist at this time. To receive WDNR surface water grants, sponsors had to be eligible under a designated set of criteria set forth by the WDNR, at this time, Buckatabon Lakes did not qualify. Using the Town of Conover, which was an eligible sponsor, the Buckatabon Lakes requested that the Town initially sponsor a WDNR Surface Water Grant for Aquatic Invasive Species Early Detection and Response. In the meantime, lake members worked with the WDNR to formally organize a qualified lake association titled the Buckatabon Lakes Association (BLA). Once legally organized, a one year grace period is required prior to the Association becoming eligible to receive future funding. During the summer of 2016, this grace period was met, and the BLA worked directly with the WDNR on transferring the grant sponsorship from the Town of Conover to the BLA.

SEASONAL MONITORING EFFORTS AND FINDINGS

Monitoring surveys using a meander approach 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 calculated 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 in size. Larger sites, typically greater than a 0.10 of an acre in size are circumnavigated and extent in acres is calculated and represented by a polygon.

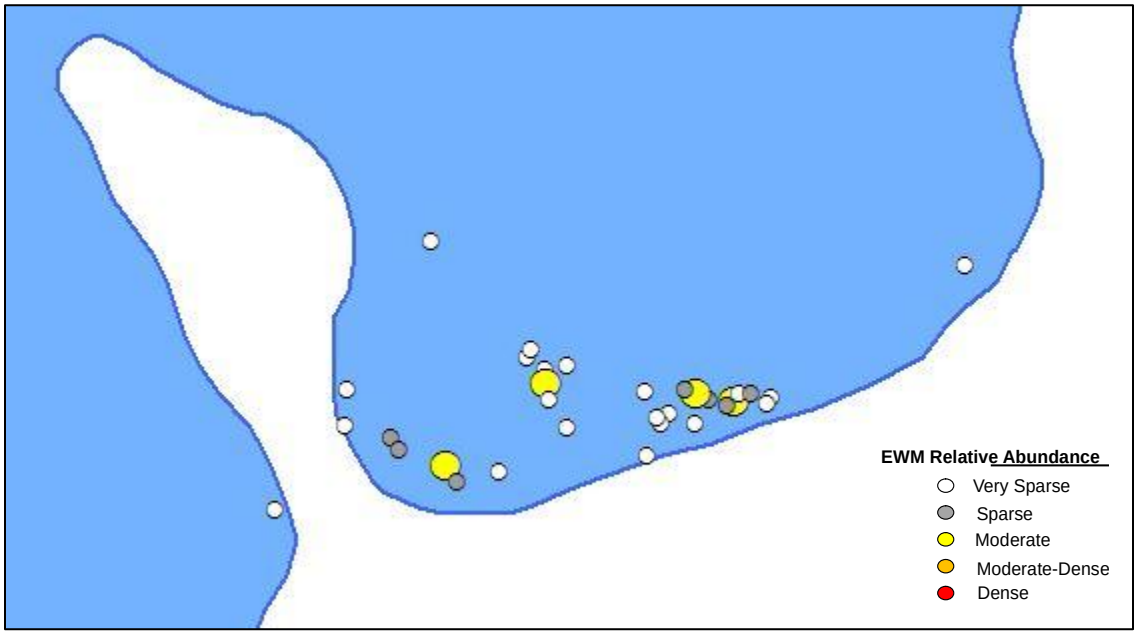
Table 1: Estimated qualitative density rankings.

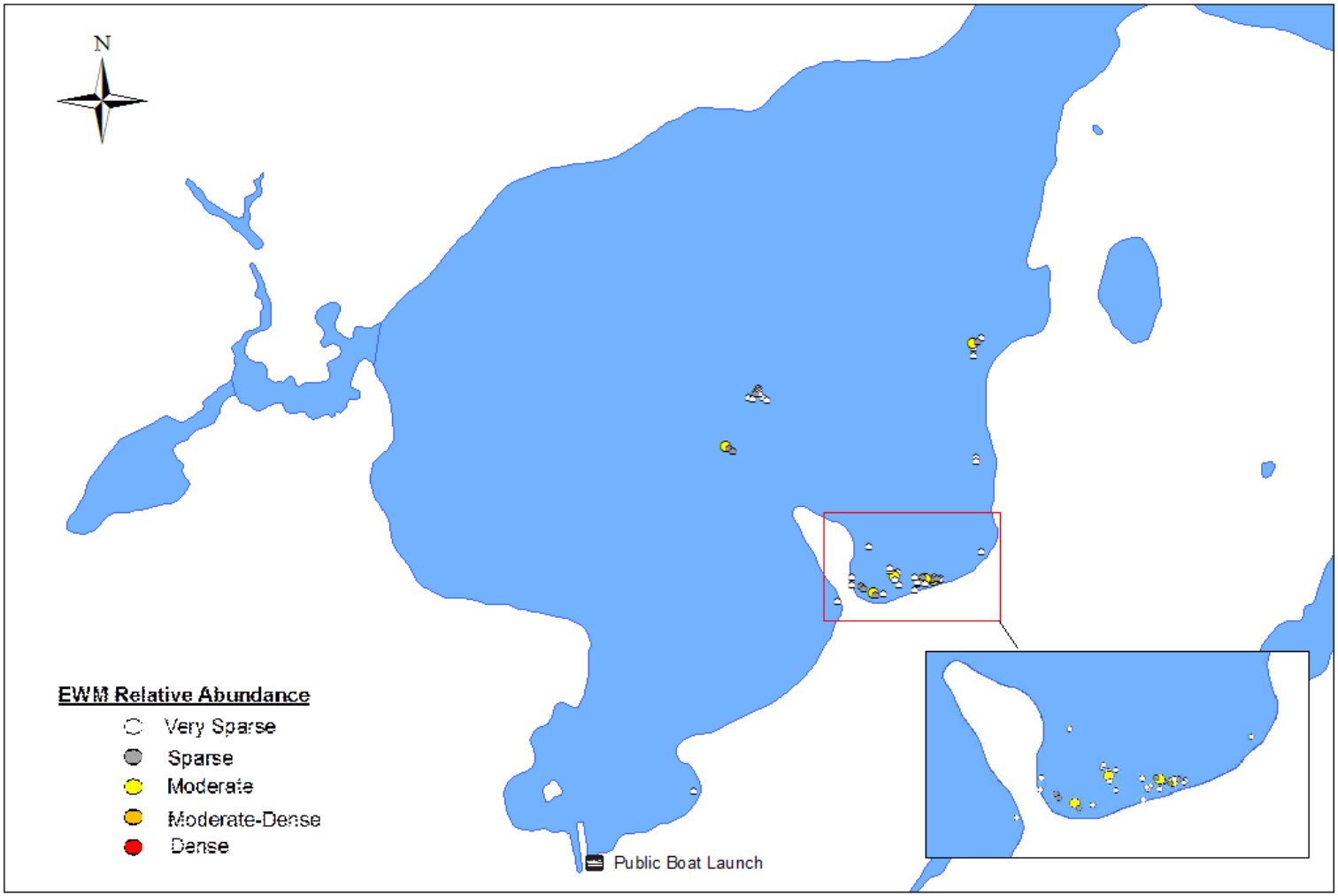
Very Sparse	Typically consists of less than 10 plants visually observed, unless otherwise noted. Extent varies and is estimated visually for smaller locations and noted. Larger locations are delineated using GPS to calculate area.
Sparse to Scattered	Typically consisted of 10-20 plants visually observed, 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.

