Appendix B 2024 Aquatic Plant Survey Tech Memo

Technical Memorandum -DRAFT

3159 Voyager Drive ● Green Bay, WI 54311

To: Michael T. Kading, City of Neenah
CC: Little Lake Butte des Morts Leadership Team
From: Korin Doering, CLM, and Stephanie Cole
Date: October 30, 2024
Re: 2024 Aquatic Plant Survey Results
Little Lake Butte des Morts Comprehensive Planning – Phase 1
City of Neenah, WI
Project No.: 2403578

1. Introduction

In July of 2024, an aquatic plant Point Intercept (PI) survey was conducted on Little Lake Butte des Morts (LLBDM) for Phase 1 of the LLBDM Comprehensive Planning project (**Appendix D.1 [Figure 1]).** This report summarizes the 2024 aquatic plant survey methods and results. LLBDM is an approximately 1,234-acre[1] lake which conjoins with Lake Winnebago and the Fox River. This system flows south to north and feeds into the Green Bay, Lake Michigan.

The City of Neenah retained GEI Consultants, Inc. (GEI) to complete the aquatic plant surveys as a part of the LLBDM project. The primary goal of the survey is to establish a baseline of aquatic plant presence, abundance, and diversity to inform lake and aquatic plant management planning and action.

2. Survey Design and Methods

The Wisconsin Department of Natural Resources (WDNR) standardized aquatic plant PI survey protocol was used for this survey [1]. This protocol provides consistency in sampling over time and space in a way that allows for quantitative analysis of aquatic plant communities and also offers the opportunity to repeat identical survey methods in the future to assess any plant management techniques used on site.

2.1. Sampling Grid Generation

The WDNR provided the sampling grid for this survey (Appendix A). To generate the point-intercept sampling grid, the WDNR applied a formula using a GIS polygon of the lake. The calculation took the lake's size, depth, and shape into consideration to determine the locations and number of sampling points for this survey. The resulting grid included 658 sampling points that were regularly spaced, with 288.7 feet (88 meters) between each point.

To conduct the surveys, the field technicians travelled to the pre-determined locations by boat using a Humminbird SOLIX 10 MEGA SI+ G3 sonar unit (Humminbird) integrated global positioning system (GPS) receiver with +/- 8.2 feet (2.5-meter) accuracy. The locations of each site were pre-loaded onto the

[1] Little Lake Butte des Morts Area of Interest (AOI) as defined for lake management planning purposes.

Humminbird head unit that is mounted on the GEI field boat. When navigating to a site by boat, approximate depth was initially determined using the boat's onboard depth sonar. Sites equal to or less than 12 feet deep were sampled using the pole rake. At sites deeper than 12 feet, the type of sampling rake (pole or rope) was selected on a site-specific basis. Sites greater than 12 feet deep with visible vegetation were sampled using the rope rake. Sites greater than 12 feet deep with limited to no visible vegetation were sampled with the pole rake.

The type of rake used at each site was determined by assessing sampling depth with consideration for vegetation conditions. At each point as per WDNR survey protocols [1], a double-headed pole rake was lowered straight through the water column to rest lightly on the bottom. The pole was then turned twice by the field technician and pulled straight out of the water for inspection. If the site was too deep for the pole rake and it was deemed necessary to use the rope rake, the field technician dropped the rope rake straight into the water alongside the boat. The field technician would then drag the rake along the sediment surface for approximately one foot and pull the rake to the surface. The pole rake had a length of 12.5 feet with an additional 6-foot extension available. The rope rake was approximately 40 feet in length.

The Humminbird's integrated GPS receiver has an accuracy of 8.2 feet (2.5-meters). The location reported by the GPS receiver has an element of error that varies under different conditions. To maximize accuracy, the boat operator used less than an 80-foot zoom level and aimed to completely cover the sampling site symbol on the GPS receiver with the onscreen navigation arrow when positioning at a site for sampling. At 80-foot zoom, the locator arrow shown on the screen represents approximately 25 feet in length.

2.2. Data Collection

Data collected in the field at each pre-determined site included: depth, dominant sediment type, rake type, rake fullness, species present, visual sitings, and inaccessible sites. These data were recorded on paper using the field sheet format from the WDNR Plant Point-Intercept Survey Data Entry and Analysis Form [2]. Descriptions of each field parameter are provided in **Appendix E.1 (Table 1)**. Any inaccessible survey points were documented as such. Rake fullness was documented based on the categorization displayed in **Illustration 1**.

A separate boat survey data form was used to document observations made during the survey that were in areas outside of the grid or in between sampling sites. When feasible, the site number closest to the observation was recorded along with observation notes. Emergent near-shore vegetation was only recorded if the plant was rooted in the water or was of significance for the project.

Illustration 1. Rake fullness ratings [1].

Fullness Rating	Coverage	Description
1		Only few plants. There are not enough plants to entirely cover the length of the rake head in a single layer.
2		There are enough plants to cover the length of the rake head in a single layer, but not enough to fully cover the tines.
3		The rake is completely covered and tines are not visible.

2.2.1. Collecting and Identifying Voucher Samples

Voucher specimens were collected for aquatic plant species observed during the aquatic plant surveys to be submitted to the University of Wisconsin Madison State Herbarium to catalog plant species present in the lake and bolster the state collections.

Plant specimens were collected for all aquatic plant species observed on the rake samples. As many parts of the plants were collected as possible including leaves, flowers, fruiting structures, roots, etc. Large duckweed (*Spirodela polyrrhiza*), small duckweed (*Lemna minor*), common watermeal (*Wolffia columbiana*), and other species observed through visual observations or during the boat survey were not collected for voucher samples.

2.2.1.1. Specimen Collection for Vouchers

When a species was observed for the first time, a sample was collected and placed into a plastic zip-loc bag. Approximately 2 inches, or enough water to cover the entire plant specimen, was added to the zip-loc bag. A permanent marker was used to label the outside of the bag with the sample point number, date, project name, and plant species name. If the identification of a plant specimen was unknown during field collection, it was labeled as “Unknown #X” to be identified at a later date. If additional specimens of the same species were added to the same bag, the label was updated with the additional sample point number. The bag was placed on ice in a cooler to protect the specimen from degrading while in the field.

Upon returning to the office each day, specimen bags were reviewed for label completeness and accuracy. The bags were placed into a refrigerator to preserve the specimens until they could be floated and pressed.

Once aquatic plant surveys were completed, the GEI Project Manager reviewed the collected specimens for identification accuracy. Voucher specimens were then floated and pressed in preparation for shipment to the University of Wisconsin Madison State Herbarium.

2.2.1.2. Specimen Voucher Preparation

Voucher specimens were mounted and pressed on August 10, 2024. Plant specimens were assigned a unique identifier. For each specimen, a piece of mounting paper was labeled with the specimen's unique identifier, lake name, and plant name.

Each specimen was either floated or placed onto the mounting paper. The plant was then covered with a sheet of waxed paper and placed inside folds of newspaper. The newspaper was placed between two sheets of blotting paper and the blotting paper placed between two sheets of corrugated cardboard. The specimens were stacked between plant press boards and compressed with rachet straps. The straps remained in place for several weeks to allow the plants to dry.

An electronic spreadsheet was prepared with the following information:

a. Specimen Identifier
b. Collector Name
c. Preparer's Name
d. Lake Name
e. County
f. Date collected
g. Specimen Name
h. Habitat (ie. muck over sand)
i. Associated Species (if known)
j. Township, Range, and Sction (TRS) (ex. T41N R07E S29)
k. Waterbody Identification Code (WBIC) (ex. 1861700)
l. More detailed location (if known)
m. GPS lat/long coordinates (if known)
n. Herbarium of deposition (ex. Madison)

A copy of the spreadsheet is provided as Appendix B. Mark Wetter at the University of Wisconsin Madison State Herbarium (Madison herbarium) was notified on October 15, 2024, of GEI's intent to ship the vouchers to their facility. The aquatic plant survey vouchers will be sent to the Madison herbarium following confirmation from Mark Wetter as to whether the facility is accepting new submissions.

2.2.2. Plant Identification and Troublesome Taxa

Plants were identified to species whenever possible, except for filamentous algae and aquatic moss (*Fontinalis* sp.). Those species are referred to simply as filamentous algae and aquatic moss. If a plant specimen was not able to be identified in the field, a specimen was collected, labeled as "Unknown #X", and identified in the lab prior to vouchering.

3. Data Entry, Analysis and Reporting

3.1. Data Entry

Data from the field forms were entered into a digital version of the WDNR Plant Point-Intercept Survey Data Entry and Analysis Form [2]. The WDNR form has embedded formulas for calculating statistics from the aquatic plant survey data. The latitude and longitude information for the sample sites were pulled

from the GPS text file and entered into the datasheet. The lake and county name, WBIC, survey date, and the names of the field technicians were recorded. If any additional species had been observed that were not already listed in the WDNR form, those species would have been added in the columns at the end of the alphabetical list.

Information recorded on the boat survey forms or other field notes were transferred from hard copy to the electronic form. Additional comments about field conditions, known management activities, or other observations were also recorded in this worksheet.

The electronic form of the aquatic plant survey data workbook is included as **Appendix C**.

3.2. Quality Assurance

Once the data were transferred from the hard copy field sheets to the electronic format, the GEI Project Manager conducted a quality check by comparing the electronically entered data against the original field datasheets to check for errors or omissions. Errors or omissions identified were corrected before data were used for data analysis. Hard copy field forms were scanned and saved to the project record for backup documentation.

3.3. Data Analysis

Data collected during the survey were used to calculate summary statistics that describe the quality, diversity, and density of aquatic plants in LLBDM. Definitions of the summary statistics are provided below in **Appendix E.2 (**Error! Not a valid bookmark self-reference.**).** The embedded formulas in the WDNR Plant Point-Intercept Survey Data Entry and Analysis Form [2] were used to calculate most of the summary statistics per the statewide protocol. Additional data analysis was completed to summarize statistics for dominant sediment types, average growth form, and average water level across the lake. Due to the WDNR aquatic plant survey workbook having embedded formulas and text restrictions, the dominant sediment type was updated in ArcGIS Pro following completion of fieldwork. The notes recorded for each sample point were used to create an updated sediment type feature, which allowed for a more accurate description of observed sediment.

3.4. Reporting

All electronic data were sent by email to the WDNR at DNRBaselineAquaticPlants@wisconsin.gov and submitted to the client. This included the following:

1. Raw data from the quantitative survey which provides a lakewide plant species list, distribution, and rake fullness data for each species observed.
2. Summary statistics useful in characterizing and comparing populations.
3. Observations from the general boat survey.

This technical memorandum summarizing methods, analysis, and results including map figures and tables will also be provided to the WDNR and client. The aquatic plant survey vouchers will be sent to the Madison herbarium following confirmation from Mark Wetter as to whether the facility is accepting new submissions.

4. Survey Results

Field technicians sampled 641 out of the 658 pre-determined sampling locations as shown in **Appendix D.2 (Figure 2**). Seventeen locations were not sampled due to shallow water conditions that prevented access. Four sample locations were moved approximately 100 feet away from their original survey point due to shallow water or non-navigable plant conditions present at the original location. The updated survey points were the nearest, accessible point that the boat could reach in a safe and proactive manner.

4.1. Summary Statistics

Definitions of aquatic plant statistics are provided in **Appendix E.2 (Table 2)**. Summary statistics for the 2024 aquatic plant sampling effort are provided in **Appendix E.3 (Table 3).**

A total of 24 aquatic species were observed during the 2024 survey including native and invasive aquatic plants, aquatic moss, emergent plant species, and filamentous algae. Twenty species were found on the sampling rake or were visual findings within six feet of a sample point. Four species were observed in other parts of the lake outside of the pre-determined sampling grid but were included in data collection to provide the most detailed and truthful description of the aquatic plant community within LLBDM.

A total of 347 of the 641 sites sampled (54.13%) were considered vegetated (vegetation pulled up on sample rake(s)). Average total rake fullness across vegetated sites was 2.05, and average total rake fullness across all sampled sites was 1.07. Average growth form across vegetated sites was 3.87, and average growth form across all sampled sites was 2.08. Total rake fullness observed across the lake is displayed in **Appendix D.5 (Figure 5).** Growth form observed across the lake is displayed in **Appendix D.6 (Figure 6).**

There were 17 aquatic plant species observed on rake samples (species richness). Aquatic moss and filamentous algae were also found on the rake but are not included in total rake fullness because they are not considered aquatic plants, but they were recorded when observed. Coontail (*Ceratophyllum demersum* [81%]) and common waterweed (*Elodea canadensis* [76%]) were the most frequently observed species across vegetated sample sites. The mean Floristic Quality Index (FQI) for LLBDM was 20.91, the Simpson Diversity Index (SDI) was 0.83. and the mean C-value was 5.4. A list of species observed on solely rake samples are provided in **Appendix E.4 (Table 4).**

One additional species, watershield (*Brasenia schreberi*), was identified through visual observations within a 6-foot radius around each sample location. A total of 22 aquatic plants species, as well as filamentous algae and aquatic moss, were observed through visual observations. This includes rake samples, visual observations, and additional species observed during the boat survey. A complete species observation list is included in **Appendix E.5 (Table 5).**

4.2. Dominant Sediment Type

The updated dominant sediment type data indicated that six sediment types were observed across the lake as shown in **Appendix D.7 (Figure 7).** Muck was the most prevalent sediment type observed across sample points (60.7%). Clay and rock mix was the least prevalent sediment type observed across sample points (0.3%). Dominant sediment type summary statistics are included in **Appendix E.6 (Table 6).** At seven sample locations where water depth exceeded the pole rake's extent of 18.5 ft, predominant sediment types at adjacent locations were referenced to infer sediment characteristics.

4.3. Depth Profile and Maximum Depth of Plants

Water depth was recorded at sample points to the nearest 0.25-foot. The minimum water depth observed at a sample point was +/- 1.0 feet. The maximum water depth observed at a sample point was +/- 23.0 feet. The average water depth observed across all sample points was 7.23 feet.

To illustrate the data, water levels were broken down into 3-foot increments. These increments were chosen to condense the wide array of water depths and because most aquatic plant harvesters are unable to harvest plant material in water levels shallower than three feet. Water depth data is displayed in **Appendix D.8 (Figure 8).**

Based on the hand recorded field data sheets, the maximum depth where plants were observed was 18.0 feet at site 657 which had a rake fullness of 3. Plant species observed at that site include: coontail, common waterweed, sago pondweed (*Stuckenia pectinata*), and wild celery/eel grass (*Vallisneria ameriacana*). Site 657 was likely vegetated due to the proximity of the site to a dense plant community northwest of the site, near Strobe Island, and the flow of water which may provide better water clarity than other areas. Although this site had vegetation 5.25 feet deeper than the original second deepest depth of plants, it was included in the calculations due to the complexity of the lake and river system.

4.4. Invasive Plant Findings

Aquatic invasive species (AIS), found in water or wetlands, are non-native plant or animal species likely to cause economic, environmental, or human harm. Once established, invasive species can threaten ecological systems by disrupting the natural diversity and stability of plants, animals, and water quality conditions. AIS observed on rake samples and by visual observations include Eurasian watermilfoil (*Myriophyllum spicatum*) and curly-leaf pondweed (*Potamogenton crispus*).

Eurasian watermilfoil (EWM) was observed on the rake at 135 of the 641 sampled sites and via visual observation at an additional 22 sites as shown in **Appendix D.3 (Figure 3).** The frequency of EWM occurrence within vegetated areas was 38.8%.

Curly-leaf pondweed (CLP) was observed on the rake sample at 39 of the 641 sampled sites and via visual observation at an additional 4 sites as shown in **Appendix D.4 (Figure 4**). The frequency of CLP occurrence within vegetated areas was 11.2%. Rooted CLP plants and turions were observed during the surveys.

Additional AIS observed along the LLBDM shoreline during the boat survey include three purple loosestrife (*Lythrum salicaria*) plant clumps, one large phragmites/common reed (*Phragmites australis*) monoculture stand near US Highway 10, and a large monoculture stand of hybrid cattail (*Typha x glauca*) near Strobe Island.

4.5. Additional Site Observations

Additional site observations noted in the Boat Survey include:

- The boat launch was completely filled with aquatic plant debris and fragments, filamentous algae, and blue-green algae on 7/22/24, making launching very difficult. A photo is provided below.

- Aquatic plant debris had been removed from the boat launch by the Village of Fox Crossing prior to visiting the site on 7/24/24.
- The active harmful algal bloom (HAB) was present throughout the lake during the week of aquatic plant surveys. The HAB was at its worst throughout the entire lake on 7/26/24.
- An active bald eagle (*Haliaeetus leucocephalus*) nest was observed near site 136, with one adult and two juvenile bald eagles present.
- Although native, coontail, and common waterweed were observed to be growing in dense, monocultures in certain areas of LLBDM.

Illustration 2. Fritse Park Boat Launch, July 2024.

5. Discussion

Field technicians sampled 641 out of the 658 pre-determined sampling locations. Seventeen locations were not sampled due to accessibility challenges in areas with shallow water. The locations of three sample sites were adjusted due to non-navigable conditions of the original, predetermined location.

Survey results indicate that 348 of the 641 sites sampled (54%) were vegetated (vegetation pulled up on sample rake). One additional species was identified through visual observations within a 6-foot radius around each sample location. A total of 24 aquatic species were observed throughout the survey, which includes rake samples, visual observations, and additional species observed during the boat survey (**Appendix E.4 & E.5 (Table 4 & 5)**.

