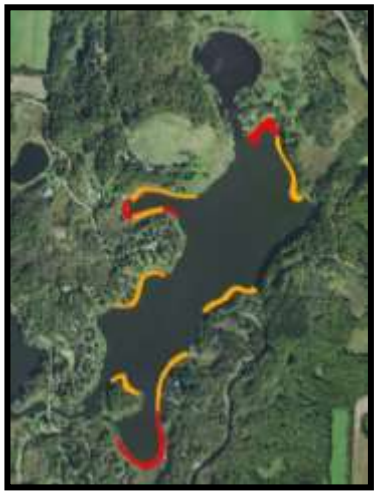
Curly-leaf Pondweed (*Potamogeton crispus*) and Eurasian Water-milfoil (*Myriophyllum spicatum*)

Pre/Post Herbicide and EWM Bed Mapping Surveys

Little Trade Lake – WBIC: 2639300

Burnett County, Wisconsin

Eurasian water-milfoil (Berg 2007)



2020 CLP/EWM Final Treatment Areas

Project Initiated by: Round-Trade Lakes Improvement Association Inc., Lake Education and Planning Services, LLC, and the Wisconsin Department of Natural Resources (Grant ACEI21618)

Mats of Coontail and filamentous algae in the north bay 8/29/20

Surveys Conducted by and Report Prepared by:

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May 15, June 18, and August 29, 2020

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INTRODUCTION:

Little Trade Lake (WBIC 2639300) is a 126 acre drainage lake in southwest/south-central Burnett County, Wisconsin in the Town of Trade Lake (T37N R18W S21). It reaches a maximum depth of 19ft in the central basin and has an average depth that is approximately 9ft (the DNR's stated depth average of 15ft combined depth data from Big Trade and Little Trade Lakes) (WDNR 2020). The lake is eutrophic in nature with intermittent Secchi disc readings from 2000-2019 (the most recent year available) ranging from 2.0-4.5ft and averaging 3.2ft (WDNR 2020). This very poor water clarity produced a littoral zone that extended to approximately 6.5ft in 2020. The bottom substrate is predominately organic muck with scattered gravel and sandy areas along the shoreline and around the island (Bush et al. 1968).

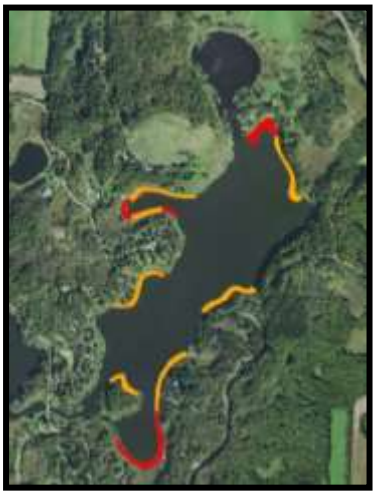


Figure 1: 2020 CLP/EWM Treatment Areas

BACKGROUND AND STUDY RATIONALE:

In 2009, the Wisconsin Department of Natural Resources (WDNR) confirmed the presence of Eurasian water-milfoil (EWM) (*Myriophyllum spicatum*) in Little Trade Lake. Following the development of a WDNR approved Aquatic Plant Management Plan (APMP) that outlined strategies to control EWM and Curly-leaf pondweed (*Potamogeton crispus*) (CLP), another invasive exotic species that dominates the lake's spring littoral zone, the Round-Trade Lake Improvement Association, Inc. (RTLIA) began using manual removal and herbicide treatments to control these species.

The RTLIA – under the direction of Dave Blumer (Lake Education and Planning Services, LLC - LEAPS) – applied for and was awarded a WDNR Aquatic Invasive Species control grant (ACEI21618) to help cover the costs associated with management. In 2020, these funds were used to chemically treat seven areas totaling 7.27 acres (5.77% of the lake's surface area) for EWM and six areas totaling 7.01 acres (5.56% surface area) for CLP (Figure 1). On May 15th, we conducted a pretreatment survey to gather baseline data from the proposed treatment areas and to allow LEAPS/RTLIA to finalize treatment plans. After the May 19th and 22nd herbicide applications, we completed a June 18th posttreatment survey to evaluate the effectiveness of the treatment. We also conducted an August 29th EWM bed mapping survey to determine where control might be considered in 2021. This report is the summary analysis of these three field surveys.

METHODS:

Pre/Post Herbicide Surveys:

LEAPS provided treatment shapefiles, and we generated pre/post survey points based on the size and shape of the potential treatment areas that covered 15.81 acres. The requested 128 point sampling grid approximated to over 8pts/acre – double the minimum of 4pts/acre required by WDNR protocol for pre/post treatment surveys (Appendix I).

During the surveys, we located each point using a handheld mapping GPS unit (Garmin 76CSx) and used a rake to sample an approximately 2.5ft section of the bottom. All plants on the rake were assigned a rake fullness value of 1-3 as an estimation of abundance, and a total rake fullness for all species was also recorded (Figure 2). Visual sightings of EWM and CLP were noted if they occurred within 6ft of the point; however, visuals of other species were not recorded as they do not figure into the pre/posttreatment calculation. In addition to plant data, we recorded the lake depth using a metered pole and the substrate (bottom) type when we could see it or reliably determine it with the rake.

We entered all data collected into the standard APM spreadsheet (Appendix II). Data was analyzed using the linked statistical summary sheet and the WDNR pre/post analysis worksheet. For pre/post differences of individual plant species as well as count data, we used the Chi-square analysis on the WDNR pre/post survey worksheet (UWEX 2010). For comparing averages (mean species/point and mean rake fullness/point), we used t-tests. Differences were determined to be significant at $p<0.05$, moderately significant at $p<0.01$ and highly significant at $p<0.001$.

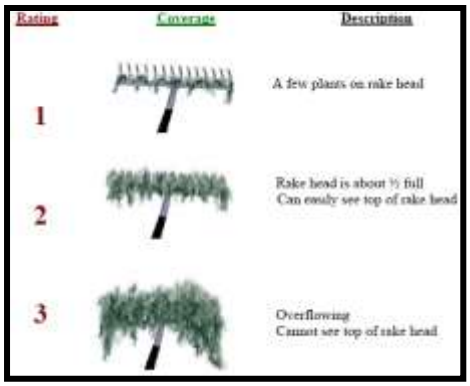


Figure 2: Rake Fullness Ratings

Late Summer Eurasian Water-milfoil Bed Mapping:

During the late summer survey, we searched the visible littoral zone of the lake and mapped all known beds of EWM. A "bed" was determined to be any area where we visually estimated that EWM made up >50% of the area's plants and was generally continuous with clearly defined borders. After we located a bed, we motored around the perimeter of the area, took GPS coordinates at regular intervals, and estimated both the range and mean rake fullness rating of EWM within the bed (Figure 2). Using the WDNR's Forestry Tool's Extension to ArcGIS 9.3.1, we plotted these coordinates to generate bed shapefiles and determine the acreage to the nearest hundredth of an acre. We also took waypoints of EWM plants outside these beds as they were generally few in number.

RESULTS AND DISCUSSION:

Finalization of Treatment Areas:

Eight areas were selected for chemical control, and, after the pretreatment survey found EWM and CLP in each area, treatment continued as planned with the exception of eliminating the northern lobe of Areas 2 and 8 (Figure 3) (Appendix I). Seven of these areas totaling 7.27 acres were treated for EWM (liquid 2,4-D – Shredder Amine – 3ppm) and six areas totaling 7.01 acres were treated for CLP (liquid Endothall – Aquathol K – 2ppm) (Table 1).

Northern Aquatic Services (Dale Dressel – Dresser, WI) carried out the CLP treatment on May 19th and the EWM treatment on May 22nd. During the initial treatment, the reported water temperature was 57°F and the ambient air temperature was 61°F with winds out of the northwest at 3-4mph. The follow-up treatment reported a water temperature of 61°F, an air temperature of 70°F, and winds from the southeast at 3-4mph.

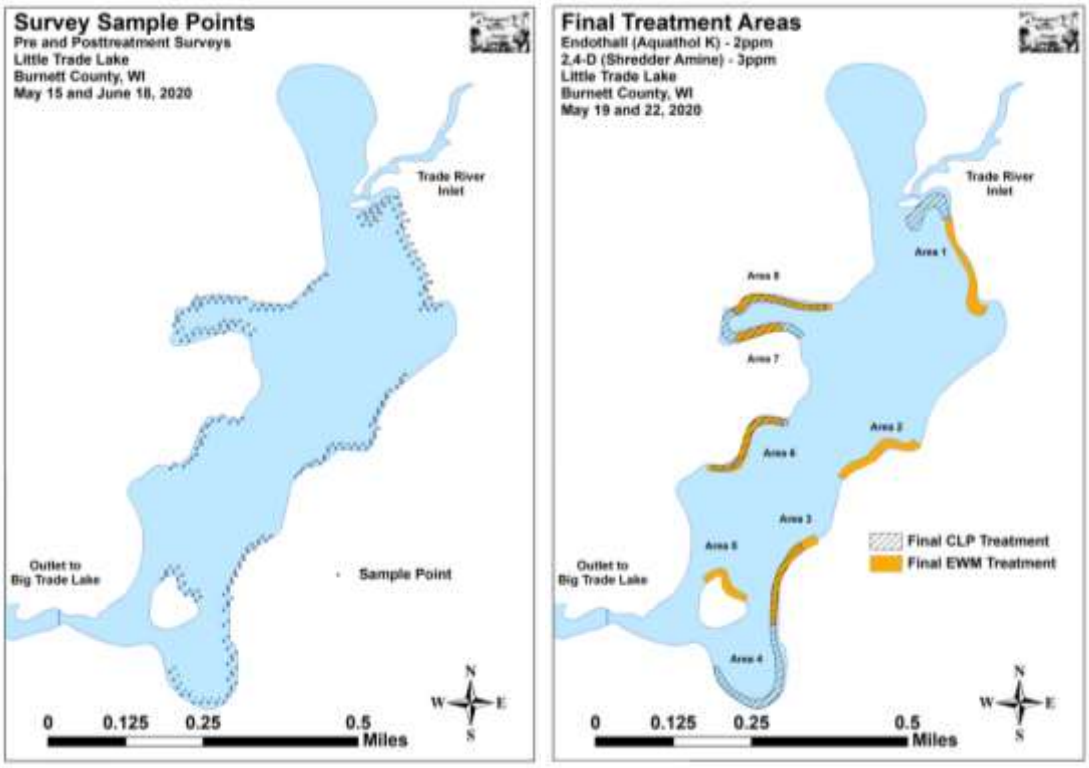


Figure 3: Survey Sample Points and Final Treatment Areas

Table 1: Spring CLP/EWM Treatment Summary
Little Trade Lake, Polk County
May 19 and 22, 2020

Treatment Area	CLP Acreage	EWM Acreage	Chemical(s) – Dosage – Total Gallons
1	1.15	1.33	Endothall – 2.0ppm – 6.10gal./2,4-D – 3ppm – 11.33gal.
2	0	1.25	2,4-D – 3ppm – 10.65gal.
3	0.88	1.23	Endothall – 2ppm – 4.70gal./2,4-D – 3ppm – 10.48gal.
4	1.65	0	Endothall – 2ppm – 8.80gal.
5	0	0.71	2,4-D – 3ppm – 6.05gal.
6	0.97	1.11	Endothall – 2.0ppm – 5.20gal./2,4-D – 3ppm – 9.46gal.
7	1.34	0.61	Endothall – 2.0ppm – 7.10gal./2,4-D – 3ppm – 5.20gal.
8	1.02	1.03	Endothall – 2.0ppm – 5.40gal./2,4-D – 3ppm – 8.78gal.
Total Acres	**7.01**	**7.27**	

Pre/Post Herbicide Surveys:

All points occurred in areas between 1.0ft and 8.0ft of water. The mean depth of plant growth declined slightly from 3.4ft pretreatment to 3.1ft posttreatment while the median depth was unchanged at 3.0ft during both surveys (Table 2). Most Curly-leaf pondweed plants were established over thick nutrient-rich organic muck, while Eurasian water-milfoil was more common over sand and rock (Figure 4) (Appendix III).

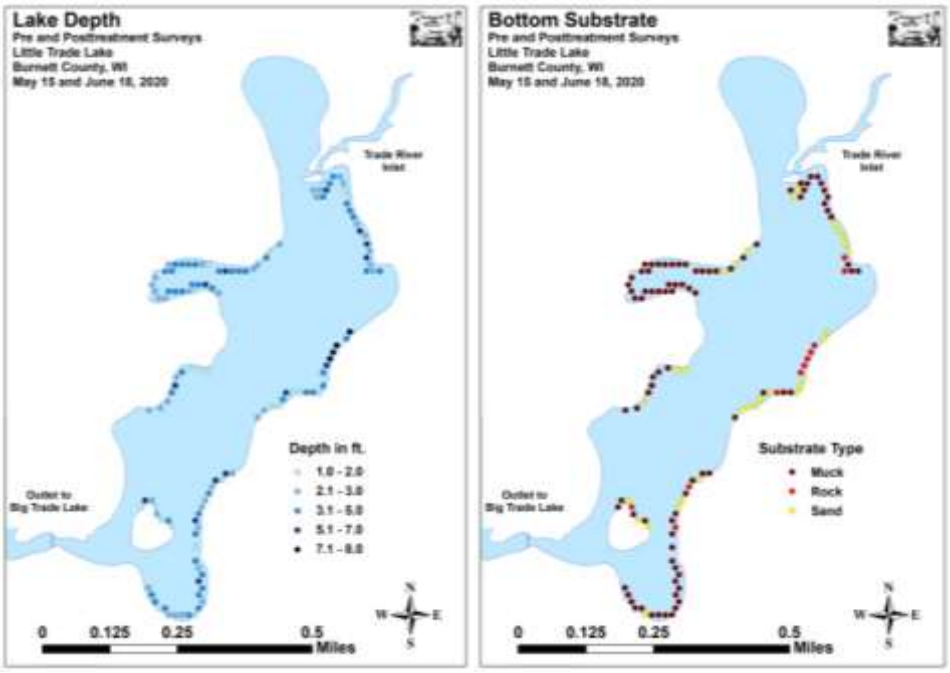


Figure 4: Treatment Area Depths and Bottom Substrate

Table 2: Pre/Post Surveys Summary Statistics
Little Trade Lake, Burnett County
May 15 and June 18, 2020

Summary Statistics:	Pre	Post
Total number of points sampled	128	128
Total number of sites with vegetation	121	121
Total number of sites shallower than the maximum depth of plants	123	124
Freq. of occur. at sites shallower than max. depth of plants (in percent)	98.4	97.6
Simpson Diversity Index	0.60	0.80
Mean Coefficient of Conservatism	5.2	5.3
Floristic Quality Index	11.6	18.5
Maximum depth of plants (ft)	6.5	6.5
Mean depth of plants (ft)	3.4	3.1
Median depth of plants (ft)	3.0	3.0
Average number of all species per site (shallower than max depth)	1.54	2.60
Average number of all species per site (veg. sites only)	1.57	2.66
Average number of native species per site (shallower than max depth)	1.03	2.50
Average number of native species per site (sites with native veg. only)	1.11	2.58
Species richness	7	13
Mean rake fullness (veg. sites only)	2.14	2.27

The littoral zone within the beds extended to 6.5ft during both the pre and posttreatment surveys. The frequency of plant occurrence was also essentially unchanged at 98.4% pretreatment and 97.6% posttreatment (Figure 5) (Appendix IV). Total richness nearly doubled from seven species pretreatment to 13 species posttreatment. Similarly, the Simpson's Diversity Index jumped from a moderate pretreatment value of 0.60 to a moderately/high posttreatment value of 0.80. The Floristic Quality Index (another measure of native plant community health) also rose from 11.6 pretreatment to 18.5 posttreatment.