2015

After the initial discovery and subsequent PI completed by the WDNR, a whole lake meander survey took place on Upper and Lower Buckatabon Lakes in September of 2015. This survey collected information on lake-wide abundance and distribution of EWM on both Upper and Lower Buckatabon. This survey located EWM adjacent to the initial findings by the WDNR and at several additional locations in both Upper and Lower Buckatabon, with the majority of EWM documented in Upper Buckatabon. Based on this survey, lake-wide distribution and abundance of EWM on both Upper and Lower Buckatabon Lakes is considered low. Several moderate density pockets of EWM exist on Upper Buckatabon Lake; however, these are small and isolated in size, with the majority of these sites found along a bay located along the southeastern shore (Figure 1). The chosen strategy for management based on the current condition included hand removal using diving and diver assisted suction harvesting (DASH). Diving efforts would focus on isolated areas of very sparse to sparse locations, whereas, DASH efforts would focus on larger sites with greater abundance. In October, samples of EWM from both lakes were collected and analyzed for the presence of hybrid watermilfoil. Of the samples collected, no hybrid watermilfoil was detected (Appendix A).

Figure 1: Close up of EWM locations along the southeast shore of Upper Buckatabon - 2015.





Lake: Upper and Lower Buckatabon Lakes
Location: Conover Township - Vilas County, WI
Map Date & Creator: 12.18.2015, Many Waters, LLC
Source: WDNR hydro
File: EOY_2015_Buckatabon

0 625 1,250 2,500 Feet

Upper and Lower Buckatabon
Vilas County, WI
2015 EWM Locations
Upper Buckatabon

Lake: Upper and Lower Buckatabon Lakes
Location: Conover Township - Vilas County, WI
Map Date & Creator: 12.18.2015, Many Waters, LLC
Source: WDNR hydro
File: EOY_2015_Buckatabon

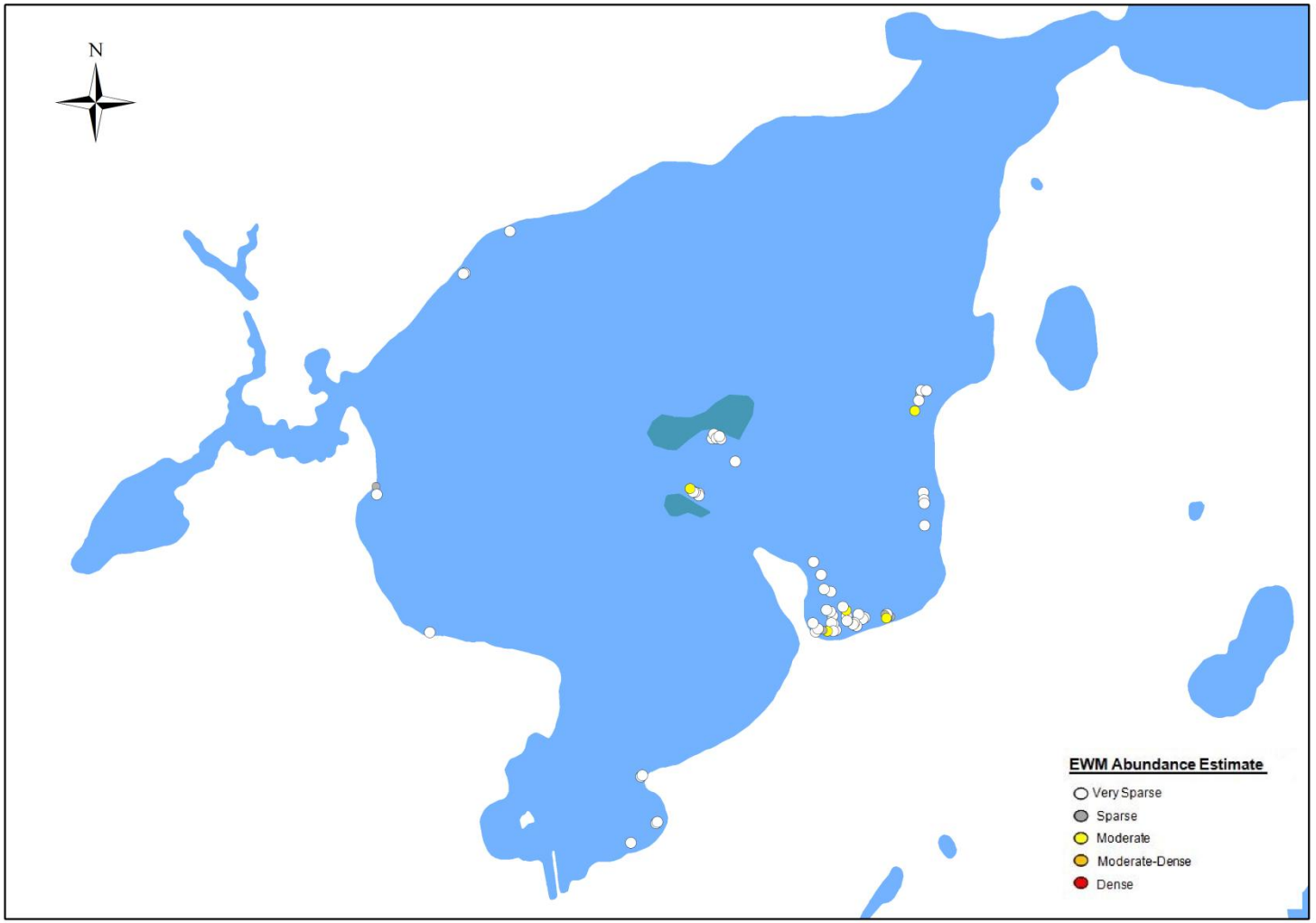
0 487.5 975 1,950 Feet

Upper and Lower Buckatabon
Vilas County, WI
2015 EWM Locations
Lower Buckatabon

2016

Early season monitoring on June 9th focused on relocating existing EWM locations found in 2015 and high likelihood areas including boat launches, shallow bays and regions adjacent to known locations. This information was used to finalize management strategies including specific DASH locations.

