Wisconsin Department of Natural Resources
Surface Water Grants Program
Aquatic Invasive Species
Grant # AIRR-23419

Buckatabon Lakes Eurasian Watermilfoil Control and Prevention Rapid Response Project

Upper and Lower Buckatabon Lakes - Vilas County, WI

Final Reporting

Submitted To:
Wisconsin Department of Natural Resources
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And

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This report summarizes activities completed under the WDNR Aquatic Invasive Species Grant # AIRR-23419 for Eurasian watermilfoil (EWM) - 2018 to 2020. This grant (AIRR-23419) ran concurrently with an aquatic invasive species (AIS) planning grant (AEPP-55418). The Buckatabon Lakes Association, Inc. sponsored both grants. EWM monitoring in 2018 and 2019 was funded under the AIS planning grant, whereas monitoring in 2020 was funded under the AEPP grant. For continuity, this final report includes EWM monitoring from 2018 to 2020.

PROJECT OVERVIEW

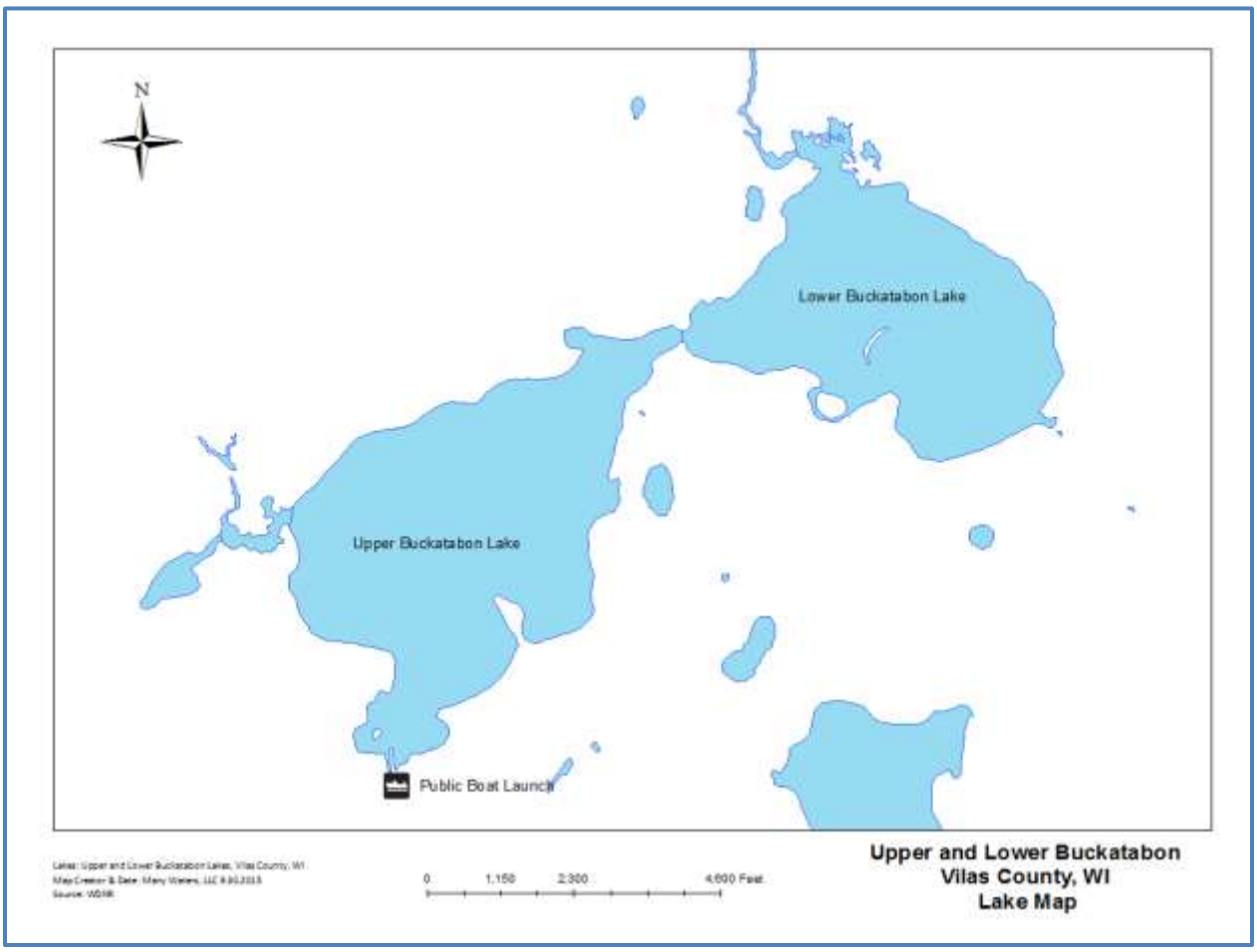
Upper and Lower Buckatabon Lakes are connected waterways located in Conover Township, Vilas County, WI with 493 and 352 surface water acres respectfully. Upper Buckatabon has a maximum depth of 30 feet and Lower Buckatabon has a maximum depth of 16 feet. Both lakes are drainage lakes and complex two-story fisheries. Located in the Tamarack Pioneer River Watershed, land cover consists primarily of forests, wetlands and open water. This watershed is ranked medium for non-point sources affecting lakes (WDNR). Aquatic invasive species known to occur on the Buckatabon Lakes include banded mystery snails, Chinese mystery snails, Eurasian watermilfoil, and yellow iris.

Buckatabon Creek flows into Upper Buckatabon from the north. This creek is a cool-cold headwater, macro-invertebrate natural community that supports a Class II trout stream. From the headwaters of Buckatabon Creek to the inlet of Upper Buckatabon, a substantial portion of property is public including State of WI Board of Commissioners of Public Lands, Wisconsin Department of Natural Resources (WDNR) and Vilas County Commercial Forestry Land. Upper Buckatabon has a floristic quality index[1] of 37.98, EWM frequency of littoral occurrence[2] of 2.53%, and 7.26 acres of mapped EWM.

Lower Buckatabon is a shallow fertile lake. Wisconsin Valley Improvement Company owns and operates a dam at the southeast end of the lake, draining Buckatabon Creek to the Wisconsin River. The State of Wisconsin and State of Wisconsin Board of Commissioners of Public Lands owns property at the far north end of the lake. Lower Buckatabon has a floristic quality index of 36.28, EWM frequency of littoral occurrence of 0% and 0.083 acres of EWM.

[1] Floristic Quality Index (FQI) measures the natural quality of a lake's aquatic plant community or nearness of the lake's plants to those seen in undisturbed conditions.

[2] Frequency of littoral occurrence of a species uses the results of a point intercept survey by taking the presence of a species on a rake sample divided by the total number of points sampled within the littoral zone.



EWM SEASONAL MONITORING

Aquatic invasive species (AIS) monitoring targets Eurasian watermilfoil but includes other aquatic and wetland invasive plant species. The first survey, timed during the first half of the growing season, reconfirms previous EWM locations to refine management strategies and monitors for EWM, mainly in shallow waters (Appendix A). The second survey, timed to capture EWM plants at or near their greatest annual growth potential occurs during the second half of the growing season and includes deeper waters and off shore locations where vegetation grows (Appendix A).

Monitoring efforts are qualitative in nature, meaning information collected describes the condition or population of the target AIS rather than relying on measured or quantitatively collected and calculated values. Smaller sites are geo-referenced with a GPS point and extent is determined by visually estimating coverage in foot-circumference. This is an observed estimate of exact extent, not footprint. 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 on a map with a polygon.

2018

A notable expansion of EWM occurred on Upper Buckatabon Lake from 2017 to 2018 and included many new locations across the lake. Most sites consisted of very sparse to sparse clusters; however, several moderate to moderate-dense colonies were documented. The majority of expansion occurred along the eastern and southeast shore of Upper Buckatabon Lake. Isolated low-density EWM sites detected on Lower Buckatabon consisted of single to a few plants at each location. Surveys mapped a total 3.17 acres of EWM on Upper and Lower Buckatabon Lakes combined, with the majority documented on Upper Buckatabon.