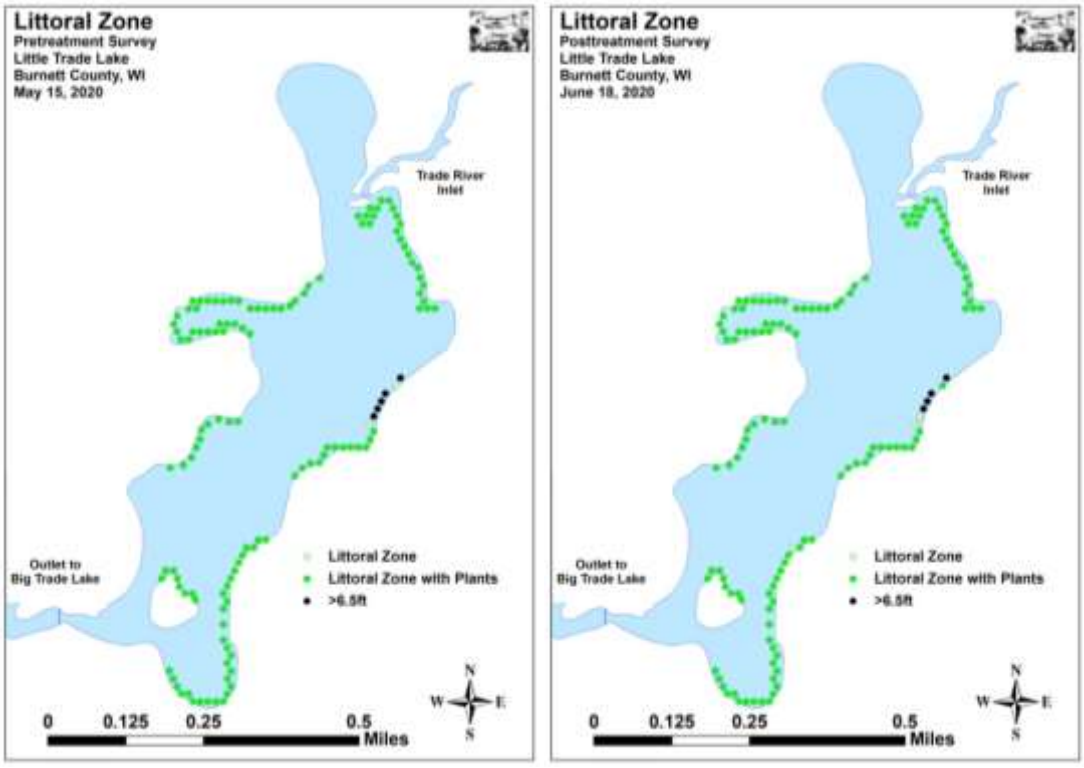


Figure 5: Pre/Post Littoral Zone

Mean native species richness at points with native vegetation increased sharply from 1.11 species/point pretreatment to 2.58 species/point posttreatment (Figure 6). Although this increase in localized richness was highly significant **($p<0.001$)**, it can largely be attributed to the increase in the number of "duckweeds". Total mean rake fullness experienced a nearly-significant increase ($p=0.06$) from a moderate 2.14 pretreatment to a moderately high 2.27 posttreatment (Figure 7) (Appendix IV).

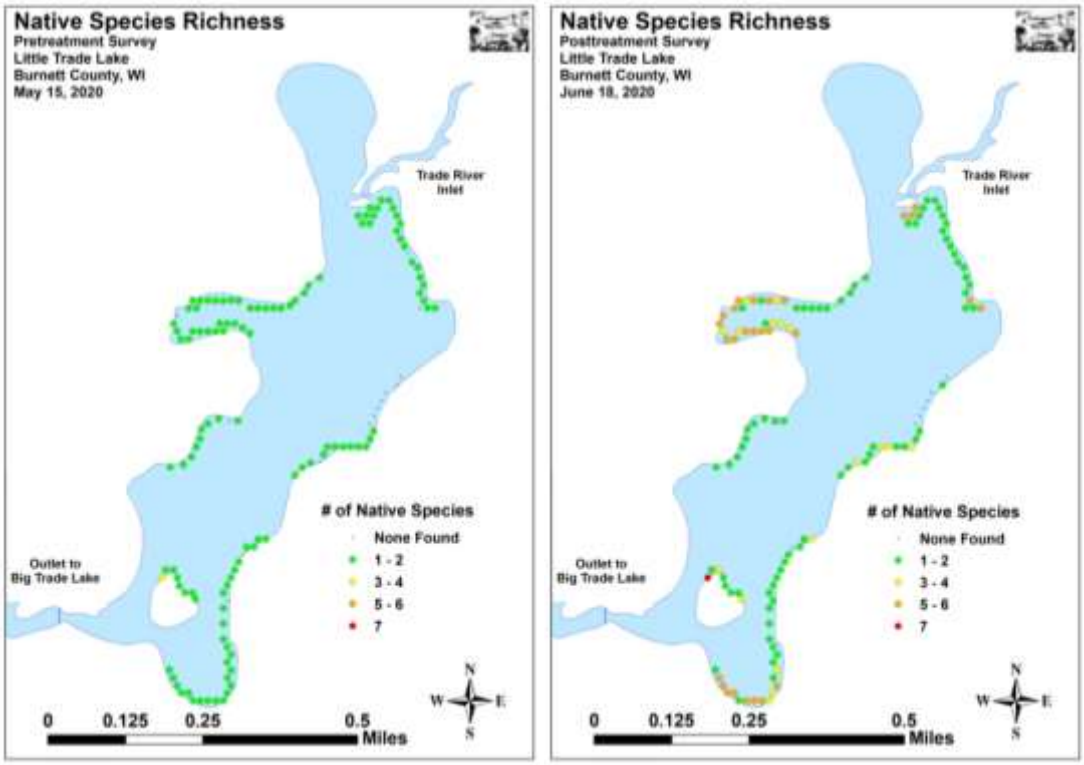


Figure 6: Pre/Post Native Species Richness

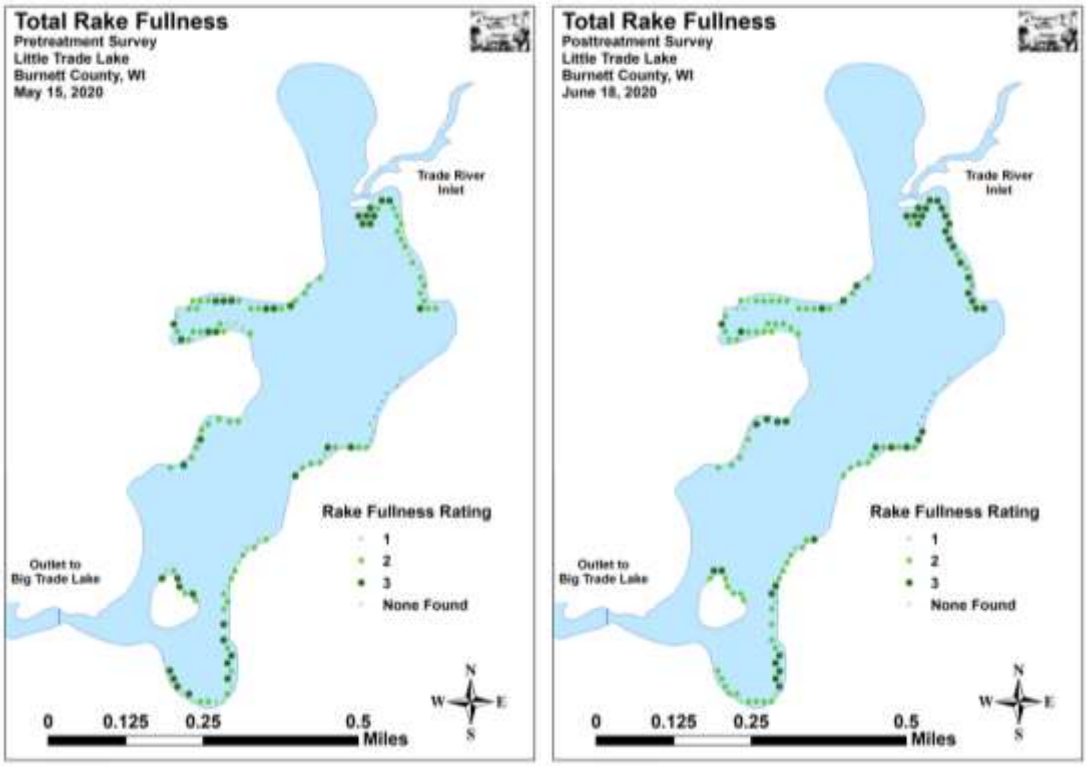


Figure 7: Pre/Post Total Rake Fullness

We found Curly-leaf pondweed at 32 of 128 sites during the pretreatment survey (25.0% coverage) (Figure 8). Of these, one had a rake fullness rating of 3, two rated a 2, and the remaining 29 were a 1 – there were also 13 visual sightings. This produced a mean rake fullness of 1.13 and suggested that 2.3% of the proposed treatment areas had a significant infestation (rake fullness 2 and 3).

During the posttreatment survey, we found CLP at 12 points (9.4% coverage) with one rating a 3, four a 2 (3.9% sig. infest), and seven a 1 for a mean rake fullness of 1.50. We also noted eight visual sightings. **Although this was a significant increase in mean rake density ($p<0.05$), our results demonstrated a moderately significant decline in total distribution ($p=0.001$) and a highly significant decline in rake fullness 1 ($p<0.001$)** (Figure 9) (Appendix V).

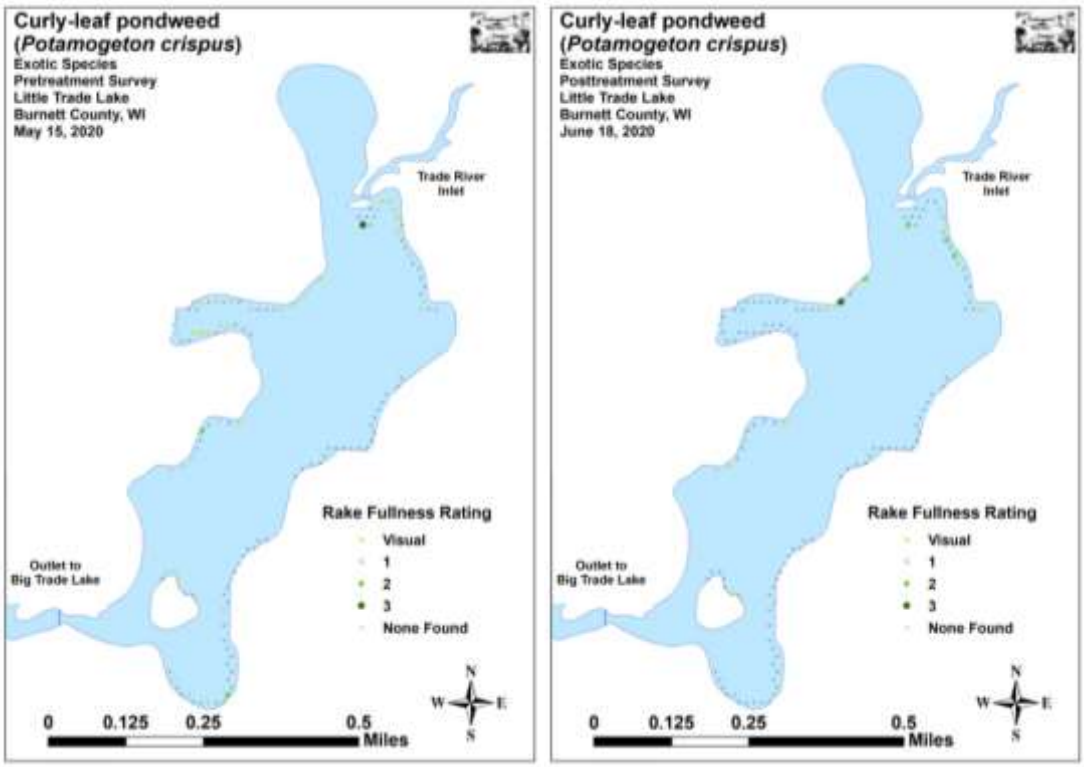
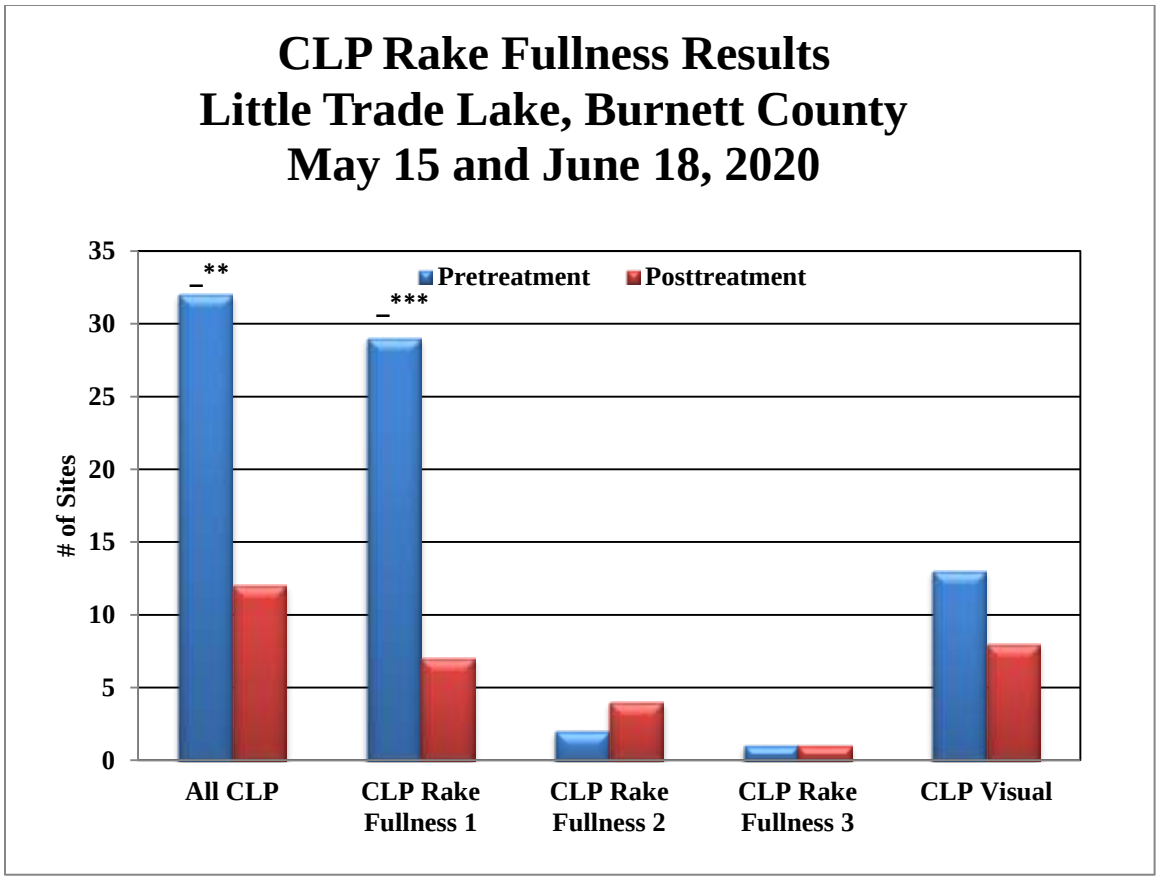


Figure 8: Pre/Post CLP Density and Distribution



Significant differences = * $p<0.05$, ** $p<0.01$, *** $p<0.001$

Figure 9: Pre/Post Changes in CLP Rake Fullness

Eurasian water-milfoil was present at 31 of 128 points (24.2% coverage) during the pretreatment survey (Figure 10). We rated two points a 3, 12 points a 2, and 17 points a 1 with 27 additional visual sightings. This extrapolated to 10.9% of the proposed treatment areas having a significant infestation (rake fullness 2 and 3) and produced a mean rake fullness of 1.52.

During the posttreatment survey, we didn't find EWM in the rake at any point. In fact, we saw no evidence of it anywhere in the lake. **This represented a highly significant decrease ($p<0.001$) in mean rake density, total distribution, rake fullness 2 and 1, and visual sightings** (Figure 11) (Appendix V).