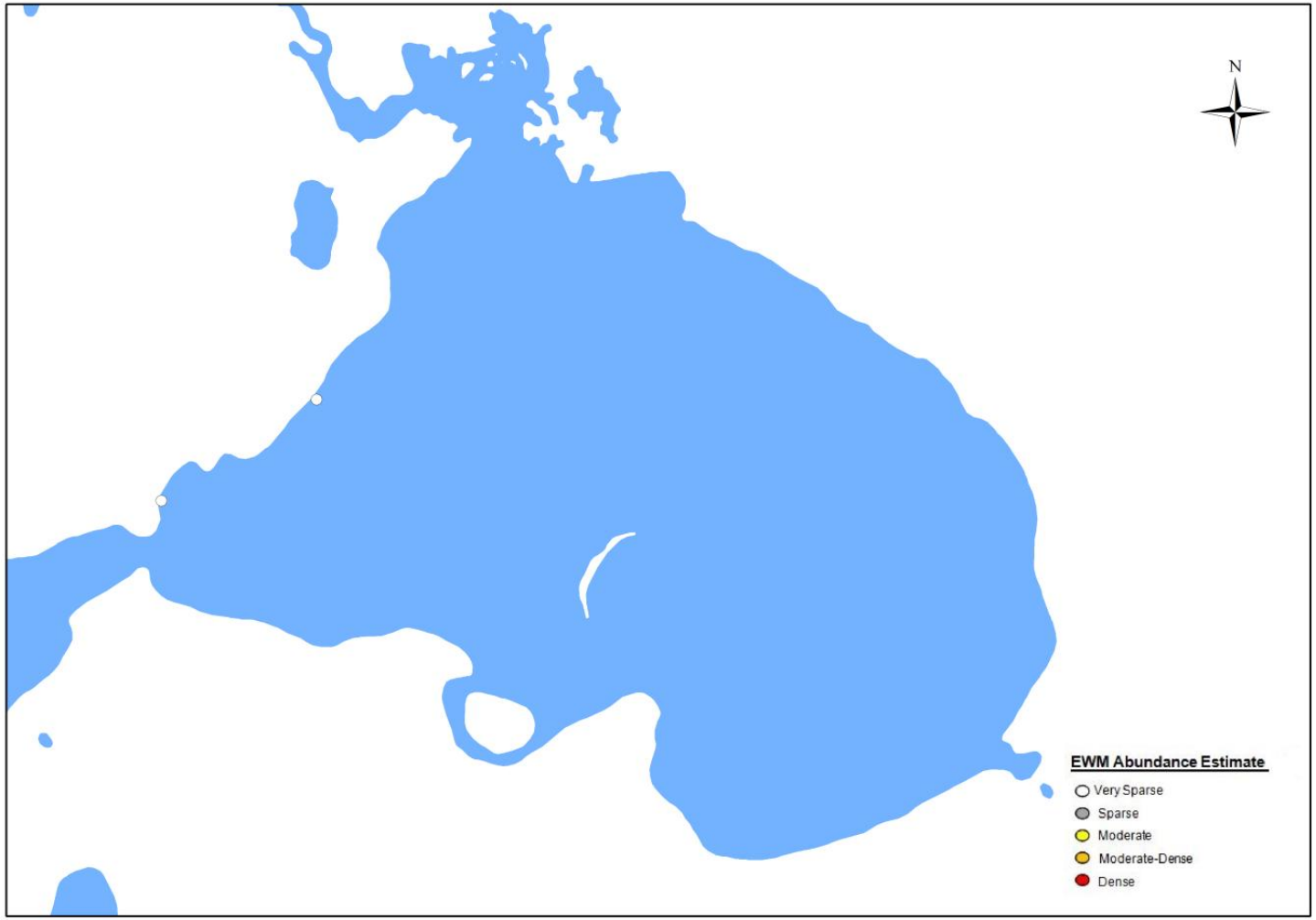
A whole lake meander survey for both Upper and Lower Buckatabon occurred on August 10th. This survey returned to previously known sites already dove and also sought to detect new locations. Overall, very few new EWM detections were observed on both Upper and Lower Buckatabon. One, new location along the far southern end of Lower Buckatabon adjacent to the dam was detected and one new location east of the boat launch on Upper Buckatabon was detected.



Lake: Upper Buckatabon, Vilas County, WI
Map Date & Creator: 1.2.2017, Many Waters, LLC
Source: WDNR hydro, EWM-Many Waters, Islands
Digitized by Many Waters
Survey Date: 6.9.2016
File: Buckatabon_ES_2016

0 650 1,300 2,600 Feet

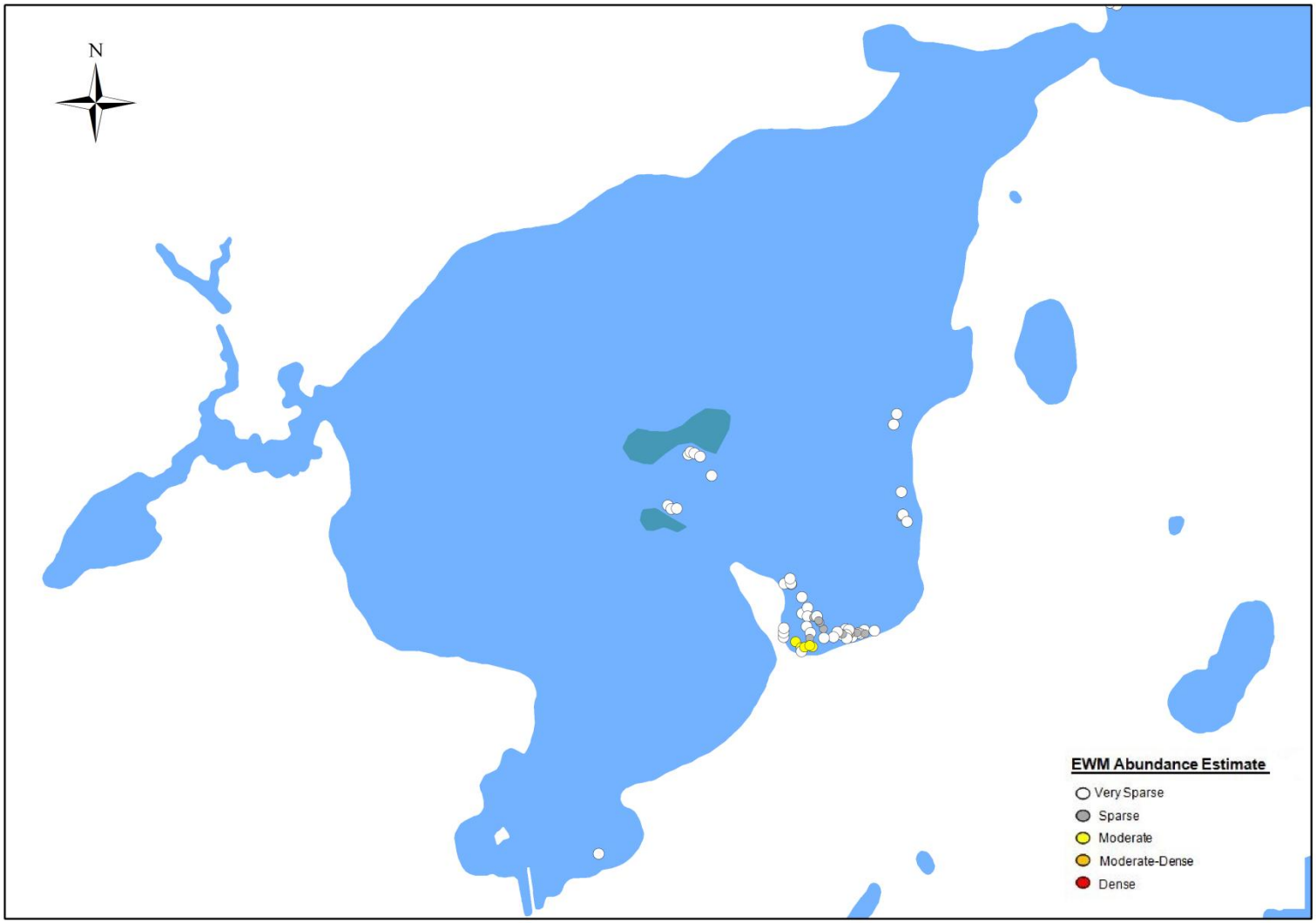
Early Season EWM Survey
Upper Buckatabon Lake
2016