2019

From the 2018 to 2019, the largest single year increase in abundance and extent of EWM occurred on Upper and Lower Buckatabon Lakes. Roughly, half of the documented acreage on Upper Buckatabon fit the moderate to moderate-dense abundance estimates and many new small sparse clusters of plants on Lower Buckatabon were documented mainly along the western end. Surveys mapped a total of 7.58 acres of EWM on Upper and Lower Buckatabon Lakes combined.

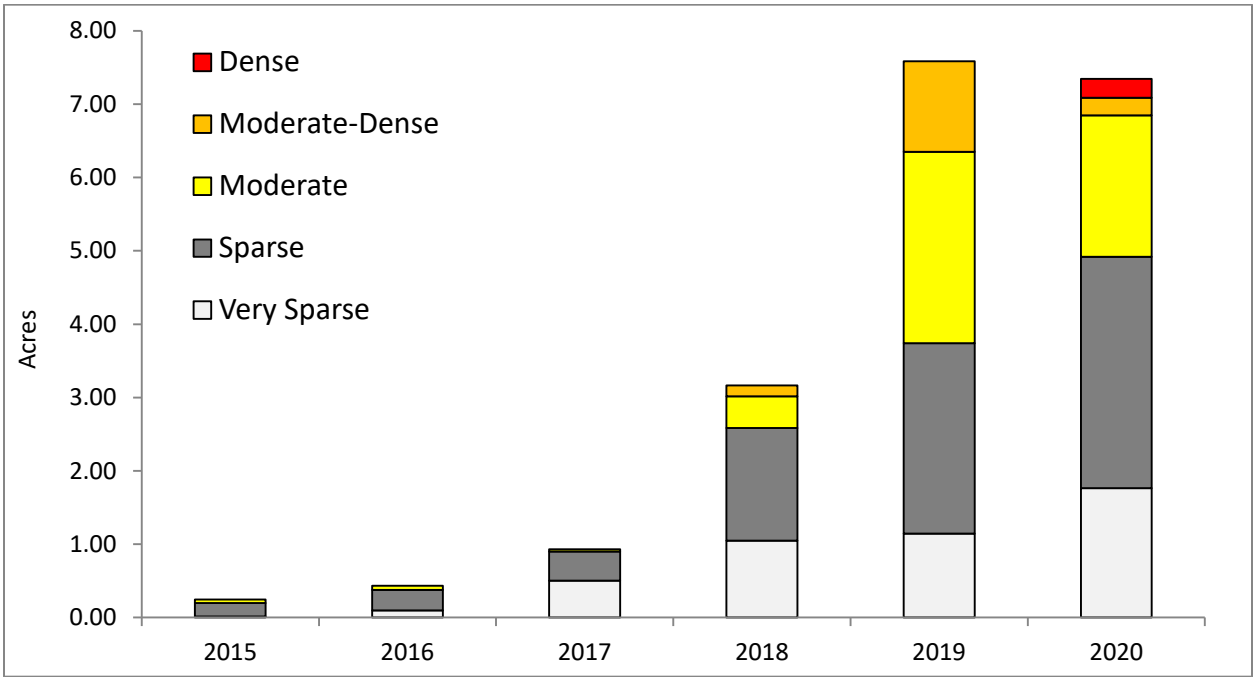
2020

EWM populations did not continue to climb in the accelerated pattern seen from 2017 to 2019. Monitoring results show a slight decline in total acreage, with more or less regions where EWM has been prevalent "fill-in" rather than expand to new regions of the lake seen in previous years. Surveys mapped a total of 7.34 acres of EWM on Upper and Lower Buckatabon Lakes combined.

Table 1: *Change in EWM abundance from 2015-2020, Upper and Lower Buckatabon Lakes combined.*

EWM Abundance Estimate	2015	2016	2017	2018	2019	2020
Very Sparse	0.02	0.10	0.50	1.05	1.15	1.75
Sparse	0.18	0.28	0.40	1.54	2.60	3.15
Moderate	0.05	0.05	0.03	0.43	2.61	1.93
Moderate-Dense	0.00	0.00	0.00	0.15	1.23	0.24
Dense	0.00	0.00	0.00	0.00	0.00	0.26
TOTALS (acres)	**0.25**	**0.43**	**0.93**	**3.17**	**7.58**	**7.34**

Figure 1: *Change in EWM abundance from 2015-2020, Upper and Lower Buckatabon Lakes combined.*



EWM MANAGEMENT

Due to the expansion of EWM across Upper Buckatabon and several new locations of EWM found in Lower Buckatabon, beginning in 2019, EWM management sought to reduce distribution (foot-print) of EWM rather than overall abundance. The approach included hand removing all known EWM locations on Lower Buckatabon and emphasizing low density and regionally isolated sites on Upper Buckatabon. The distribution reduction rationale was to target smaller less dense sites before they could potentially expand and reduce lake-wide footprint. This meant that no DASH work was performed in 2019 or 2020. Given the current status of EWM of Upper Buckatabon, DASH efforts may have reduced EWM abundance at very localized level, but would have done very little to reduce lake-wide abundance or foot-print.

<u>2018</u>

Nineteen and a quarter dive hours removed 788 pounds (wet weight) of EWM across all DASH sites (Appendix B). Most dive hours focused in a region along the southeastern shore removing a total of 716 pounds of EWM. Dive efforts focused on isolated locations of EWM on both Upper and Lower Buckatabon, but most efforts focused on removing all known locations on Lower Buckatabon. Twenty-four plants weighing 16 pounds (wet weight) were removed on Lower Buckatabon, covering all known locations at that time. An additional 112 plants weighing 25 pounds (wet weight) were removed from three locations on Upper Buckatabon along the north shore just west of the channel to Lower Buckatabon.

2019

Divers removed 200 plants weighing 30 pounds on Lower Buckatabon. Dive efforts focused on isolated locations of EWM on Upper Buckatabon starting north of the boat launch working clock-wise around the lake to the first moderate colony found just south of the entrance to the springs. In total divers removed 67 plants weighing 14 pounds.

2020

Divers removed 159 plants weighing 12.25 pounds on Lower Buckatabon. A single location of EWM at the channel to the boat launch on Upper Buckatabon was removed. Outside of this grant scope, the BLA spent a great deal of time and effort to initiate a weevil rearing project. This entailed working with the Vilas County Land and Water Conservation district to collect and feed weevils that were released into Upper Buckatabon Lake. A report summarizing these efforts and weevil monitoring will be released by Vilas County sometime during the winter/spring of 2021.

FUTURE MANAGMENT EWM

Many sites on Upper Buckatabon documented in 2018, expanded in 2019 and then somewhat stabilized in 2020. Overall, the total acreage of EWM on Buckatabon Lakes changed very little between 2019 to 2020, but many of the sites, particularly along the southeastern shore of Upper Buckatabon Lake are "filling-in" with a more contiguous beds, rather than slightly spaced locations. This is evident with more polygons representing those locations rather than single GPS points. There are locations on the lake considered nuisance condition. There is subjectivity in defining nuisance, based on perspective, lake use, and knowledge of invasive species. However, a narrative description of nuisance condition includes effecting reasonable access and use of the lake. Having to motor around EWM beds to access property, relocation of access sites (such as personal piers) or having to clear a prop are considered effecting reasonable access and lake use. To minimize spread in EWM abundant regions of the lake, the BLA buoys off these areas to limit boat traffic and fragmentation caused by boat props. This buoyed off region also makes an ideal "quiet" location for weevil augmentation. Being quiet and dense, buoyed locations have been the focal region for weevil release efforts.

End of the season EWM locations on Lower Buckatabon have varied since monitoring began in 2015, with anywhere from zero to 39 sites documented. At the end of the 2019 season, monitoring detected 39 EWM locations, whereas at the end of the 2020 season, 17 sites were detected. Most sites still consist of sparse to very sparse EWM. Continuing to target each known location one to two times a season would be the designed approach going into 2021.