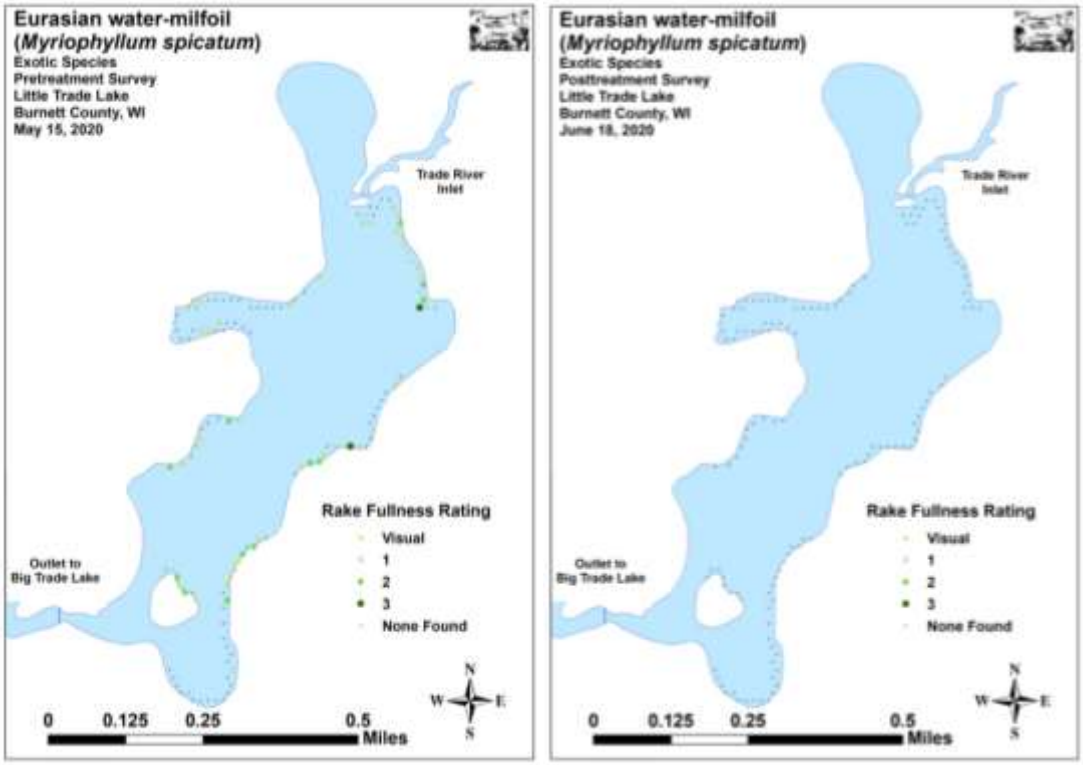
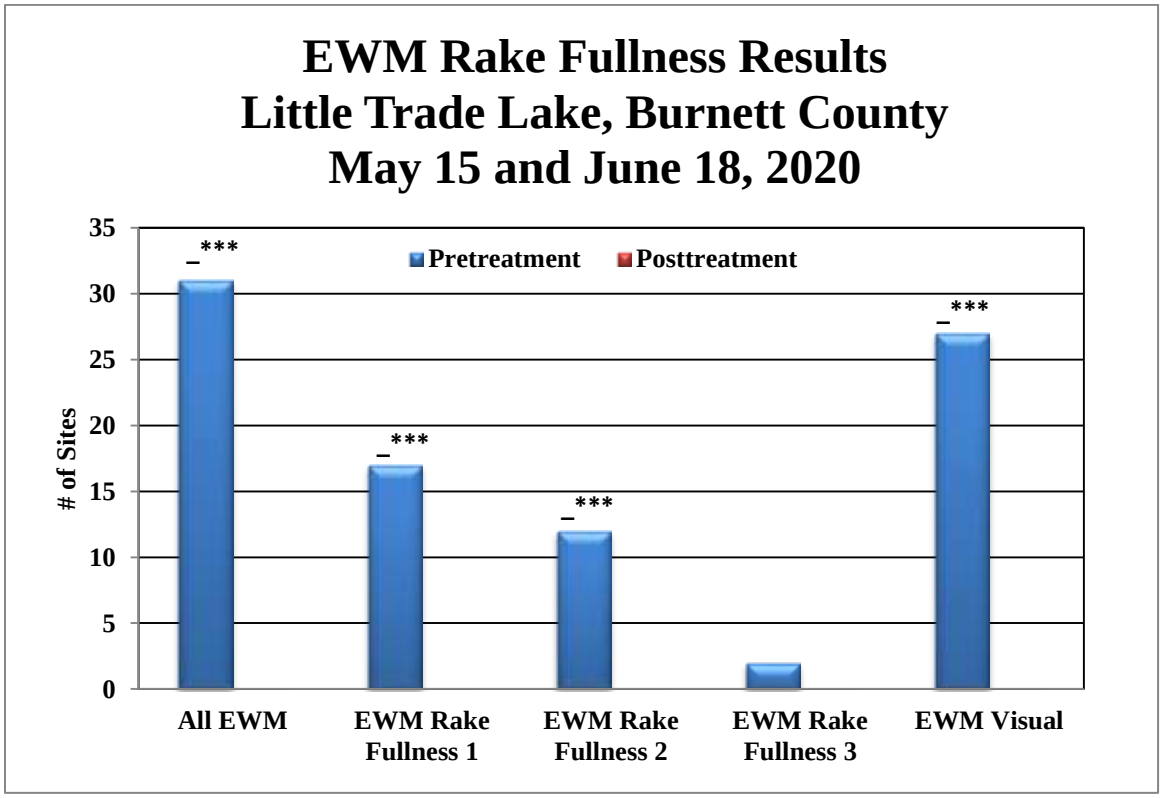


Figure 10: Pre/Post EWM Density and Distribution



Significant differences = * $p<0.05$, ** $p<0.01$, *** $p<0.001$

Figure 11: Pre/Post Changes in EWM Rake Fullness

Coontail (*Ceratophyllum demersum*) (Figure 12) and White water lily (*Nymphaea odorata*) (Figure 13) were the most common native species during both the pretreatment (Table 3) and the posttreatment (Table 4) surveys. Coontail was present at 111 sites with a mean rake fullness of 2.13 pretreatment, and these values were almost unchanged posttreatment (114 sites with a mean rake of 2.05).

White water lily, a late-growing species, demonstrated highly significant increases **(*p*<0.001)** in both density and distribution from 11 sites with a mean rake of 1.13 pretreatment to 57 sites with a mean rake of 1.79 posttreatment. It was especially common in the south bay and the western bay midlake.

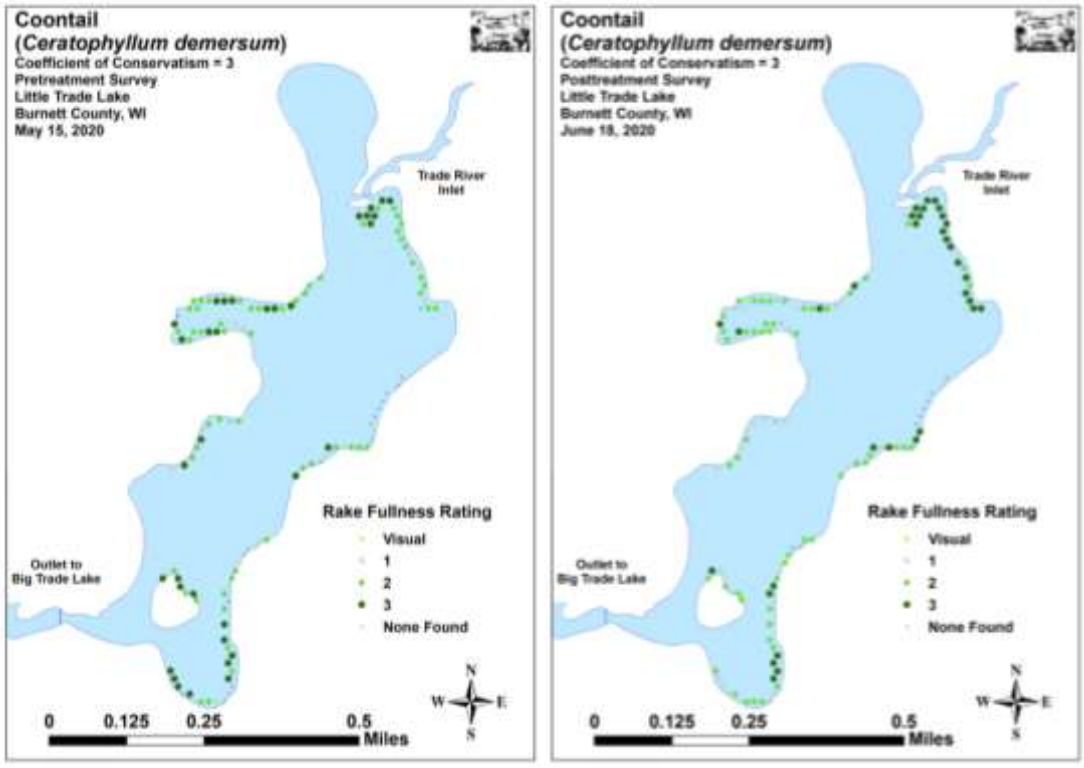


Figure 12: Pre/Post Coontail Density and Distribution

Similarly, Small duckweed (*Lemna minor*), Large duckweed (*Spirodela polyrhiza*), and Common watermeal (*Wolffia columbiana*) all enjoyed highly significant increases **(*p*<0.001)** in posttreatment distribution; and Common waterweed (*Elodea canadensis*) and Spatterdock (*Nuphar variegata*) saw significant increases **(*p*=0.01)**. Filamentous algae also experienced a significant increase in distribution **(*p*=0.008)** (102 sites pre/116 sites post) and density **(*p*<0.05)** (mean rake 1.76 pre/1.94 post) (Figure 14). Other than CLP and EWM, no other species experienced a decline posttreatment (Figure 15) (Maps for all native species from the pre and posttreatment surveys are available in Appendixes VI and VII).

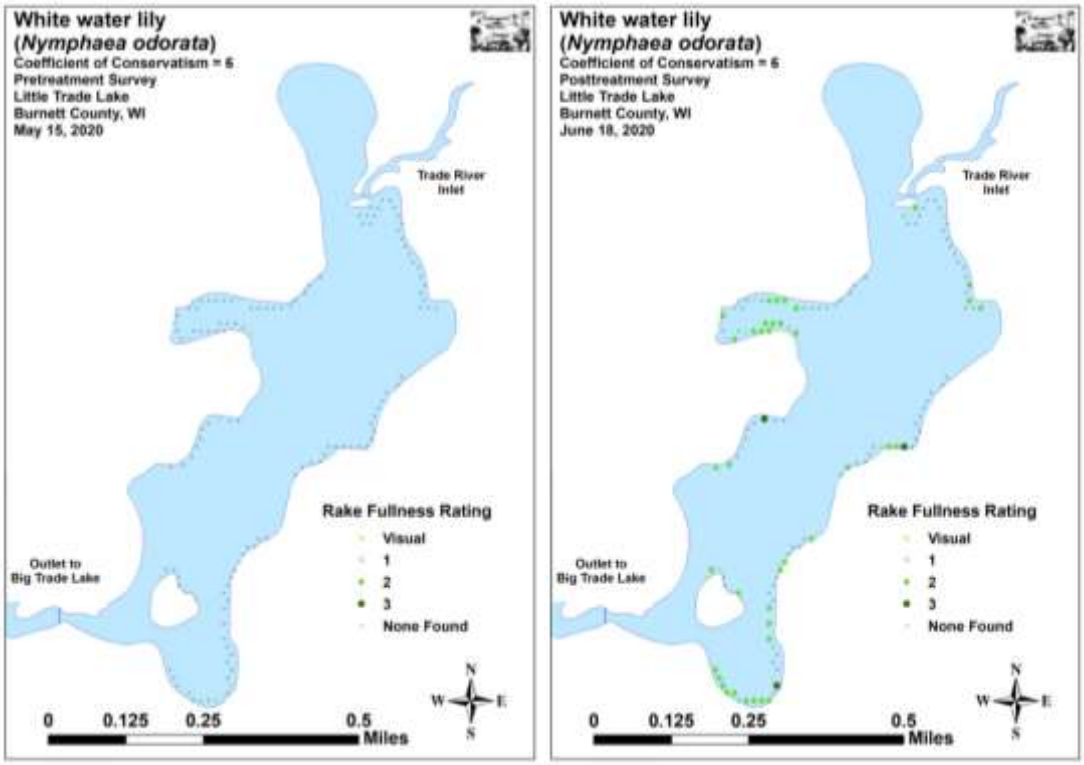


Figure 13: Pre/Post White Water Lily Density and Distribution

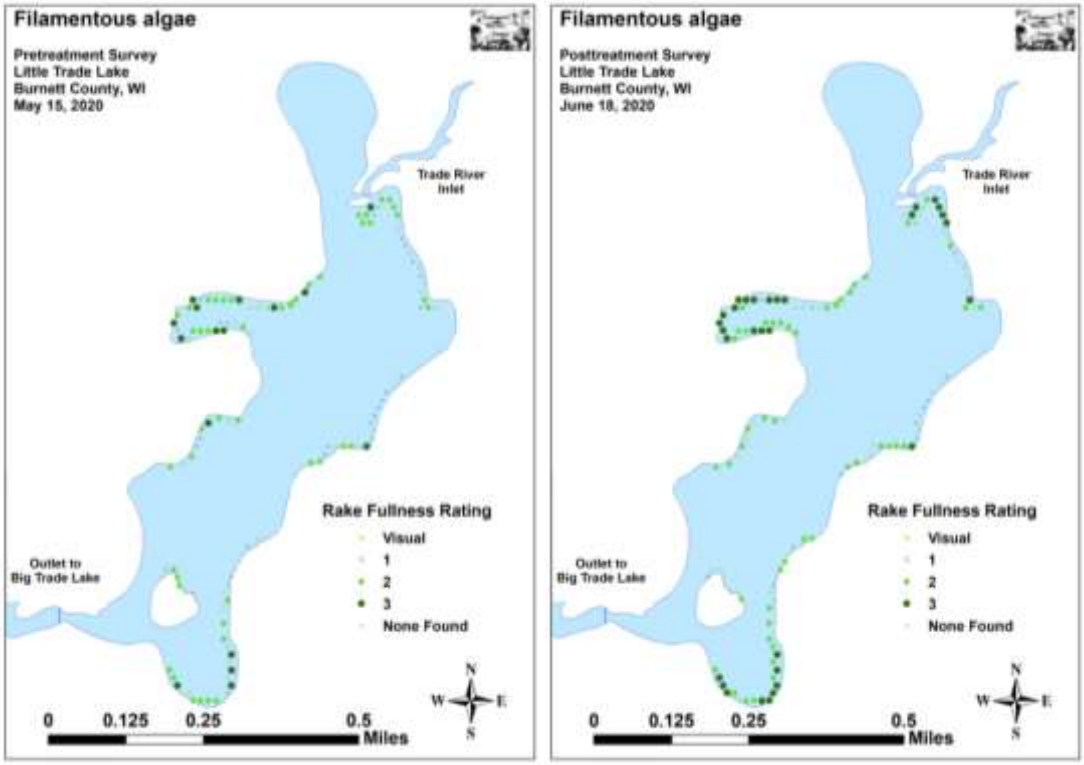


Figure 14: Pre/Post Filamentous Algae Density and Distribution

Table 3: Frequencies and Mean Rake Sample of Aquatic Macrophytes
Pretreatment Survey – Little Trade Lake, Burnett County
May 15, 2020

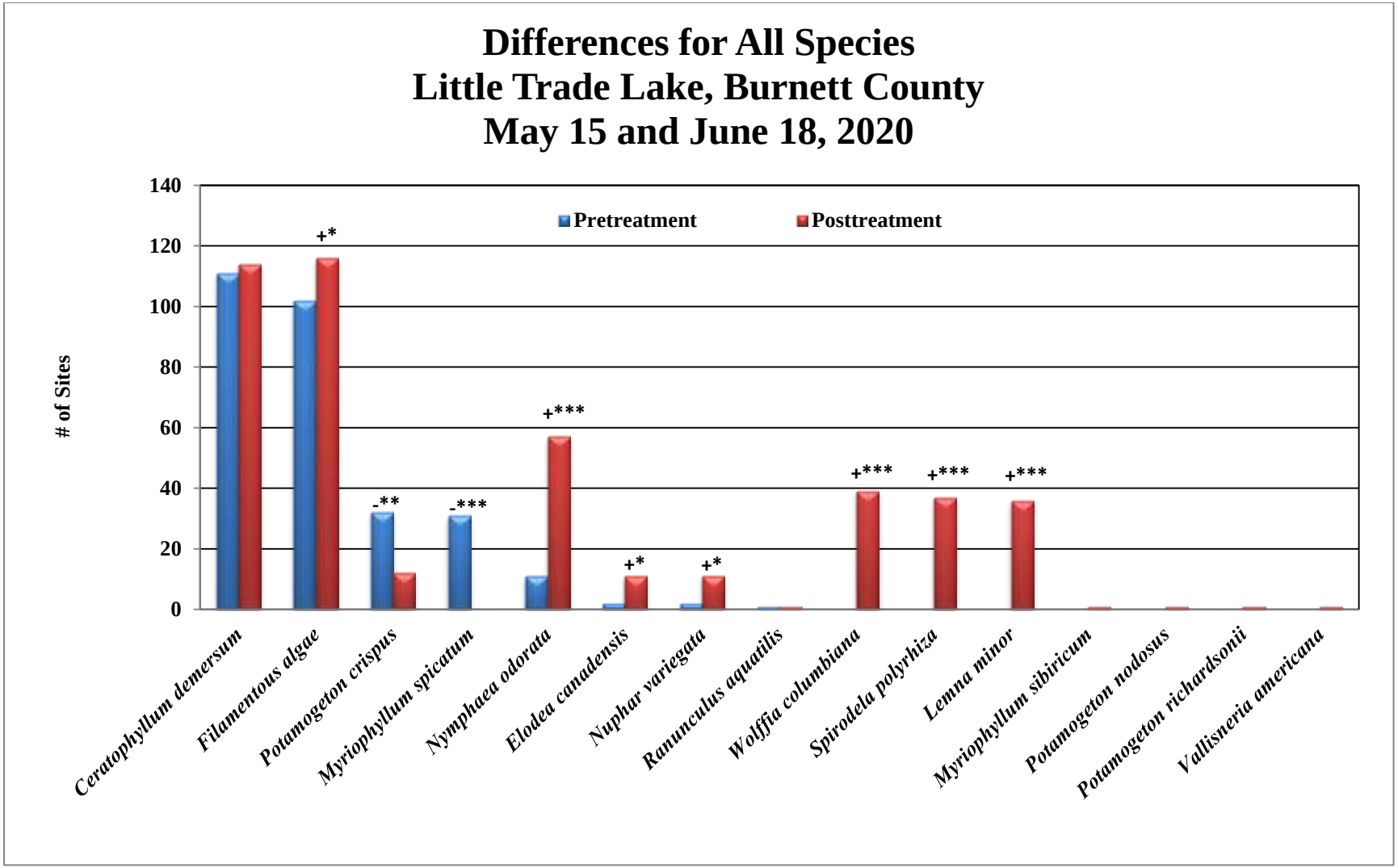
Species	Common Name	Total Sites	Relative Freq.	Freq. in Veg.	Freq. in Lit.	Mean Rake	Visual Sites
Ceratophyllum demersum	Coontail	111	58.42	91.74	90.24	2.13	0
	Filamentous algae	102	*	84.30	82.93	1.76	0
Potamogeton crispus	Curly-leaf pondweed	32	16.84	26.45	26.02	1.13	13
Myriophyllum spicatum	Eurasian water-milfoil	31	16.32	25.62	25.20	1.52	27
Nymphaea odorata	White water lily	11	5.79	9.09	8.94	1.00	0
Elodea canadensis	Common waterweed	2	1.05	1.65	1.63	2.00	0
Nuphar variegata	Spatterdock	2	1.05	1.65	1.63	1.00	0
Ranunculus aquatilis	White water crowfoot	1	0.53	0.83	0.81	1.00	0