Lake: Lower Buckatabon, Vilas County, WI
Map Date & Creator: 1.2.2017, Many Waters, LLC
Source: WDNR hydro, EWM-Many Waters, Islands
Digitized by Many Waters
Survey Date: 6.9.2016
File: Buckatabon_ES_2016

0 500 1,000 2,000 Feet

Early Season EWM Survey
Lower Buckatabon Lake
2016



Lake: Upper Buckatabon, Vilas County, WI
Map Date & Creator: 1.2.2017, Many Waters, LLC
Source: WDNR hydro, EWM-Many Waters, Islands
Digitized by Many Waters
Survey Date: 8.10.2016
File: Buckatabon_ES_2016

0 650 1,300 2,600 Feet

Mid/Late Season EWM Survey
Upper Buckatabon Lake
2016

Lake: Upper Buckatabon, Vilas County, WI
Map Date & Creator: 1.2.2017, Many Waters, LLC
Source: WDNR hydro, EWM-Many Waters, Islands
Digitized by Many Waters
Survey Date: 8.10.2016
File: Buckatabon_ES_2016

0 500 1,000 2,000 Feet

Mid/Late Season EWM Survey
Lower Buckatabon Lake
2016

MANAGEMENT STRATEGIES

Based on the 2016 early season survey, the proposed management program for Lower Buckatabon Lake included two rounds of hand pulling using divers alone. The first round would be completed prior to the mid/late season survey and include the known sites found in 2015 and spring of 2016. An additional visit would occur once the mid/late season mapping was complete and would include a follow up visit to the previously dove sites and also any new sites discovered. A similar strategies was proposed for Upper Buckatabon Lake, however included 4 DASH sites. 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.

Working from the least abundant sites to the most abundant site, hand removal efforts initiated on Lower Buckatabon, then to individual sites on Upper Buckatabon and finally onto DASH sites.

SUMMARY OF MANAGEMENT EFFORTS

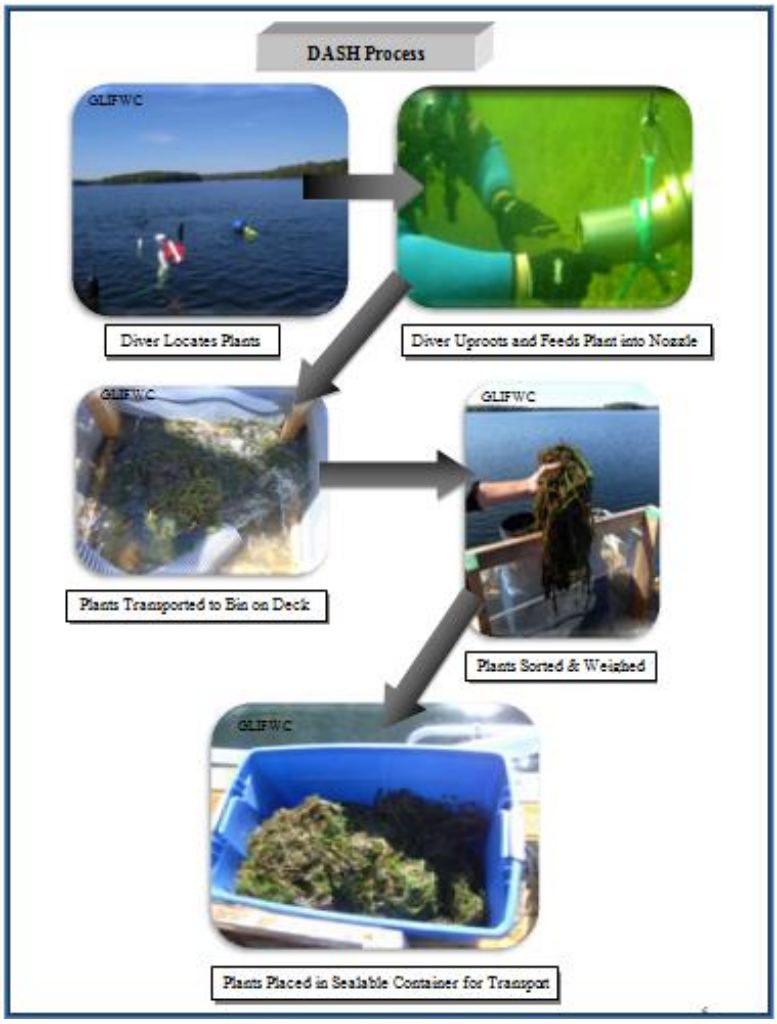
Divers Using DASH to Remove EWM

<u>Diver Assisted Suction Harvesting</u>

The initial work plan for DASH sites was to work sites A-16, B-16 and C-16, then continuing onto site D-16. Due to strong winds during the time of DASH efforts, site order had to be re-arranged and initiated at site D-16. DASH efforts removed a total of 521 pounds of wet weight EWM in 17 dive hours.