5.1. Regional and Statewide Comparison

Results from the 2024 surveys were compared to the Wisconsin Lakes Statewide and Southeastern Wisconsin Till Planes (SWTP) Ecoregion averages. This information is useful for understanding ecosystem quality and informing future management and restoration goals. Results from this comparison are provided in **Appendix E.7 (Table 7).**

The comparison indicates that LLBDM had a higher species richness (17 species) than both the statewide (13 species) and SWTP ecoregion averages (14 species). The mean Floristic Quality Index (FQI) and Simpson Diversity Index (SDI) were similar in LLBDM (20.91, 0.83) compared to the statewide (22.2, 0.85) and SWTP ecoregion averages (20.90, 0.91), with LLBDM being greater than the SWTP ecoregion averages and lower than the statewide average. However, the mean C-value was slightly lower within LLBDM (5.4) than the statewide (6.0) and SWTP (5.6) averages. Given that the species richness was higher in LLBDM than the statewide and SWTP average, a lower C-value indicates that the plants present are tolerant of impaired or disturbed conditions.

5.2. Limitations and Challenges

Limitations to data collection were experienced during the surveys due to survey timing and water quality conditions. It is not anticipated that these limitations had a significant impact on overall survey results. Limitations and challenges experienced during the surveys include:

- Some invasive species, such as CLP, grow early in the season and senesce before the peak growth period of most other aquatic plants in Wisconsin. This aquatic plant survey targeted the native plant peak growth period which is late July and early August. It is possible that the survey missed the window of growth for CLP. A greater density of CLP may have been documented if surveys for CLP were conducted earlier in the growing season.
- The depth and predominant sediment types were measured using a pole rake for most samples. A rope rake was utilized at 17 sample locations. However, it can be difficult to discern between sand and muck when using the rope rake, and the best scientific judgment had to be made. Additionally, at seven sample locations where water depth exceeded the pole rake's extent of 18.5 ft, the Humminbird depth finder was used to measure water depth. Predominant sediment types at adjacent locations were referenced to infer sediment characteristics.
- Water clarity was poor during the survey due to an active HAB with a scum layer. This limited visibility of the water column, so it is possible that small patches of aquatic plants were missed during visual and boat surveys.
- Voucher specimens did not include large duckweed (*Spirodela polyrrhiza*), small duckweed (*Lemna minor*), common watermeal (*Wolffia columbiana*), or other species observed through visual observations or during the boat survey.

5.3. Recommendations

Management should address submergent invasive species (EWM and CLP), emergent invasive species (phragmites, purple loosestrife, hybrid cattail), and dominant native species where plants were observed growing at nuisance levels (common waterweed, coontail). This would improve conditions for recreation and navigation and help to enhance aquatic ecosystem health in LLBDM. A thorough analysis of environmental conditions (water quality, clarity, sediment, wind/waves, invasive species density, sensitive native species locations etc.) is needed to pinpoint areas and species for management and set attainable restoration goals. Water depths likely suitable for aquatic plant harvesting (greater than three feet) are displayed in **Appendix D.9 (Figure 9**). Further analysis and recommendations will be included in the Aquatic Plant Management Plan.

KMD /B. Majka:admin initials
B:\Working\NEENAH, CITY OF\2403578 LLBDM Management\06_In_Progress\2d_Aquatic Plant Survey\Aquatic Plant Survey Report\2024_10_23_LLBDM Aquatic Plant Survey Report_Final draft for client review.docx

Appendices

6. Citations

1. J. Hauxwell, S. Knight, K. Wagner, A. Mikulyuk, M. Nault, M. Porzky, et al. Recommended Baseline Monitoring of Aquatic Plants in Wisconsin: Sampling Design and Laboratory Procedures, Data Entry and Analysis, and Applications [Internet]. Wisconsin Department of Natural Resources; 2010. Report No.: PUB-SS-1068 2010. Available from: http://www.uwsp.edu/cnr-ap/UWEXLakes/Documents/ecology/Aquatic%20Plants/PI-Protocol-2010.pdf

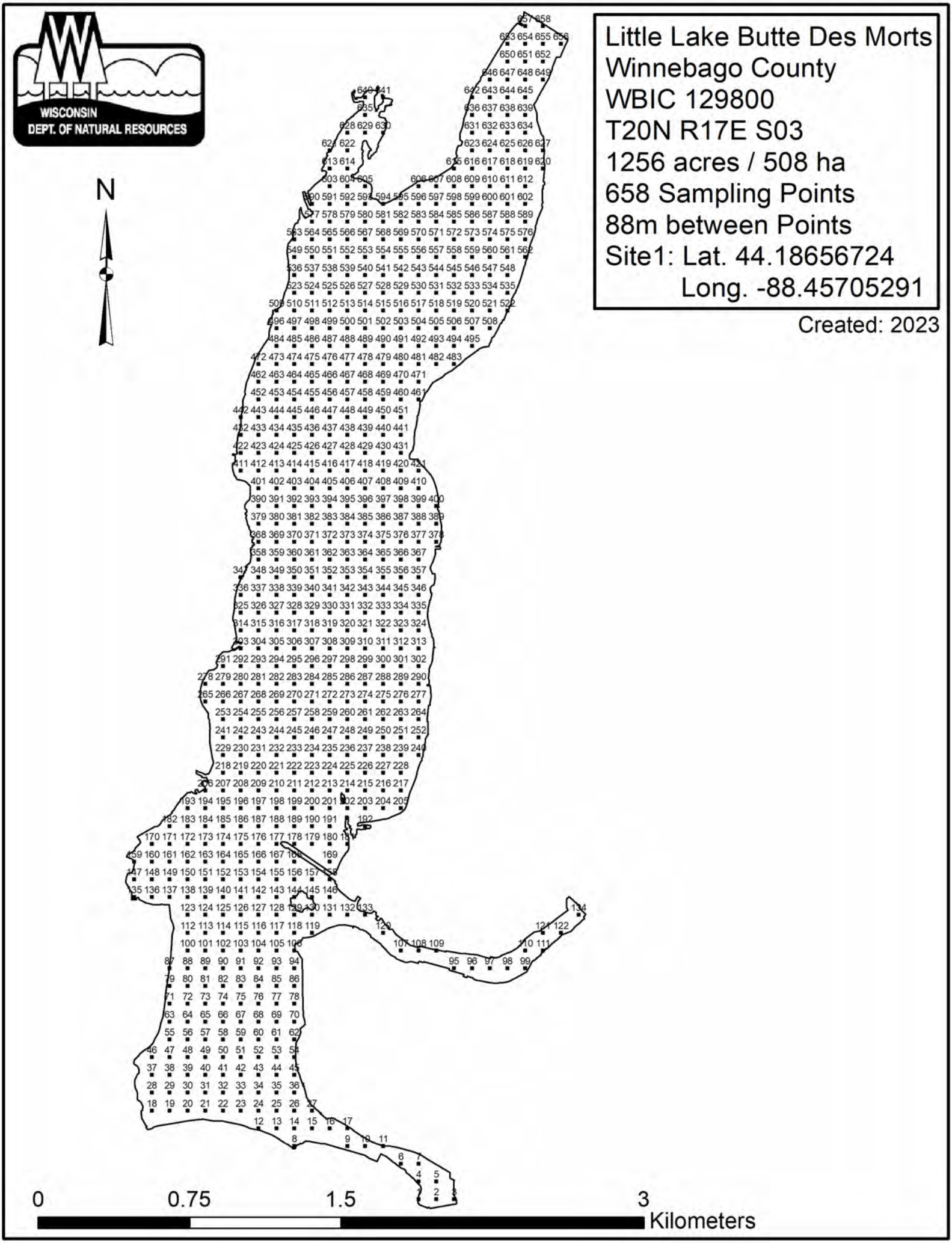
2. WDNR. Plant Point-Intercept Survey Data Entry and Analysis Form [Internet]. Wisconsin Department of Natural Resources; 2009 Oct. Available from: https://apps.dnr.wi.gov/swims/Documents/DownloadDocument?id=111509551

3. Nichols SA. Distribution and Habitat Descriptions of Wisconsin Lake Plants. Wisconsin Geological and Natural History Survey. 1999;Bulletin 96:266.

4. Nichols SA. Floristic Quality Assessment of Wisconsin Lake Plant Communities with Example Applications. Lake and Reservoir Management. 1999;15(2):133–41.

5. Omernik JM, Gallant A. ECOREGIONS OF THE UPPER MIDWEST STATES [Internet]. U.S. Environmental Protection Agency; 1988. Report No.: EPA/600/3-88/037 (NTIS PB89138440). Available from: https://cfpub.epa.gov/si/si_public_record_Report.cfm?Lab=NHEERL&dirEntryId=29611

Appendix A WDNR Aquatic Plant PI-Survey Grid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DEPT. OF NATURAL RESOURCES
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Little Lake Butte Des Morts
Winnebago County
WBIC 129800
T20N R17E S03
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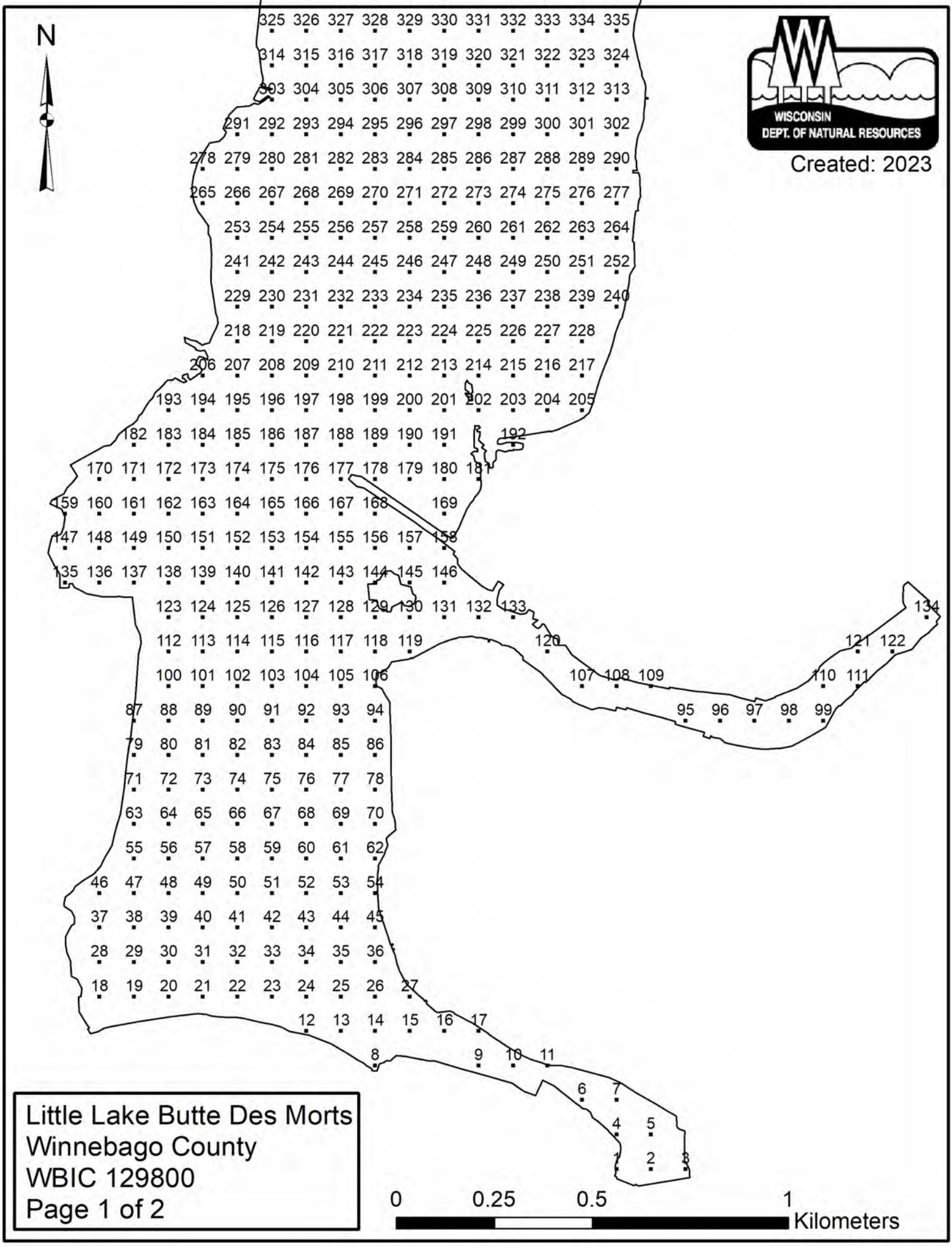

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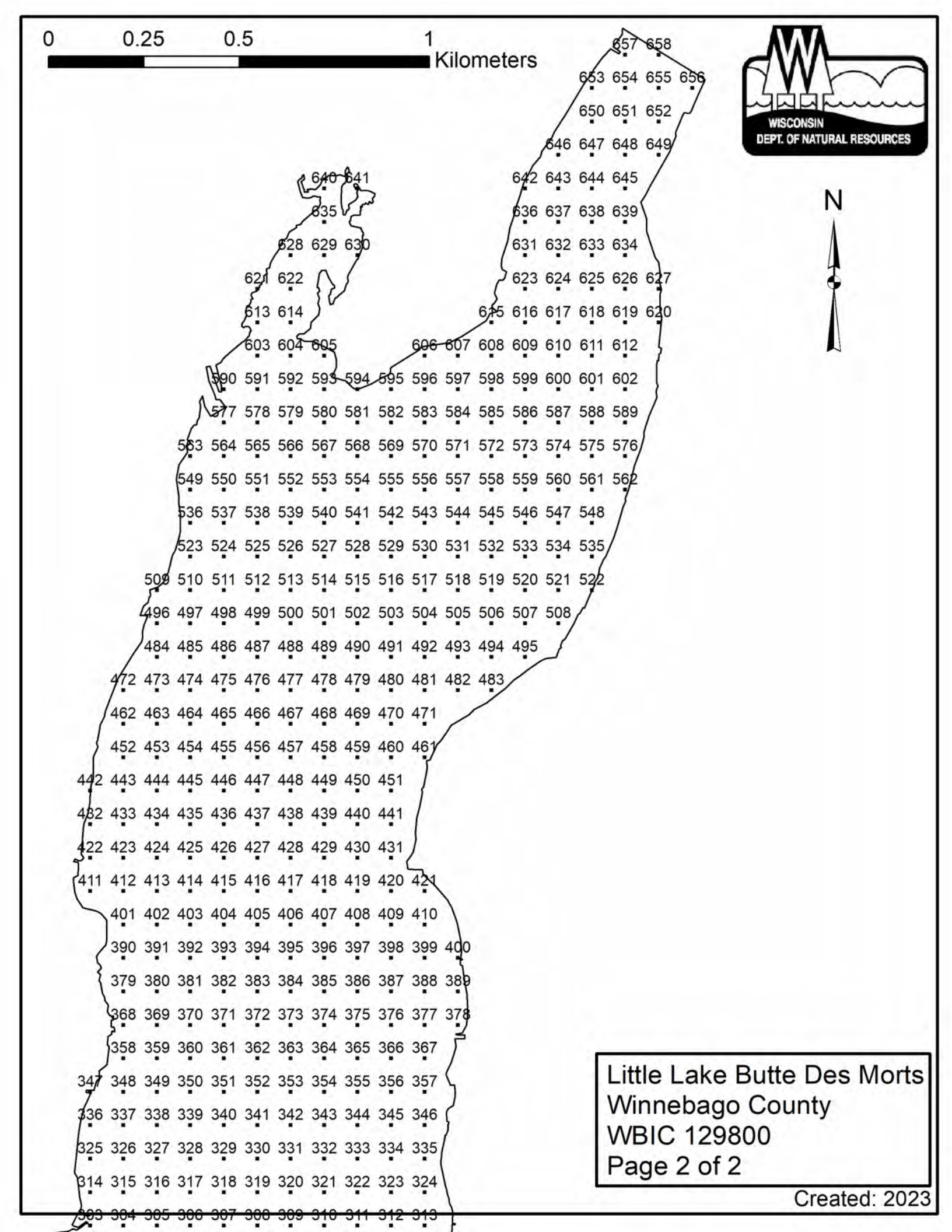
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Appendix B 2024 LLBDM Aquatic Plant Voucher List