As mentioned above, with assistance from Gold Sands RC&D and Vilas County LWCD, the Buckatabon Lakes Association (BLA) initiated a successful weevil-stocking program in 2020. Volunteers monitored four troughs of weevils daily, assisted in food collection and final weevil release into Upper Buckatabon Lake. There is a current grant application to WDNR to continue weevil stocking efforts in 2021 and 2022. Funds from this grant would allow the BLA to build on 2020 weevil rearing efforts and continue to stock weevils in 2021 and 2022 and monitor weevil progress.

The 2021 approach will be to continue to apply an integrated approach to EWM management using manual removal, biological control, and population monitoring to address a growing EWM population in Buckatabon Lakes. Using and outward to inward approach, outlier populations will be targeted with manual removal, whereas the core infestation will be stocked with native milfoil weevils (Appendix C).

BLA's AIS management approach contains a prevention component. Prevention efforts include participating in Clean Boats Clean Waters inspections and initiating a new campaign in 2020 to educate lake users about the importance of not tossing all weeds collected on recreational equipment back into the lake. This year due to Covid-19, Association members did not participate in Clean Boats Clean Waters inspections. The association intends to re-implement the Clean Boats Clean Waters program in the future. Volunteerism for these efforts have dwindled over the years, and the most practical approach for the association may be to utilize the CBCW grant program to hire paid inspectors in the future.

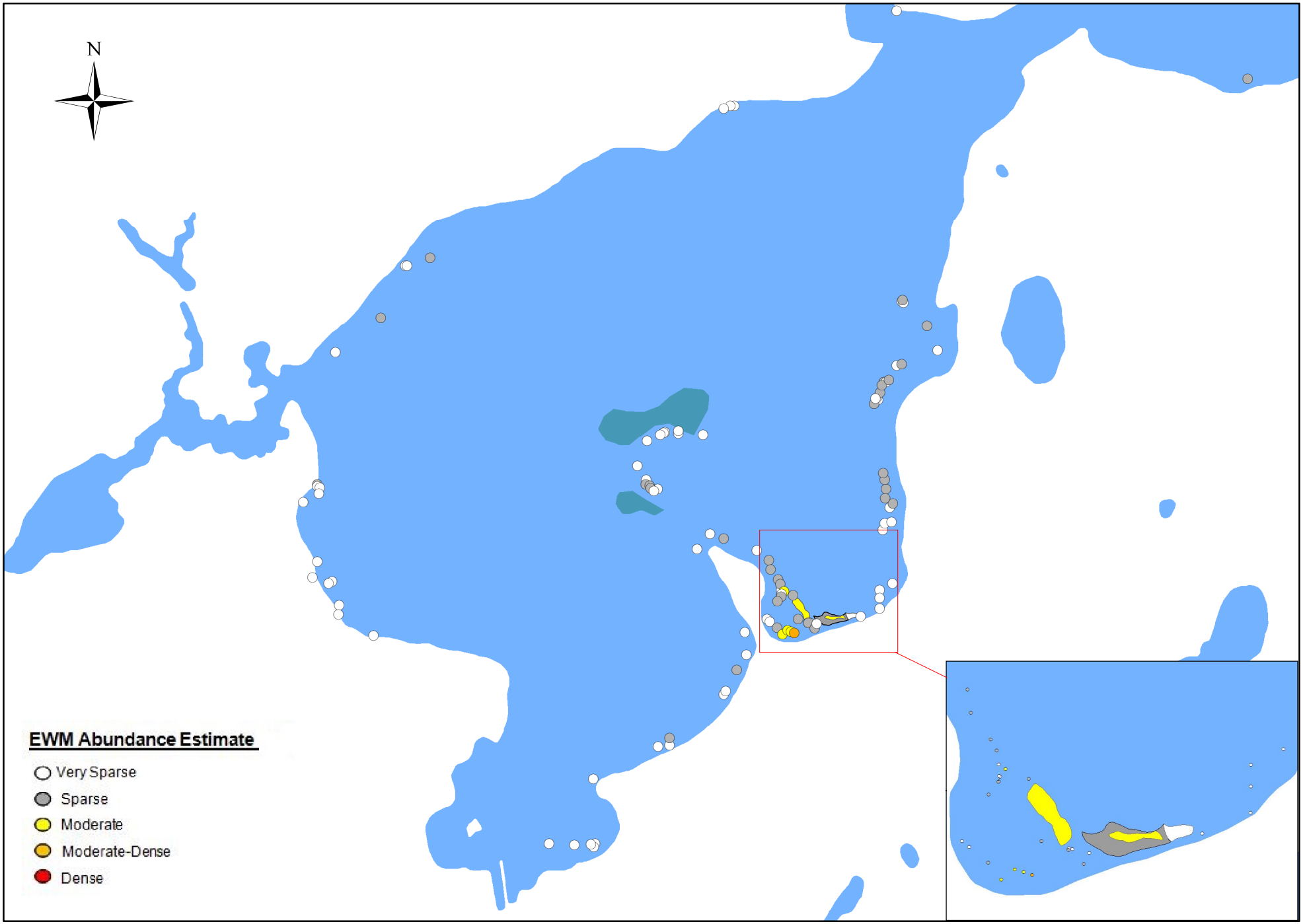
APPENDIX A

SEASONAL EWM MONITORING
2018-2020

Lake: Lower Buckatabon, Vilas County, WI
Map Date & Creator: 4.24.2019 Many Waters, LLC
Source: WDNR hydro, EWM-Many Waters
File: Buckatabon_ES_2018

0 550 1,100 2,200 Feet

Early Season EWM Survey
Lower Buckatabon
2018



Lake: Upper Buckatabon, Vilas County, WI
Map Date & Creator: 4.24.2019 Many Waters, LLC
Source: WDNR hydro, EWM-Many Waters, Islands
Digitized by Many Waters
File: Buckatabon_DASH_2018