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 as much sediment from the root is removed before plants enter the nozzle. This helps maintain visibility for the diver and minimizes debris

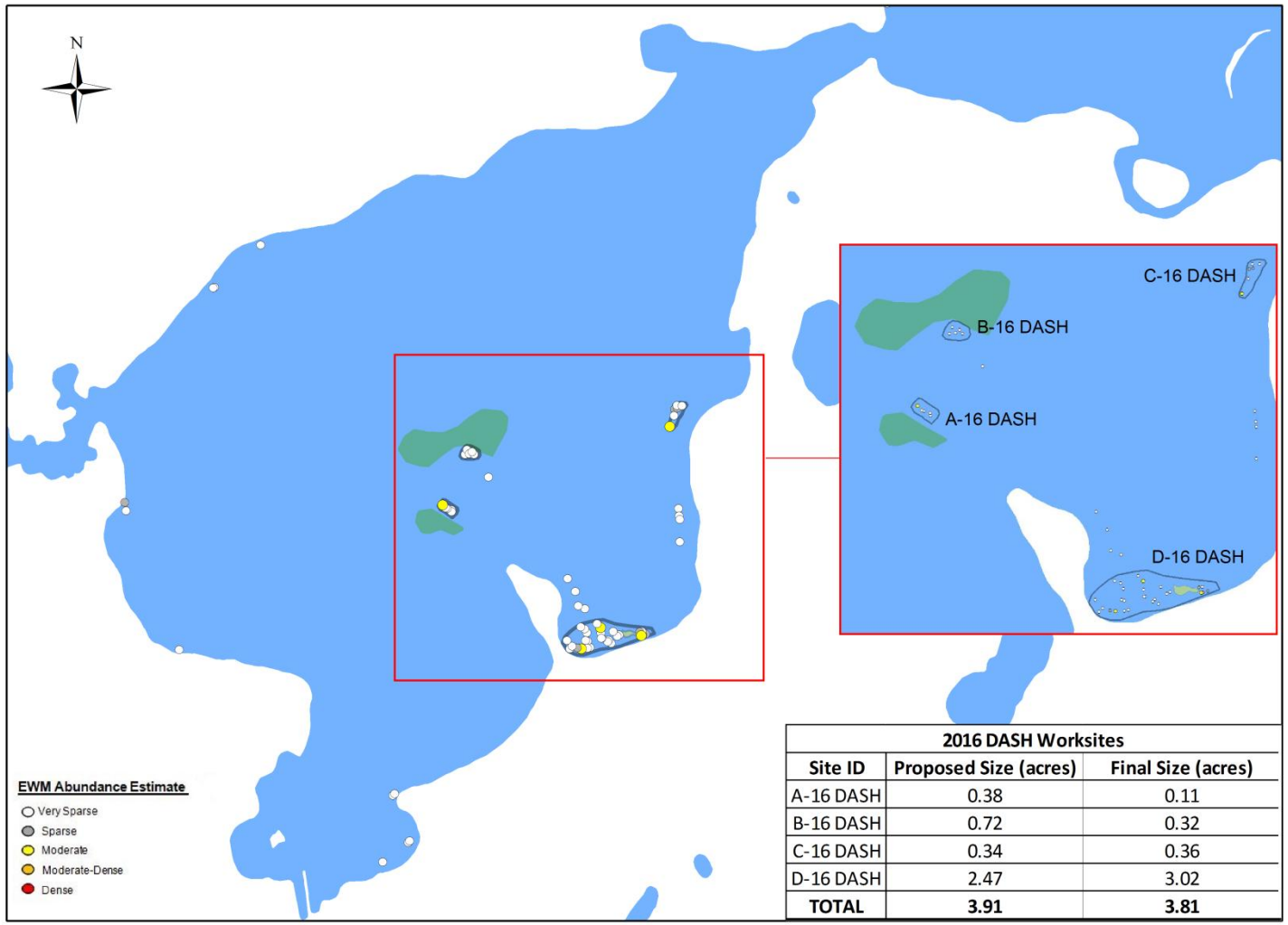
and sediment in the holding bins. The diver observes plants fed into the nozzle for fragmentation and will catch any fragments and feed them into the nozzle.



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.



2016 DASH Worksites		
Site ID	Proposed Size (acres)	Final Size (acres)
A-16 DASH	0.38	0.11
B-16 DASH	0.72	0.32
C-16 DASH	0.34	0.36
D-16 DASH	2.47	3.02
TOTAL	**3.91**	**3.81**

Lake: Upper Buckatabon, Vilas County, WI
Map Datre & Creator: 6.30.2016, Many Waters, LLC
Source: WDNR hydro, EWM-Many Waters, Islands
Digitized by Many Waters
File: Buckatabon_ES_2016

0 650 1,300 2,600 Feet

2016 DASH Worksite Locations
Upper Buckatabon Lake
Vilas County, WI

Table 2: 2016 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)					
7/12/2016	D-16	3.02	46.01201	89.34207	5.50	273.0	13.50	5%	286.50
7/13/2016	D-16	3.02	46.01204	89.34216	2.00	36.0	2.00	6%	38.00
7/13/2016	D-16		46.01193	89.34179	1.75	16.0	0.50	3%	16.50
7/15/2016	C-16	0.34	46.01694	89.3404	1.00	33.0	1.00	3%	34.00
7/15/2016	A-16	0.38	46.01477	89.34774	0.75	14.0	0.50	4%	14.50
7/15/2016	D-16	3.02	46.01202	89.34177	1.75	28.0	1.00	4%	29.00
7/15/2016	D-16		46.01192	89.34207	0.75	8.0	0.50	6%	8.50
9/30/2016	D-16	3.02	46.01195	89.34215	3.50	113.0	13.00	12%	126.00
					17.00	**521.0**	**32.00**	**5% Ave.**	**553.00**

* wet weight

Daily Dive Log

July 12th 2016 Weather- Partly Cloudy, 80˚F, S SW wind 10-15 mph

Due to very strong winds, we were unable to dive the work areas near the island or on the eastern shore. D-16 was the only DASH work area where we could hold on anchor. Five and half dive hours removed 273 pounds of EWM. Incidental harvest of native species included water celery (*V. americana*), common waterweed (*E. canadensis*), fern pondweed (*P. robbinsii*), coontail (*C. demersum*), small pondweed, (*P. pusillus*), northern watermilfoil (*M. sibericum*) and water marigold (*B. beckii*).

July 13th 2016 Weather- Sunny, 70˚F, W SW wind 10-15 mph

Again today due to wind, the only feasible work area was D-16. Three and three quarter dive hours removed 52 pounds of EWM. Incidental native harvest remained similar to the previous day.