2024 LLBDM Aquatic Plant Vouchers

Specimen Identifier	Collector Name	Preparer Name	Lake Name	County	Date Collected	Point_ID	Specimen ID_Common	Specimen ID_Scientific	Habitat	Associat	TRS	WBIC	GPS lat/long	Herbarium of deposition
KD2024-01	Stephanie Cole	Korin Doering	Little Lake Butte des M	Winnebago	7/22/2024	176	Sago pondweed	*Stuckenia pectinata*	Sand		T20N R17E S3	129800	44.20254059, -88.46654815	UW-Madison
KD2024-02	Stephanie Cole	Korin Doering	Little Lake Butte des M	Winnebago	7/22/2024	105	Leafy pondweed	*Potamogeton foliosus*	Muck		T20N R17E S3	129800	44.19777382, -88.46557054	UW-Madison
KD2024-03	Stephanie Cole	Korin Doering	Little Lake Butte des M	Winnebago	7/22/2024	176	Coontail	*Ceratophyllum demersum*	Sand		T20N R17E S3	129800	44.20254059, -88.46654815	UW-Madison
KD2024-04	Stephanie Cole	Korin Doering	Little Lake Butte des M	Winnebago	7/22/2024	14	Long-leaf pondweed	*Potamogeton nodosus*	Rocky		T20N R17E S3	129800	44.18983906, -88.46467535	UW-Madison
KD2024-05	Stephanie Cole	Korin Doering	Little Lake Butte des M	Winnebago	7/22/2024	14	Slender naiad	*Najas flexilis*	Rocky		T20N R17E S3	129800	44.18983906, -88.46467535	UW-Madison
KD2024-06	Stephanie Cole	Korin Doering	Little Lake Butte des M	Winnebago	7/22/2024	168	Water stargrass	*Heteranthera dubia*	Sand		T20N R17E S3	129800	44.20171901, -88.46436679	UW-Madison
KD2024-07	Stephanie Cole	Korin Doering	Little Lake Butte des M	Winnebago	7/26/2024	562	Northern watermilfoil	*Myriophyllum sibiricum*	Rocky		T20N R17E S3	129800	44.22845328, -88.44934783	UW-Madison
KD2024-08	Stephanie Cole	Korin Doering	Little Lake Butte des M	Winnebago	7/22/2024	176	Curly-leaf pondweed	*Potamogeton crispus*	Sand		T20N R17E S3	129800	44.20254059, -88.46654815	UW-Madison
KD2024-09	Stephanie Cole	Korin Doering	Little Lake Butte des M	Winnebago	7/25/2024	238	Flat-stem pondweed	*Potamogeton zosteriformis*	Muck		T20N R17E S3	129800	44.20639682, -88.45873811	UW-Madison
KD2024-10	Stephanie Cole	Korin Doering	Little Lake Butte des M	Winnebago	7/22/2024	157	Fries' pondweed	*Potamogeton friesii*	Rocky		T20N R17E S3	129800	44.2009122, -88.46328643	UW-Madison
KD2024-11	Stephanie Cole	Korin Doering	Little Lake Butte des M	Winnebago	7/22/2024	176	Water celery	*Vallisneria americana*	Sand		T20N R17E S3	129800	44.20254059, -88.46654815	UW-Madison
KD2024-12	Stephanie Cole	Korin Doering	Little Lake Butte des M	Winnebago	7/22/2024	167	White-stem pondweed	*Potamogeton praelongus*	Sand		T20N R17E S3	129800	44.2017338, -88.46546774	UW-Madison
KD2024-13	Stephanie Cole	Korin Doering	Little Lake Butte des M	Winnebago	7/22/2024	167	Eurasian watermilfoil	*Myriophyllum spicatum*	Sand		T20N R17E S3	129800	44.2017338, -88.46546774	UW-Madison
KD2024-14	Stephanie Cole	Korin Doering	Little Lake Butte des M	Winnebago	7/22/2024	176, 158, 157	Slender waterweed	*Elodea nuttallii*	Sand		T20N R17E S3	129800	44.20254059, -88.46654815	UW-Madison
KD2024-15	Stephanie Cole	Korin Doering	Little Lake Butte des M	Winnebago	7/22/2024	176, 158, 157	Common waterweed	*Elodea canadensis*	Sand		T20N R17E S3	129800	44.20254059, -88.46654815	UW-Madison

Specimen labeled "elodea" in the field was determine to be two different species of elodea during voucher preparation (KD2024-14 and -15)

Specimen labeled Illinois Pondweed in the field was determined to be white-stem pondweed during voucher preparation (KD2024-12)

Appendix C Aquatic Plant Survey Data Workbook

LLBDM 2024 Aquatic Plant Survey Data Workbook

Entry		sampling point	Latitude (need electronic copy of site locations)	Longitude (need electronic copy of site locations)	Depth (ft)		Dominant sediment type (M=muck, S=Sand, R=Rock)	Sampled holding rake pole (P) or rake rope (R)?	comments	Total Rake Fullness	Myriophyllum spicatum, Eurasian water-milfoil or Hybrid water-milfoil	Potamogeton crispus, Curly-leaf pondweed	Brasenia schreberi, Watershield	Ceratophyllum demersum, Coontail	Elodea canadensis, Common waterweed	Heteranthera dubia, Water star-grass	Lemna minor, Small duckweed	Lythrum salicaria, Purple loosestrife	Myriophyllum sibiricum, Northern water-milfoil	Najas flexilis, Slender naiad	Nitella sp., Nitella	Nuphar variegata, Spatterdock	Nymphaea odorata, White water lily	Phalaris arundinacea, Reed canary grass	Phragmites australis, Common reed	Potamogeton foliosus, Leafy pondweed	Potamogeton friesii, Fries' pondweed	Potamogeton praelongus, White-stem pondweed	Potamogeton zosteriformis, Flat-stem pondweed	Sparganium eurycarpum, Broad-fruit bur-reed	Stuckenia pectinata, Sago pondweed	Typha sp., Cattail	Vallisneria americana, Wild celery	Wolffia columbiana, Common watermeal	Aquatic moss	Freshwater sponge	Filamentous algae	Riccia fluitans, Slender riccia	Ricciocarpus natans, Purple-fringed riccia	spr1	spr2	spr3	spr4
Name	Little Lake Butte des Morts	LBDM001	44.1865672	-88.45705291					SHALLOW																																
County	Winnebago	LBDM002	44.1865524	-88.45595224					SHALLOW																																
WBIC	129800	LBDM003	44.1865375	-88.45485158					SHALLOW																																
Date	7/22/24, 7/24/24, 7/25/24, & 7/26/24	LBDM004	44.1873592	-88.45703225					SHALLOW																																
Field Crew	Stephanie Cole	LBDM005	44.1873444	-88.45593156					SHALLOW																																
	Korin Doering	LBDM006	44.1881661	-88.45811228					SHALLOW																																
	Katie Reed	LBDM007	44.1881512	-88.45701158					SHALLOW																																
	Bryce Kohler	LBDM008	44.1890471	-88.46469592	6	R		P			V		V			V																				V				
		LBDM009	44.1890026	-88.46139377					SHALLOW																																
		LBDM010	44.1889878	-88.46029305					SHALLOW																																
		LBDM011	44.188973	-88.45919234					SHALLOW																																
		LBDM012	44.1898686	-88.46687682	5	R		P		2					1	2																					2				
		LBDM013	44.1898539	-88.46577608	6.75	M		P		3	1			3	2																						2				
		LBDM014	44.1898391	-88.46467535	5	R		P		1	1			1	1	1				1																			1			
		LBDM015	44.1898243	-88.46357462					SHALLOW																																
		LBDM016	44.1898094	-88.46247389					SHALLOW																																
		LBDM017	44.1897946	-88.46137316					SHALLOW																																
		LBDM018	44.1907491	-88.47346079	4	M		P		3			1	3	1																										
		LBDM019	44.1907344	-88.47236004	5	M		P		2	1			2	2																										
		LBDM020	44.1907197	-88.47125928	4.5	M		P		3	2			3	1	1				1				1																	
		LBDM021	44.1907049	-88.47015853	5	S		P		1				1																										
		LBDM022	44.1906902	-88.46905778	5	R		P		1				1																							1			
		LBDM023	44.1906754	-88.46795703	5	S		P		2				2							1																	1			
		LBDM024	44.1906606	-88.46685628	4.5	M		P		3				3	1	1																					1			
		LBDM025	44.1906459	-88.46575553	5	R		P		3				2	3	3																									
		LBDM026	44.1906311	-88.46465479	6	R		P		2					1	2																					1			
		LBDM027	44.1906163	-88.46355404	4.5	R		P																																
		LBDM028	44.1915411	-88.47344034	4.5	M		P		3				1	3																										
		LBDM029	44.1915264	-88.47233957	5.5	M		P		2				2	2																										
		LBDM030	44.1915117	-88.47123881	6.5	M		P																																
		LBDM031	44.1914969	-88.47013804	5.5	M		P		3	3		1	3	1	1																					1		3		
		LBDM032	44.1914822	-88.46903727	5	M		P		3	2			3	1	1																					1		2		
		LBDM033	44.1914674	-88.46793651	5	M		P		3	3			3	1	1																					1		3		
		LBDM034	44.1914526	-88.46683575	5.75	M		P		3	1			3	2	1																							3		
		LBDM035	44.1914378	-88.46573498	5.5	S		P		2			1	1	2	2																					1		1		
		LBDM036	44.1914231	-88.46463422	5	R		P		2						2																					1				
		LBDM037	44.1923331	-88.47341989	5	M		P		2	1			2	2																										
		LBDM038	44.1923184	-88.47231911	6.75	M		P																																
		LBDM039	44.1923037	-88.47121833	6.5	R		P			V				V																										
		LBDM040	44.1922889	-88.47011755	5.5	R		P		2	1			2	1																							1			
		LBDM041	44.1922742	-88.46901677	5.25	M		P		3	2			3	1																							2			
		LBDM042	44.1922594	-88.46791599	5.5	M		P		3	2			3	2	1																							3			
		LBDM043	44.1922446	-88.46681521	5.5	R		P		1	1			1	1																										
		LBDM044	44.1922298	-88.46571443	5.5	M		P		3	1			2	2	1					1																	3			
		LBDM045	44.1922151	-88.46461365	4.5	R		P		3				2	2	3																							1			
		LBDM046	44.1931251	-88.47339944	5.5	M		P		1				1		1																										
		LBDM047	44.1931104	-88.47229864	6.5	M		P		1	1			1	1	1																										
		LBDM048	44.1930957	-88.47119785	6.5	S		P			V			V																											
		LBDM049	44.1930809	-88.47009705	6	S		P		3	2			3	3						1																	3			
		LBDM050	44.1930662	-88.46899626	5.5	M		P	Substrate was M/R mix	3	1			3	1																								1			
		LBDM051	44.1930514	-88.46789546	5	M		P		3	2	V		3	1																								2			
		LBDM052	44.1930366	-88.46679467	5.5	S		P		3	3			3	1	1																										
		LBDM053	44.1930218	-88.46569388	6	S		P		1					1						V																V				
		LBDM054	44.1930071	-88.46459309	3.5	R		P		3	1			3	3	1										1											2				
		LBDM055	44.1939024	-88.47227818	6.5	M		P																																
		LBDM056	44.1938876	-88.47117737	6.5	M		P		3	1			3	3																										
		LBDM057	44.1938729	-88.47007656	5.5	M		P		3	3			3	2	1					1																2		3		
		LBDM058	44.1938582	-88.46897575	5	M		P		3	V			3	1	1																							3			
		LBDM059	44.1938434	-88.46787494	4.5	M		P		3				3	2	1																							3			
		LBDM060	44.1938286	-88.46677413	5	M		P		3	3			3		1																						1		3		
		LBDM061	44.1938138	-88.46567332	5.5	S		P		1				1	1																							1				
		LBDM062	44.193799	-88.46457252	4	M		P		3				3	3																										
		LBDM063	44.1946944	-88.47225771	4.75	M		P		2	2			1	1	1																										
		LBDM064	44.1946796	-88.47115689	6	M		P		2	2			1	2																										
		LBDM065	44.1946649	-88.47005606	6.25	M		P		1					1																							1			
		LBDM066	44.1946502	-88.46895524	5.5	M		P		3	3			3	2	1																							1			
		LBDM067	44.1946354	-88.46785441	5	M		P	Substrate was M/R mix	3	1			3	1	V																							3			
		LBDM068	44.1946206	-88.46675359	5	R		P		3	3			3	2	1									1													3			
		LBDM069	44.1946058	-88.46565277	5	R		P		2				2	1	1																										
		LBDM070	44.194591	-88.46455195	4.5	M		P		3				3	1	1																							2			
		LBDM071	44.1954864	-88.47223725	5	S		P		1					1																										
		LBDM072	44.1954716	-88.47113641	7	M		P		2	2			1	2																										
		LBDM073	44.1954569	-88.47003557	6	M		P		3				3	1	1					1																				
		LBDM074	44.1954422	-88.46893473	6	M		P		3	1			3	2																										
		LBDM075	44.1954274	-88.46783389	5.75	M		P		3	2			3	2	1																							3			
		LBDM076	44.1954126	-88.46673305	5.5	M		P		3	1			3		1																							1			
		LBDM077	44.1953978	-88.46563221	5.5	S		P		1				1	1	1																										
		LBDM078	44.195383	-88.46453138	5.5	M		P		3				3	2																							1			
		LBDM079	44.1962784	-88.47221678	5.5	R		P		1	1			1																										
		LBDM080	44.1962636	-88.47111592	6.75	M		P		2				2	1																										
		LBDM081	44.1962489	-88.47001507	6.25	M		P		3				3	1	1																							2			
		LBDM082	44.1962342	-88.46891421	6	M		P		3	1			3	3	1																							2			
		LBDM083	44.1962194	-88.46781336	5.75	M		P		2				2	1																							2			
		LBDM084	44.1962046	-88.46671251	5.75	S		P		1				1																										
		LBDM085	44.1961898	-88.46561166	5	M		P		3	1			3	2	1	1								1													3			
		LBDM086	44.196175	-88.46451081	5.5	S		P																																
		LBDM087	44.1970704	-88.47219631	5	R		P			V					V																									
		LBDM088	44.1970556	-88.47109544	5.5	M		P		1				1	1																										
		LBDM089	44.1970409	-88.46999457	6.5	M		P		3				2	3																										
		LBDM090	44.1970262	-88.4688937	6	M		P		3				1																							3			
		LBDM091	44.1970114	-88.46779283	6	M		P		1																											1			
		LBDM092	44.1969966	-88.46669197	6.25	R		P		1						1																									

LLBDM 2024 Aquatic Plant Survey Data Workbook

Entry		sampling point	Latitude (need electronic copy of site locations)	Longitude (need electronic copy of site locations)	Depth (ft)		Dominant sediment type (M=muck, S=Sand, R=Rock)	Sampled hooking rake pole (P) or rake rope (R)?	comments	Total Rake Fullness	Myriophyllum spicatum, Eurasian water-milfoil or Hybrid water-milfoil	Potamogeton crispus, Curly-leaf pondweed	Brasenia schreberi, Watershield	Ceratophyllum demersum, Coontail	Elodea canadensis, Common waterweed	Heteranthera dubia, Water star-grass	Lemna minor, Small duckweed	Lythrum salicaria, Purple loosestrife	Myriophyllum sibiricum, Northern water-milfoil	Najas flexilis, Slender naiad	Nitella sp., Nitella	Nuphar variegata, Spatterdock	Nymphaea odorata, White water lily	Phalaris arundinacea, Reed canary grass	Phragmites australis, Common reed	Potamogeton amplifolius, Large-leaf pondweed	Potamogeton foliosus, Leafy pondweed	Potamogeton friesii, Fries' pondweed	Potamogeton praelongus, White-stem pondweed	Potamogeton zosteriformis, Flat-stem pondweed	Stuckenia pectinata, Sago pondweed	Typha sp., Cattail	Vallisneria americana, Wild celery	Wolffia columbiana, Common watermeal	Aquatic moss	Freshwater sponge	Filamentous algae	Ricciocarpus natans, Purple-fringed riccia	sp1	sp2	sp3	sp4
		LBDM093	44.1969818	-88.4655911	6	S		P		1	1						1																		1								
		LBDM094	44.196967	-88.46449024	4.5	M		P		3	1			3	2	1	V												V														
		LBDM095	44.1968334	-88.45458249	2	R		P																																				
		LBDM096	44.1968185	-88.45348163	2	R		P																																				
		LBDM097	44.1968036	-88.45238077	3	R		P																																				
		LBDM098	44.1967887	-88.45127992	2.5	R		P																																				
		LBDM099	44.1967737	-88.45017906	2.5	R		P		3				1	1	3																			2								
		LBDM100	44.1978476	-88.47107496	7	M		P																											V								
		LBDM101	44.1978329	-88.46997407	5.5	M		P																																				
		LBDM102	44.1978181	-88.46887319	6	M		P		1	1				1																			1								
		LBDM103	44.1978034	-88.46777231	6	S		P		1				1	1	1																											
		LBDM104	44.1977886	-88.46667142	4.75	R		P		2	2			1		1																			1								
		LBDM105	44.1977738	-88.46557054	5	M		P		3	1	1		2	1	2	1								1										2		1		1				
		LBDM106	44.197759	-88.46446966	4	M		P	Location of plot shifted, coordinates mapped. Substrate was M/R mix	3	2	1		2	1	1	1		1										1						1				3						
		LBDM107	44.19767	-88.4578644	3.5	R		P																																				
		LBDM108	44.1976552	-88.45676353	3	R		P																																				
		LBDM109	44.1976403	-88.45566265	4	R		P																																				
		LBDM110	44.1975657	-88.4501583	2	R		P																																				
		LBDM111	44.1975508	-88.44905743	1.5	R		P			V					V																											
		LBDM112	44.1986396	-88.47105447	8	M		P		1						1																			1								
		LBDM113	44.1986249	-88.46995357	6	M		P		3				3	1	1																			3								
		LBDM114	44.1986101	-88.46885267	8.25	S		P																																				
		LBDM115	44.1985954	-88.4675178	5.5	M		P		2	1			1		1																			2								
		LBDM116	44.1985806	-88.46665088	4.25	S		P		2																									2								
		LBDM117	44.1985658	-88.46554998	4	M		P		2																									2								
		LBDM118	44.198551	-88.46444909	5.5	R		P		1																									1								
		LBDM119	44.1985362	-88.4633482	5	R		P	Substrate was R/M mix	2				1	1																			1		1							
		LBDM120	44.1984769	-88.45894463	2.5	R		P		1																									1								
		LBDM121	44.1983428	-88.44903665					SHALLOW																																			
		LBDM122	44.1983278	-88.44793577					SHALLOW																																			
		LBDM123	44.1994316	-88.47103398	10.5	M		P																																			
		LBDM124	44.1994169	-88.46993307	6	M		P		2				2																					2								
		LBDM125	44.1994021	-88.46883216	8	M		P		1						1																											
		LBDM126	44.1993874	-88.46773125	5.5	M		P		3				1		3																								1			
		LBDM127	44.1993726	-88.46663033	4.5	R		P		2		1				1																			2								
		LBDM128	44.1993578	-88.46552942	3.5	R		P		2		1				1																		1	2								
		LBDM129	44.199343	-88.46442852	2.25	R		P		2		1																						2	1								
		LBDM130	44.1993282	-88.46332761	2.5	R		P		1																									1								
		LBDM131	44.1993134	-88.4622267	3.5	R		P																																				
		LBDM132	44.1992986	-88.46112579	4.5	R		P																																				
		LBDM133	44.1992837	-88.46002489	3	R		P																																				
		LBDM134	44.1991048	-88.44681408					SHALLOW																																			
		LBDM135	44.2002678	-88.47431629	2	M		P		1	v		1		1		V							V																		
		LBDM136	44.2002531	-88.47321536	4	M		P		3		1	V	3	3		V							V																		
		LBDM137	44.2002384	-88.47211443	5	M		P		3				3	3																											
		LBDM138	44.2002236	-88.4710135	9.5	M		P																																			
		LBDM139	44.2002089	-88.46991257	6.25	M		P																																			
		LBDM140	44.2001941	-88.46881164	8.5	S		P								V																											
		LBDM141	44.2001794	-88.46771072	5.75	M		P		1				1																									1			
		LBDM142	44.2001646	-88.46660979	4.75	R		P		1				1		1																								1			
		LBDM143	44.2001498	-88.46550886	3.75	R		P		3	3			3	2	1																								2			
		LBDM144	44.200135	-88.46440794	2	M		P		2	1				1																			2								
		LBDM145	44.2001202	-88.46330702	2.5	R		P		1					1																			1								
		LBDM146	44.2001054	-88.46220609	4	R		P																																				
		LBDM147	44.2010598	-88.47429584	3.75	M		P		3				3	3		2							V																			
		LBDM148	44.2010451	-88.4731949	5	M		P		3	1	1		3	3	1	1							V					2							1				1			
		LBDM149	44.2010304	-88.47209395	7	M		P																																				
		LBDM150	44.2010156	-88.47099301	9.5	M		P																																				
		LBDM151	44.2010009	-88.46989207	6.75	M		P																																				
		LBDM152	44.2009861	-88.46879112	8	M		P																																				
		LBDM153	44.2009714	-88.46769018	6	M		P		2						2																											
		LBDM154	44.2009566	-88.46658924	5	R		P		3	1			3	1	3	V							V																			
		LBDM155	44.2009418	-88.4654883	4.5	R		P		3	2			3	2																			1	2								
		LBDM156	44.200927	-88.46438736	2.5	R		P		3					3													1						2	1				2				
		LBDM157	44.2009122	-88.46328643	3	R		P		1		1			1											1		1															
		LBDM158	44.2008974	-88.46218549	4.5	M		P	Thick algae present	3	1			1	1	3								V																				
		LBDM159	44.2018518	-88.4742754	4	M		P		3	2			3	3	1	1												1								1			3			
		LBDM160	44.2018371	-88.47317444	5.5	M		P																																			
		LBDM161	44.2018224	-88.47207348	7	M		P		1				1	1																											
		LBDM162	44.2018076	-88.47097252	9.5	M		P																																			
		LBDM163	44.2017929	-88.46987156	6.75	M		P																																			
		LBDM164	44.2017781	-88.46877061	7.5	S		P																																			
		LBDM165	44.2017634	-88.46766965	5.5	S		P		1				1	1	1																											
		LBDM166	44.2017486	-88.4665587	4.75	R		P		1				1	1																								1			
		LBDM167	44.2017338	-88.46546774	5	S		P		1	1																	V											1			
		LBDM168	44.201719	-88.46436679	5	S		P		1		1				1																							1			
		LBDM169	44.2016894	-88.46216488	3.5	M		P		3				1								2																					
		LBDM170	44.2026291	-88.47315398	5	M		P		1				1	1																											
		LBDM171	44.2026144	-88.47205301	7.25	M		P		1		1																														
		LBDM172	44.2025996	-88.47095203	9	M		P																																				
		LBDM173	44.2025849	-88.46985106	8.75	M		P		1																									1					1			
		LBDM174	44.2025701	-88.46875009	7.5	M		P																																			
		LBDM175	44.2025554	-88.46764912	6	M		P		1																									1					1			
		LBDM176	44.2025406	-88.46654815	6.5	S		P	CLP turion present	1		1		1	1																			1					1			
		LBDM177	44.2025258	-88.46544718	5.5	R		P		1																														1			
		LBDM178	44.202511	-88.46434621	3.5	M		P		1	1			1																												
		LBDM179	44.2024962	-88.46324524	4.25	M		P		2	1			1	1																												
		LBDM180	44.2024814	-88.46214428	3	R		P		1	1				1							V																				
		LBDM181	44.2024666	-88.46104331	1.25	R		P		1				1	1																												
		LBDM182	44.2034064	-88.47203253	4.5	M		P		3				3	2																												
		LBDM183	44.2033916	-88.47093154	8.75	M		P																																				