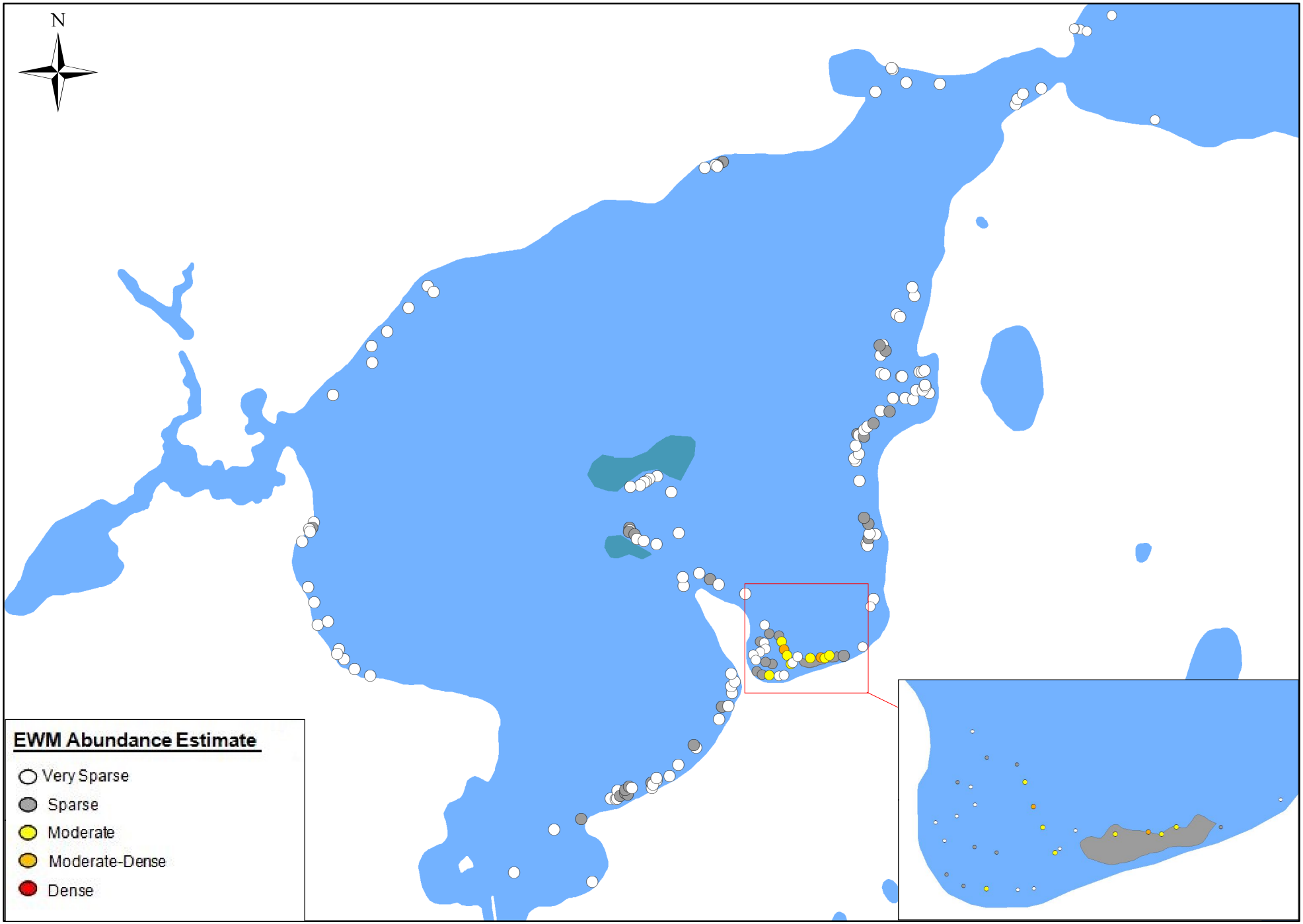
0 700 1,400 2,800 Feet

Early Season EWM Survey
Upper Buckatabon
2018

Lake: Lower Buckatabon, Vilas County, WI
Map Date & Creator: 4.24.2019 Many Waters, LLC
Source: WDNR hydro, EWM-Many Waters
File: Buckatabon_MLSS_EOY_2018

0 550 1,100 2,200 Feet

Mid/Late Season EWM
Lower Buckatabon
2018



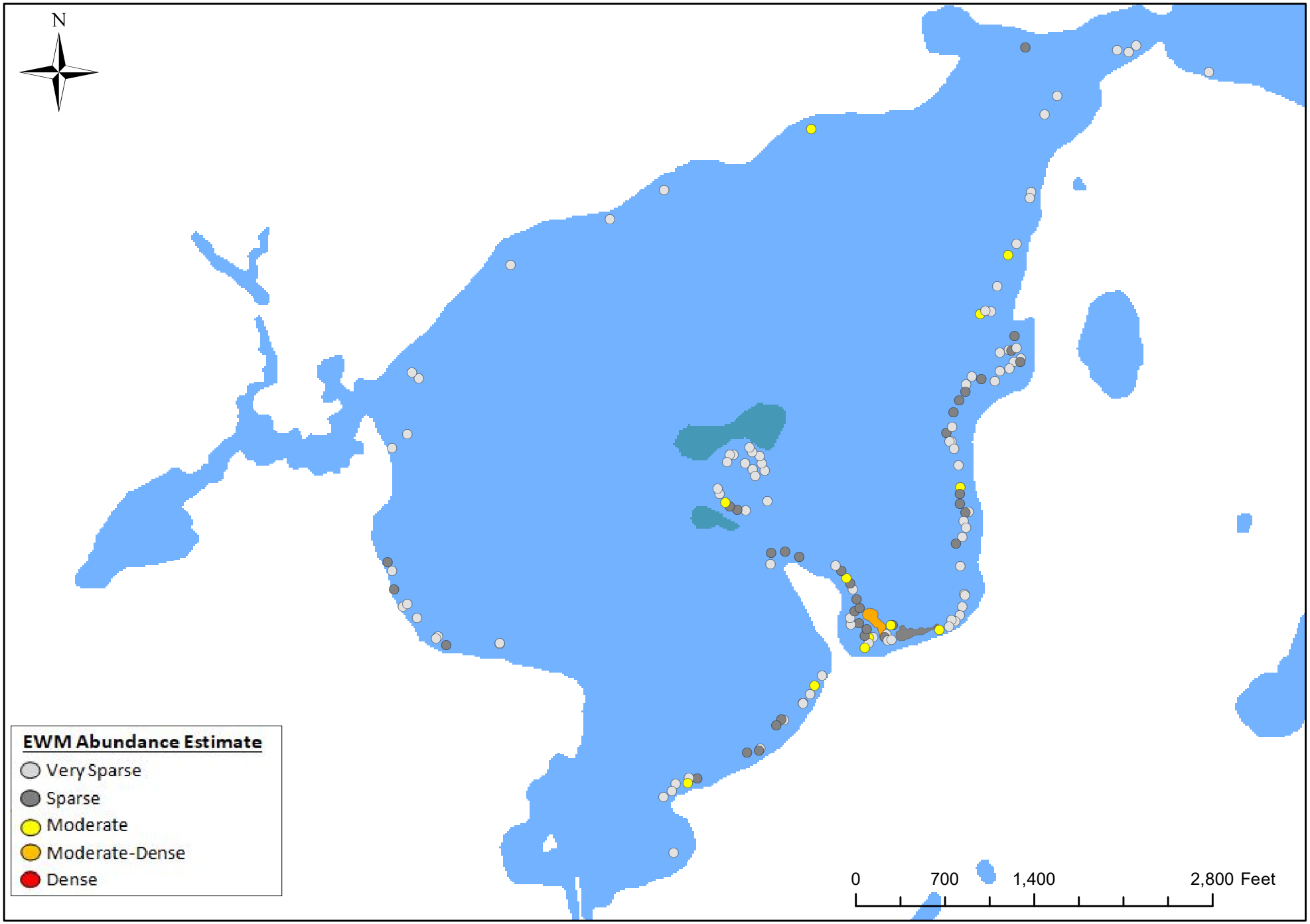
Lake: Upper Buckatabon, Vilas County, WI
Map Date & Creator: 4.24.2019 Many Waters, LLC
Source: WDNR hydro, EWM-Many Waters, Islands-Digitized
File: Buckatabon_MLSS_EOY_2018

0 700 1,400 2,800 Feet

Mid/Late Season EWM Survey
Upper Buckatabon
2018

Lake: Lower Buckatabon, Vilas County, WI
Map Date & Creator: 8.13.19, updated 3.18.20,Many Waters, LLC
Survey Date: 7.8.19
Source: WDNR hydro, EWM-Many Waters
File: Buckatabon_ES_2019