* Excluded from relative frequency analysis

Table 4: Frequencies and Mean Rake Sample of Aquatic Macrophytes
Posttreatment Survey – Little Trade Lake, Burnett County
June 18, 2020

Species	Common Name	Total Sites	Relative Freq.	Freq. in Veg.	Freq. in Lit.	Mean Rake	Visual Sites
	Filamentous algae	116	*	95.87	93.55	1.94	0
Ceratophyllum demersum	Coontail	114	35.40	94.21	91.94	2.05	0
Nymphaea odorata	White water lily	57	17.70	47.11	45.97	1.79	0
Wolffia columbiana	Common watermeal	39	12.11	32.23	31.45	1.59	0
Spirodela polyrhiza	Large duckweed	37	11.49	30.58	29.84	1.41	0
Lemna minor	Small duckweed	36	11.18	29.75	29.03	1.31	0
Potamogeton crispus	Curly-leaf pondweed	12	3.73	9.92	9.68	1.50	8
Elodea canadensis	Common waterweed	11	3.42	9.09	8.87	1.64	0
Nuphar variegata	Spatterdock	11	3.42	9.09	8.87	2.18	0
Myriophyllum sibiricum	Northern water-milfoil	1	0.31	0.83	0.81	1.00	0
Potamogeton nodosus	Long-leaf pondweed	1	0.31	0.83	0.81	1.00	0
Potamogeton richardsonii	Clasping-leaf pondweed	1	0.31	0.83	0.81	1.00	0
Ranunculus aquatilis	White water crowfoot	1	0.31	0.83	0.81	1.00	0
Vallisneria americana	Wild celery	1	0.31	0.83	0.81	1.00	0

* Excluded from relative frequency analysis



Significant differences = * $p<0.05$, ** $p<0.01$, *** $p<0.001$

Figure 15: Pre/Post Macrophyte Changes

Late Summer Eurasian Water-milfoil Bed Mapping Survey:

Following a highly successful treatment that left Eurasian water-milfoil at undetectable levels in June, our August survey located and mapped four microbeds totaling 0.16 acre (0.12% of the lake's total surface area) (Figure 16) (Appendix VIII). Outside of these beds, we marked just six additional EWM plants (Table 5). This was a decline of 1.43 acres (-89.94%) from the 12 EWM beds totaling 1.59 acres (1.26% coverage) we mapped in 2019. It was also well below the seven beds covering 1.40 acres (1.11% coverage) mapped in 2018; the 14 beds totaling 1.09 acres (0.87% coverage) in 2017; the eight beds on 0.34 acre (0.27% coverage) in 2016; or the peak of 12 beds covering 4.23 acres (3.36% coverage) in 2015 (Table 6).

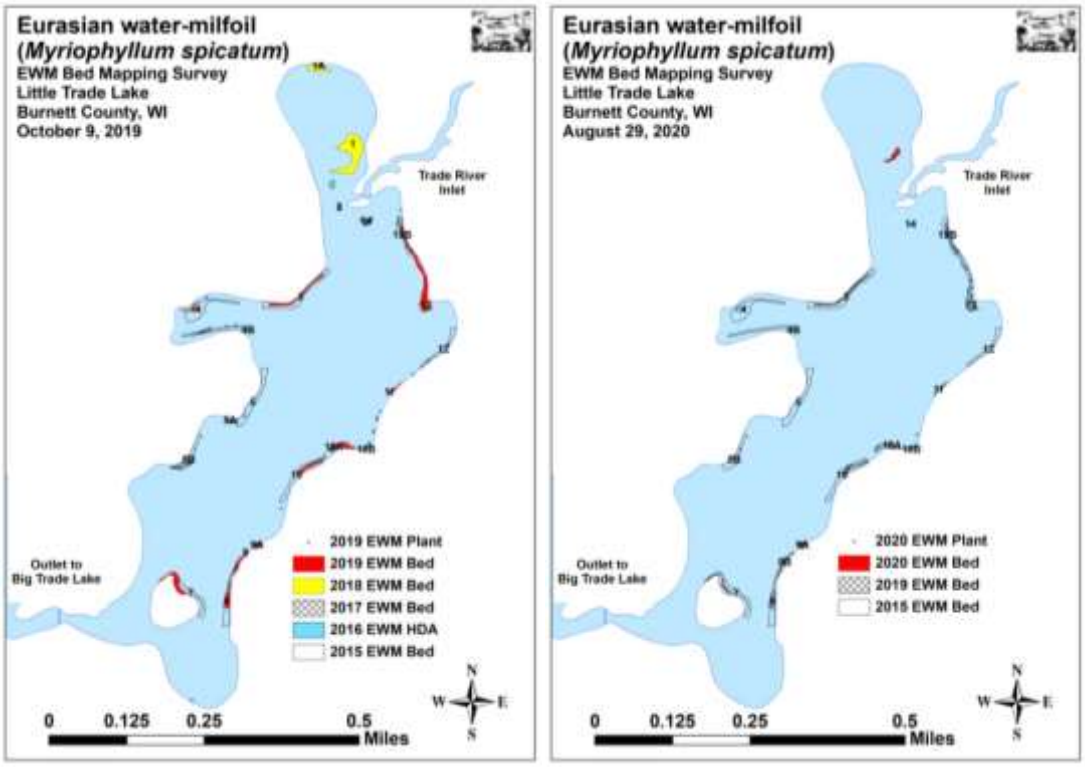


Figure 16: Fall 2019 and Late Summer 2020 EWM Bed Maps

Table 5: Late Summer Eurasian Water-milfoil Bed Mapping Summary
Little Trade Lake, Burnett County
August 29, 2020

Bed Number	2020 Area in Acres	2019 Area in Acres	2020 Change in Acreage	Rake Range; Mean Rake Fullness	Depth Range and Mean Depth	Navigation Impairment	2020 Field Notes
1	0.10	0	0.10	<<<1-2; 1	3-6; 5	Minor	More of an HDA – mixed with Coontail
1A	0	0	0	-	-	-	No EWM seen
2	0	0	0	-	-	-	No EWM seen
3	0	0.22	-0.22	-	-	-	No EWM seen
4	0	0.04	-0.04	-	-	-	No EWM seen
4B	0	0	0	-	-	-	No EWM seen
5 and 5A	0	0	0	-	-	-	No EWM seen
5B	<0.01	<0.01	0	2-3; 2	2-4; 3	Minor	Dense microbed – too small to be mod. impair.
6	0	0	0	-	-	-	No EWM seen
7	0	0.22	-0.22	-	-	-	No EWM seen
8A and 8B	0	0.19	-0.19	<<<1	4	None	Two EWM plants – rake removed
9 and 9A	0.04	0.07	-0.03	<<1-2; 1	2-5; 3	Minor	Plants among docks – mixed with Coontail
10	0	0.11	-0.11	-	-	-	No EWM seen
10A	0.02	0.15	-0.13	1-3; 2	3-5; 4	Minor	Narrow bed near dock
10B	0	0	0	<<<1	4	None	Single EWM plant – rake removed
11	0	0.05	-0.05	-	-	-	No EWM seen
12	0	0	0	-	-	-	No EWM seen
12B	0	0	0	-	-	-	No EWM seen
12C	0	0	0	-	-	-	No EWM seen
13	0	0.53	-0.53	<<<1	4	None	Two EWM plants – rake removed
13B	0	Merged	0	-	-	-	No EWM seen
14	0	0.01	-0.01	-	-	-	No EWM seen
Total Acres	**0.16**	**1.59**	**-1.43**				

Table 6: Historical Late Summer/Fall Eurasian Water-milfoil Bed Mapping Summary
Little Trade Lake, Burnett County
2011-2020

Bed Number	2020 Area in Acres	2019 Area in Acres	2018 Area in Acres	2017 Area in Acres	2016 Area in Acres	2015 Area in Acres	2014 Area in Acres	2013 Area in Acres	2012 Area in Acres
1	0.10	0	0.93	0	0.06	0	3.84	4.61	2.16
1A	0	0	0.18	0.04	0	0	0	0	0
2	0	0	0	0	0.02	0	Merged	Merged	Merged
3	0	0.22	0	0	0	0.65	0.23	0.03	0
4	0	0.04	0.06	0.07	0	0.58	0	0	0
4B	0	0	0	0.07	0	0.26	0	0	0
5 and 5A	0	0	0	0.01	0	0.52	0	0	0
5B	<0.01	<0.01	0.02	0.07	0	0.33	0	0	0
6	0	0	0	0	0	0	0	0	0
7	0	0.22	0.06	0.04	0.02	0.31	0	0	0
8A and 8B	0	0.19	0	0.10	0	0.42	0	0	0
9 and 9A	0.04	0.07	0	0.01	0	0	0	0	0
10	0	0.11	0.05	0.05	0	0.51	0	0	0
10A	0.02	0.15	0	0.10	0.11	0	0	0	0
10B	0	0	0	0	0	0.05	0	0	0
11	0	0.05	0	0	0.01	0	0	0	0
12	0	0	0	0	0	0.26	0	0	0
12B	0	0	0	0	0	0	0	0	0.02
12C	0	0	0	0	0	0	0	<0.01	0.08
13	0	0.53	0.10	0.27	0.05	0.08	0.14	<0.01	0
13B	0	Merged	0	0.16	0.02	0.26	0	0	0
14	0	0.01	0	0.10	0.05	0	0.10	<0.01	0.31
Total Acres	**0.16**	**1.59**	**1.40**	**1.09**	**0.34**	**4.23**	**4.32**	**4.65**	**2.57**

Descriptions of Current and Former Eurasian Water-milfoil Beds:

Bed 1 – More "High Density Area" than true bed, Eurasian water-milfoil was peppered among mats of Coontail and filamentous algae near the river inlet in the north bay.

Beds 1A and 2 – We saw no evidence of EWM anywhere along the north bay's northern shoreline. We also didn't find any EWM in the entrance to the north bay.

Beds 3, 4, 4B, 5, and 5A – Somewhat surprisingly, neither the western midlake bay, nor the rocky shorelines north and south of the bay had any surviving EWM. Historically, these areas have proven tough to treat. Perhaps the dense canopied Coontail in the bay or the thick layers of filamentous algae that covered these firms substrates assisted in preventing EWM from surviving and/or reestablishing in this area.

Bed 5B – We mapped a small but dense canopied microbed in the same location as in 2019. This area was treated for CLP with Endothall, but not for EWM.

Bed 6 – We saw no evidence of EWM in this area.

Bed 7 – The bed on the north and northeast shoreline of the island appeared to have been completely eliminated by the treatment as we saw no evidence of EWM anywhere around the island.

Beds 8A and 8B – We saw no evidence of EWM in these former narrow shoreline beds.

Beds 9 and 9A – We found regular canopied towers in shallow water among the docks on this newly developed shoreline.

Bed 10 – Only two plants were seen in this area, and we rake removed them both.

Bed 10A – This area had a small bed along the drop-off next to a dock. This area continued to have a significant amount of Northern water-milfoil (*Myriophyllum sibiricum*) mixed in.

Bed 10B – We rake removed a single EWM plant on the north end of the eastern midlake bay.

Beds 11 and 12 – We saw no evidence of EWM along the northeast shoreline.

Beds 13, 13B, and 4 – On the northeast points where EWM has been proven to be difficult to treat in the past, we found and rake removed just two individual plants.

LITERATURE CITED

Busch, C., C. Olson, L. Sather, and C. Holt. [online]. 1968. Big/Little Trade Lake Map. Available from http://dnr.wi.gov/lakes/maps/DNR/2638700a.pdf (2020, November).

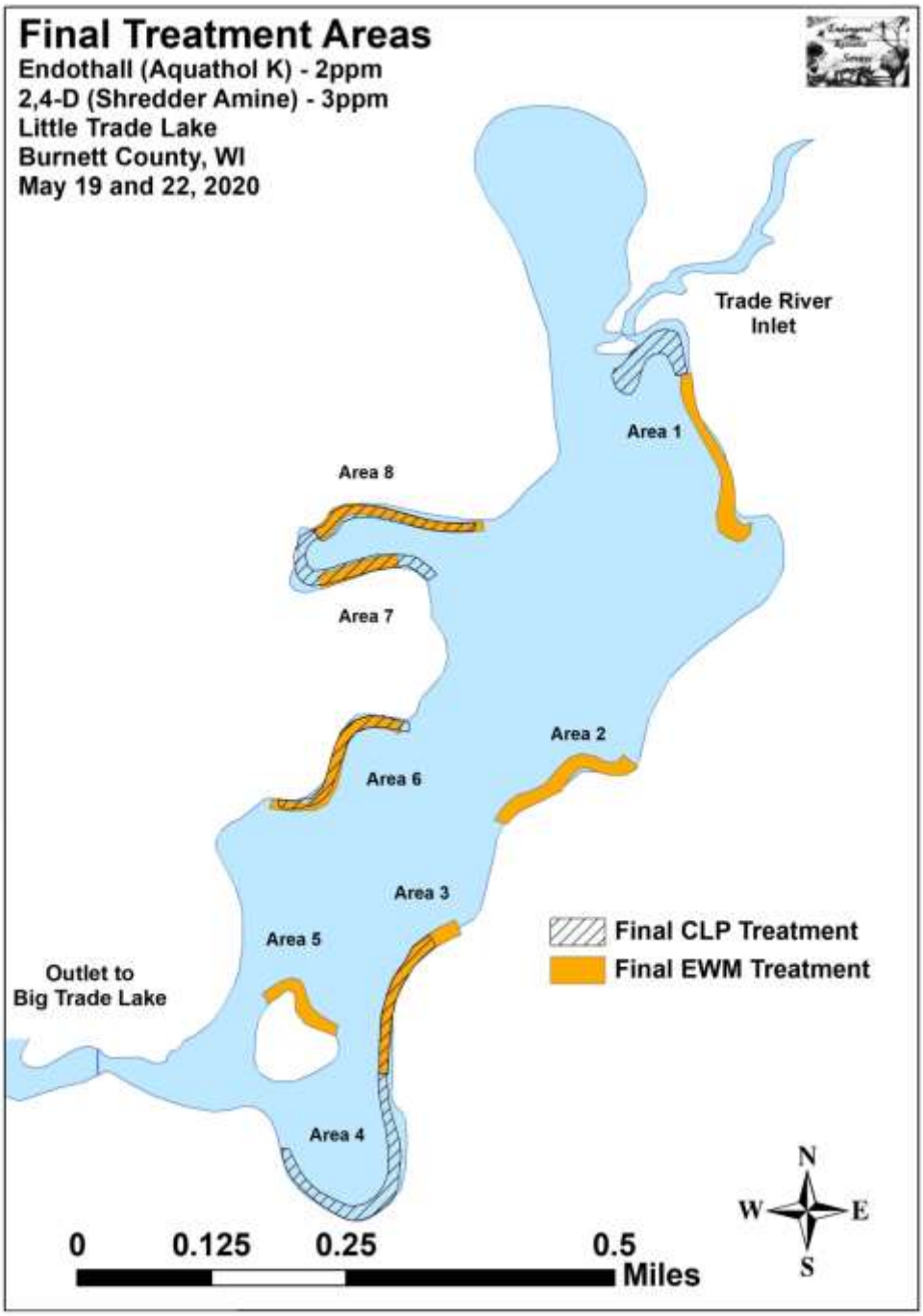
UWEX Lakes Program. [online]. 2010. Aquatic Plant Management in Wisconsin. Available from http://www.uwsp.edu/cnr-ap/UWEXLakes/Pages/ecology/aquaticplants/default.aspx (2019, November).

UWEX Lakes Program. [online]. 2010. Pre/Post Herbicide Comparison. Available from http://www.uwsp.edu/cnr-ap/UWEXLakes/Documents/ecology/Aquatic%20Plants/Appendix-D.pdf (2020, November).

WDNR. [online]. 2020. Little Trade Lake - Citizen Lake Water Quality Monitoring Database. Available from http://dnr.wi.gov/lakes/waterquality/Station.aspx?id=073121 (2020, November).