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Entry		sampling point	Latitude (need electronic copy of site locations)	Longitude (need electronic copy of site locations)	Depth (ft)	Dominant sediment type (M=muck, S=Sand, R=Rock)	Sampled rodding rake pole (P) or rake rope (R)?	comments	Total Rake Fullness	Myriophyllum spicatum, Eurasian water-milfoil or Hybrid water-milfoil	Potamogeton crispus, Curly-leaf pondweed	Brasenia schreberi, Watershield	Ceratophyllum demersum, Coontail	Elodea canadensis, Common waterweed	Heteranthera dubia, Water star-grass	Lemna minor, Small duckweed	Lythrum salicaria, Purple loosestrife	Myriophyllum sibiricum, Northern water-milfoil	Najas flexilis, Slender naiad	Nitella sp., Nitella	Nuphar variegata, Spatterdock	Nymphaea odorata, White water lily	Phalaris arundinacea, Reed canary grass	Phragmites australis, Common reed	Potamogeton amplifolius, Large-leaf pondweed	Potamogeton foliosus, Leafy pondweed	Potamogeton friesii, Fries' pondweed	Potamogeton praelongus, White-stem pondweed	Sparganium fluctuans, Floating-leaf burreed	Stuckenia pectinata, Sago pondweed	Typha sp., Cattail	Vallisneria americana, Wild celery	Wolffia columbiana, Common watermeal	Aquatic moss	Freshwater sponge	Filamentous algae	Ricciocarpus natans, Purple-fringed riccia	sp1	sp2	sp3	sp4
		LBDM184	44.2033769	-88.46983055	11.25	M	P																																		
		LBDM185	44.2033621	-88.46872957	8	M	P																																		
		LBDM186	44.2033474	-88.46762858	7.5	S	P																																		
		LBDM187	44.2033326	-88.4665276	5.5	R	P		1	1	1		1		1									f						1										
		LBDM188	44.2033178	-88.46542661	5.25	R	P		1	1					1																									
		LBDM189	44.203303	-88.46432563	4.5	M	P		3	2			3	2	V												V			1									
		LBDM190	44.2032882	-88.46322465	4.25	M	P		3	1			3	3																									
		LBDM191	44.2032734	-88.46212367	4.5	M	P		2	2			1	2																									
		LBDM192	44.2032437	-88.45992171	3.25	R	P		1	1				1																									
		LBDM193	44.2041836	-88.47091105	7	M	P																																		
		LBDM194	44.2041689	-88.46981005	10	M	P																																		
		LBDM195	44.2041541	-88.46870905	16	M	R																																		
		LBDM196	44.2041394	-88.46760805	6.75	S	P		1					1	1																									
		LBDM197	44.2041246	-88.46650705	5.5	S	P		3	1			3	2																									
		LBDM198	44.2041098	-88.46540605	4.75	M	P		3				3	2	1																				2				
		LBDM199	44.204095	-88.46430505	5.5	S	P			V			V		V													V											
		LBDM200	44.2040802	-88.46320405	5.25	R	P		2	1			2	1																									
		LBDM201	44.2040654	-88.46210306	5	M	P		2				2															V											
		LBDM202	44.2040505	-88.46100206	8	M	P		1				1																										
		LBDM203	44.2040357	-88.45990107	4.5	M	P		3	2			3	3																									
		LBDM204	44.2040208	-88.45880008	5	M	P		2	1			2	2																									
		LBDM205	44.204006	-88.45769908	5.25	M	P		1				1	1																									
		LBDM206	44.2049609	-88.46978954	5.5	M	P	Detritus present																															
		LBDM207	44.2049461	-88.46868853	11.5	S	P																																		
		LBDM208	44.2049314	-88.46758751	9.5	M	P																																		
		LBDM209	44.2049166	-88.4664865	6	M	P		2				2	1																									
		LBDM210	44.2049018	-88.46538548	5.5	M	P		3				3	2	1																				3				
		LBDM211	44.204887	-88.46428447	5.5	M	P		2				1	1	2																				1				
		LBDM212	44.2048722	-88.46318346	5.75	M	P		1	1				1																									
		LBDM213	44.2048574	-88.46208245	6	M	P		1	1																													
		LBDM214	44.2048425	-88.46098144	8.5	M	P																																		
		LBDM215	44.2048277	-88.45988043	5.25	M	P						V																										
		LBDM216	44.2048128	-88.45877942	5.5	M	P		3	1			2	3								V																	
		LBDM217	44.204798	-88.45767841	5.5	M	P		3	2			3	3													V			1									
		LBDM218	44.2057381	-88.468668	6	S	P		1				1																										
		LBDM219	44.2057234	-88.46756697	13.5	M	R																																		
		LBDM220	44.2057086	-88.46646595	7	M	P																																		
		LBDM221	44.2056938	-88.46536492	5.5	M	P		3																		V			V									
		LBDM222	44.205679	-88.46426389	7	M	P		1				3	1																1				3				
		LBDM223	44.2056642	-88.46316286	5.5	M	P		3	1			3	3																				3				
		LBDM224	44.2056494	-88.46206184	6.5	M	P		3				3																									
		LBDM225	44.2056345	-88.46096081	8.5	M	P																																		
		LBDM226	44.2056197	-88.45985979	6.25	M	P		2	1			2	2																									
		LBDM227	44.2056048	-88.45875877	6	M	P		3	2			3	3																				2				
		LBDM228	44.20559	-88.45765774	5.25	M	P		3				3																									
		LBDM229	44.2065301	-88.46864748	1.5	M	P		1		1																												
		LBDM230	44.2065154	-88.46754644	13.5	M	R																																		
		LBDM231	44.2065006	-88.46644539	9.75	M	P																																		
		LBDM232	44.2064858	-88.46534435	5.75	M	P		3	2			3	2	1															1				1				
		LBDM233	44.206471	-88.46424331	5.5	M	P		3	1			3	2																				1				
		LBDM234	44.2064562	-88.46314227	6	M	P		1				1																									
		LBDM235	44.2064414	-88.46204123	5.5	M	P		3	2			3	2	1																				3				
		LBDM236	44.2064265	-88.46094019	6	S	P		2				1	2	1																								
		LBDM237	44.2064117	-88.45983915	6	R	P		1	1			1	1	V																V							
		LBDM238	44.2063968	-88.45873811	6.5	M	P		2	1			2	2													1											
		LBDM239	44.206382	-88.45763707	5	R	P		2				2	1																				1				
		LBDM240	44.2063671	-88.45653604	5	M	P		1				1	1																									
		LBDM241	44.2073221	-88.46862696	4.5	M	P		1					1	1																									
		LBDM242	44.2073073	-88.4675259	7	M	P																																		
		LBDM243	44.2072926	-88.46642484	12	M	R																																		
		LBDM244	44.2072778	-88.46532378	6	M	P	Sediment was M/R mix	2	1			2	1																2									
		LBDM245	44.207263	-88.46422273	5.5	M	P		3	1			3	2													1							3				
		LBDM246	44.2072482	-88.46312167	8	M	P																																		
		LBDM247	44.2072333	-88.46202061	6	M	P		3				2	1	3															1				1				
		LBDM248	44.2072185	-88.46091956	6	S	P																																		
		LBDM249	44.2072037	-88.45981851	6.75	M	P																																		
		LBDM250	44.2071888	-88.45871745	6.75	M	P		1				1																									
		LBDM251	44.207174	-88.4576164	5.75	M	P		2	1			2	1																									
		LBDM252	44.2071591	-88.45651535	5	R	P		1				1	1																									
		LBDM253	44.2081141	-88.46860643	4.5	M	P		3	1			3	3	V												1	V		1				1				
		LBDM254	44.2080993	-88.46750536	9	M	P																																		
		LBDM255	44.2080846	-88.46640429	11.75	M	P																																		
		LBDM256	44.2080698	-88.46530321	7	S	P		1				1		1																									
		LBDM257	44.208055	-88.46420214	5.5	M	P		3				3	3																				3				
		LBDM258	44.2080402	-88.46310107	6.25	M	P		3				3	2																				2				
		LBDM259	44.2080253	-88.462	5.75	M	P		3				3																	2								
		LBDM260	44.2080105	-88.46089893	6.5	M	P		2				2	1	1																								
		LBDM261	44.2079957	-88.45979786	6	R	P		3				3																									
		LBDM262	44.2079808	-88.4586968	6.5	M	P		3				3																									
		LBDM263	44.2079659	-88.45759573	6	M	P		3	1			3	3	V															1				1				
		LBDM264	44.2079511	-88.45649466	5	R	P		2	1			2	1																									
		LBDM265	44.2089209	-88.469687	3.25	M	P		3				2	2	2	1												1	3				1					
		LBDM266	44.2089061	-88.46858591	4.5	M	P		2				2	1																									
		LBDM267	44.2088913	-88.46748482	7	M	P		1				1	1																									
		LBDM268	44.2088766	-88.46638373	12	M	R																																		
		LBDM269	44.2088618	-88.46528264	9.5	M	P																																		
		LBDM270	44.208847	-88.46418156	5	M	P		3				3		1															1				2				
		LBDM271	44.2088322	-88.46308047	6.5	M	P		3				3	1	2																								
		LBDM272	44.2088173	-88.46197939	6.5	M	P		2				2	1																									
		LBDM273	44.2088025	-88.4608783	6.75	M	P																																		
		LBDM274	44.2087877	-88.45977722	7	M	P																																		
		LBDM275	44.2087728	-88.45867614	7	M	P																																		