Early Season EWM Survey
Lower Buckatabon
2019

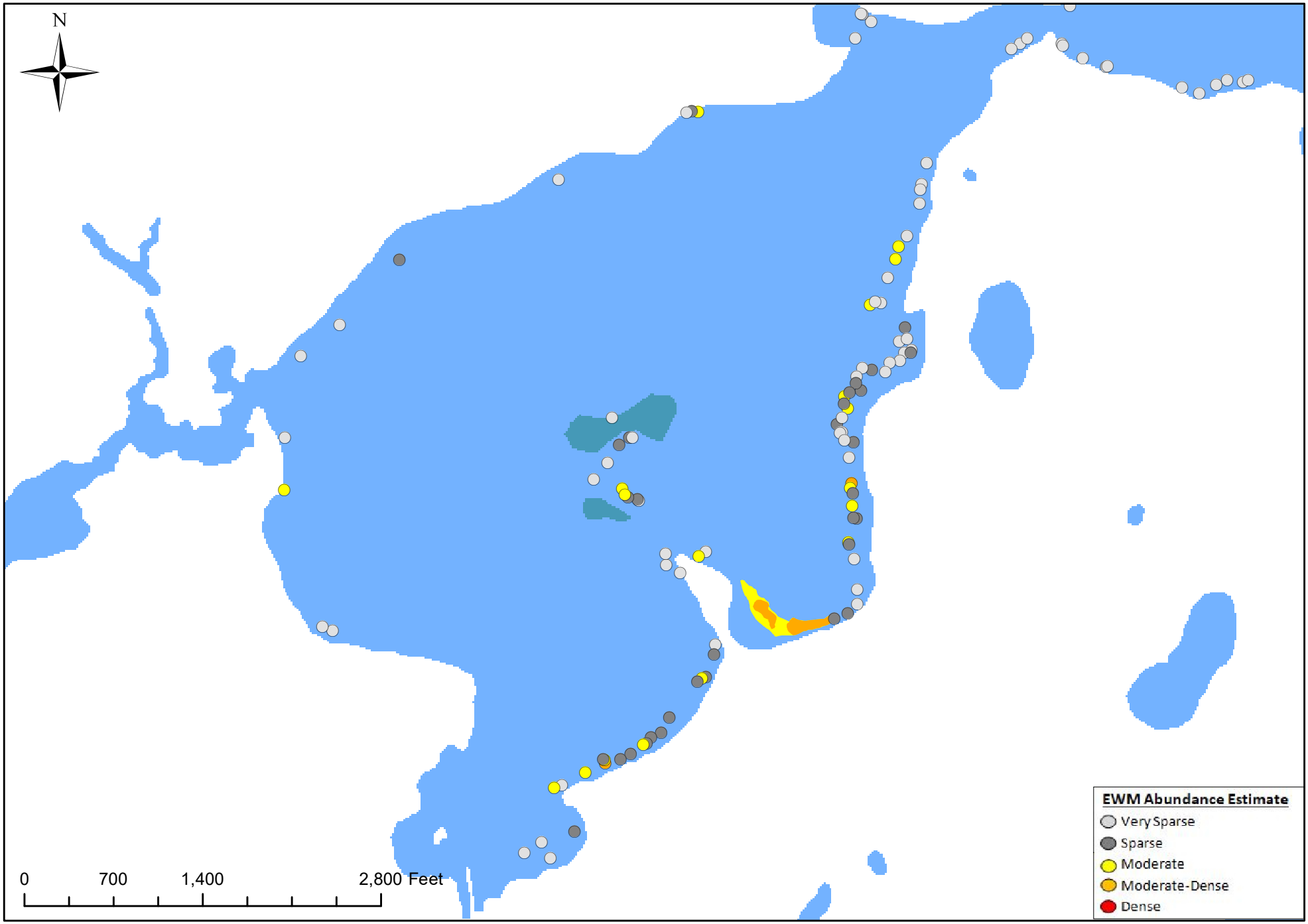


Lake: Upper Buckatabon, Vilas County, WI
Map Date & Creator: 8.13.19, updated 3.18.20,Many Waters, LLC
Survey Date: 7.8.19
Source: WDNR hydro, EWM-Many Waters
File: Buckatabon_ES_2019

Early Season EWM Survey
Upper Buckatabon
2019

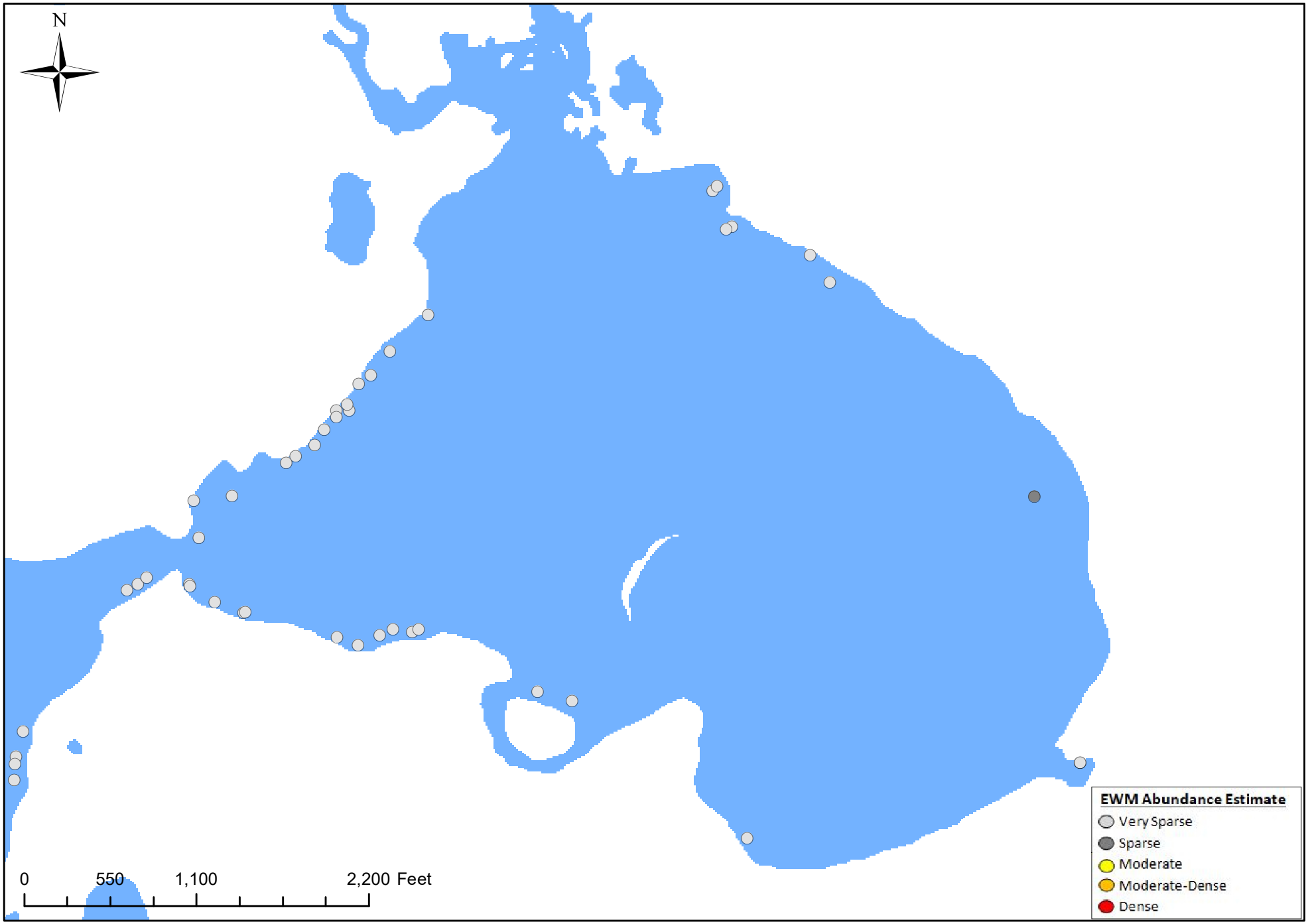
Lake: Lower Buckatabon, Vilas County, WI
Map Date & Creator: 3.18.20,Many Waters, LLC
Survey Date: 9.28.2019
Source: WDNR hydro, EWM-Many Waters
File: Buckatabon_MLSS_EOY_2019