Appendix I: Survey Sample Points and Final Treatment Areas

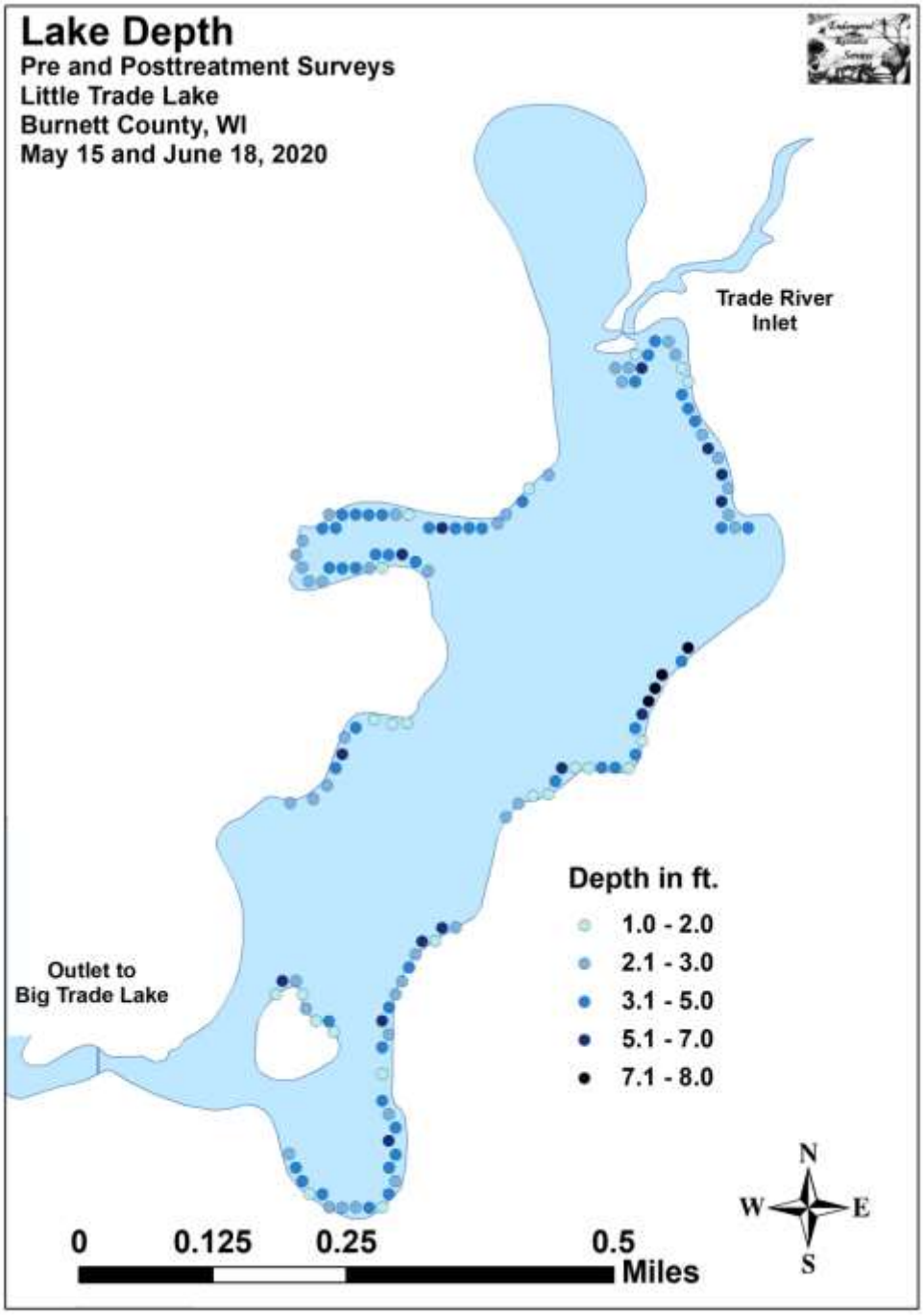

Survey Sample Points
Pre and Posttreatment Surveys
Little Trade Lake
Burnett County, WI
May 15 and June 18, 2020
Trade River
Inlet
Outlet to
Big Trade Lake
Sample Point
N
W
E
S
0
0.125
0.25
0.5
Miles

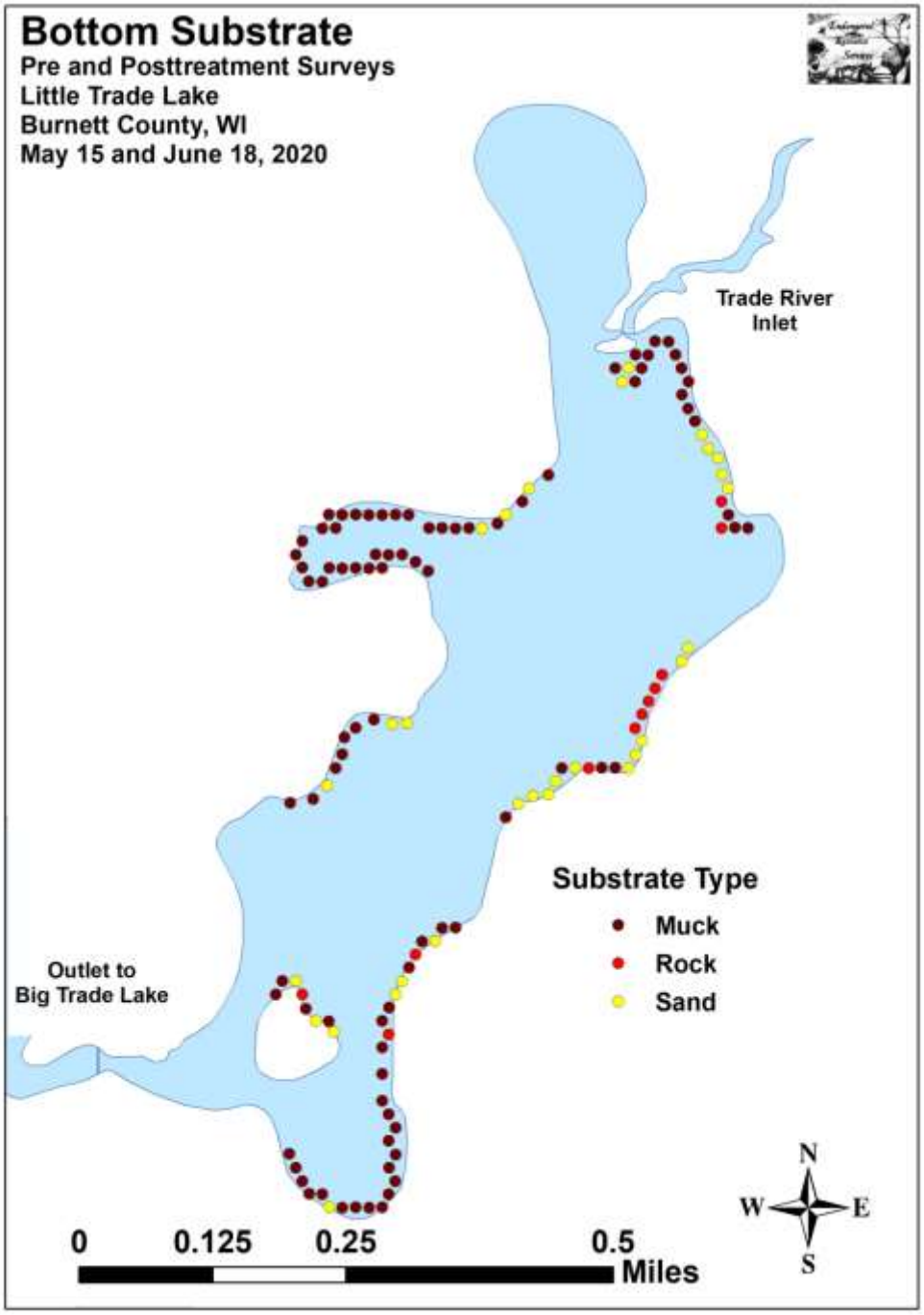

Final Treatment Areas
Endothall (Aquathol K) - 2ppm
2,4-D (Shredder Amine) - 3ppm
Little Trade Lake
Burnett County, WI
May 19 and 22, 2020
Trade River Inlet
Area 1
Area 8
Area 7
Area 2
Area 6
Area 3
Area 5
Outlet to Big Trade Lake
Area 4
Final CLP Treatment
Final EWM Treatment
N
W
E
S
0
0.125
0.25
0.5
Miles

Appendix II: Vegetative Survey Datasheet

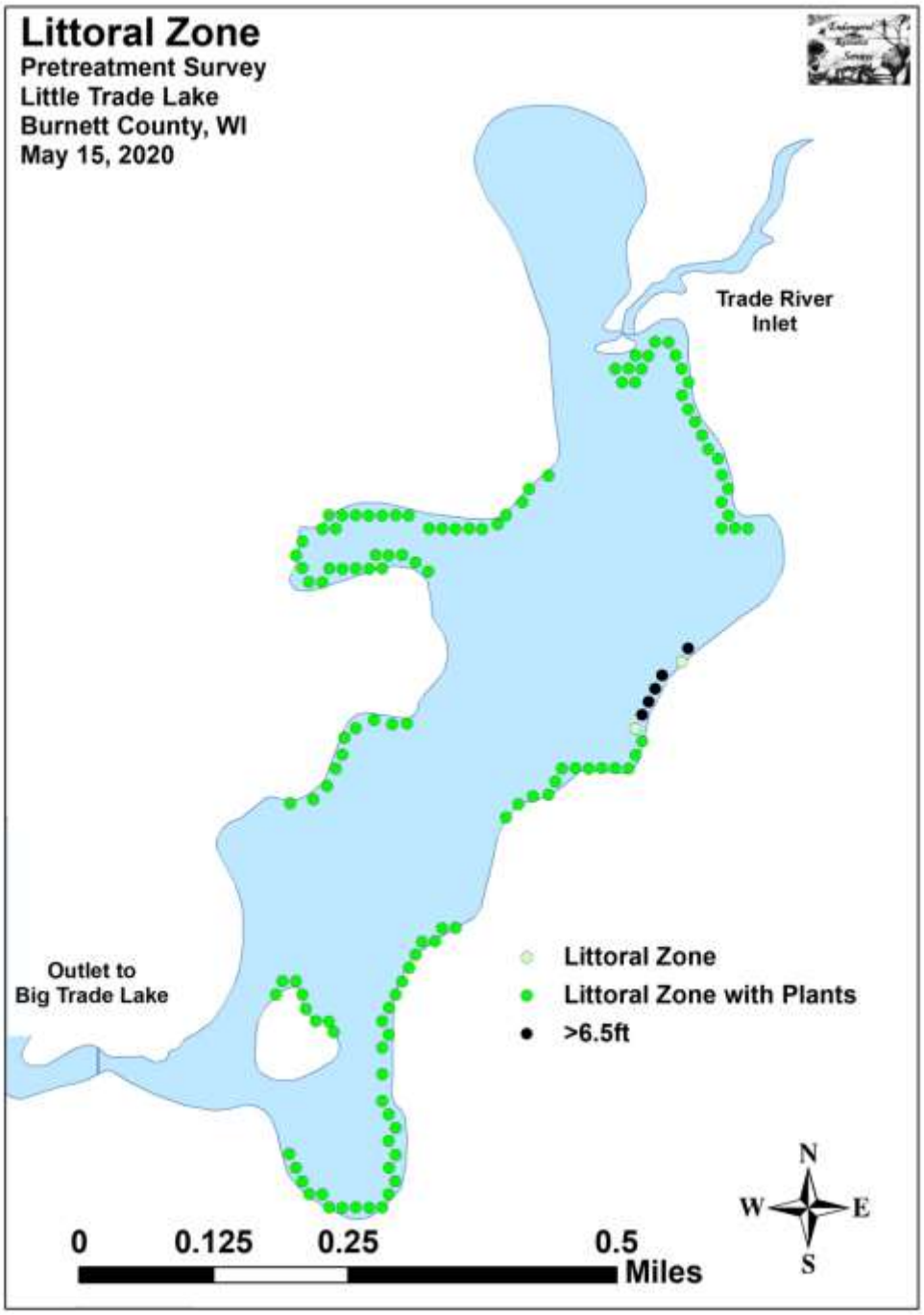
Observers for this lake: names and hours worked by each:																										
Lake:									**WBIC**									**County**						**Date:**		
Site #	**Depth (ft)**	**Muck (M), Sand (S), Rock (R)**	**Rake pole (P) or rake rope (R)**	**Total Rake Fullness**	**EWM**	**CLP**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**
1																									
2																									
3																									
4																									
5																									
6																									
7																									
8																									
9																									
10																									
11																									
12																									
13																									
14																									
15																									
16																									
17																									
18																									
19																									
20																									

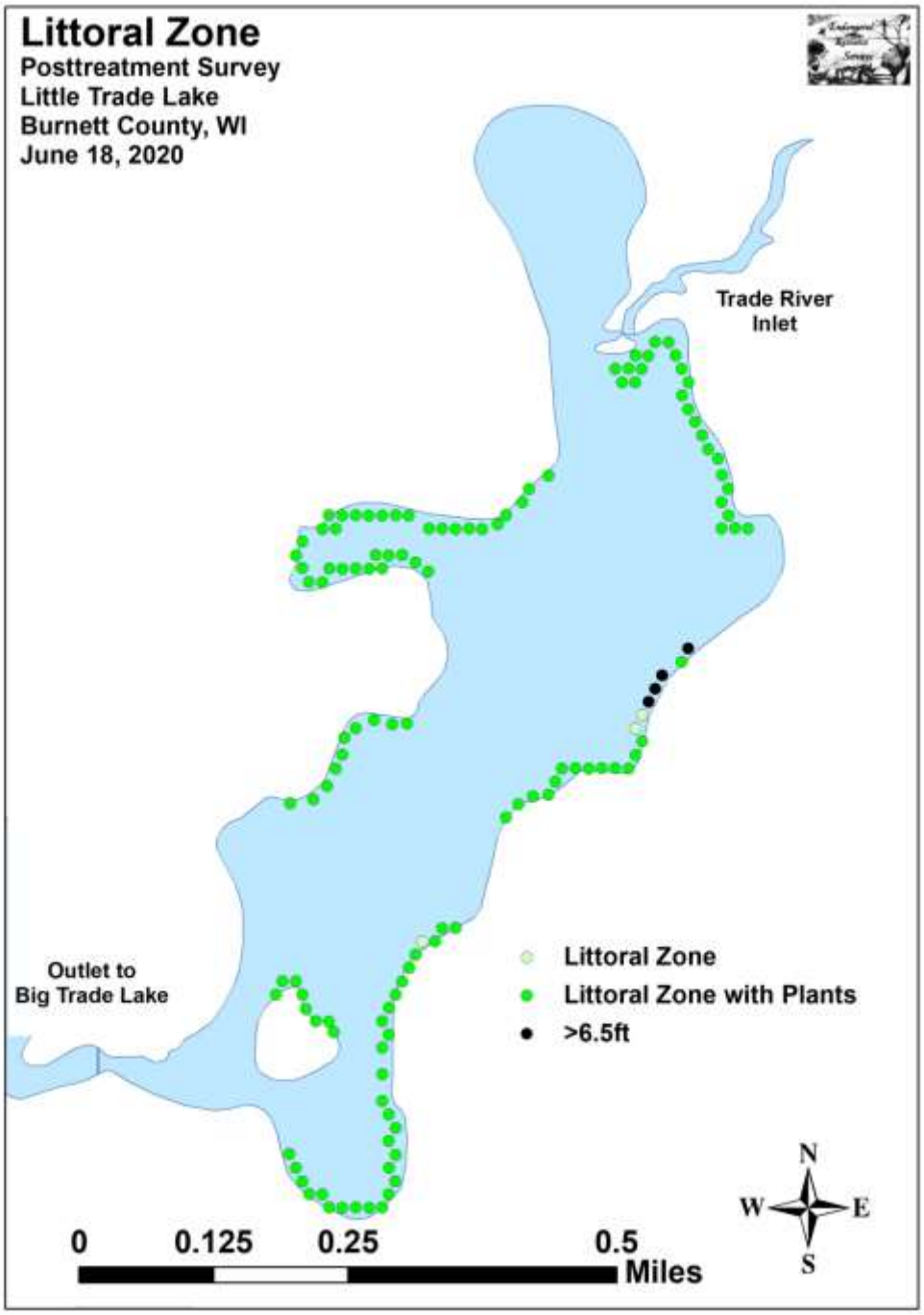
Appendix III: Pre/Post Habitat Variable Maps