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Entry		sampling point	Latitude (need electronic copy of site locations)	Longitude (need electronic copy of site locations)	Depth (ft)	Dominant sediment type (M=muck, S=Sand, R=Rock)	Sampled rooting rake pole (P) or rake rope (R)?	comments	Total Rake Fullness	Myriophyllum spicatum, Eurasian water-milfoil or Hybrid water-milfoil	Potamogeton crispus, Curly-leaf pondweed	Brasenia schreberi, Watershield	Ceratophyllum demersum, Coontail	Elodea canadensis, Common waterweed	Heteranthera dubia, Water star-grass	Lemna minor, Small duckweed	Lythrum salicaria, Purple loosestrife	Myriophyllum sibiricum, Northern water-milfoil	Najas flexilis, Slender naiad	Nitella sp., Nitella	Nuphar variegata, Spatterdock	Nymphaea odorata, White water lily	Phalaris arundinacea, Reed canary grass	Phragmites australis, Common reed	Potamogeton foliosus, Leafy pondweed	Potamogeton friesii, Fries' pondweed	Potamogeton praelongus, White-stem pondweed	Potamogeton zosteriformis, Flat-stem pondweed	Sparganium eurycarpum, Broad-fruit bur-reed	Stuckenia pectinata, Sago pondweed	Typha sp., Cattail	Vallisneria americana, Wild celery	Wolffia columbiana, Common watermeal	Aquatic moss	Freshwater sponge	Filamentous algae	Ricciocarpus natans, Purple-fringed riccia	sp1	sp2	sp3	sp4
		LBDM276	44.2087579	-88.45757506	7.25	M	P																																		
		LBDM277	44.2087431	-88.45647398	6	M	P		3				3	2		V										V															
		LBDM278	44.2097129	-88.46966649	2.75	M	P		3				3	2		V						V				V								1						
		LBDM279	44.2096981	-88.46856538	4.5	M	P		3				3	2	1	V						V				V				V										
		LBDM280	44.2096833	-88.46746428	7.5	M	P		1				1	1																										
		LBDM281	44.2096686	-88.46636318	12	M	R																																		
		LBDM282	44.2096538	-88.46526207	7.5	S	P		1					1	1																									
		LBDM283	44.209639	-88.46416097	5.5	M	P		1					1																					V					
		LBDM284	44.2096242	-88.46305987	9.5	M	P																																		
		LBDM285	44.2096093	-88.46195877	10.25	M	P																																		
		LBDM286	44.2095945	-88.46085767	7	M	P		1																								1								
		LBDM287	44.2095797	-88.45975658	7	M	P																																		
		LBDM288	44.2095648	-88.45865548	7.25	M	P																																		
		LBDM289	44.2095499	-88.45755438	7.25	M	P																																		
		LBDM290	44.2095351	-88.45645329	6.5	M	P		2	2			2	1	V										1															
		LBDM291	44.2104901	-88.46854485	3.5	M	P		3		1		3	2	1							V																	
		LBDM292	44.2104753	-88.46744374	5	M	P		2				2	2	1																								
		LBDM293	44.2104606	-88.46634262	11.5	M	P																																		
		LBDM294	44.2104458	-88.4652415	11.5	M	P																																		
		LBDM295	44.210431	-88.46414039	6	M	P		1				1		1																									
		LBDM296	44.2104161	-88.46303927	9	M	P		1						1																									
		LBDM297	44.2104013	-88.46193816	9.75	M	P																																		
		LBDM298	44.2103865	-88.46083704	7.5	M	P																																		
		LBDM299	44.2103716	-88.45973593	7.5	M	P						V			V										V														
		LBDM300	44.2103568	-88.45863482	7.25	M	P																																		
		LBDM301	44.2103419	-88.45753371	7.5	M	P																																		
		LBDM302	44.210327	-88.4564326	6.25	M	P	Sediment was clay	1	V			1																											
		LBDM303	44.2112673	-88.46742319	4.25	M	P		3				3	3	1											1									1					
		LBDM304	44.2112525	-88.46632206	10	M	P																																		
		LBDM305	44.2112378	-88.46522093	11.5	M	P																																		
		LBDM306	44.211223	-88.4641198	7.5	M	P																																		
		LBDM307	44.2112081	-88.46301867	10.5	M	P		1				V																						1					
		LBDM308	44.2111933	-88.46191754	9.5	R	P																																		
		LBDM309	44.2111785	-88.46081641	8	R	P																																		
		LBDM310	44.2111636	-88.45971529	7.5	M	P																																		
		LBDM311	44.2111488	-88.45861416	7.5	S	P		1				1	1																										
		LBDM312	44.2111339	-88.45751303	7.75	M	P																																		
		LBDM313	44.211119	-88.45641191	7.5	M	P																																		
		LBDM314	44.2120593	-88.46740265	3.75	M	P		3		1		3	3	1	V						V				V									2					
		LBDM315	44.2120445	-88.4663015	7.75	M	P																																		
		LBDM316	44.2120297	-88.46520036	10.25	M	P			V																															
		LBDM317	44.2120149	-88.46409921	10.25	M	P																																		
		LBDM318	44.2120001	-88.46299807	9	S	P						V																											
		LBDM319	44.2119853	-88.46189692	11.25	M	P								V																									
		LBDM320	44.2119705	-88.46079578	8.5	S	P																																		
		LBDM321	44.2119556	-88.45969464	8	M	P																																		
		LBDM322	44.2119408	-88.4585935	7.5	S	P																																		
		LBDM323	44.2119259	-88.45749236	7.25	S	P																																		
		LBDM324	44.211911	-88.45639122	7.5	R	P						V																											
		LBDM325	44.2128513	-88.46738211	3.5	M	P	Sediment was M/R mix	1				1	1		V										V									1					
		LBDM326	44.2128365	-88.46628094	5	M	P		3	2			3	1	1																									
		LBDM327	44.2128217	-88.46517978	9	S	P																																		
		LBDM328	44.2128069	-88.46407862	11	M	P																																		
		LBDM329	44.2127921	-88.46297746	8.5	R	P																																		
		LBDM330	44.2127773	-88.46187631	11.5	M	P																																		
		LBDM331	44.2127625	-88.46077515	9.5	M	P																																		
		LBDM332	44.2127476	-88.45967390	8	M	P																																		
		LBDM333	44.2127328	-88.45857284	7.25	M	P	Sediment was clay	1				1																											
		LBDM334	44.2127179	-88.45747168	7.5	M	P	Sediment was clay																																
		LBDM335	44.212703	-88.45637053	7.75	M	P																																		
		LBDM336	44.2136433	-88.46736156	4	M	P	CLP turion	1		1	V		1	1		V									V									1					
		LBDM337	44.2136285	-88.46626038	5.5	M	P		1		1			1	1																									
		LBDM338	44.2136137	-88.46515921	6.5	M	P		2						1											2														
		LBDM339	44.2135989	-88.46405803	10.5	M	P																																		
		LBDM340	44.2135841	-88.46295686	10.5	R	P																																		
		LBDM341	44.2135693	-88.46185569	10.25	R	P																																		
		LBDM342	44.2135545	-88.46075451	9.25	S	P																																		
		LBDM343	44.2135396	-88.45965334	8.5	M	P	Sediment was clay					V																											
		LBDM344	44.2135248	-88.45855217	7	M	P	Sediment was clay	1					1	V																										
		LBDM345	44.2135099	-88.457451	7.5	M	P	Sediment was clay																																
		LBDM346	44.213495	-88.45634983	8	M	P	Sediment was clay																																
		LBDM347	44.2144353	-88.46734101	3.75	M	P		3		1		3	3	1	1										1									2	1		3		
		LBDM348	44.2144205	-88.46623982	5.25	M	P		1		1		1	1	1																								
		LBDM349	44.2144057	-88.46513863	6.5	M	P		2		2		2																										
		LBDM350	44.2143909	-88.46403744	8	M	P																																		
		LBDM351	44.2143761	-88.46293625	12	R	P																																		
		LBDM352	44.2143613	-88.46183507	11	R	P																																		
		LBDM353	44.2143465	-88.46073388	9.5	M	P																																		
		LBDM354	44.2143316	-88.45963269	9	R	P																																		
		LBDM355	44.2143167	-88.45853151	7	S	P								V																									
		LBDM356	44.2143019	-88.45743032	7	R	P																																		
		LBDM357	44.214287	-88.45632914	8	R	P																																		
		LBDM358	44.2152125	-88.46621926	4	M	P		1		1	1		1	1	V	V					V																		
		LBDM359	44.2151977	-88.46511806	5	M	P		3	V			3	3	1																									
		LBDM360	44.2151829	-88.46401695	6.5	M	P		1		1																													
		LBDM361	44.2151681	-88.46291565	12	R	P																																		
		LBDM362	44.2151533	-88.46181445	11.5	M	P																																		
		LBDM363	44.2151384	-88.46071324	10.25	M	P		1						1																									
		LBDM364	44.2151236	-88.45961204	10	M	P		1					1																										
		LBDM365	44.2151087	-88.45851084	7	M	P	Sediment was clay																																
		LBDM366	44.2150939	-88.45740964	7	M	P	Sediment was clay							V																									
		LBDM367	44.215079	-88.45630845	7.75	R	P																																		

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Entry		sampling point	Latitude (need electronic copy of site locations)	Longitude (need electronic copy of site locations)	Depth (ft)		Dominant sediment type (Mmuck, S-Sand, R-Rock)	Sampled hooking rake pole (P) or rake rope (R)?	comments	Total Rake Fullness	Myriophyllum spicatum, Eurasian water-milfoil or Hybrid water-milfoil	Potamogeton crispus, Curly-leaf pondweed	Brasenia schreberi, Watershield	Ceratophyllum demersum, Coontail	Elodea canadensis, Common waterweed	Heteranthera dubia, Water star-grass	Lemna minor, Small duckweed	Lythrum salicaria, Purple loosestrife	Myriophyllum sibiricum, Northern water-milfoil	Najas flexilis, Slender naiad	Nitella sp., Nitella	Nuphar variegata, Spatterdock	Nymphaea odorata, White water lily	Phalaris arundinacea, Reed canary grass	Phragmites australis, Common reed	Potamogeton foliosus, Leafy pondweed	Potamogeton friesii, Fries' pondweed	Potamogeton praelongus, White-stem pondweed	Potamogeton zosteriformis, Flat-stem pondweed	Sparganium eurycarpum, Broad-fruit bur-reed	Stuckenia pectinata, Sago pondweed	Typha sp., Cattail	Vallisneria americana, Wild celery	Wolffia columbiana, Common watermeal	Aquatic moss	Freshwater sponge	Filamentous algae	Riccia fluitans, Slender riccia	Ricciocarpus natans, Purple-fringed riccia	sp1	sp2	sp3	sp4
		LBDM368	44.2160045	-88.4661987	3	M	P			2	1		2	2	1	V								V																				
		LBDM369	44.2159897	-88.4650748	5.5	M	P			1	V	1	1	1										V																				
		LBDM370	44.2159749	-88.46399626	6.5	M	P			3	1		3	3	1	1														1													
		LBDM371	44.2159601	-88.46289504	10.5	R	P			1			1	1																													
		LBDM372	44.2159453	-88.46179382	12.5	R	P																																				
		LBDM373	44.2159304	-88.46069261	10.75	S	P																																			
		LBDM374	44.2159156	-88.45959139	9.25	M	P																																				
		LBDM375	44.2159007	-88.45849018	7	S	P			2			2	1	1																												
		LBDM376	44.2158859	-88.45738896	7	R	P		Sediment was clay																																		
		LBDM377	44.215871	-88.45628775	7.5	R	P																																				
		LBDM378	44.2158561	-88.45518654	6	M	P			3	1		3	2																													
		LBDM379	44.2167965	-88.46617814	3.5	M	P		Water star-grass flowering	3	2	1	2	1	3	1													V									1						
		LBDM380	44.2167817	-88.4650769	5.25	M	P			3	1		2	3	1																												
		LBDM381	44.2167669	-88.46397567	6.75	M	P			2	2	1	2																														
		LBDM382	44.2167521	-88.46287443	10	M	P																																				
		LBDM383	44.2167373	-88.4617732	12.5	R	P																																			
		LBDM384	44.2167224	-88.46067197	11.75	M	P																																				
		LBDM385	44.2167076	-88.45957074	10.25	M	P																																			
		LBDM386	44.2166927	-88.45846951	7	R	P																																				
		LBDM387	44.2166779	-88.45736828	6.5	R	P			1																																	
		LBDM388	44.216663	-88.45626705	6.5	R	P						1	1	1																												
		LBDM389	44.2166481	-88.45516583	7	R	P			3			3	1	1																												
		LBDM390	44.2175885	-88.46615757	3.5	M	P			2	1		2	2	1																												
		LBDM391	44.2175737	-88.46505632	6	M	P			1			1	1	1																												
		LBDM392	44.2175589	-88.46395507	7.25	M	P			2	1		2	2																													
		LBDM393	44.2175441	-88.46285383	8.5	R	P																																				
		LBDM394	44.2175293	-88.46175258	12.5	R	P																																			
		LBDM395	44.2175144	-88.46065133	12	M	P																																				
		LBDM396	44.2174996	-88.45955009	10.25	M	P																																				
		LBDM397	44.2174847	-88.45844884	7.5	M	P		Sediment was clay	1					1																													
		LBDM398	44.2174698	-88.4573476	7	M	P		Sediment was clay	1					1																													
		LBDM399	44.217455	-88.45624636	7.5	M	P		Sediment was clay																																		
		LBDM400	44.2174401	-88.45514512	6	M	P			1	1		1	1	1	V													V														
		LBDM401	44.2183805	-88.46613701	4	R	P			1			1	1	1																												
		LBDM402	44.2183657	-88.46503574	7	R	P																																				
		LBDM403	44.2183509	-88.46393448	7	M	P																																				
		LBDM404	44.2183361	-88.46283322	9	M	P			3			3	1																												
		LBDM405	44.2183213	-88.46173195	12	R	P																																				
		LBDM406	44.2183064	-88.46063069	12.25	R	P																																			
		LBDM407	44.2182916	-88.45952943	12	R	P																																				
		LBDM408	44.2182767	-88.45842818	10.5	M	P																																				
		LBDM409	44.2182618	-88.45732692	7.75	R	P		Sediment was clay																																		
		LBDM410	44.218247	-88.45622566	6.5	R	P		Sediment was clay																																		
		LBDM411	44.2191873	-88.46721772	3.5	M	P			3			3	3	1	1									V					V							1				3				
		LBDM412	44.2191725	-88.46611644	4.75	M	P			3	1		3	3	2																										1				
		LBDM413	44.2191577	-88.46501516	6.25	M	P			3	1		3	3	1																													
		LBDM414	44.2191429	-88.46391388	7.5	M	P			2	1		1	2																													
		LBDM415	44.2191281	-88.46281261	9	M	P																																				
		LBDM416	44.2191132	-88.46171133	11.5	M	P																																				
		LBDM417	44.2190984	-88.46061005	12.5	M	P																																				
		LBDM418	44.2190836	-88.45950878	10.5	M	P																																				
		LBDM419	44.2190687	-88.45840751	8.5	M	P																																				
		LBDM420	44.2190538	-88.45730623	5.75	R	P																																				
		LBDM421	44.2190389	-88.45620496	5.5	M	P			3	2		3		1																												
		LBDM422	44.2199793	-88.46719717	4.5	M	P		Point location updated. ~ 100 feet from original point due to thick vegetation at original location.	3	V		2	3	3	V									V					1							1							
		LBDM423	44.2199645	-88.46609587	5.25	M	P			1			1	1	V	V									V												1						
		LBDM424	44.2199497	-88.46499458	7.25	M	P			1			1																														
		LBDM425	44.2199349	-88.46389329	6.75	M	P			3	2		3	3																										1		3				
		LBDM426	44.2199201	-88.462792	8.5	M	P			1	1		1																														
		LBDM427	44.2199052	-88.4616907	10	R	P																																				
		LBDM428	44.2198904	-88.46058941	12.5	R	P																																				
		LBDM429	44.2198755	-88.45948812	11	R	P																																				
		LBDM430	44.2198607	-88.45838684	10	M	P																																				
		LBDM431	44.2198458	-88.45728555	8	R	P																																				
		LBDM432	44.2207713	-88.46717662	4.25	M	P			3			2	3		1																										3				
		LBDM433	44.2207565	-88.46607531	6	M	P			1			1	1	V										V					V														
		LBDM434	44.2207417	-88.464974	7.5	M	P			1			1	1																													
		LBDM435	44.2207269	-88.46387269	8	M	P			1			1																														
		LBDM436	44.2207121	-88.46277138	9.5	M	P																																				
		LBDM437	44.2206972	-88.46167008	10.5	R	P																																				
		LBDM438	44.2206824	-88.46056877	12.25	R	R																																				
		LBDM439	44.2206675	-88.45946747	11	M	P																																				
		LBDM440	44.2206527	-88.45836617	10.5	M	P																																				
		LBDM441	44.2206378	-88.45726486	5.75	M	P			1	V				1																												
		LBDM442	44.2215633	-88.46715606	3.5	M	P			3			1	3	1	1														1							1				3				
		LBDM443	44.2215485	-88.46605474	5.5	M	P			3		1	3	3																											3				
		LBDM444	44.2215337	-88.46495341	7.25	M	P			3			3	3																1											2				
		LBDM445	44.2215189	-88.46385209	8	M	P			1	V		V		1														V															
		LBDM446	44.221504	-88.46275077	9.25	M	P																																				
		LBDM447	44.2214892	-88.46164945	9.5	R	P																																				
		LBDM448	44.2214744	-88.46054813	12.25	R	P																																				
		LBDM449	44.2214595	-88.45944681	11.5	R	P																																				
		LBDM450	44.2214447	-88.45834549	9.75	R	P																																				
		LBDM451	44.2214298	-88.45724418	7	M	P																																				
		LBDM452	44.2223405	-88.46603417	5.5	M	P			3	1		3	3		1														1						1	1				3				
		LBDM453	44.2223257	-88.46493283	7.75	M	P						V																														
		LBDM454	44.2223109	-88.46383149	8.5	M	P																																				
		LBDM455	44.222296	-88.46273016	9	M	P																																				
		LBDM456	44.2222812	-88.46162882	9.75	R	P																																				
		LBDM457	44.2222664	-88.46052749	12	R	P																																				