July 15th 2016 Weather- Overcast, 60˚F, N NE wind 5-10 mph

Due to lighter winds, we were able to work the remaining DASH work areas. We started on C-16 and then moved to A-16 and then moved back to D-16. At C-16 there was high fishing pressure and at times we had fishermen much closer to our divers than we were comfortable so we moved to a different work area. A total of four and a quarter dive hours removed 83 pounds of EWM, thirty-three pounds from C-16, fourteen pounds from A-16 and thirty-four from D-16. Incidental harvest of native species remained similar to previous efforts.

September 30th 2016 Weather- Cloudy, 51˚F, north wind 5-10 mph

DASH efforts focused on D-16. Due to the later timing of this site visit, we expected much better water clarity than what we experienced. Diver visibility was less than two feet, as with an outreached arm your hand was usually not visible. The poor visibility made finding EWM plants difficult if there were not multiple EWM plants right next to each other. Three and half dive hours removed 113 pounds of EWM.

Diving Efforts

Diving efforts focused on scattered low density EWM locations on both Upper and Lower Buckatabon.

Table 3: 2016 Summary of Dive Efforts.

Date	Dive Site	~ Number of EWM Plants Removed	Pounds* of EWM Removed
6/25/2016	North Shore - Lower Buckatabon	8	1
	North Side of Channel - Lower Buckatabon	8	1
	Point Near Camp Ramah - Upper Buckatabon	21	5
	Southeastern Portion of the Boat Landing Bay - Upper Buckatabon	7	2
6/27/2016	Northwest Shore - Upper Buckatabon	1	<1
	Northwest Shore - Upper Buckatabon	9	1.5
	West Shore, South of Springs Inlet - Upper Buckatabon	70	13
	West Shore, South of Springs Inlet Upper Buckatabon	4	<1
	East Shore South of B-16 – Upper Buckatabon	80	28
7/18/2016	A-16 – Upper Buckatabon	100	29
	B-16 – Upper Buckatabon	40	8.5
	Southeast of B-16 – Upper Buckatabon	16	4.5
	C-16 – Upper Buckatabon	7	3
9/29/2016	North Shore - Lower Buckatabon	8	2
	B-16 – Upper Buckatabon	61	10.5
	A-16 – Upper Buckatabon	50	11.5
	Northwest of D-16 Along West Shore – Upper Buckatabon	1	1
	South of C-16 – Upper Buckatabon	6	2.5
	South of C-16 – Upper Buckatabon	79	16
Date	Near Wisconsin River Outlet - Lower Buckatabon	19	2
	North Side of Channel - Lower Buckatabon	6	< 1
	TOTAL	~593	~144

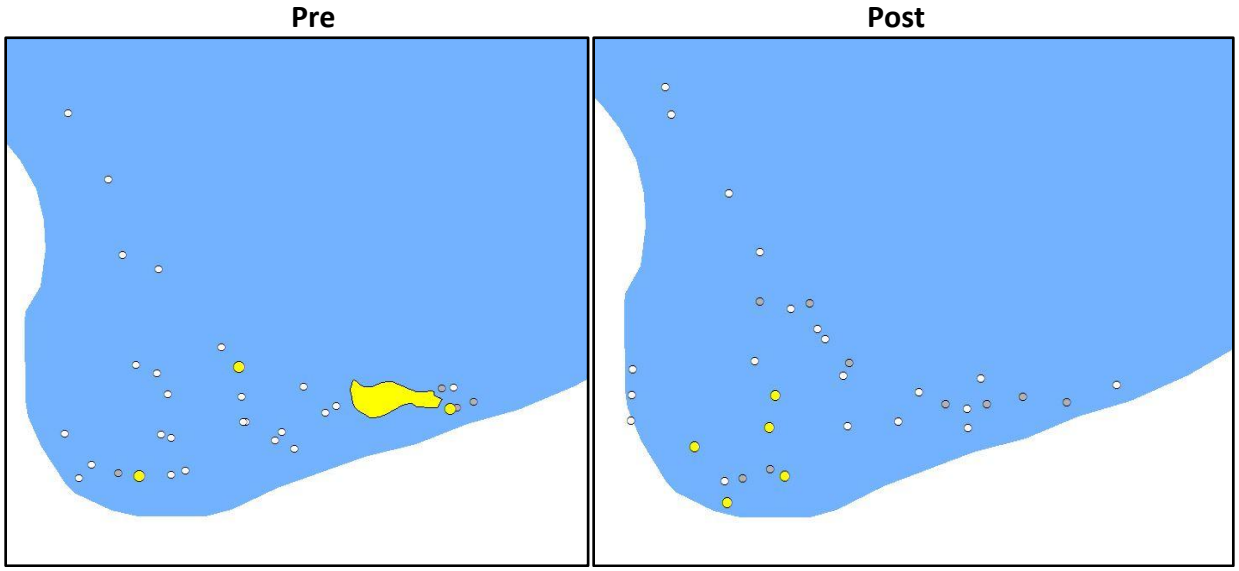
*wet weight

POST MANAGMENET EVALUATION & DISCUSSION

An end of the year survey evaluating management efforts took place on October 6th. The purpose of the end of year evaluation is 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.

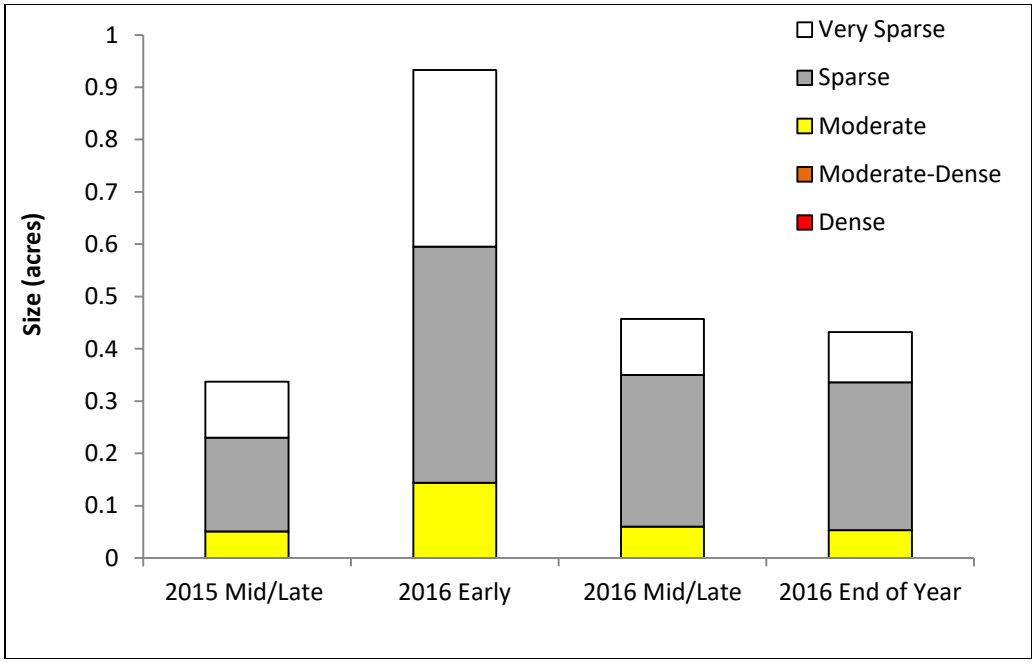
Eurasian watermilfoil was detected at several locations on Upper Buckatabon, but primarily within and adjacent to DASH work area D-16. This area is quite large for a hand pulling and 2016 efforts focused on denser near surface EWM plants rather than single to small sparse density colonies. DASH efforts were able to reduce a moderate density colony of EWM from polygon based mapping to point based mapping. However, eradication of EWM from this region, or in general from the Buckatabon Lakes is not a feasible management end point.