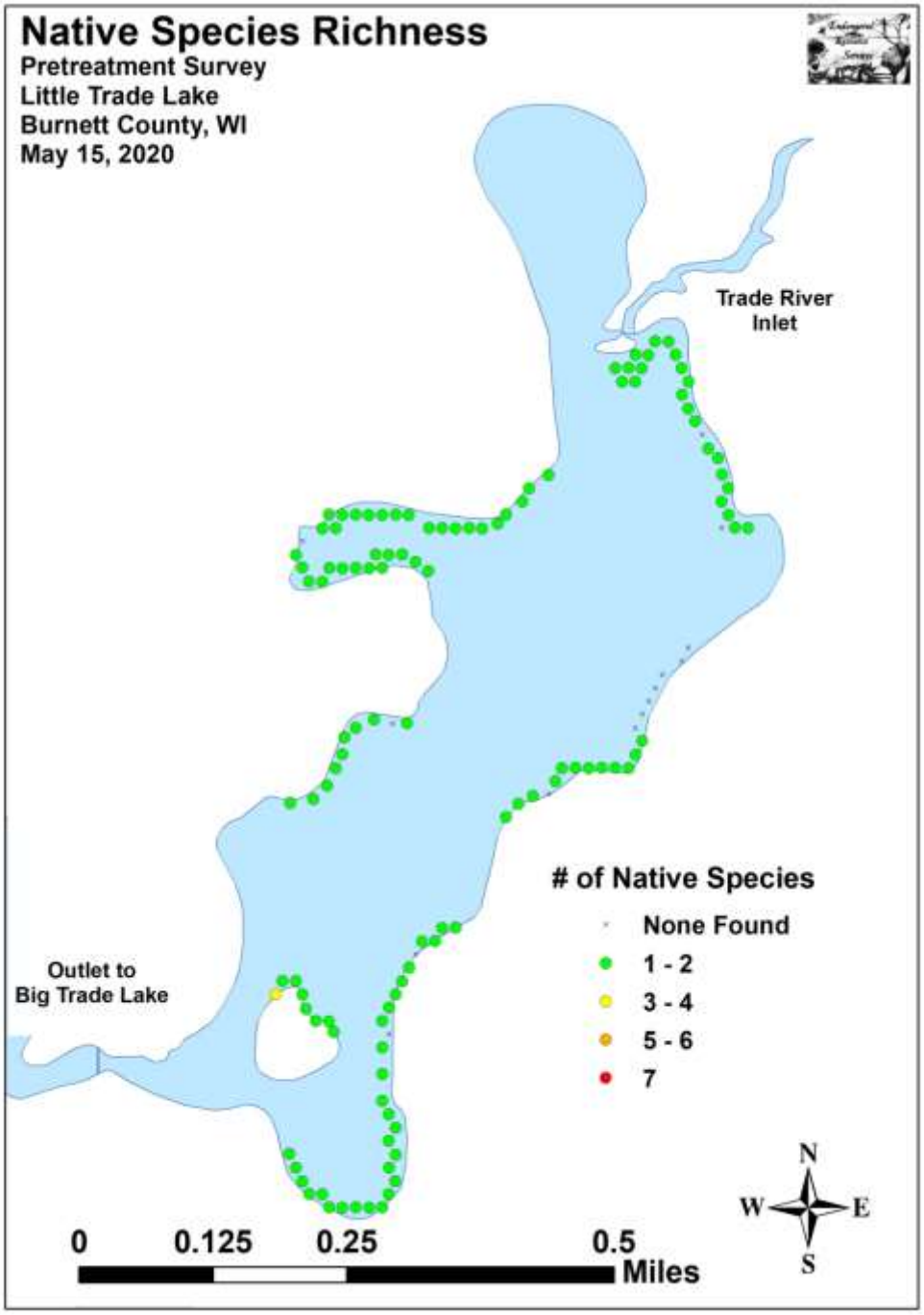

Lake Depth
Pre and Posttreatment Surveys
Little Trade Lake
Burnett County, WI
May 15 and June 18, 2020
Trade River
Inlet
Outlet to
Big Trade Lake
Depth in ft.
1.0 - 2.0
2.1 - 3.0
3.1 - 5.0
5.1 - 7.0
7.1 - 8.0
N
W
E
S
0
0.125
0.25
0.5
Miles

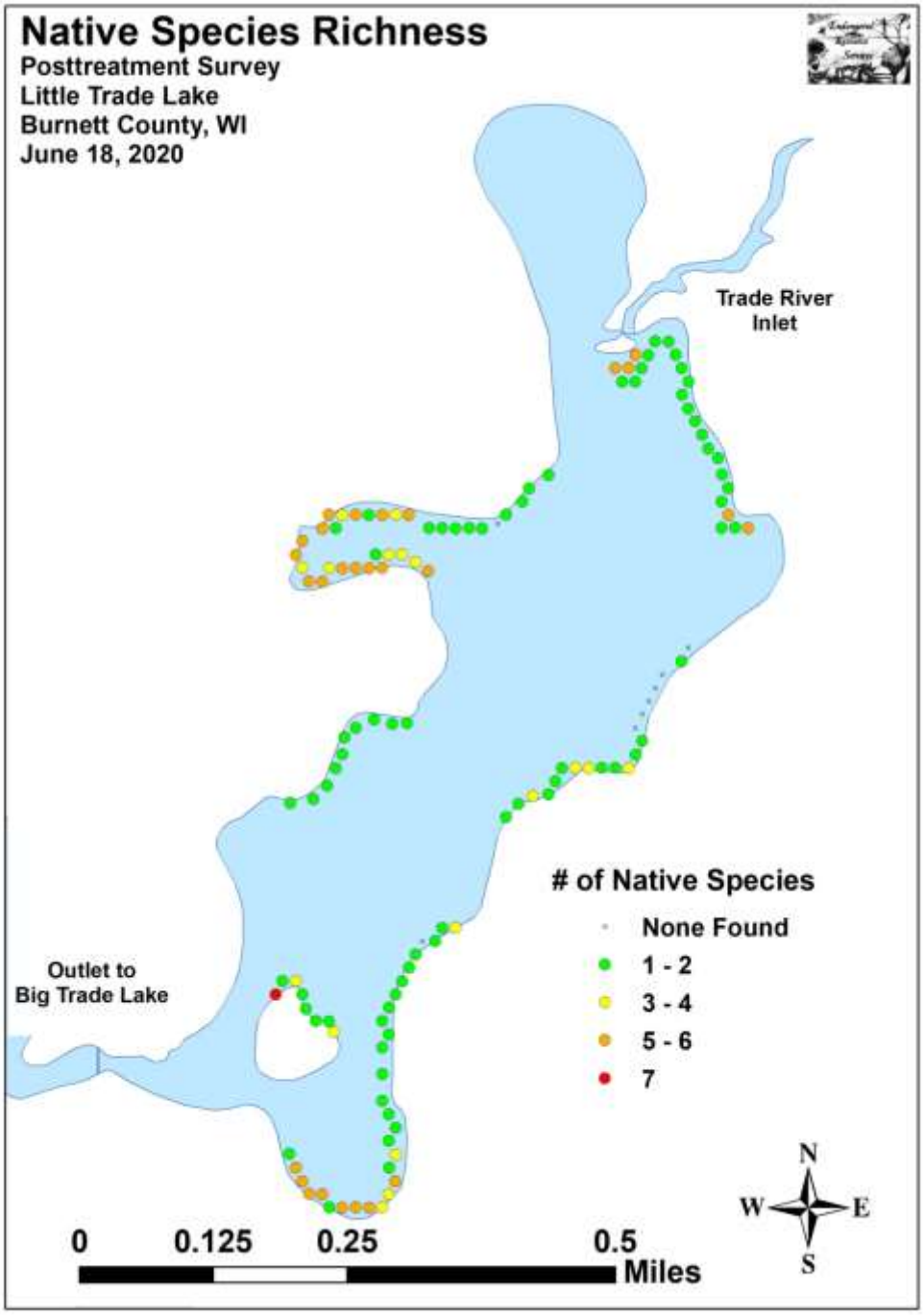

Bottom Substrate
Pre and Posttreatment Surveys
Little Trade Lake
Burnett County, WI
May 15 and June 18, 2020
Trade River
Inlet
Outlet to
Big Trade Lake
Substrate Type
Muck
Rock
Sand
N
W
E
S
0
0.125
0.25
0.5
Miles

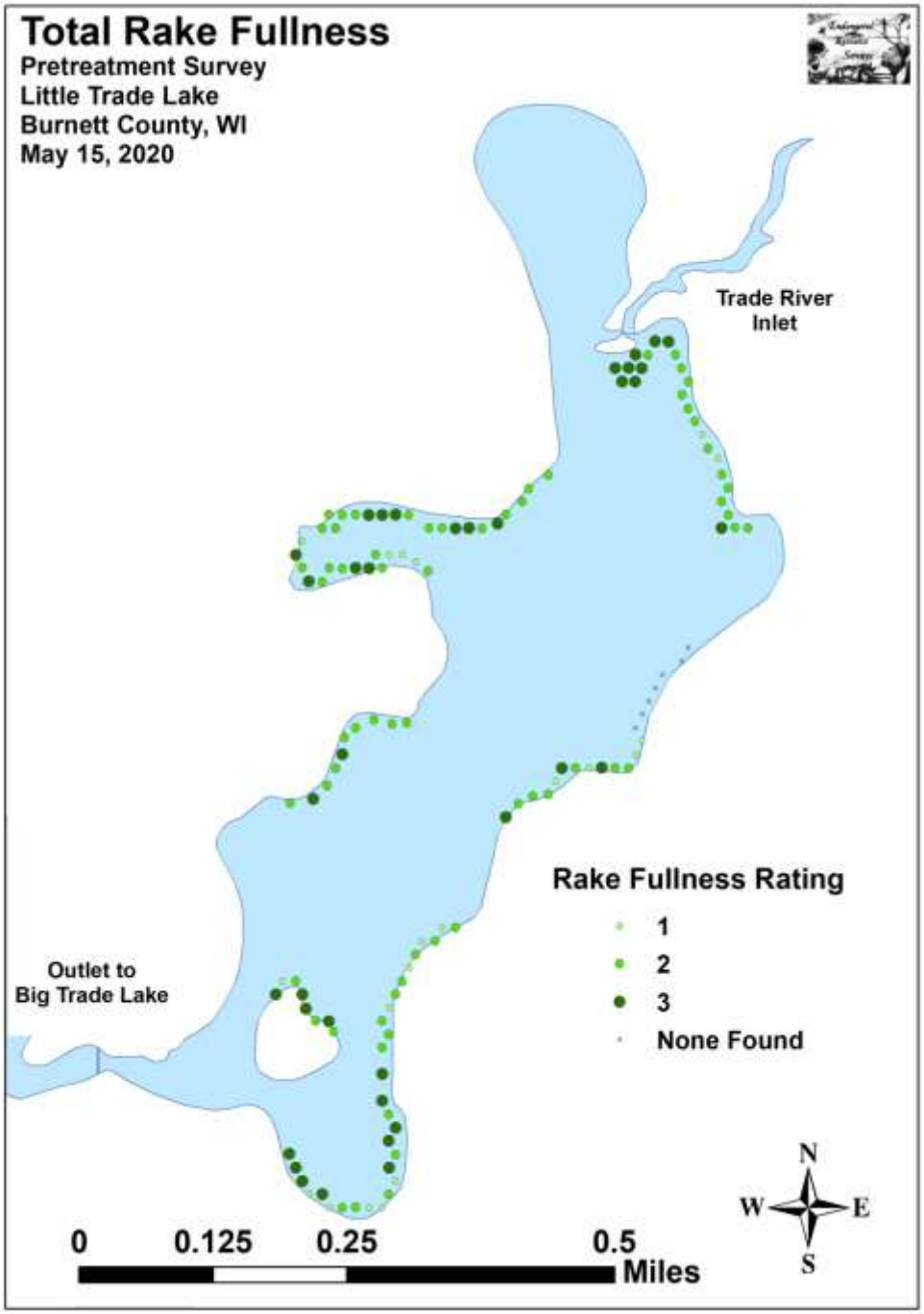
Appendix IV: Pre/Post Littoral Zone, Native Species Richness and Total Rake Fullness

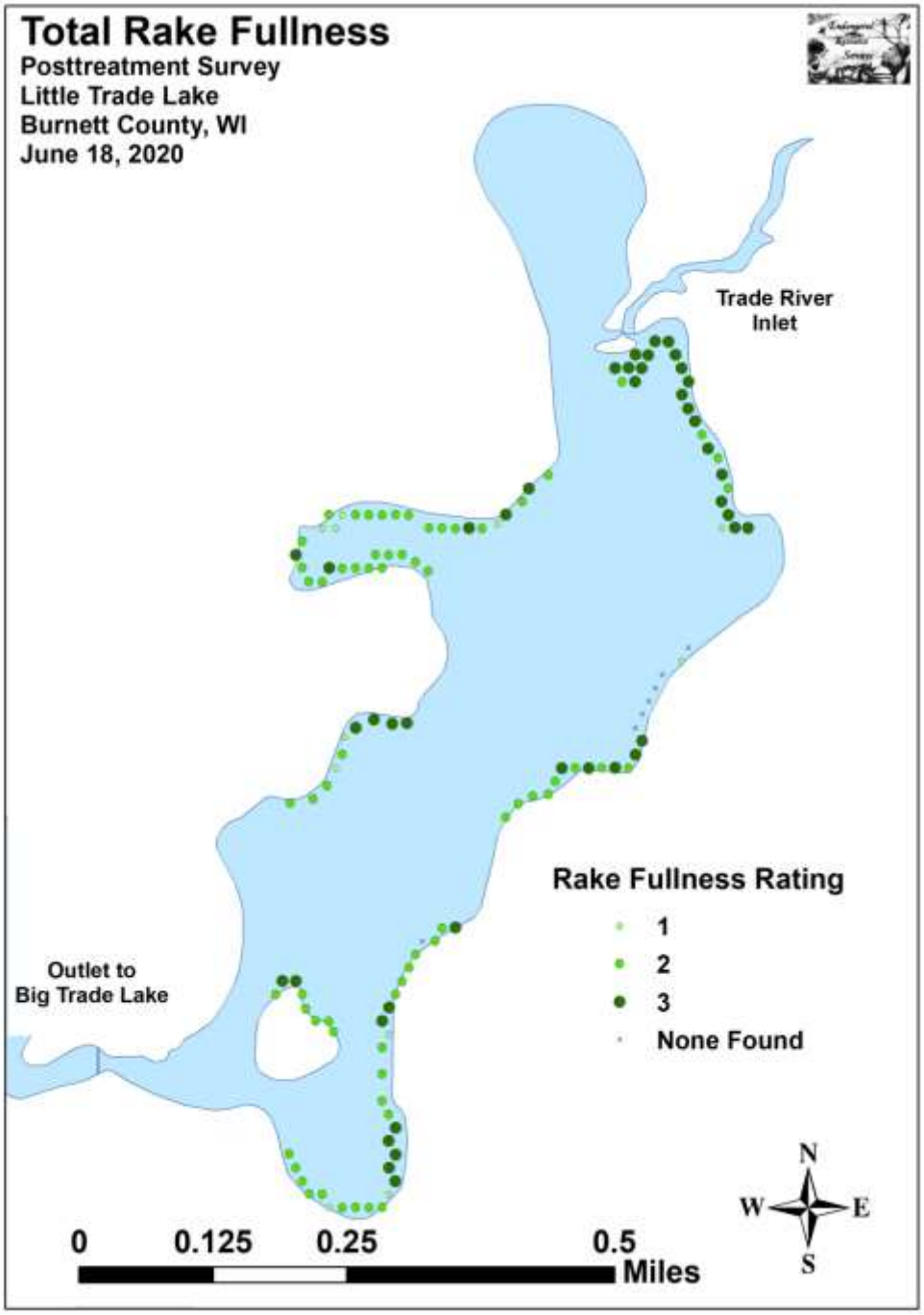

Littoral Zone
Pretreatment Survey
Little Trade Lake
Burnett County, WI
May 15, 2020
Trade River
Inlet
Outlet to
Big Trade Lake
Littoral Zone
Littoral Zone with Plants
>6.5ft
N
W
E
S
0
0.125
0.25
0.5
Miles


Littoral Zone
Posttreatment Survey
Little Trade Lake
Burnett County, WI
June 18, 2020
Trade River
Inlet
Outlet to
Big Trade Lake
Littoral Zone
Littoral Zone with Plants
>6.5ft
N
W
E
S
0
0.125
0.25
0.5
Miles

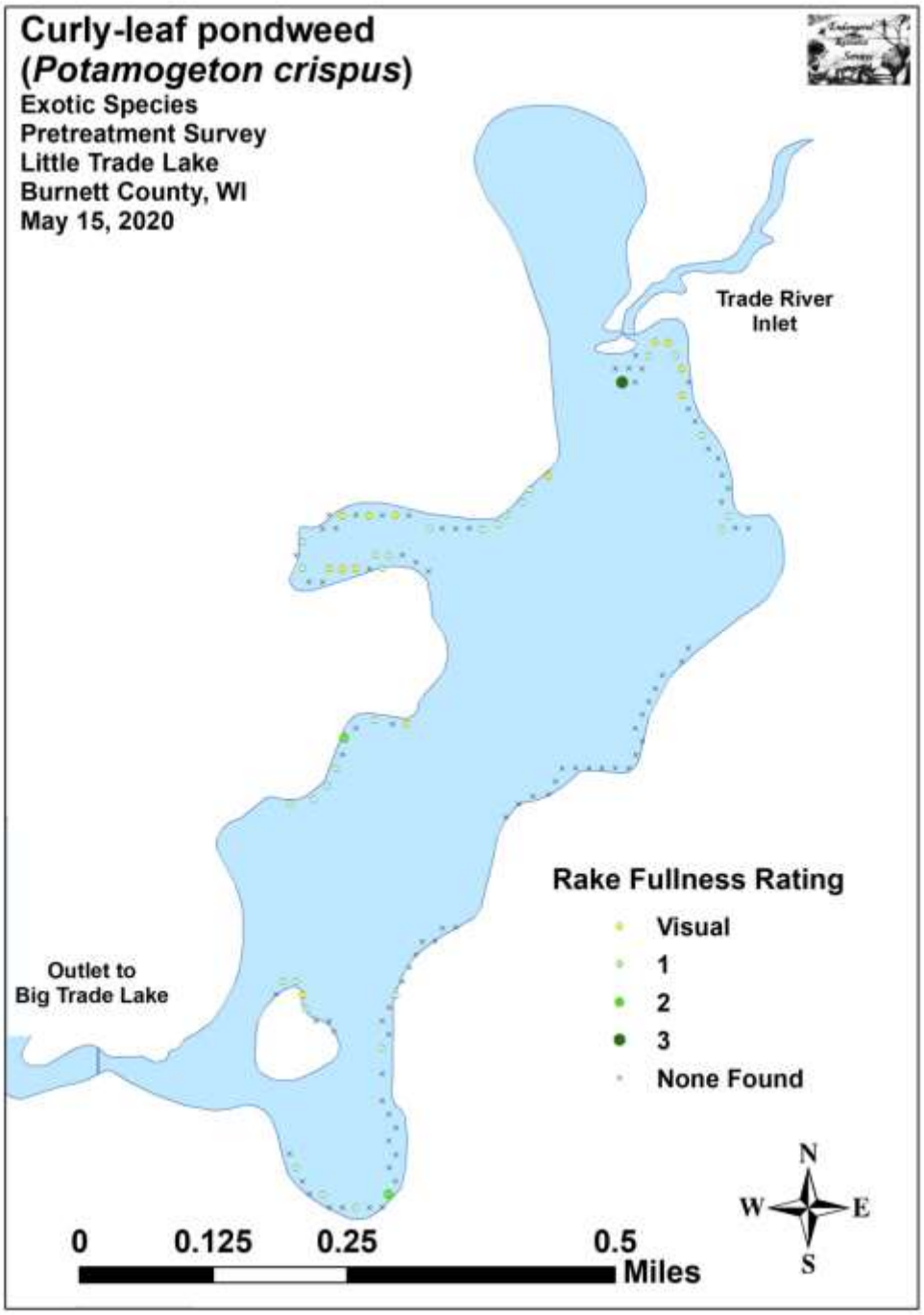

Native Species Richness
Pretreatment Survey
Little Trade Lake
Burnett County, WI
May 15, 2020
Trade River
Inlet
Outlet to
Big Trade Lake
# of Native Species
None Found
1 - 2
3 - 4
5 - 6
7
N
W
E
S
0
0.125
0.25
0.5
Miles