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Entry		sampling point	Latitude (need electronic copy of site locations)	Longitude (need electronic copy of site locations)	Depth (ft)	Dominant sediment type (M=muck, S=Sand, R=Rock)	Sampled holding rake pole (P) or rake rope (R)?	comments	Total Rake Fullness	Myriophyllum spicatum, Eurasian water-milfoil or Hybrid water-milfoil	Potamogeton crispus, Curly-leaf pondweed	Brasenia schreberi, Watershield	Ceratophyllum demersum, Coontail	Elodea canadensis, Common waterweed	Heteranthera dubia, Water star-grass	Lemna minor, Small duckweed	Lythrum salicaria, Purple loosestrife	Myriophyllum sibiricum, Northern water-milfoil	Najas flexilis, Slender naiad	Nitella sp., Nitella	Nuphar variegata, Spatterdock	Nymphaea odorata, White water lily	Phalaris arundinacea, Reed canary grass	Phragmites australis, Common reed	Potamogeton foliosus, Leafy pondweed	Potamogeton friesii, Fries' pondweed	Potamogeton praelongus, White-stem pondweed	Sparganium fluctuans, Floating-leaf burreed	Stuckenia pectinata, Sago pondweed	Typha sp., Cattail	Vallisneria americana, Wild celery	Wolffia columbiana, Common watermeal	Aquatic moss	Freshwater sponge	Filamentous algae	Riccia fluitans, Slender riccia	Ricciocarpus natans, Purple-fringed riccia	sp1	sp2	sp3	sp4
		LBDM458	44.2222515	-88.45942615	11.5	R	P																																	
		LBDM459	44.2222367	-88.45832482	9.5	M	P																																	
		LBDM460	44.2222218	-88.45722349	7.5	M	P																																	
		LBDM461	44.2222069	-88.45612216	4	M	P	Sediment was M/R mix	3	1			2	3	1	V																								
		LBDM462	44.2231325	-88.4660136	5	M	P		3					3		V														V										
		LBDM463	44.2231177	-88.46491225	7.5	M	P						V			V														V										
		LBDM464	44.2231029	-88.46381089	8	M	P	CLP turion	1		1																		1										
		LBDM465	44.223088	-88.46270954	8.75	M	P																																	
		LBDM466	44.2230732	-88.46160819	9	M	P																																	
		LBDM467	44.2230584	-88.46050684	11.25	R	P																																	
		LBDM468	44.2230435	-88.4594055	12.25	R	P																																	
		LBDM469	44.2230287	-88.45830415	10.5	M	P																																	
		LBDM470	44.2230138	-88.4572028	8.5	M	P																																	
		LBDM471	44.2229989	-88.45610145	5.5	M	P		1				1																											
		LBDM472	44.2239245	-88.46599303	4.25	M	P		3	1			3	3		2														2					1					1	
		LBDM473	44.2239097	-88.46489166	7	M	P		1				1	V		V														V									V	
		LBDM474	44.2238948	-88.46379029	8.25	M	P						V																											
		LBDM475	44.22388	-88.46268893	8.25	M	P																																	
		LBDM476	44.2238652	-88.46158756	8.75	R	P																																	
		LBDM477	44.2238504	-88.4604862	11.5	R	P																																	
		LBDM478	44.2238355	-88.45938484	12.5	R	P																																	
		LBDM479	44.2238206	-88.45828347	11	R	P																																	
		LBDM480	44.2238058	-88.45718211	9.75	M	P																																	
		LBDM481	44.2237909	-88.45608075	8	R	P																																	
		LBDM482	44.223776	-88.45497939	5.25	M	P		3	1			3	2	1																								3	
		LBDM483	44.2237611	-88.45387803	4	M	P		2				1	1																								V	2	
		LBDM484	44.2247016	-88.46487107	4.5	M	P		3				2	3		1													1	1					1				1	
		LBDM485	44.2246868	-88.46376969	6.25	M	P		3	1			3	3	1														1									1	
		LBDM486	44.224672	-88.46266831	7	M	P		1	1			1	1										1																
		LBDM487	44.2246572	-88.46156693	9.5	M	P																																	
		LBDM488	44.2246423	-88.46046555	10	R	P																																	
		LBDM489	44.2246275	-88.45936418	12	R	P																																	
		LBDM490	44.2246126	-88.4582628	12	R	P																																	
		LBDM491	44.2245978	-88.45716142	10.75	R	P																																	
		LBDM492	44.2245829	-88.45606005	9	M	P																																	
		LBDM493	44.224568	-88.45495867	7	M	P																																	
		LBDM494	44.2245531	-88.4538573	5.75	M	P		2				2		V									1														2	
		LBDM495	44.2245382	-88.45275593	5.5	M	P		3	1	1		3	3	1																								3	
		LBDM496	44.2254936	-88.46485049	3	M	P		2	1	1		2	1																									2	
		LBDM497	44.2254788	-88.46374909	5.5	M	P		1	V				1																									1	
		LBDM498	44.225464	-88.46264769	6.75	M	P			V			V																											
		LBDM499	44.2254492	-88.4615463	7.5	M	P																																	
		LBDM500	44.2254343	-88.46044491	8.5	R	P																																	
		LBDM501	44.2254195	-88.45934351	11.5	R	P																																	
		LBDM502	44.2254046	-88.45824212	12.25	R	P																																	
		LBDM503	44.2253897	-88.45714073	11.5	R	P																																	
		LBDM504	44.2253749	-88.45603934	10	M	P																																	
		LBDM505	44.22536	-88.45493795	8	S	P																																	
		LBDM506	44.2253451	-88.45383656	7	M	P																																	
		LBDM507	44.2253302	-88.45273518	5.75	M	P		3	1	1		3	3	1																								3	
		LBDM508	44.2253152	-88.45163379	4.5	M	P		1				1	1																									1	
		LBDM509	44.2262856	-88.4648299	3	M	P		3		1		3	3	1	1																							3	
		LBDM510	44.2262708	-88.46372849	4.25	M	P		2	1	2		2	2															1										2	
		LBDM511	44.226256	-88.46262708	6.5	M	P		1	V			1																											
		LBDM512	44.2262412	-88.46152567	7.25	M	P																																	
		LBDM513	44.2262263	-88.46042426	6.5	R	P		1					1																										
		LBDM514	44.2262115	-88.45932285	8.5	R	P																																	
		LBDM515	44.2261966	-88.45822145	12.25	R	P																																	
		LBDM516	44.2261817	-88.45712004	12	R	P																																	
		LBDM517	44.2261669	-88.45601863	11	R	P																																	
		LBDM518	44.226152	-88.45491723	9	M	P																																	
		LBDM519	44.2261371	-88.45381583	8.25	M	P																																	
		LBDM520	44.2261221	-88.45271443	6.5	M	P		1				V		1																									
		LBDM521	44.2261072	-88.45161302	6	M	P		3	1			2	3										V														3	
		LBDM522	44.2260923	-88.45051162	4	R	P		2	1			2	2							V																		
		LBDM523	44.2270628	-88.46370788	4	M	P		3	1	1		2	3	1						V																	3	
		LBDM524	44.227048	-88.46260646	5.5	M	P		1	V			1	V																									
		LBDM525	44.2270332	-88.46150503	6.5	M	P		1	V	1			1																									
		LBDM526	44.2270183	-88.46040361	6	M	P	Sediment was clay	1				1	1																									
		LBDM527	44.2270035	-88.45930219	7.75	M	P	Sediment was clay																															
		LBDM528	44.2269886	-88.45820077	13.5	M	R																																	
		LBDM529	44.2269737	-88.45709935	12.25	R	P																																	
		LBDM530	44.2269588	-88.45599793	11.75	R	P																																	
		LBDM531	44.2269439	-88.45489651	10.75	R	P																																	
		LBDM532	44.226929	-88.45379509	10	M	P																																	
		LBDM533	44.2269141	-88.45269367	8.5	M	P																																	
		LBDM534	44.2268992	-88.45159226	6.75	M	P		2	V			2																											
		LBDM535	44.2268843	-88.45049084	5.75	M	P		1				1																											
		LBDM536	44.2278548	-88.46368728	5	M	P		3	1			2	3	1	V																							1	
		LBDM537	44.22784	-88.46258584	5.5	M	P		3	2			2	3		1																							2	
		LBDM538	44.2278252	-88.4614844	5.75	M	P		2				2	2																										
		LBDM539	44.2278103	-88.46038296	5.5	M	P		1	1	1		1	1																										
		LBDM540	44.2277955	-88.45928153	7	M	P	Sediment was clay																															
		LBDM541	44.2277806	-88.45818009	8	M	P	Sediment was clay																															
		LBDM542	44.2277657	-88.45707865	11.5	R	P																																	
		LBDM543	44.2277508	-88.45597722	12.5	M	R																																	
		LBDM544	44.2277359	-88.45487579	12	R	P																																	
		LBDM545	44.227721	-88.45377435	10.5	R	P																																	
		LBDM546	44.2277061	-88.45267292	8.5	M	P																																	
		LBDM547	44.2276912	-88.45157149	8	M	P																																	
		LBDM548	44.2276762	-88.45047006	6.25	M	P	Sediment was clay	1	1			1	1																										
		LBDM549	44.2286468	-88.46366667	3.5	M	P		3				2	3	2	1														1					1				3	

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Entry		sampling point	Latitude (need electronic copy of site locations)	Longitude (need electronic copy of site locations)	Depth (ft)	Dominant sediment type (M=muck, S=Sand, R=Rock)	Sampled holding rake pole (P) or rake rope (R)?	comments	Total Rake Fullness	Myriophyllum spicatum, Eurasian water-milfoil or Hybrid water-milfoil	Potamogeton crispus, Curly-leaf pondweed	Brasenia schreberi, Watershield	Ceratophyllum demersum, Coontail	Elodea canadensis, Common waterweed	Heteranthera dubia, Water star-grass	Lemna minor, Small duckweed	Lythrum salicaria, Purple loosestrife	Myriophyllum sibiricum, Northern water-milfoil	Najas flexilis, Slender naiad	Nitella sp., Nitella	Nuphar variegata, Spatterdock	Nymphaea odorata, White water lily	Phalaris arundinacea, Reed canary grass	Phragmites australis, Common reed	Potamogeton foliosus, Leafy pondweed	Potamogeton friesii, Fries' pondweed	Potamogeton praelongus, White-stem pondweed	Potamogeton zosteriformis, Flat-stem pondweed	Sparganium eurycarpum, Broad-fruit bur-reed	Stuckenia pectinata, Sago pondweed	Typha sp., Cattail	Vallisneria americana, Wild celery	Wolffia columbiana, Common watermeal	Aquatic moss	Freshwater sponge	Filamentous algae	Riccia fluitans, Slender riccia	Ricciocarpus natans, Purple-fringed riccia	sp1	sp2	sp3	sp4
		LBDM550	44.228632	-88.46256522	5	M	P	~~Unknown plant material (possible terrestrial plant part)~~	3		1		3	3																1		3									
		LBDM551	44.2286171	-88.46146377	3.5	M	P		3				2	3	1																	3									
		LBDM552	44.2286023	-88.46036231	5	R	P		1		1		1	1																										
		LBDM553	44.2285874	-88.45926086	6	M	P	CLP turion	1		1		1	1																										
		LBDM554	44.2285726	-88.45815941	7.25	R	P		1				1	1																										
		LBDM555	44.2285577	-88.45705796	8.25	R	P																																	
		LBDM556	44.2285428	-88.45595651	12.5	R	P																																	
		LBDM557	44.2285279	-88.45485506	12.75	R	P																																	
		LBDM558	44.228513	-88.45375362	12.5	R	P																																	
		LBDM559	44.2284981	-88.45265217	10	R	P																																	
		LBDM560	44.2284832	-88.45155072	9	R	P																																	
		LBDM561	44.2284682	-88.45044928	7	R	P																																	
		LBDM562	44.2284533	-88.44934783	5	R	P		1	1			1	1		1		1																						
		LBDM563	44.2294388	-88.46364607	5.5	M	P		2				2	1																										
		LBDM564	44.229424	-88.4625446	4.25	M	P		2				1	2																										
		LBDM565	44.2294091	-88.46144313	5	M	P		3		1		3	3																										
		LBDM566	44.2293943	-88.46034166	5	M	P		3	1			3	3																										
		LBDM567	44.2293794	-88.4592402	5.75	R	P		1	1			1	1	1																										
		LBDM568	44.2293646	-88.45813873	6.5	R	P	Sediment was clay/ R mix																																	
		LBDM569	44.2293497	-88.45703727	7	R	P	Sediment was R/M mix	1	1																															
		LBDM570	44.2293348	-88.4559358	8.25	R	P	Sediment was clay/ R mix																																	
		LBDM571	44.2293199	-88.45483434	12.5	R	P		1					1																										
		LBDM572	44.229305	-88.45373288	13	R	R																																	
		LBDM573	44.2292901	-88.45263141	12.5	R	P																																	
		LBDM574	44.2292752	-88.45152995	10.25	M	P																																	
		LBDM575	44.2292602	-88.45042849	9.5	M	P																																	
		LBDM576	44.2292453	-88.44932704	6	R	P		2				2	1	1																									
		LBDM577	44.230216	-88.46252398	4	M	P		3		1		3			1											1	1			1		3							
		LBDM578	44.2302011	-88.46142249	5	M	P		3		1		3	3	1																	3							
		LBDM579	44.2301863	-88.46032101	5.25	M	P		3	1			3	3	2	1													2			3						
		LBDM580	44.2301714	-88.45921953	4.75	M	P		2				2	2										1								1						
		LBDM581	44.2301566	-88.45811805	5.5	M	P		1				1	1																									
		LBDM582	44.2301417	-88.45701657	6.5	R	P																																	
		LBDM583	44.2301268	-88.45591509	7.5	M	P																																	
		LBDM584	44.2301119	-88.45481361	10.25	R	P																																	
		LBDM585	44.230097	-88.45371214	13	R	R																																	
		LBDM586	44.2300821	-88.45261066	13.75	R	R																																	
		LBDM587	44.2300671	-88.45150918	12.5	R	P																																	
		LBDM588	44.2300522	-88.45040771	8.5	R	P																																	
		LBDM589	44.2300373	-88.44930624	6.5	S	P		1					1																										
		LBDM590	44.2310079	-88.46250335	3	M	P		3				2	3		1								3			1				1		3						
		LBDM591	44.2309931	-88.46140185	4	M	P		3	1			3	3		1											1				1		3						
		LBDM592	44.2309783	-88.46030036	4.5	M	P		3				3	3	1	1															1		3						
		LBDM593	44.2309634	-88.45919886	3.75	M	P		2		1		1	2																										
		LBDM594	44.2309486	-88.45809737	4.5	M	P		2	1			2	2	1							1											1						
		LBDM595	44.2309337	-88.45699587	5.75	R	P		2	1			1	2																										
		LBDM596	44.2309188	-88.4558938	6.5	R	P																																	
		LBDM597	44.2309039	-88.45479289	7.5	M	P		1				1	1														1											
		LBDM598	44.230889	-88.45369139	10	R	P																																	
		LBDM599	44.2308741	-88.4525899	14	R	R																																	
		LBDM600	44.2308591	-88.45148841	15	M	R																																	
		LBDM601	44.2308442	-88.45038692	12.75	M	P								1																									
		LBDM602	44.2308292	-88.44928544	6	R	P		1																															
		LBDM603	44.2317851	-88.46138122	3.25	M	P		2		V		2	2		1																1		2					
		LBDM604	44.2317703	-88.4602797	3	M	P		3		1		3	3																				3					
		LBDM605	44.2317554	-88.45917819	3.5	M	P		3	1			3	3	1	1											1				1		3						
		LBDM606	44.2317108	-88.45587367	4.75	M	P		3				3	1	2																									
		LBDM607	44.2316959	-88.45477216	7	M	P	Sediment was clay																																
		LBDM608	44.231681	-88.45367065	7.5	R	P																																	
		LBDM609	44.2316661	-88.45256915	13	R	R																																	
		LBDM610	44.2316511	-88.45146764	16.25	R	R																																	
		LBDM611	44.2316362	-88.45036614	15	R	R																																	
		LBDM612	44.2316212	-88.44926464	7	R	P																																	
		LBDM613	44.2325771	-88.46136058	1	M	P		3				3	3	V		1		1		V								1		1		2					
		LBDM614	44.2325623	-88.46025905	2	M	P		3				3	3										2					1									
		LBDM615	44.232473	-88.45364991	2	M	P		3				2	3																										
		LBDM616	44.232458	-88.45254839	8.75	M	P																					1											
		LBDM617	44.2324431	-88.45144687	16	R	P																																	
		LBDM618	44.2324282	-88.45034535	18	M	P																																	
		LBDM619	44.2324132	-88.44924383	10	R	P																																	
		LBDM620	44.2323983	-88.44814232	6.25	R	P								V												V											
		LBDM621	44.2333691	-88.46133994	2	M	P		3				3	3		1											V	V			1		1					
		LBDM622	44.2333542	-88.4602384	1.5	M	P		2				2	2	V														1				1					
		LBDM623	44.23325	-88.45252763	5.5	M	P		1					1																									
		LBDM624	44.2332351	-88.45141261	16.5	M	P																																	
		LBDM625	44.2332202	-88.45032456	21	M	R																																	
		LBDM626	44.2332052	-88.44922303	8.5	R	P																																	
		LBDM627	44.2331902	-88.4481215	6.5	R	P		1					1																									
		LBDM628	44.2341462	-88.46021774	2	M	P		1				1	1															1									
		LBDM629	44.2341314	-88.45911619	1.75	M	P				V		V														V											
		LBDM630	44.2341165	-88.45801463	1.5	M	P		2	V			2	1		1											1	V			1							
		LBDM631	44.234042	-88.45250687	4	M	P		3	1			3	2	1										1					1		1						
		LBDM632	44.2340271	-88.45140532	11.75	R	P																																	
		LBDM633	44.2340121	-88.45030378	21	R	P	Depth measured with depth finder																																
		LBDM634	44.2339972	-88.44920223	8.25	R	P																																	
		LBDM635	44.2349234	-88.45909551	1.75	M	P		2				2	1	V														1				V					
		LBDM636	44.234834	-88.45248611	4	M	P		3	2			3	3	1																		2					
		LBDM637	44.2348191	-88.45138455	8.25	S	P																																	
		LBDM638	44.2348041	-88.45028299	23	R	P	Depth measured with depth finder																																
		LBDM639	44.2347892	-88.44918142	6	R	P	Sediment was clay																																

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Entry		sampling point	Latitude (need electronic copy of site locations)	Longitude (need electronic copy of site locations)	Depth (ft)	Dominant sediment type (M=muck, S=Sand, R=Rock)	Sampled holding rake pole (P) or rake rope (R)?	comments	Total Rake Fullness	*Myriophyllum spicatum*, Eurasian water-milfoil or Hybrid water-milfoil	*Potamogeton crispus*, Curly-leaf pondweed	*Brasenia schreberi*, Watershield	*Ceratophyllum demersum*, Coontail	*Elodea canadensis*, Common waterweed	*Heteranthera dubia*, Water star-grass	*Lemna minor*, Small duckweed	*Lythrum salicaria*, Purple loosestrife	*Myriophyllum sibiricum*, Northern water-milfoil	*Najas flexilis*, Slender naiad	*Nitella* sp., Nitella	*Nuphar variegata*, Spatterdock	*Nymphaea odorata*, White water lily	*Phalaris arundinacea*, Reed canary grass	*Phragmites australis*, Common reed	*Potamogeton foliosus*, Leafy pondweed	*Potamogeton friesii*, Fries' pondweed	*Potamogeton praelongus*, White-stem pondweed	*Sparganium zosteriformis*, Flat-stem pondweed	*Stuckenia pectinata*, Sago pondweed	*Typha* sp., Cattail	*Vallisneria americana*, Wild celery	*Wolffia columbiana*, Common watermeal	Aquatic moss	Freshwater sponge	Filamentous algae	*Riccia fluitans*, Slender riccia	*Ricciocarpus natans*, Purple-fringed riccia	sp1	sp2	sp3	sp4
		LBDM640	44.2357154	-88.45907484	1.5	M	P	Point location updated. ~ 100 feet from original point due to shallow depth at original location.	3				3	1	V		1												V	1				1			2							
		LBDM641	44.2357005	-88.45797326				SHALLOW																																			
		LBDM642	44.235626	-88.45246535	3.5	M	P		1				1	1		1														1			1	1									
		LBDM643	44.2356111	-88.45136377	7.5	M	P																																				
		LBDM644	44.2355961	-88.4502622	21.5	R	R	Depth measured with depth finder																																			
		LBDM645	44.2355812	-88.44916062	9	R	P																																				
		LBDM646	44.236403	-88.451343	7	M	P																																				
		LBDM647	44.2363881	-88.4502414	18	R	P																																				
		LBDM648	44.2363731	-88.44913981	20	R	R	Depth measured with depth finder																																			
		LBDM649	44.2363582	-88.44803822	4.5	M	P		1		1		1	1	1														1													
		LBDM650	44.2371801	-88.45022061	15.5	M	P																																				
		LBDM651	44.2371651	-88.44911901	22	M	R	Depth measured with depth finder. Sediment was M/R mix																																			
		LBDM652	44.2371502	-88.4480174	6	M	P		1					1																													
		LBDM653	44.2379721	-88.45019982	10.25	S	P																																				
		LBDM654	44.2379571	-88.4490982	21.5	M	R	Depth measured with depth finder																																			
		LBDM655	44.2379421	-88.44799658	17	M	P																																				
		LBDM656	44.2379272	-88.44689496	4	M	P		1				1																													
		LBDM657	44.2387491	-88.44907739	18	M	P		3				3	2																1			1									
		LBDM658	44.2387341	-88.44797575	21	M	R	Depth measured with depth finder																																			

Boat Survey

Lake	Little Lake Butte des Morts
County	Winnebago
WBIC	129800
Date of Survey	7/22/24, 7/24/24, 7/25/24, & 7/26/24
Field Crew	Stephanie Cole, Korin Doering, Katie Reed, and Bryce Kohler
	Korin Doering
Nearest Point	**Species seen, habitat information**
8	*Culvert flowing into the lake creating high flow conditions observed and mapped*
12	*Purple loosestrife observed and mapped along shoreline.*
54	*Purple loosestrife observed and mapped along shoreline.*
314	*Purple loosestrife observed and mapped along shoreline.*
379	*Non-native phragmites monoculture observed and mapped along shoreline just south of US Highway 10*
614	*Hybrid cattail monoculture observed and mapped near Stroebe Island*
12	*Elodea nuttalli observed throughout the lake.*
590, 603, 604, 613, 614, 621, & 622	*Water clarity very good at listed points. Could see to the bottom (depths ranged 1-3.5 feet)*
628, 629, 630, 635	*Water was very turbid near listed points due to signficant fish activity as boat approached.*
357, 346, 335, 324	*Visuals on plant growth along shoreline (greater than 6 ft from boat) - duckweed, coontail, watermilfoil*
	ADDITIONAL COMMENTS
	Boat launch completely filled with aquatic plants, filamentous algae, and blue green algae on 7/22/24
	Boat launch cleared out on 7/24/24
	Blue green algae at its worst throughout entire lake on 7/26/24
	Active bald eagle nest observed near point 136. 1 adult and 2 juveniles present.