Figure 2: Pre and Post Management Abundance and Distribution of EWM in D-16.



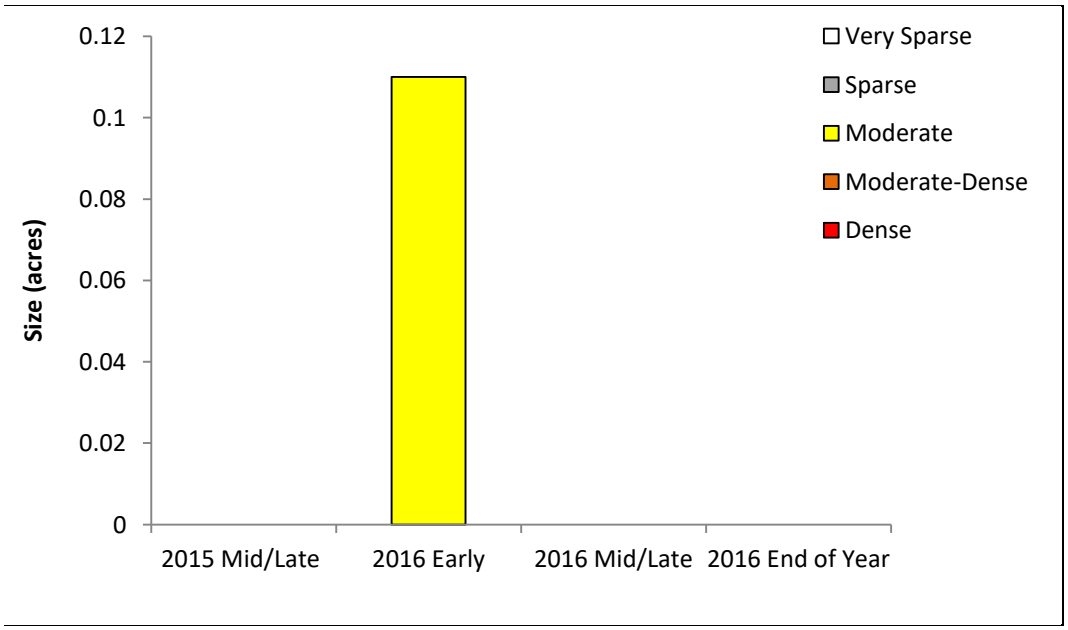
The management strategy for hand removal was to have one round of hand removal across all known sites (minus D-16) prior to the mid/late season survey. An additional round of hand removal on new and re-visits to existing areas occurred, however, the majority of observed reduction occurred between the 2016 early seasons surveys to the mid/late season survey. Furthermore, no EWM was detected on Lower Buckatabon during the post management evaluation.

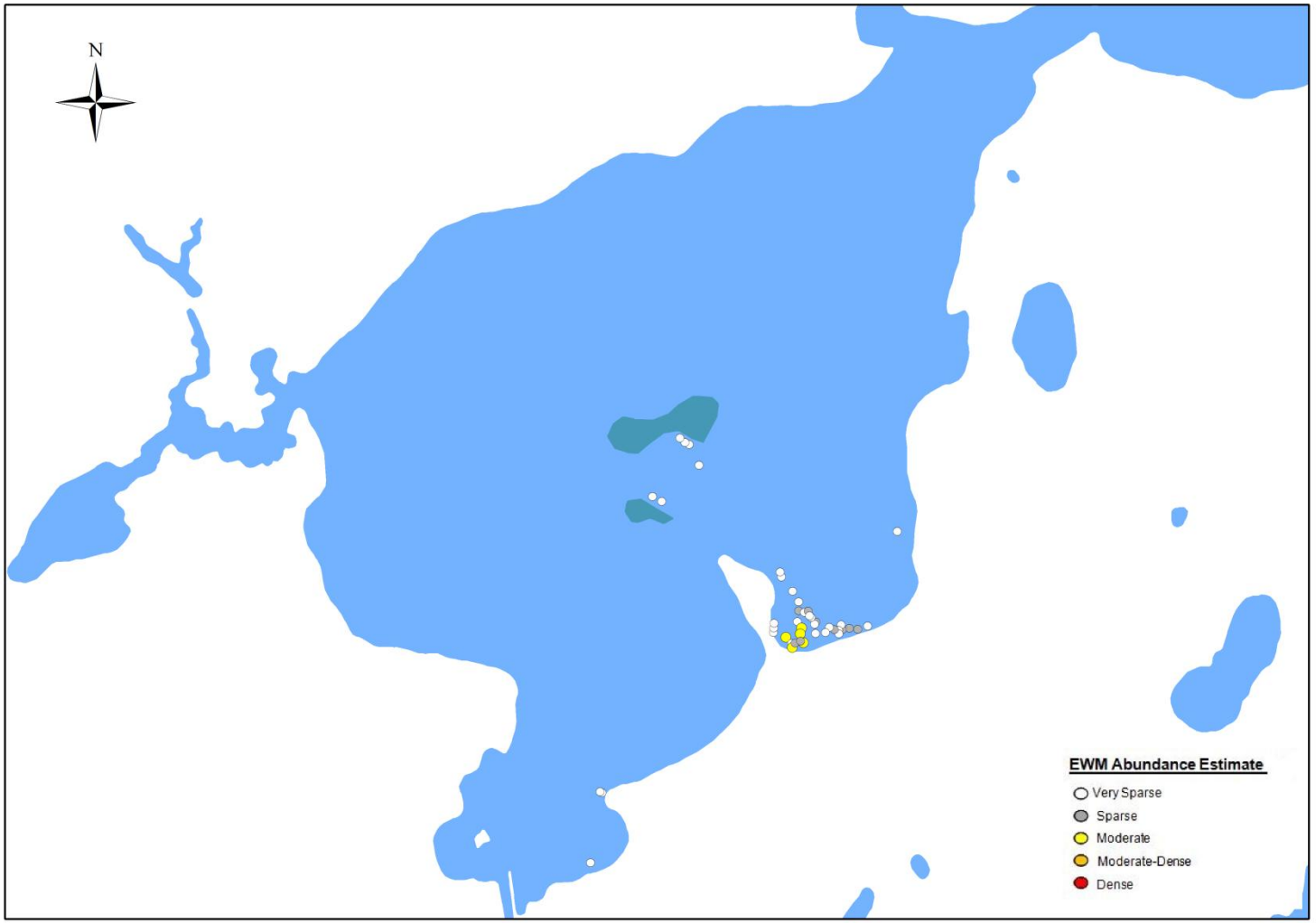
Figure 3: EWM point based abundance estimate on Upper and Lower Buckatabon combined from 2015 to 2016.