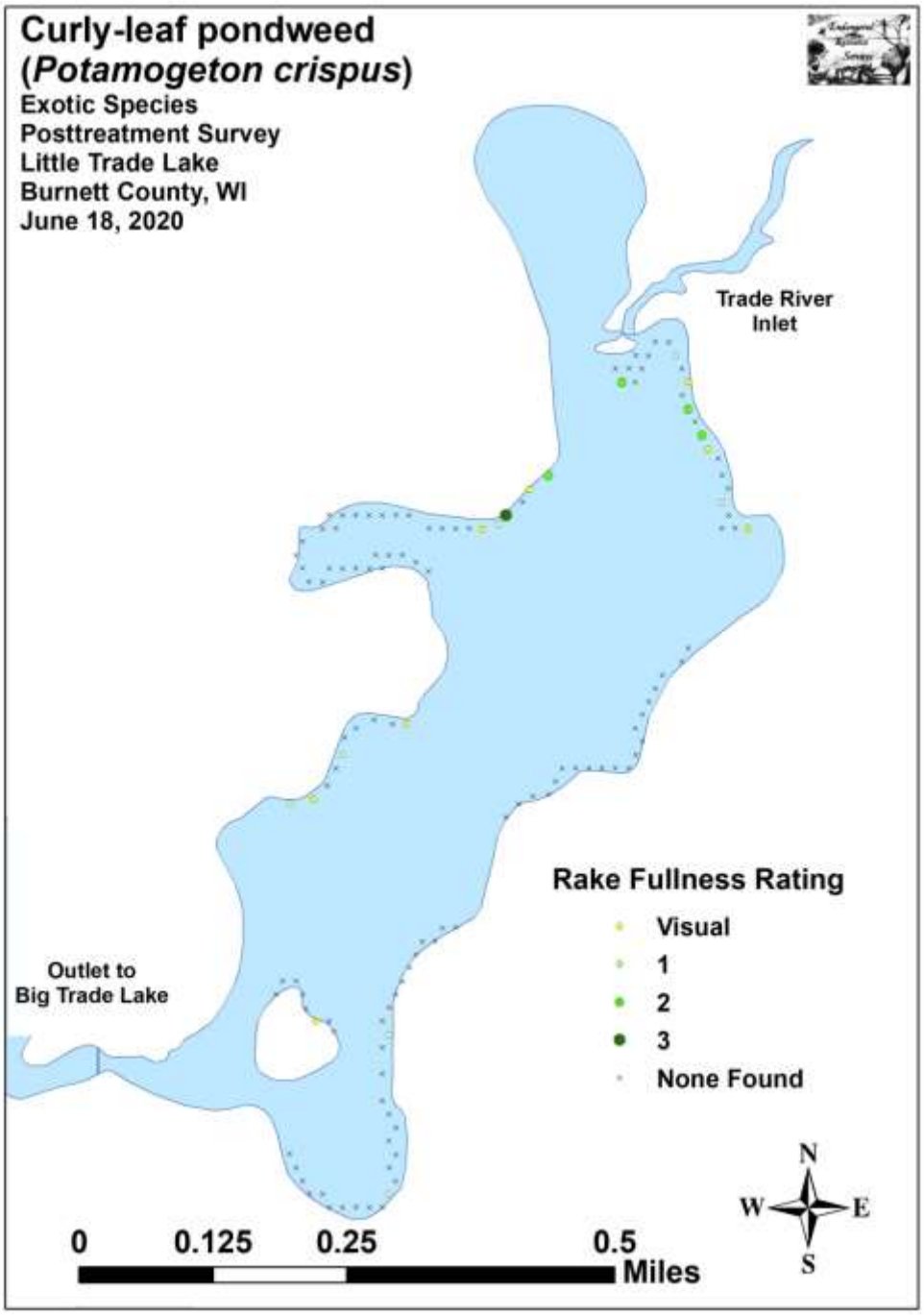

Native Species Richness
Posttreatment Survey
Little Trade Lake
Burnett County, WI
June 18, 2020
Trade River
Inlet
Outlet to
Big Trade Lake
# of Native Species
None Found
1 - 2
3 - 4
5 - 6
7
N
W
E
S
0
0.125
0.25
0.5
Miles

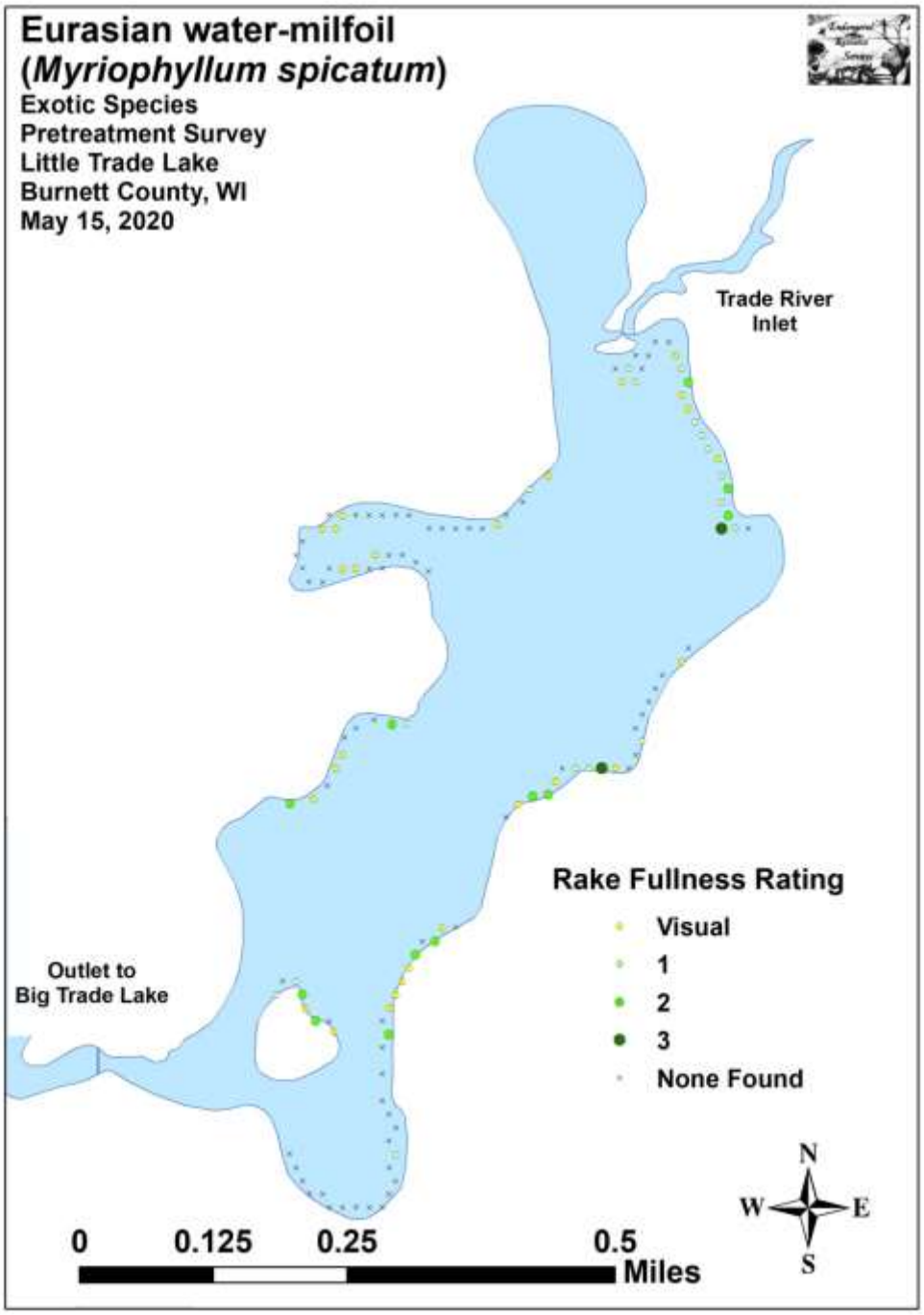

Total Rake Fullness
Pretreatment Survey
Little Trade Lake
Burnett County, WI
May 15, 2020
Trade River
Inlet
Outlet to
Big Trade Lake
Rake Fullness Rating
1
2
3
None Found
N
W
E
S
0
0.125
0.25
0.5
Miles

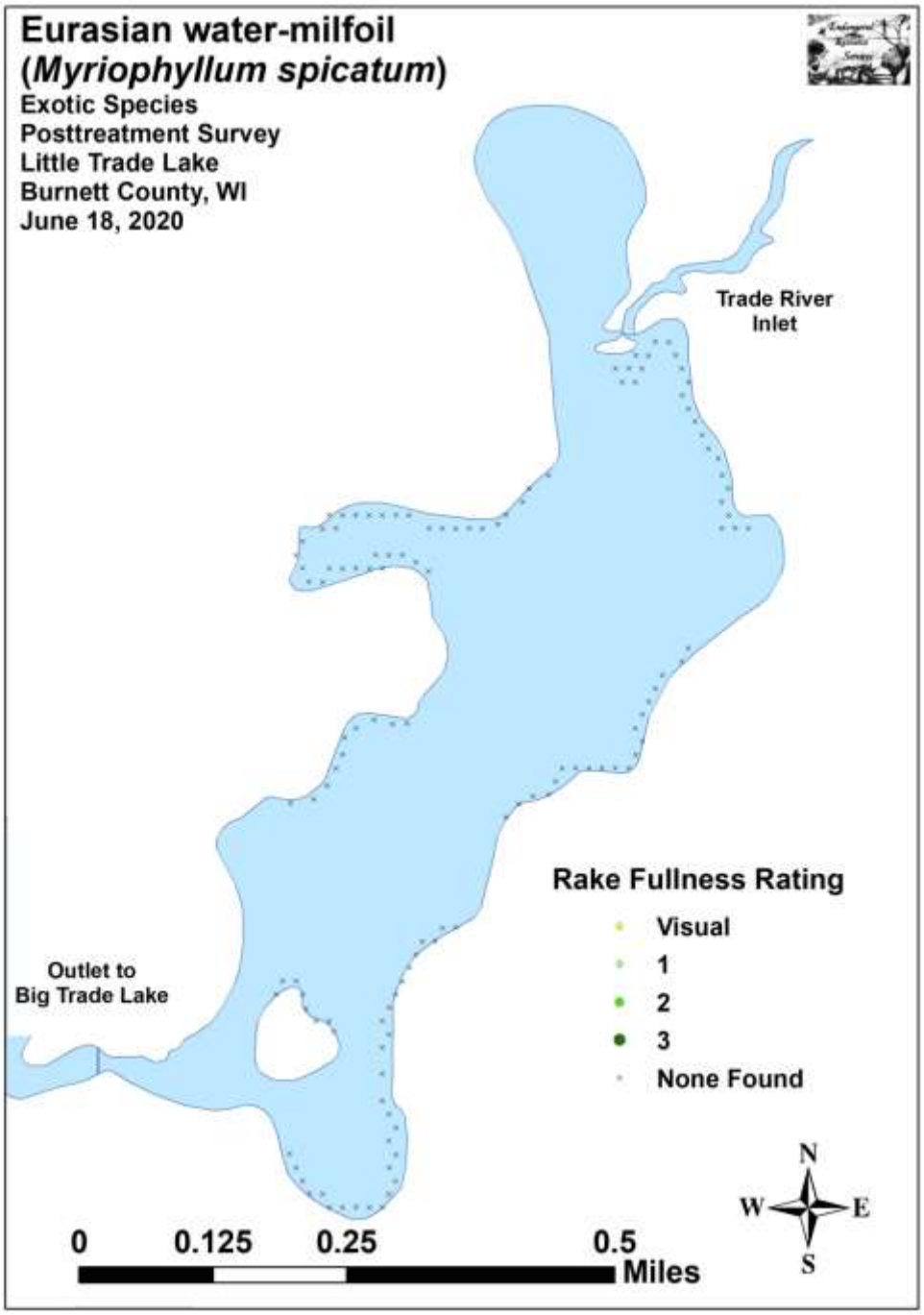

Total Rake Fullness
Posttreatment Survey
Little Trade Lake
Burnett County, WI
June 18, 2020
Trade River
Inlet
Outlet to
Big Trade Lake
Rake Fullness Rating
1
2
3
None Found
N
W
E
S
0
0.125
0.25
0.5
Miles

Appendix V: CLP and EWM Pre/Post Density and Distribution

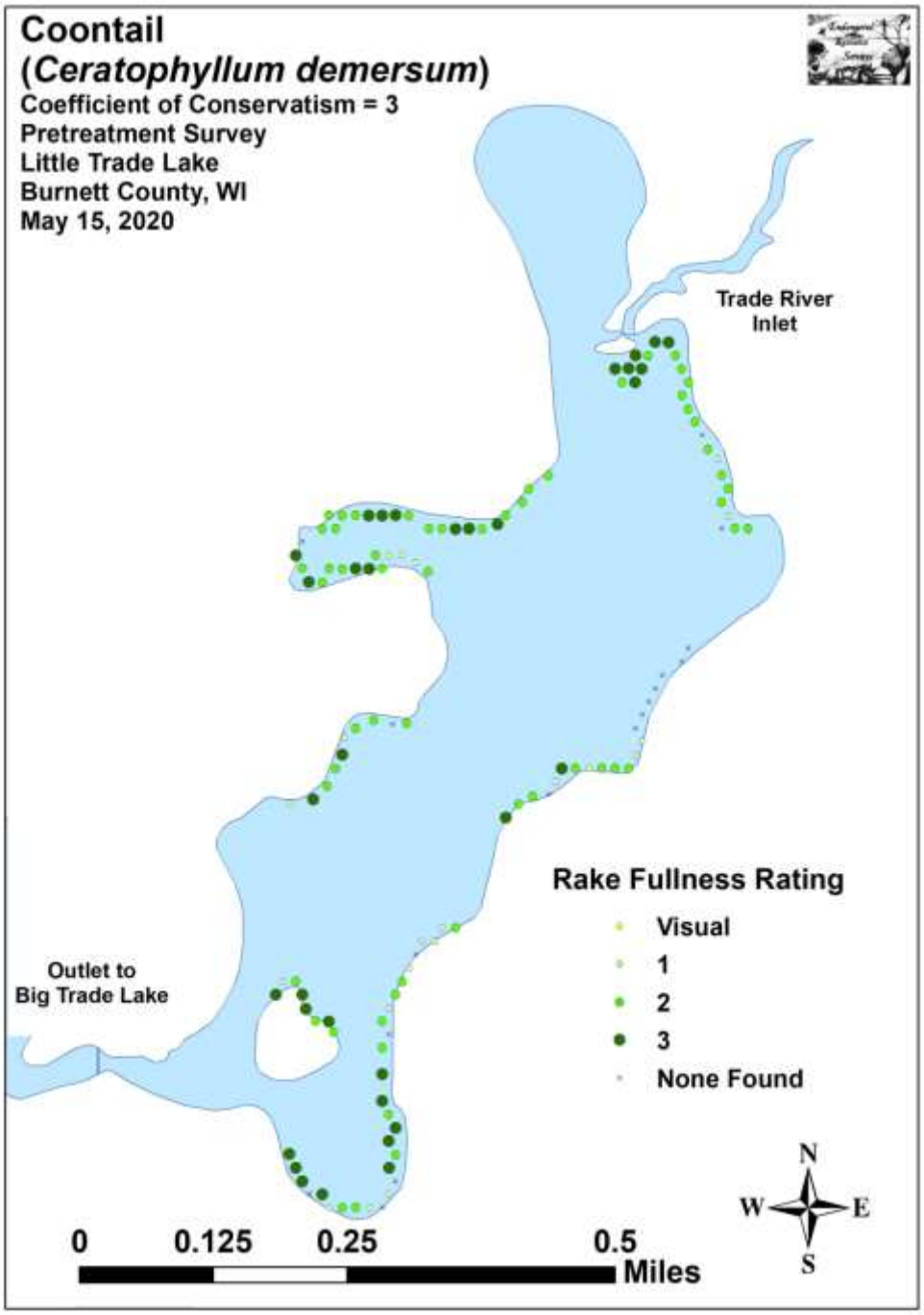

Curly-leaf pondweed
(Potamogeton crispus)
Exotic Species
Pretreatment Survey
Little Trade Lake
Burnett County, WI
May 15, 2020
Trade River
Inlet
Outlet to
Big Trade Lake
Rake Fullness Rating
Visual
1
2
3
None Found
N
W
E
S
0
0.125
0.25
0.5
Miles