Appendix D Figures

D.1. Aquatic Plant Survey Area and USGS Topographic Map

D.2. Aquatic Plant Survey Points

D.3. Eurasian Watermilfoil Observation Points

D.4. Curly-leaf Pondweed Observation Points

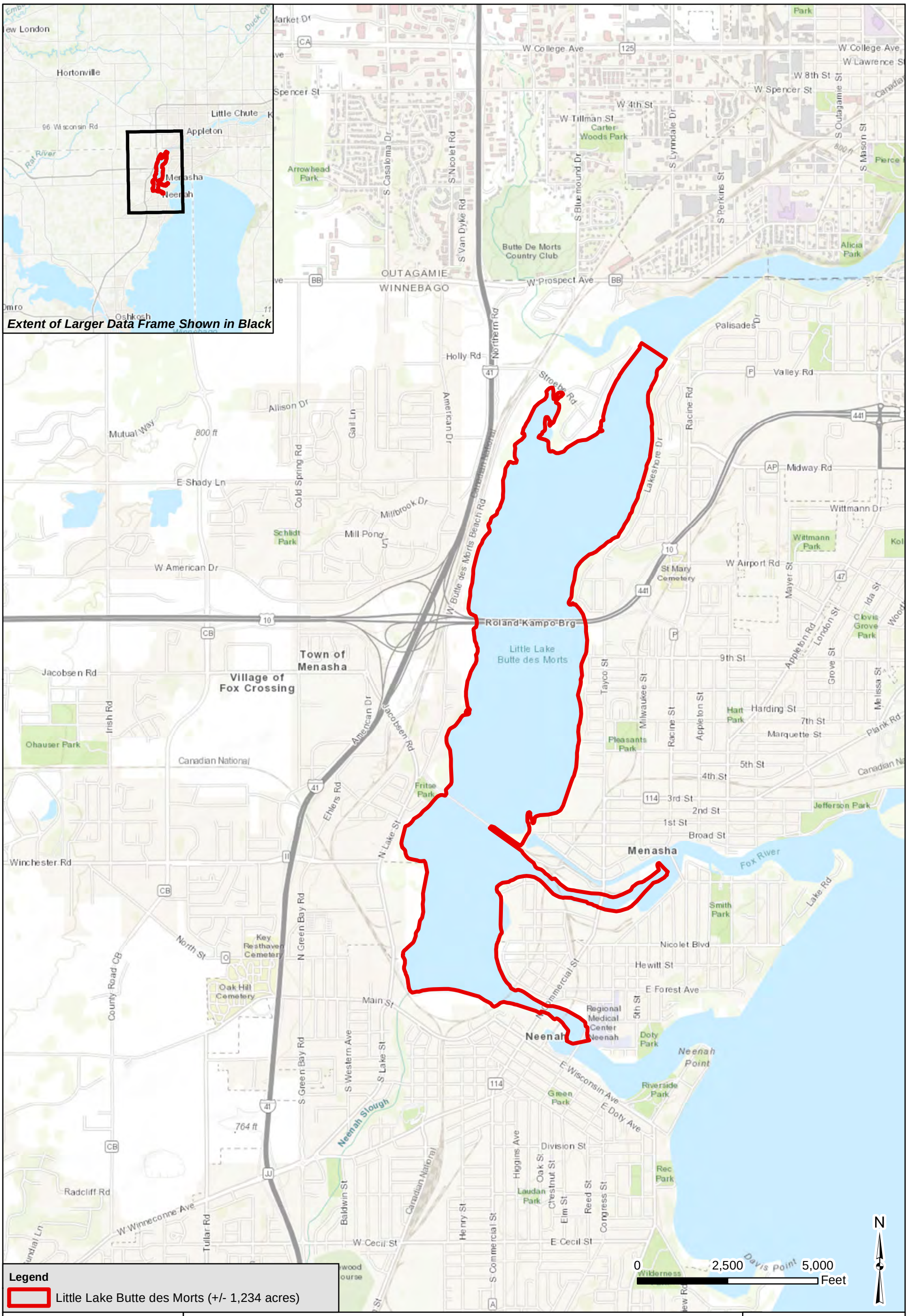
D.5. Total Rake Fullness

D.6. Growth Form

D.7. Dominant Sediment Type

D.8. Water Depth

D.9. Water Depth Ranges for Aquatic Vegetation Harvester



GEI Consultants

3159 Voyager Drive
Green Bay, WI 54311
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FIGURE 1
AQUATIC PLANT SURVEY AREA & USGS TOPOGRAPHIC MAP

CITY OF NEENAH
LITTLE LAKE BUTTE DES MORTS MANAGEMENT PROJECT
WINNEBAGO COUNTY, WISCONSIN

Drawn: SLC 9/16/2024
Approved: KD 9/16/2024
Scale: AS SHOWN
Project Number: 2403578
Page 1 of 1

Document Path: ***B:\Working\NEENAH, CITY OF\2403578 LLBDM Management\05_GIS\PDF\Aquatic Plant Survey Maps***

Service Layer Credits: 2013 National Geographic Society, Esri

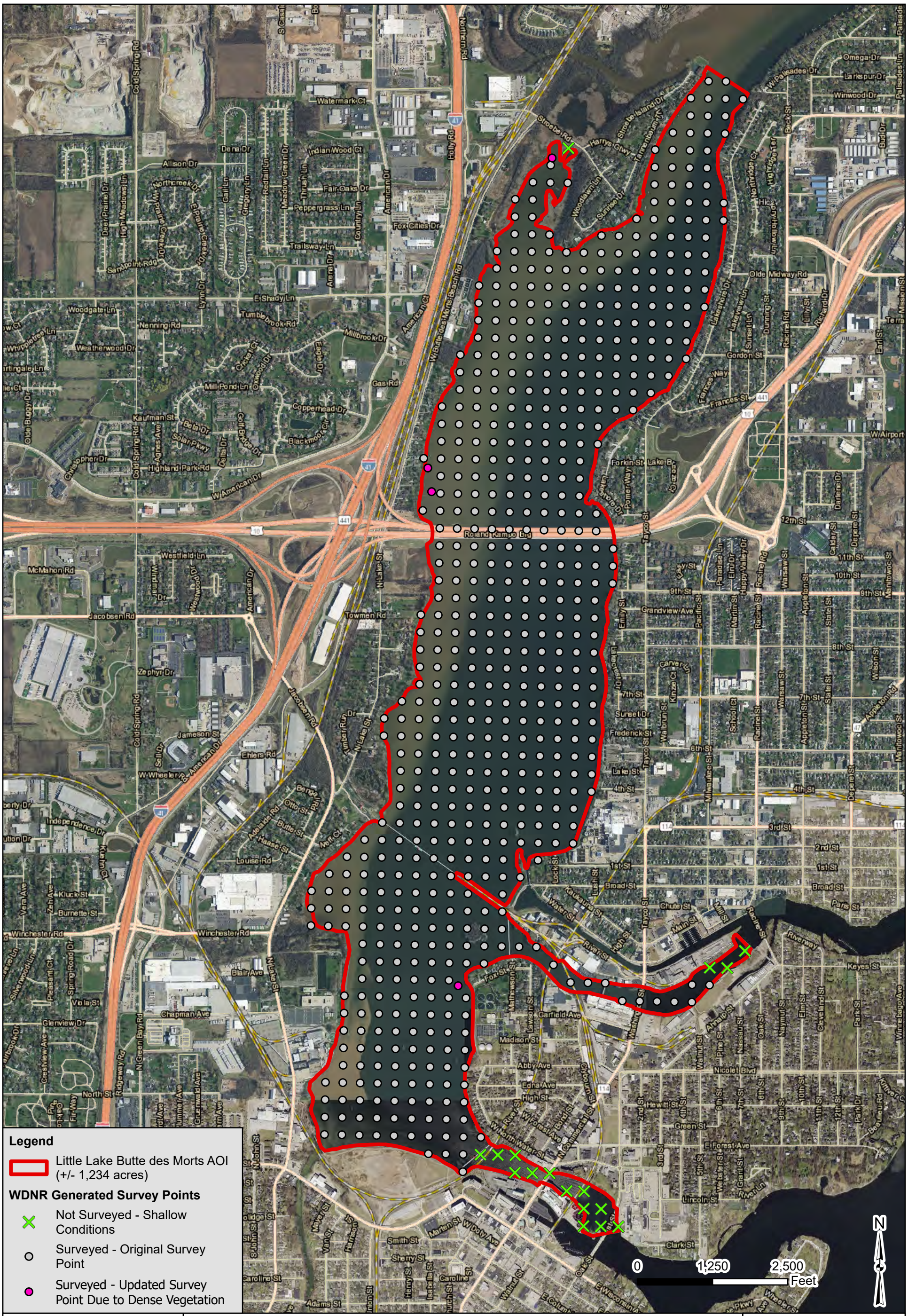

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FIGURE 2
AQUATIC PLANT SURVEY POINTS

CITY OF NEENAH
LITTLE LAKE BUTTE DES MORTS MANAGEMENT PROJECT
WINNEBAGO COUNTY, WISCONSIN

Drawn: SLC 10/22/2024
Approved: KD 10/22/2024
Scale: AS SHOWN
Project Number: 2403578
Page 1 of 1

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Service Layer Credits: WDNR Orthophoto (2023)

Rake fullness is a metric measured according to how much vegetation was observed on the rake at each survey point. Rake fullness is ranked from 0-3.

Ranking values are as follows:
0 - No plants
1 - A few plants observed on the rake.
2 - Plants cover the rake head in a single layer. Rake tines are visible.
3 - Plants completely cover the rake head. Rake tines are not visible.

Legend

- Little Lake Butte des Morts AOI (+/- 1,234 acres)

Eurasian Watermilfoil Observation Points

- Rake Fullness - 0
- Rake Fullness - 1
- Rake Fullness - 2
- Rake Fullness - 3
- Visual Observation
- Not Surveyed - Shallow Conditions

0 1,250 2,500 Feet

N

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FIGURE 3
EURASIAN WATERMILFOIL OBSERVATION POINTS

CITY OF NEENAH
LITTLE LAKE BUTTE DES MORTS MANAGEMENT PROJECT
WINNEBAGO COUNTY, WISCONSIN

Drawn: SLC 10/22/2024
Approved: KD 10/22/2024
Scale: AS SHOWN
Project Number: 2403578

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Service Layer Credits: WDNR Orthophoto (2023)

Rake fullness is a metric measured according to how much vegetation was observed on the rake at each survey point. Rake fullness is ranked from 0-3.

Ranking values are as follows:
0 - No plants
1 - A few plants observed on the rake.
2 - Plants cover the rake head in a single layer. Rake tines are visible.
3 - Plants completely cover the rake head. Rake tines are not visible.

Legend

- Little Lake Butte des Morts AOI (+/- 1,234 acres)

Curly-leaf Pondweed Observation Points

- Rake Fullness - 0
- Rake Fullness - 1
- Rake Fullness - 2
- Visual Observation
- Not Surveyed - Shallow Conditions

0 1,250 2,500 Feet

N

FIGURE 4
CURLY-LEAF PONDWEED OBSERVATION POINTS

CITY OF NEENAH
LITTLE LAKE BUTTE DES MORTS MANAGEMENT PROJECT
WINNEBAGO COUNTY, WISCONSIN

GEI Consultants
3159 Voyager Drive
Green Bay, WI 54311
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Drawn: SLC 10/22/2024
Approved: KD 10/22/2024
Scale: AS SHOWN
Project Number: 2403578

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Rake fullness is a metric measured according to how much vegetation was observed on the rake at each survey point. Rake fullness is ranked from 0-3.

Ranking values are as follows:
0 - No plants
1 - A few plants observed on the rake.
2 - Plants cover the rake head in a single layer. Rake tines are visible.
3 - Plants completely cover the rake head. Rake tines are not visible.

Legend

- Little Lake Butte des Morts AOI (+/- 1,234 acres)

Total Rake Fullness

- 0
- 1
- 2
- 3
- Not Surveyed - Shallow Conditions

0 1,250 2,500 Feet

N

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FIGURE 5
TOTAL RAKE FULLNESS

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Growth Form (GF) is a metric measured according to what percentage of the vertical water column rooted aquatic vegetation is growing within. GF is ranked from 0-5, with water column percent categories starting at the sediment (0%) and reaching the water surface (100%).

Ranking values are as follows:
0 - No aquatic vegetation observed.
1 - Aquatic vegetation growing within 0-25% of the water column.
2 - Aquatic vegetation growing within 25-50% of the water column.
3 - Aquatic vegetation growing within 50-75% of the water column.
4 - Aquatic vegetation growing within 75-99% of the water column.
5 - Aquatic vegetation growing to the water surface.

Legend

Little Lake Butte des Morts AOI (+/- 1,234 acres)

Growth Form

- 0
- 1
- 2
- 3
- 4
- 5
- Not Surveyed

0 1,250 2,500 Feet

N

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FIGURE 6
GROWTH FORM

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Legend

Little Lake Butte des Morts AOI (+/- 1,234 acres)

Dominant Sediment Type

- Clay
- Muck
- Rock
- Sand
- Clay/ Rock Mix
- Muck/ Rock Mix
- Not Surveyed

0 1,250 2,500 Feet

N

FIGURE 7
DOMINANT SEDIMENT TYPE

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Legend

Little Lake Butte des Morts AOI (+/- 1,234 acres)

Water Depth (Feet)

- 0-3.0
- 3.25-6.0
- 6.25-9.0
- 9.25-12.0
- 12.25-15.0
- 15.25-18.0
- 18.25-21.0
- 21.25-23.0
- Not Surveyed

0 1,250 2,500 Feet

N

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FIGURE 8
WATER DEPTH

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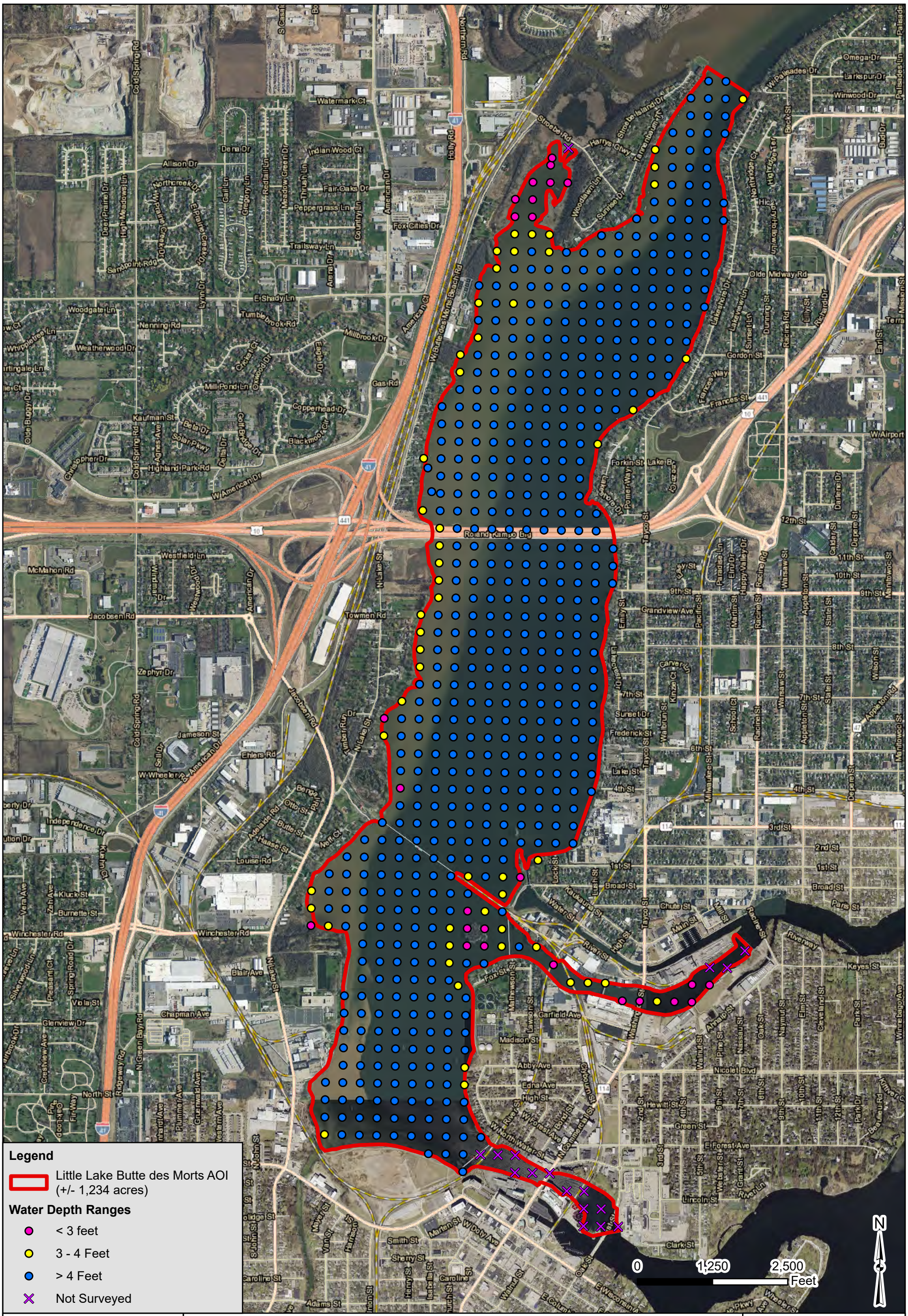