Lower Buckatabon Lake
Mid/Late Season EWM Survey
2019



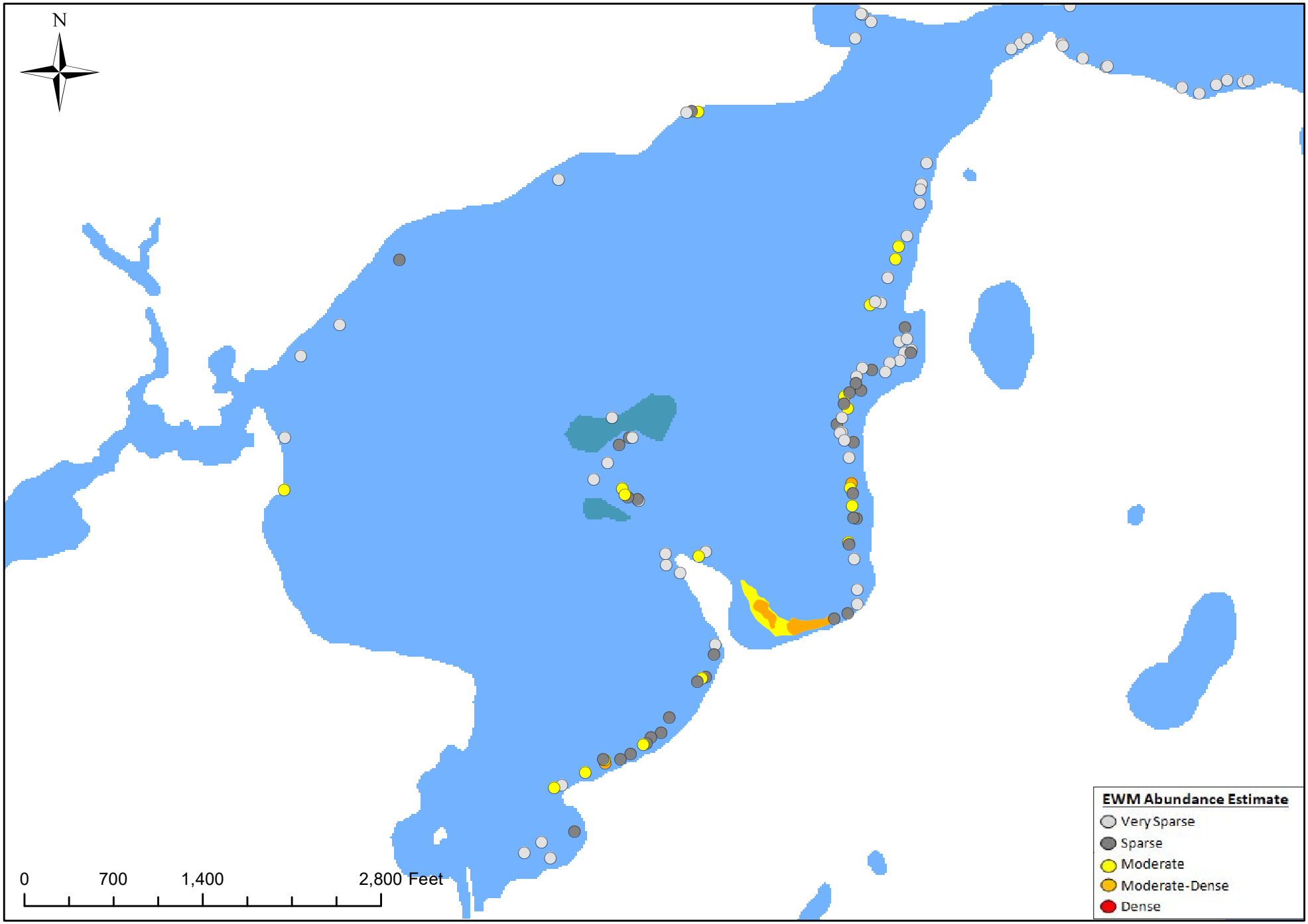
Lake: Upper Buckatabon, Vilas County, WI
Map Date & Creator: 3.18.20,Many Waters, LLC
Survey Date: 9.28.2019
Source: WDNR hydro, EWM-Many Waters
File: Buckatabon_MLSS_EOY_2019

Upper Buckatabon Lake
Mid/Late Season EWM Survey
2019



Lake: Lower Buckatabon, Vilas County, WI
Map Date & Creator: 3.18.20,Many Waters, LLC
Survey Date: 9.28.2019 & 10.4.2019
Source: WDNR hydro, EWM-Many Waters
File: Buckatabon_MLSS_EOY_2019

Lower Buckatabon Lakes
End of the Year EWM Locations
2019

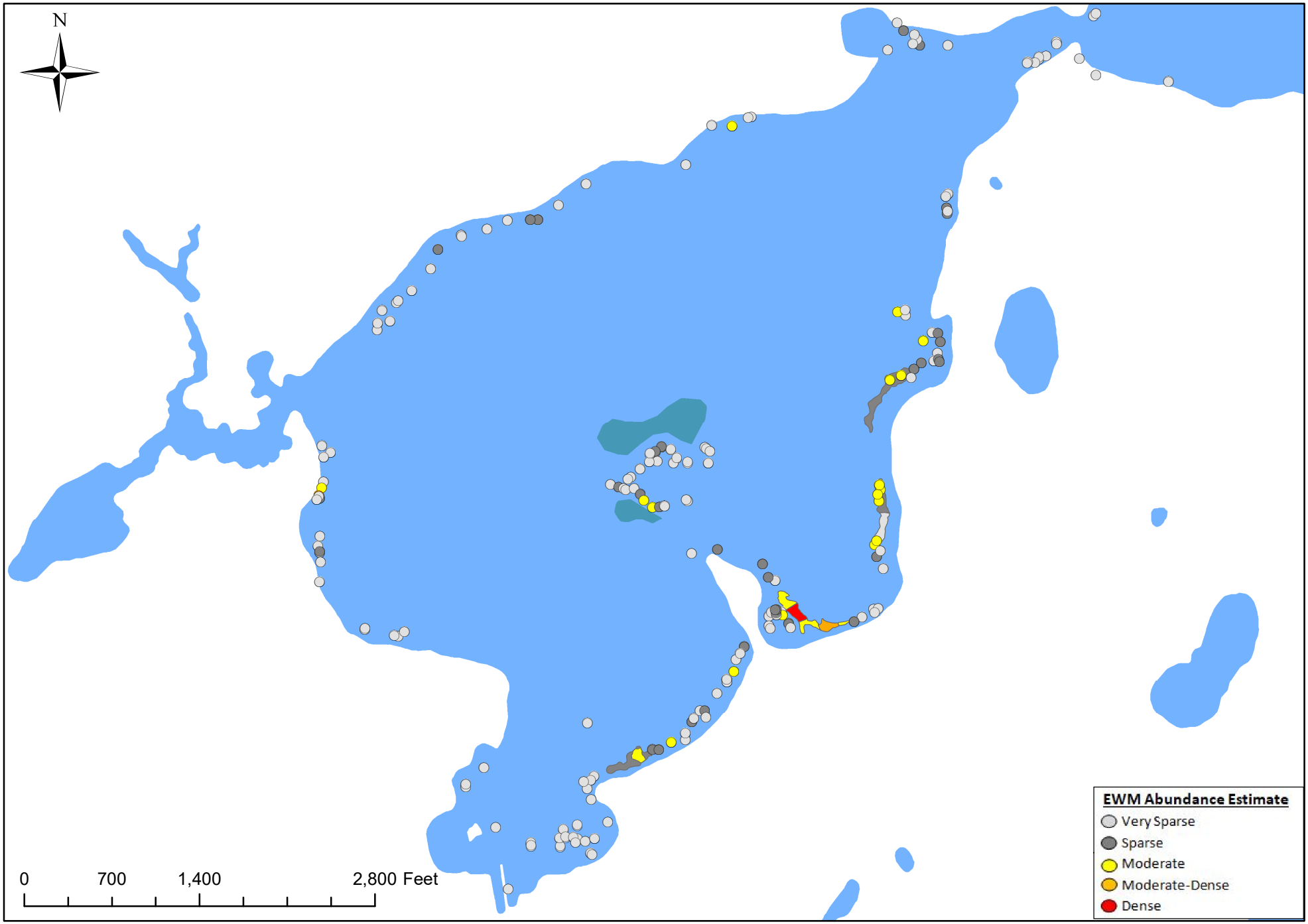


Lake: Upper Buckatabon, Vilas County, WI
Map Date & Creator: 3.18.20,Many Waters, LLC
Survey Date: 9.28.2019 & 10.4.2019
Source: WDNR hydro, EWM-Many Waters
File: Buckatabon_MLSS_EOY_2019