Values are determined by using an infield visual estimate in feet circumference converted to acres as represented by point based GPS mapping. This is not an estimate of overall footprint, but rather an estimate of exact extent.

Figure 4: EWM polygon based abundance estimate for Upper Buckatabon from 2015 to 2016. (Note: no polygon based mapping for EWM beds currently exists for Lower Buckatabon.)





Lake: Upper Buckatabon, Vilas County, WI
Map Date & Creator: 1.2.2017, Many Waters, LLC
Source: WDNR hydro, EWM-Many Waters, Islands
Digitized by Many Waters
Survey Date: 10.6.2016
File: Buckatabon_ES_2016

0 625 1,250 2,500 Feet

End of the Year EWM Survey
Upper Buckatabon Lake
2016

Water clarity on both Upper and Lower Buckatabon deteriorated during the second half of the season making surveying and hand pulling more difficult. Clarity reduction is more than likely due to the increase in algae abundance. Due to this limitation, the end of the year evaluation was pushed back in attempt to hopefully gain visibility as the waters clear heading into late fall. Unfortunately, this did not occur, poor water clarity persisted into later fall. Water clarity does affect the ability to visually detect EWM, even when calm and clear conditions are present. Abundant native aquatic plant growth, particularly, Northern watermilfoil, occurs in D-16. Pockets of small colonies of moderate density of EWM occur intermixed with the Northern watermilfoil, making these sites very difficult to access with divers and also DASH equipment. What is promising is that during the early season surveys at the beginning of June, relatively little Northern watermilfoil was observed from the surface and green and overwintering EWM was observed. This timeframe may be more optimal in this region to effectively and efficiently remove EWM. Other than seasonal timing, overall, 2017 strategies will mimic 2016 strategies. Furthermore, long term planning should incorporate strategies to address water clarity issues, including identification of natural or un-natural sources.

The Buckatabon Lakes are very popular for fishing and recreating, several minor challenges occurred in 2016 including accessing sites due to the presence of fishing boats and safety concerns due to lack of knowledge of the laws regarding distance to dive flags. Our experience has been that educating the lake owners and lake users on the presence of divers and the laws regarding dive flags improves safety. We would suggest providing information in the BLA newsletter's on dive flag laws and etiquette and also have a discussion with either the WDNR and/or Vilas County (property owner of the launch site) on providing information on the kiosk on dive flag laws. It is recommended that the BLA provide a refresher course on EWM identification. Buckatabon has a rich native plant community and many of these plants are "look a likes" to EWM and can be challenging even to the most experienced observer. Some options for this include a short on water training or even as simple as providing some fresh samples at annual meetings. Also, it is recommended that a volunteer monitoring program become established to assist in detecting new locations but also monitoring existing locations post hand removal to detect any re-growth that may occur.

Appendix A

Watermilfoil Genetics Testing Results

Company/Entity	**Many Waters, LLC**
Total Samples Processed	**4**
Cost per Sample	**$45**
Set up Fee (if applicable)	**$65**
Total Cost	**$290**

Summary of DNA Data for Watermilfoil

Grand Valley State University's Robert B. Annis Water Resources Institute

ATTN:
Send Invoice to:
Barb Gajewski
Many Waters, LLC
2527 Lake Ottawa Road
Iron River, MI 49935
skih2o@hotmail.com
715-617-4688

Send Results to:
Barb Gajewski (skih20@hotmail.com)

Result Details (By Lake):

Lake Name: Lower Buckatabon

Date Received: 10/18/15

Number of Samples Sent: 2

Number of Samples Processed: 2

Comments: NA

Lake Name: Upper Buckatabon

Date Received: 10/18/15

Number of Samples Sent: 2

Number of Samples Processed: 2

Comments: NA

Genetic IDs:

Area/site	Sample #	ID
Lower Buckatabon/708 and 1117	**1-2**	**Eurasian Watermilfoil (*Myriophyllum spicatum*)**
Upper Buckatabon/93 and 94	**1-2**	**Eurasian Watermilfoil (*Myriophyllum spicatum*)**

Appendix B

Summary of Lake Stewardship Activities

Membership. We have obtained lake owner lists and have secured renewals from 105 families and 10 businesses

Meetings. We have held two annual meetings which has included our general membership. In addition to general business, we use the meetings to update and encourage active participation in our efforts. We have also had a general membership breakfast which included a fundraiser. Our Board of Directors has met 14 times to conduct normal business and search out ways to increase membership and educate our membership

Newsletters. We sent out educational newsletters during the spring, summer and fall. To date we have prepared and released 7 newsletters

Signs. We have purchased and installed educational signs and posted them at the three boat landings warning all who use the lakes of AIS, specifically EWM, in our two lakes.

Buoys. We have purchased and installed buoys around the major invasive weed beds warning of the presence of EWM

CBCW. We have trained 52 adults and over 45 students as clean boats clean waters inspectors.

Diving. We have trained 9 people to dive and harvest invasive weeds.

AIS Monitoring. We have 2 people that were trained by Sandy Wickman to monitor the water quality of the two lakes.

Volunteers. We have over 200 hours logged in inspecting boats and over 240 hours installing signs, buoys and completing training. We also have incurred administrative hours keeping financial records, applying for and obtaining 501(c)(7) status, securing a DASH permit to allow mechanical harvesting of AIS, conforming to and remaining in compliance with all factions of government including the IRS, DNR and State of Wisconsin.

As a final note, to help remind our members of the challenge we face in the future, we purchased and sold to our members CBCW hats and T-Shirts so when approached, they can tell the Buckatabon story.