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FIGURE 9
WATER DEPTH RANGES FOR AQUATIC VEGETATION HARVESTER

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Appendix E Tables

Appendix E.1

Table 1. Field Sheet Parameters Defined

Field Parameter	Description
Depth	Water depth was estimated by using the incremental markings on the pole rake to the nearest 0.25 ft. If the rope rake was used, water depth was estimated using the digital depth sonar on the boat accounting for the difference between the surface of the water and the location of the sonar unit transducer (approximately 1.0 ft).
Sediment type	Dominant sediment type was recorded as mucky, sandy, or rocky by feeling the substrate with the rake and pole. The field technician(s) inferred the sediment type by the sound and texture that reverberates through the metal rake handle.
Rake fullness *(overall and by species)*	After pulling the rake from the water, overall rake fullness (based on a fullness rating) was recorded. A separate rake fullness score was also assigned to each species present on the rake at each location. Illustration 1 provides an example of the fullness rating. Rake fullness ratings for filamentous algae, aquatic moss, freshwater sponges, and liverworts were recorded for each species, but were not included in the overall rake fullness rating.
Rake type	Rake type was recorded for each sampling site (pole rake versus rope rake).
Growth Form*	At each site, field technicians observed the approximate height of rooted aquatic vegetation within the water column. Growth form (0-5) was recorded based on what percentage of the vertical water column the rooted aquatic vegetation was growing within. Table 2 provides an additional explanation of the ranking values that were utilized.
Species present	Field technicians sorted through the plants pulled in on the rake at each site and identified each species.
Visual sightings	At each site, field technicians performed a visual scan to observe any plant species within 6 feet of each sample location. Any visually observed species not collected on the rake but present within 6 feet of the boat or field technician if wading was recorded on the field sheet with a “V”. These species are included in total number of species observed. Species observed outside of the 6 ft radius were documented on the “boat survey” data sheet.
Inaccessible sites	Any sites that were inaccessible were documented as such (non-navigable due to plant density, terrestrial location, too shallow, rocks, dock, designated swim area, temporary obstacle, other).

*Growth form is not included on the WDNR Aquatic Plant Survey Data workbook. This metric was collected based on guidance provided by GEI Certified Lake Managers (CLMs) to aid in quantifying aquatic plant management recommendations.

Appendix E.2

Table 2. Definitions of Summary Statistics

Statistic	Definition
Total number of sites proposed	The total number of pre-determined sites included in the original sampling grid.
Total number of sites visited	The number of sites visited during the survey. The difference between the number of sites proposed and the number of sites visited is due to some sites being inaccessible during the survey.
Maximum depth of plants	The deepest site where vegetation was found during the survey. This generally represents the littoral zone.
Sites shallower than max depth of plants	The number of sites visited that were shallower than the deepest located where plants were found.
Vegetated sites	The number of sites visited that had vegetation on the rake or where vegetation was observed.
Percent of vegetated sites	The percentage of sampled locations where plants were found on the rake (the total number of sites with plants present divided by the total number of sites visited). This is helpful for understanding how frequently a sample site had plants present for all sites that were sampled and shows the degree of plant coverage.
Rake fullness	At each sampling site, a score is assigned for total rake fullness and then for each individual species found on the rake. A score of "1" means only a few plants were found on the sampling rake; "2" means there were enough plants to cover the length of the rake head in a single layer; "3" means the rake was completely covered (**Illustration 1**). If no plants were found, nothing was recorded. • **Total rake fullness (TRF):** An indication of overall plant density at a sample site. Filamentous algae, aquatic moss, or freshwater sponges are not included in total rake fullness. • **Average TRF:** the average TRF across the project area. This can be used as an indication of plant density at sample sites and to understand overall plant density across the sampling area. • **Species rake fullness:** An indication of density of a particular species at each sample site. Filamentous algae, aquatic moss, or freshwater sponges are included in species rake fullness. • **Average rake fullness by species:** The average rake fullness for a particular species across the sampling area. This can be used to understand the overall density of a species across the sampling grid.
Growth Form	At each sampling site, a ranking is assigned for the maximum growth form of rooted aquatic plants growing at the sample location. A ranking of "1"means the rooted aquatic vegetation was growing within 0-25% of the water column; "2" means the rooted aquatic vegetation was growing within 26-50% of the water column; "3" means that rooted aquatic vegetation was growing within 51-75% of the water column; "4" means that rooted aquatic vegetation was growing within 76-99% of the water column; "5" means that rooted aquatic vegetation was growing at or sprawling across the water surface. If no plants were found, a "0" was recorded. This metric can be paired with rake fullness to understand the approximate volume and potential recreational impact of aquatic vegetation throughout the lake.
Average number of species	**Average number of species per site (shallower than max depth):** The average number of species found across all sites shallower than the maximum depth of plants. • **All species**: this includes invasive and native species.

Statistic	Definition
	• **Native species**: this does not include invasive species **Average number of all species per site (veg. sites only):** The average number of species found for only vegetated sites.
Species richness	The number of different individual aquatic plant species found in a lake during the survey. Richness is a measure of diversity. There are four ways to report species richness based on the results from a PI survey: • **Species richness (sampled on rake):** Total number of species sampled on the rake at sample sites (does not including visual sightings). • **Native species richness (only those sampled on the rake)**: Total number of native species sampled on a rake at sample sites (does not including invasive species or visual sightings). • **Species richness including visuals**: Total number of species observed including visual sightings recorded within 6 feet of the sample site (but does not include additional species found during the boat survey). • **Total species richness (including visuals and boat survey)**: Total number of species observed including visual sightings within 6 feet of the sample site as well as additional plants observed in other areas of the lake.
Frequency of occurrence (FOO)	**FOO at sites shallower than maximum depth of plants** is expressed as a percentage and describes how often plants were found at sites shallower than the maximum depth of plants. **FOO by species** is expressed as a percentage and describes how often a plant species was found across sites sampled. This indicates which species are most common in the plant community of a given area. The greater the value, the more frequent a plant species is present in the lake. FOO by species can be measured a few different ways: • **FOO at sampled sites**: the percentage of sites sampled where a plant species was found out of all sites visited (the number of sites a plant was sampled divided by the total number of sites visited). • **FOO at vegetated sites**: the percentage of sites sampled where a plant species was found out of the total number of sites visited where plants were present. • **Littoral Frequency of Occurrence (LFOO):** the percentage of sampled locations within the littoral zone where a plant was found. This can be calculated for each species and for all plants combined. This statistic is helpful for understanding how frequent a plant species was found or how frequently a sample site had plants present within the maximum depth of plants.
Relative frequency	A percentage that represents how often a plant species was found compared to the number of types of all other species that were found. This is a statistic that is calculated for each individual species and is not dependent on the number of points sampled. Multiple species can be found at a single site so to determine how often a species is found relative to other species, the number of occurrences for each species are added together and then the total occurrence of an individual species are divided by that number. This gives a truer measure of the dominant plant species present in a lake. The higher the relative frequency, the more frequent the plant is compared to other plants.
Coefficient of Conservatism *(C or C-value)*	Each vascular plant is assigned a coefficient of conservatism (C; C-value). This value ranges from 0-10 for each species and coincides with the quality of the system a plant can grow in as well as how commonly the plant is found in Lakes around Wisconsin.

Statistic	Definition
	Species with lower C-values are generally more tolerant of disturbance and are more common in Wisconsin Lakes. Species with higher C-values are more sensitive so they are typically found in more pristine habitats and tend to be rarer species. Plants with higher c-values are more likely to respond negatively to water quality issues and human disturbance. Average C-value (mean c-value) can be used as an indicator of quality of the waterbody and can be compared to the average C-value of other lakes that fall within the same ecoregion and across the state.
Floristic Quality Index (FQI)	FQI describes the quality of a lake's aquatic plant community including the species present and their ability to tolerate changing conditions of water quality and habitat. A higher FQI value typically indicates a healthier aquatic plant community. The value is calculated using the C-value for each species found on the rake during a survey. FQI values are positively correlated with the area of a lake and Secchi depth and negatively correlated to alkalinity, conductivity, and pH [4]. For example, as Secchi depth values increase, the higher the FQI is likely to be. As pH values increase, FQI is likely to decrease [3]. The FQI for a lake can be compared to the average FQI of other lakes that fall within the same ecoregion and across the state. FQI values can also be used to assess changes in a plant community if surveys are repeated using the same protocols in subsequent years.
Simpson's Diversity Index (SDI)	This metric indicates the diversity of plant species in a lake, with values varying from 0 to 1.0. It represents the likelihood that two plants chosen randomly from the same lake belong to different species. This statistic takes into account the Frequency of Occurrence (FOO) and plant growth density observed during the survey. A higher index value signifies greater plant diversity. More diverse plant communities contribute to a healthier lake ecosystem. An index of "0" implies that only one species was present, whereas an index of "1.0" indicates that all sampled plants were of different species.
Dominant Sediment Type	The sediment types observed by the field technicians at each sampling point during the survey. Sediment is one of the factors that determine where aquatic plants can grow.

Appendix E.3

Table 3. 2024 Survey Summary Statistics

Summary Statistics	Value
Total number of sites proposed	658
Total number of sites visited	641
Vegetated sites[1]	347
Percent of visited sites that were vegetated	54.13%
Maximum depth of plants (ft)[2]	18.00
Sites shallower than maximum depth of plants	633
Average Rake Fullness[3]	2.05
Average Growth Form[4]	3.87
Number of sites sampled using rake on Rope (R)	24
Number of sites sampled using rake on Pole (P)	617
Average number of all species per site (shallower than max depth)	1.68
Average number of all species per site (veg. sites only)	3.07
Average number of native species per site (shallower than max depth)	1.41
Average number of native species per site (veg. sites only)	2.60
Frequency of occurrence at sites shallower than maximum depth of plants	54.82
Species richness (sampled on rake)	17
Native species richness (sampled on rake)	15
Species richness (including visuals)	18
Total species richness (including visuals and boat survey)[5]	24
Simpson Diversity Index (SDI)	0.83
Mean C-value	5.4
Floristic Quality Index (FQI)	20.91

Table Notes:

1. Vegetated sites include true aquatic plants only. Filamentous algae and aquatic moss, which do not fall under the classification of a plant, were observed on rake samples but are not included in this metric.
2. Based on the hand recorded field data sheets, the maximum depth of plants was 18.0 feet due to a rake fullness of 3 observed at site 657. It is apparent that site 657 was vegetated due to the proximity of the site to a dense plant community northwest of the site, near Strobe Island. This site had vegetation 5.25 feet deeper than the second deepest depth of plants. A more detailed discussion of the maximum depth of plants in LLBDM is included in Section 5.1.
3. Average rake fullness is calculated across vegetated samples points. This parameter serves as an indicator of vegetation density across vegetated points only. The average rake fullness of 2.04 is representative of the 347 points where vegetation was observed on the rake sample. If sample points without vegetation were included in the calculation (rake fullness of 0), this will result in an average rake fullness across the Project Area of 1.07
4. Average growth form is calculated across vegetated sample points. This parameter serves as an indicator of vegetation height within the water column across vegetated points only. The average growth form of 3.87 is representative of the 347 points where vegetation was observed on the rake sample. If sample points without vegetation were included in the calculation (growth form of 0), this will result in an average growth form across the Project Area of 2.08.
5. Includes filamentous algae and aquatic moss.

Appendix E.4

Table 4. Species Sampled on the Rake - 2024

Common Name	Scientific Name	C-value	FOO by species (%)		Relative Frequency (%)	Average Rake Fullness
			Vegetated Sites	Littoral		
Coontail	*Ceratophyllum demersum*	3	81%	44%	26%	2.0
Common watermeal	*Wolffia columbiana*	5	7%	4%	2%	1.0
Common waterweed	*Elodea canadensis*	3	76%	42%	25%	1.7
Curly-leaf pondweed	*Potamogeton crispus*	0	12%	6%	4%	1.0
Eurasian water milfoil	*Myriophyllum spicatum*	0	39%	21%	13%	1.3
Flat-stem pondweed	*Potamogeton zosteriformis*	6	4%	2%	1%	1.1
Fries' pondweed	*Potamogeton friesii*	8	3%	2%	1%	1.3
Large duckweed	*Spirodela polyrhiza*	5	5%	3%	2%	1.1
Leafy pondweed	*Potamogeton foliosus*	6	1%	0%	0%	1.0
Northern water-milfoil	*Myriophyllum sibiricum*	6	1%	0%	0%	1.0
Sago pondweed	*Stuckenia pectinata*	3	5%	3%	2%	1.3
Slender naiad	*Najas flexilis*	6	2%	1%	1%	1.0
Small duckweed	*Lemna minor*	4	10%	5%	3%	1.1
Water star-grass	*Zosterella dubia*[2]	6	37%	20%	12%	1.2
Watershield	*Brasenia schreberi*	6	0%	0%	0%	0.0
White water lily	*Nymphaea odorata*	6	1%	0%	0%	1.3
White-stem pondweed	*Potamogeton praelongus*	8	1%	0%	0%	1.0
Wild celery/eel grass	*Vallisneria americana*	6	22%	12%	7%	1.4
Aquatic moss[1]	--	--	--	--	0%	1.0
Filamentous algae[1]	--	--	--	--	0%	2.0

Table Notes:

1. Aquatic moss and filamentous algae were found on the rake but are not included in total rake fullness, and, as a result, are not given a species FOO or assigned a c-value.
2. Formerly known as *Heteranthera dubia* (Jacq.) MacM.

Appendix E.5

Table 5. Species Observation List and Number of Findings

Common Name	Species	Number of Sites		Boat Survey[2]
		Rake Findings	Visuals[1]	
Coontail	*Ceratophyllum demersum*	281	14	
Common watermeal	*Wolffia columbiana*	25	3	
Common waterweed	*Elodea canadensis*	263	5	
Curly-leaf pondweed	*Potamogeton crispus*	40	4	
Eurasian water milfoil	*Myriophyllum spicatum*	135	22	
Flat-stem pondweed	*Potamogeton zosteriformis*	14	1	
Fries' pondweed	*Potamogeton friesii*	12	1	
Large duckweed	*Spirodela polyrhiza*	19	31	
Leafy pondweed	*Potamogeton foliosus*	3	1	
Northern water-milfoil	*Myriophyllum sibiricum*	2	0	
Sago pondweed	*Stuckenia pectinata*	19	5	
Slender naiad	*Najas flexilis*	7	1	
Small duckweed	*Lemna minor*	33	28	
Water star-grass	*Zosterella dubia*[3]	129	17	
Watershield	*Brasenia schreberi*	0	1	
White water lily	*Nymphaea odorata*	3	17	
White-stem pondweed	*Potamogeton praelongus*	2	1	
Wild celery	*Vallisneria americana*	78	13	
Aquatic moss	--	1	0	
Filamentous algae	--	116	2	
Hybrid cattail	*Typha x glauca*	--	--	X
Phragmites	*Phragmites australis*	--	--	X
Purple loosestrife	*Lythrum salicaria*	--	--	X
Nuttall's waterweed	*Elodea nuttalli*	--	--	X

1. Observed within six feet of the sample location.
2. The boat survey results are not mapped. Species observed on rake samples or visual observations were not included in the boat survey to eliminate redundancy.
3. Formerly known as *Heteranthera dubia* (Jacq.) MacM.

Appendix E.6

Table 6. Dominant Sediment Type Summary Statistics

Dominant Sediment Type	Number of Sample Points	Percentage of Sample Points
Clay	22	3.4%
Muck	389	60.7%
Rock	173	27.0%
Sand	46	7.2%
Clay/Rock Mix	2	0.3%
Muck/ Rock Mix	9	1.4%

Appendix E.7

Table 7. Statewide and SWTP Ecoregion Summary Statistics Comparison [4]

Summary Statistics	Wisconsin Lakes (Statewide) Average	SWTP Ecoregion Average	LLBDM 2024
Species richness	13	14	17
Mean C-value	6.0	5.60	5.4
Mean floristic quality index (FQI)	22.2	20.90	20.91
Simpson's Diversity Index (SDI)	0.85	0.81	0.83

Notes:
1. Southeastern Wisconsin Till Plains (SWTP)