Upper Buckatabon Lakes
End of the Year EWM Locations
2019

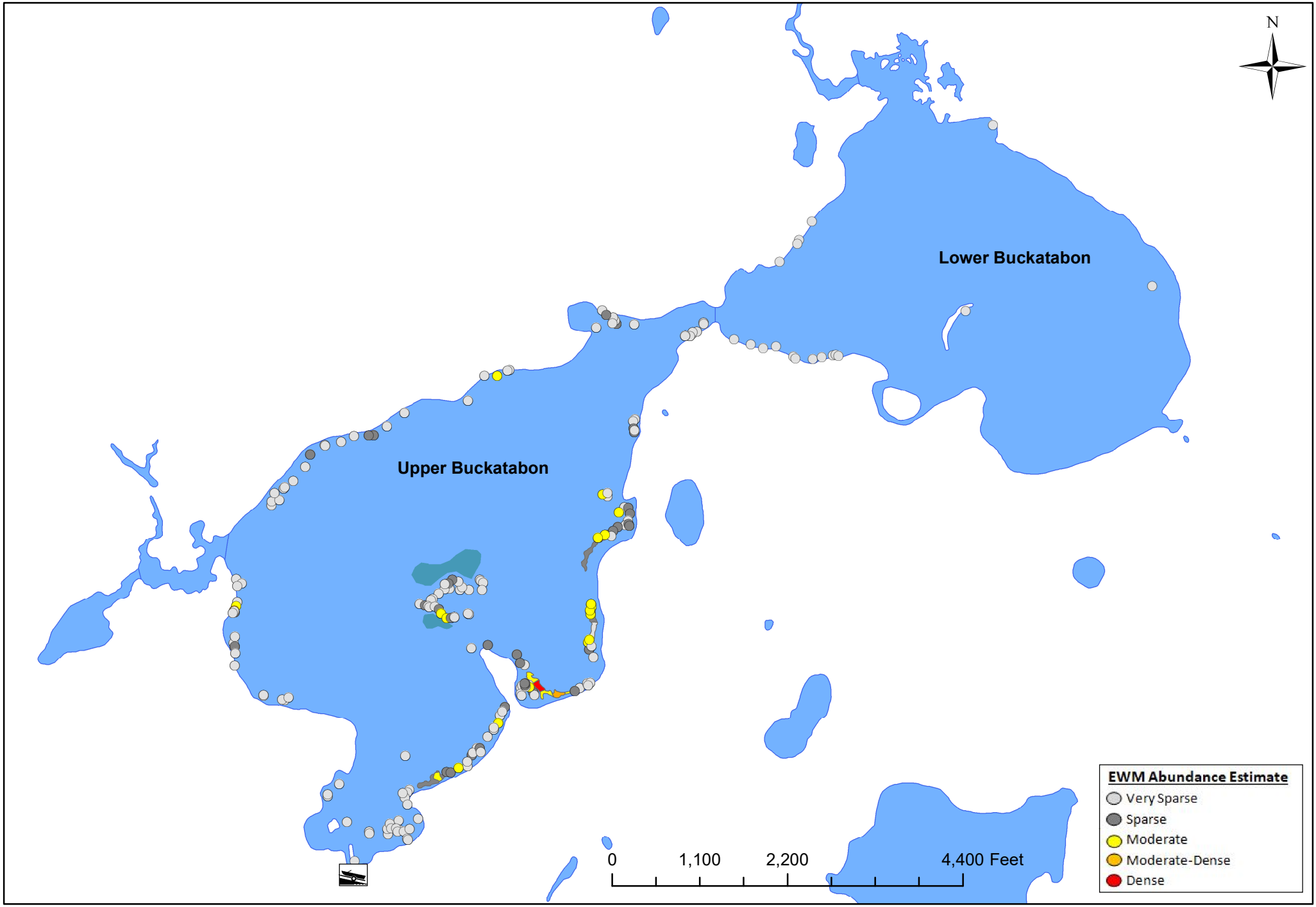
Lake: Lower Buckatabon, Vilas County, WI
Map Date & Creator: 10.14.2020,Many Waters, LLC
Survey Date: 7.30.2020-8.12.2020
Source: WDNR hydro, EWM-Many Waters
File: Buckatabon_MLSS_2020

Lower Buckatabon Lake
Mid/Late Season EWM Survey
2020



Lake: Upper Buckatabon, Vilas County, WI
Map Date & Creator: 10.14.2020,Many Waters, LLC
Survey Date: 7.30.2020-8.12.2020
Source: WDNR hydro, EWM-Many Waters
File: Buckatabon_MLSS_2020

Upper Buckatabon Lake
Mid/Late Season EWM Survey
2020



Lake: Buckatabon Lakes, Vilas County, WI
Map Date & Creator: 12.11.2020,Many Waters, LLC
Survey Date: 10.10.2020
Source: WDNR hydro, EWM-Many Waters
File: Buckatabon_EOY_2020

Buckatabon Lakes
End of the Year EWM Survey
2020

APPENDIX B

DASH Reporting

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Iron River, MI 49935
906.284.2198

Summary of Diver Assisted Suction Harvesting Efforts

Upper Buckatabon Lake – Vilas County, WI

2018 WDNR Mechanical Harvesting Permit Annual Report

Permit ID: NO-2018-64-0134M

Date: 11.27.2018

Submitted To:

Buckatabon Lakes Association, Inc
and
Wisconsin Department of Natural Resources

Submitted By:

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

Contact:

Bill Artwich: billartwich@gmail.com, 906.367.3206
Barb Gajewski: skih2o@hotmail.com, 715.617.4688

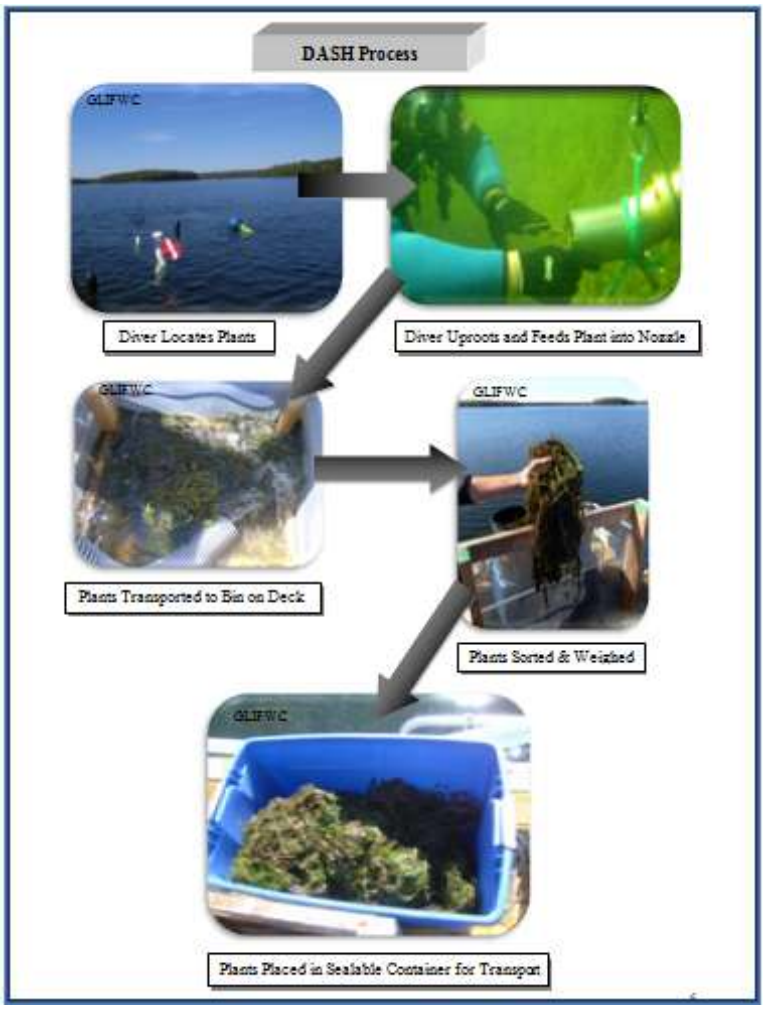
Introduction

Diver Assisted Suction Harvesting is part of the Buckatabon Lakes Association, Inc 2018 program to manage for Eurasian watermilfoil. DASH is a mechanical process and requires a mechanical harvesting permit (Form 3200-113 (R 3/04)) from the Wisconsin Department of Natural Resources (WDNR). The 2018 WDNR Permit ID is NO-2018-64-0134M.

Dive Methods

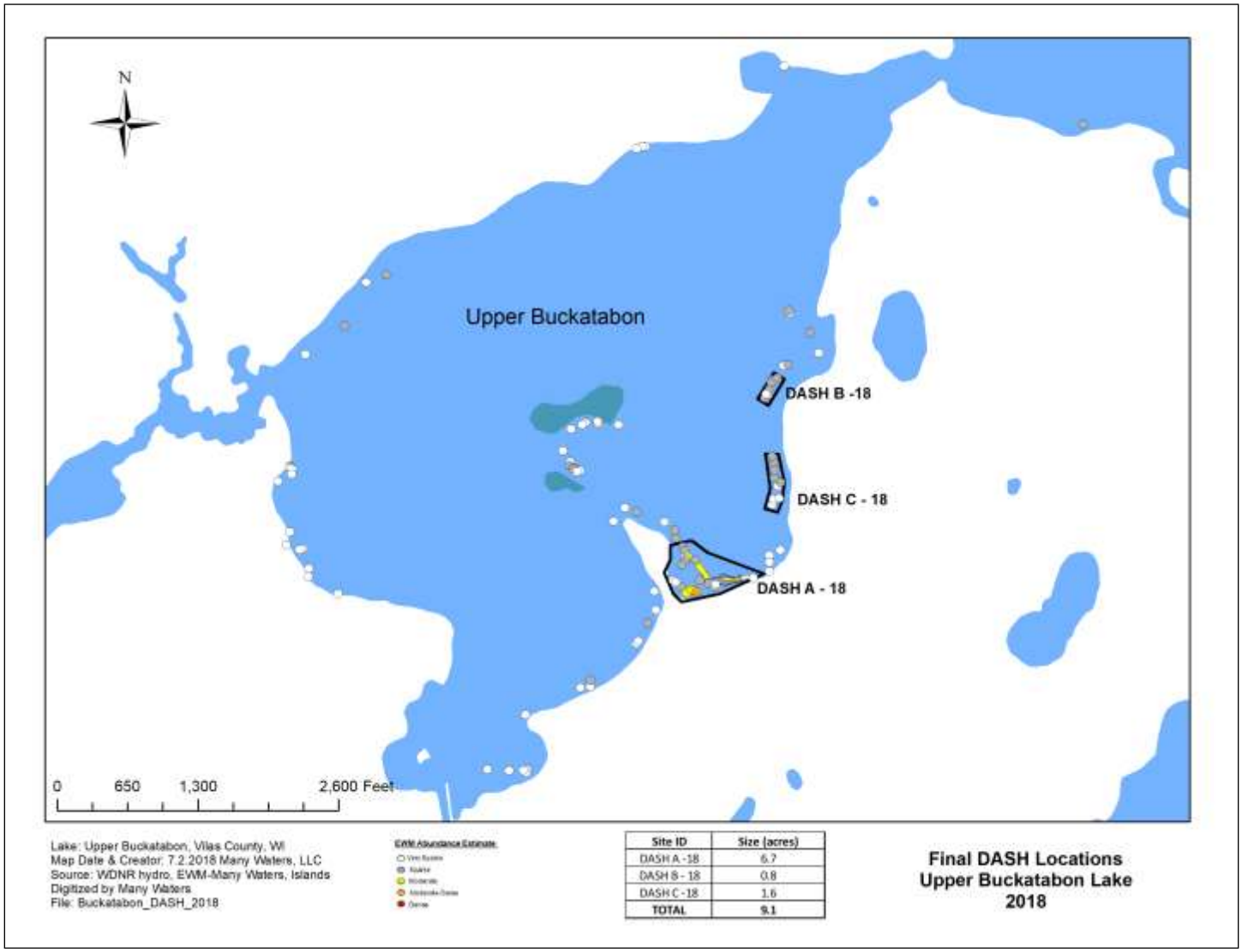
While using DASH, a diver typically will begin by locating the invasive plant such as Eurasian watermiloil from the surface, and then descend next to the plant while simultaneously lowering the nozzle. Divers works along the bottom by using fin pivots, kneeling on the bottom or hovering above the bottom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

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



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

Figure 1: 2017 DASH Work Areas



Summary

Table 1: Daily Summary of DASH Efforts

Date	Location	Size (acres)	DASH Boat Location		Dive Time (hrs)	EWM (lbs*)	Native (lbs*)	% Incidental Harvest of Native Species	Total (lbs*)
			Lat (NAD 83)	Long (NAD 83)					
8/6/2018	DASH A	6.7	46.01191	89.34274	2.50	104.0	11.50	11%	115.50
			46.01207	89.34293	2.25	146.5	11.50	8%	158.00
8/7/2018	DASH C	1.6	46.01372	89.34058	2.00	47.5	3.50	8%	51.00
			46.01445	89.34041	2.00	77.0	10.00	13%	87.00
8/8/2018	DASH A	6.7	46.01213	89.34193	4.50	252.0	12.50	5%	264.50
8/9/2018	DASH B	0.8	46.0165	89.34096	2.50	72.0	3.50	5%	75.50
	DASH C	4.6	46.01443	89.34047	2.00	59.5	6.00	10%	65.50
			46.01463	89.34057	1.50	30.0	1.00	4%	31.00
					19.25	**788.5**	**59.50**	**8% (ave)**	**848.00**

Daily Log

August 6th 2018 Weather- Mostly Sunny, 70˚F, NW wind 5-10 mph

We began work on the southwestern portion of the DASH A progressing north up the western edge. Northern watermilfoil beds were very dominate in some portions worked. Decent water clarity and firm sediments helped diver efficiency. Four and three quarter hours of diving with two divers yielded 250 pounds of EWM. Incidental harvest of native species included: Northern watermilfoil (*M. sibericum*), *Elodea* sp., coontail (*C. demersum*), Robin's pondweed (*P. robbinsii*), large leaf pondweed (*P. amplifolius*), water celery (*V. americana),* common bladderwort (*U. vulgaris*), small pondweed (*P. pusillus*), Frie's pondweed (*P. fresii*), water marigold (*B. bec*kii), *Nitella* sp. and variable pondweed (*P. graminius*).

August 7th 2018 Weather- 63F, Sunny, Calm Winds

Dive conditions remained very similar to the previous day however a little bit chilly air temps for this time of year. Sediments remained primarily firm but native vegetation was very dense at times. Working DASH C, four hours of dive time for one diver removed 124 pounds of EWM. Incidental harvest of native species remained similar to the previous day.

August 8th 2018 Weather – 65F, Overcast, Fog, Light West Wind

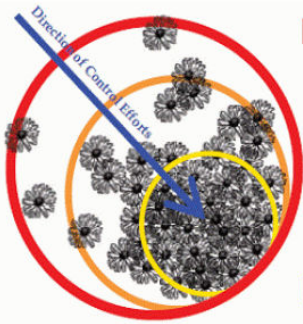
Dive work continued along the southeast portion of DASH A, near a steeper depth break. EWM was fairly dense and nearing the surface. One diver down for four and a half hours yielded 252 pounds of EWM. Incidental harvest of native species remained similar to the previous days.

August 9th 2018 Weather- Sunny, 71˚F, Calm Winds

Dive work continued on both DASH B and DASH C. Heavy coontail was encountered in portions of DASH B, otherwise incidental harvest of native species remained similar to previous DASH efforts. Six hours of diving yielded 161 pounds of EWM.

APPENDIX C

2021 EWM Management Strategy



Outliers – Highest priority

- Lowest density of infestation
- Goal = eliminate small, isolated infestations
- Prevent the reproduction and survival of outliers
- Monitor annually beyond the known infestation for new outliers
- Lowest level of commitment, resources and effort needed

Advancing Front

- Goal = control the advancing front and perimeter of core infestations
- Prevent the expansion of the core infestation

Core – Lower priority

- Highest density of infestation
- Goal = suppress the interior of core infestations
- Highest level of commitment, resources and effort needed

Note: Effective control may require the use of multiple control methods. Control efforts must be followed up by monitoring for new plants, regrowth, and flowering, generally within the same growing season. Monitoring should be done annually.

Adapted from www.dnr.wisconsin.gov

Proposed Management Methods
Manual Removal
Monitor & Evaluate/Manual Removal
Biological Control

N

Lower Buckatabon

Upper Buckatabon

0 1,100 2,200 4,400 Feet

EWM Abundance Estimate

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

Lake: Buckatabon Lakes, Vilas County, WI
Map Date & Creator: 10.129.2020,Many Waters, LLC
Survey Date: 7.30.2020-8.12.2020
Source: WDNR hydro, EWM-Many Waters
File: Buckatabon_MLSS_2020

Buckatabon Lakes
Prioritized EWM Management Strategy