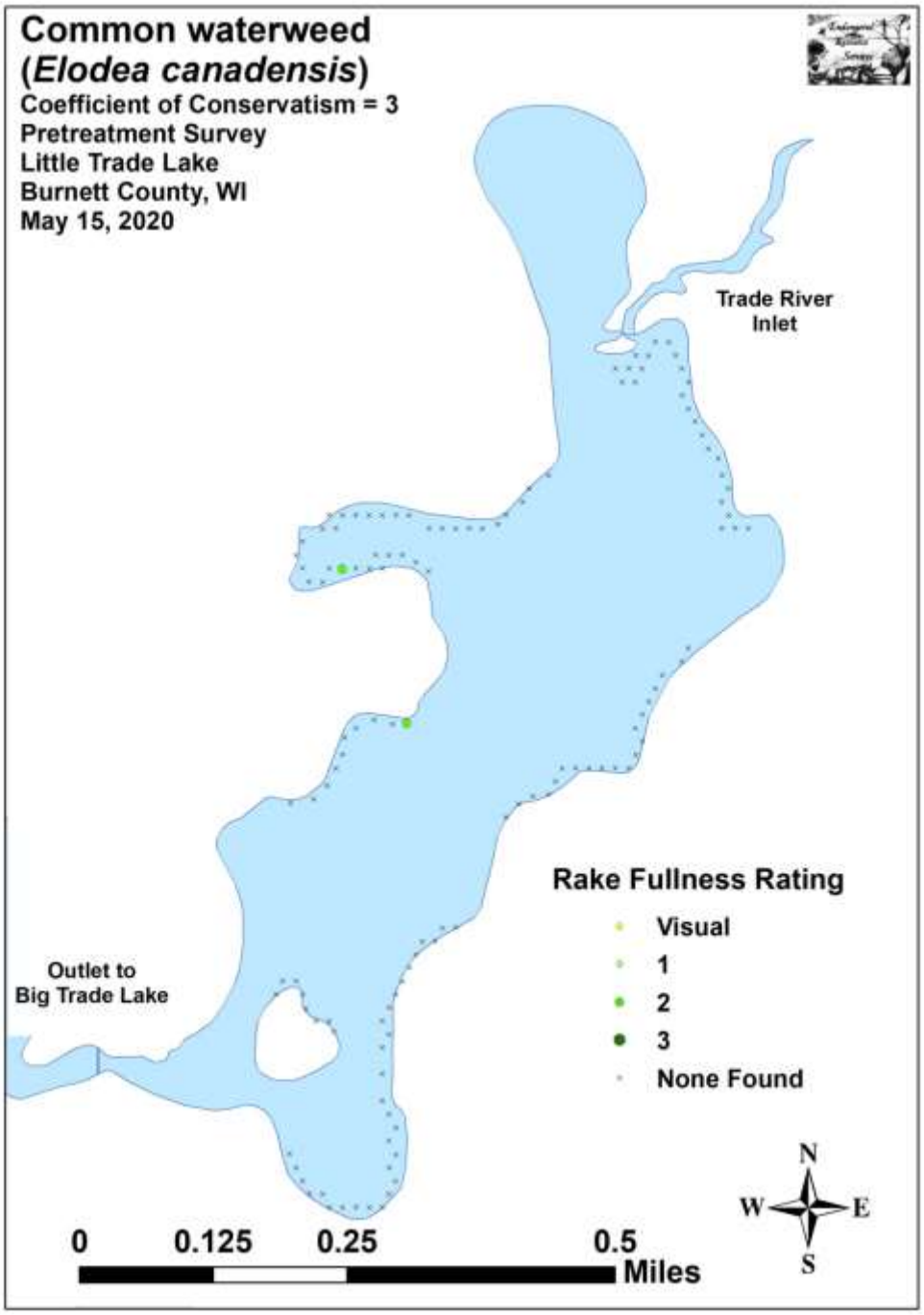

Curly-leaf pondweed
(Potamogeton crispus)
Exotic Species
Posttreatment Survey
Little Trade Lake
Burnett County, WI
June 18, 2020
Trade River
Inlet
Outlet to
Big Trade Lake
Rake Fullness Rating
Visual
1
2
3
None Found
N
W
E
S
0
0.125
0.25
0.5
Miles

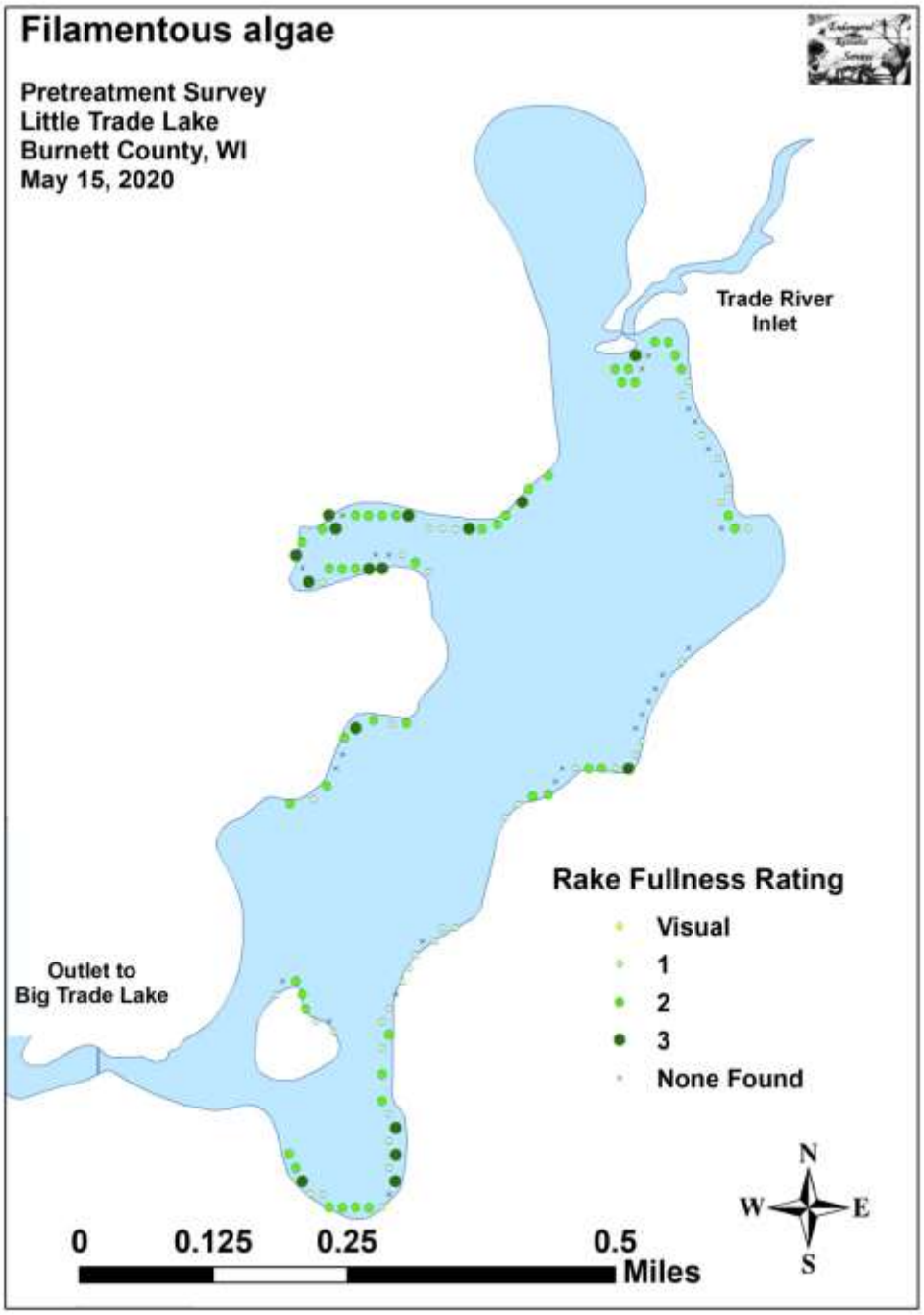

Eurasian water-milfoil
(Myriophyllum spicatum)
Exotic Species
Pretreatment Survey
Little Trade Lake
Burnett County, WI
May 15, 2020
Trade River
Inlet
Outlet to
Big Trade Lake
Rake Fullness Rating
Visual
1
2
3
None Found
N
W
E
S
0
0.125
0.25
0.5
Miles

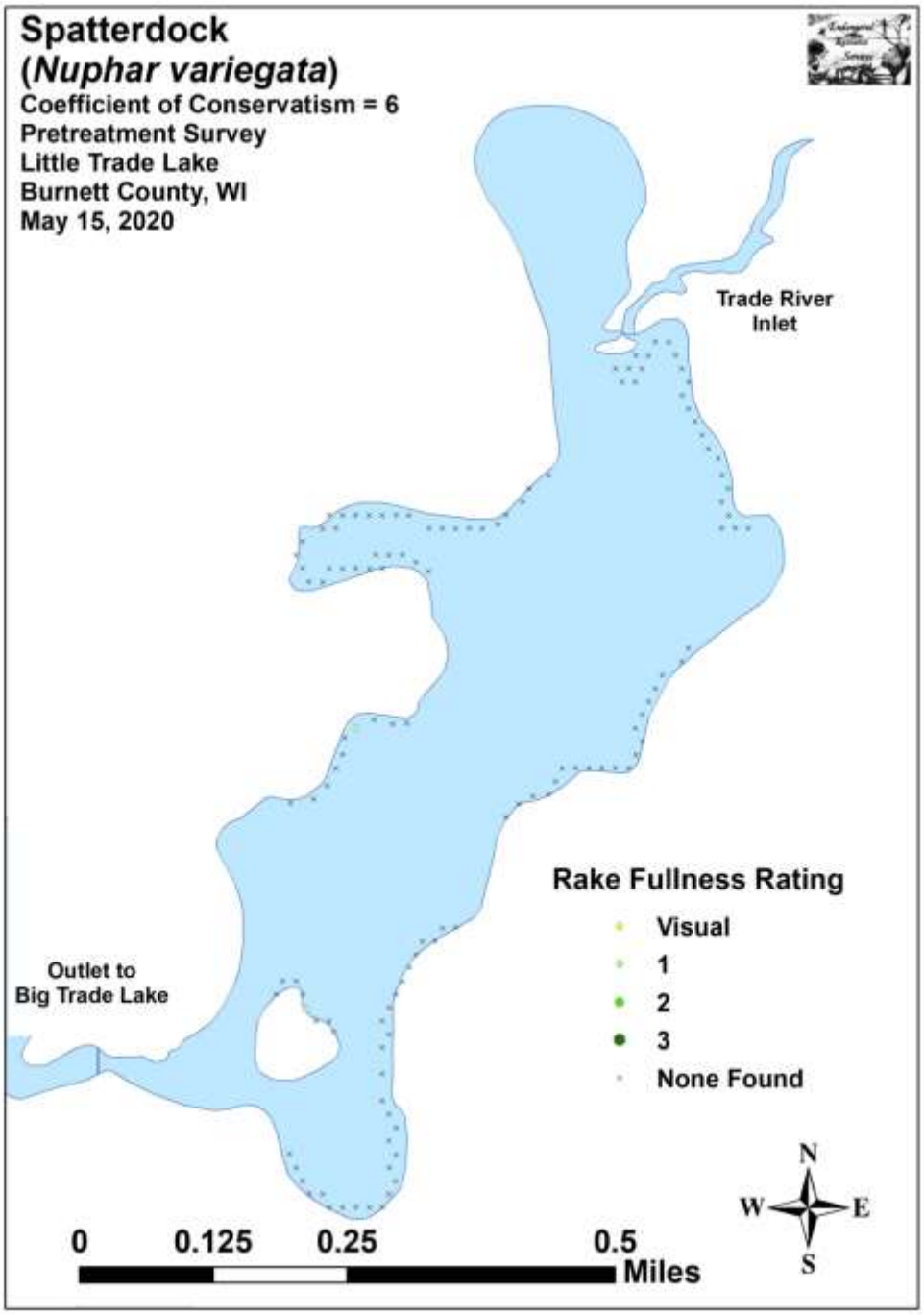

Eurasian water-milfoil
(Myriophyllum spicatum)
Exotic Species
Posttreatment Survey
Little Trade Lake
Burnett County, WI
June 18, 2020
Trade River
Inlet
Outlet to
Big Trade Lake
Rake Fullness Rating
Visual
1
2
3
None Found
N
W
E
S
0
0.125
0.25
0.5
Miles

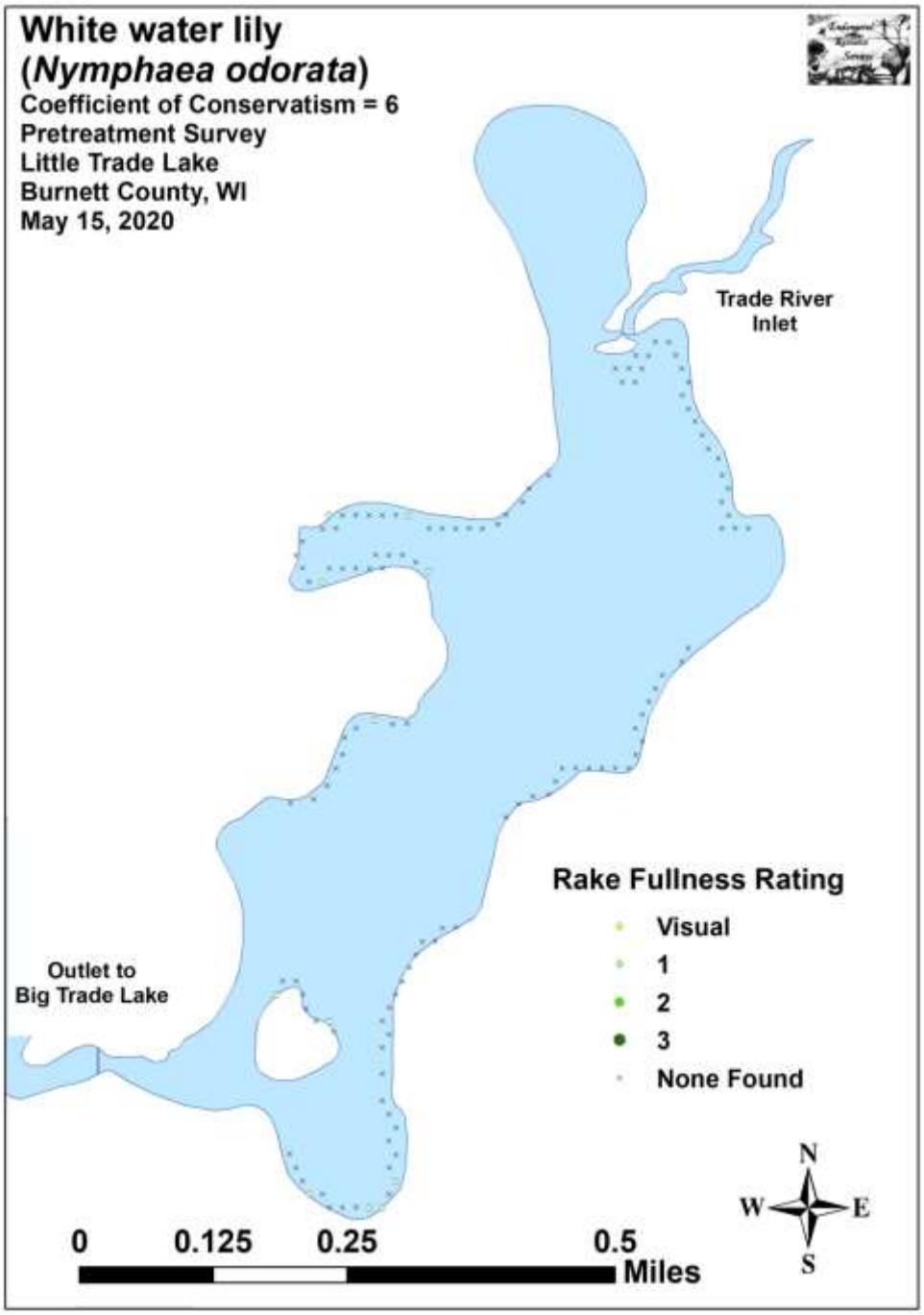
Appendix VI: Pretreatment Native Species Density and Distribution

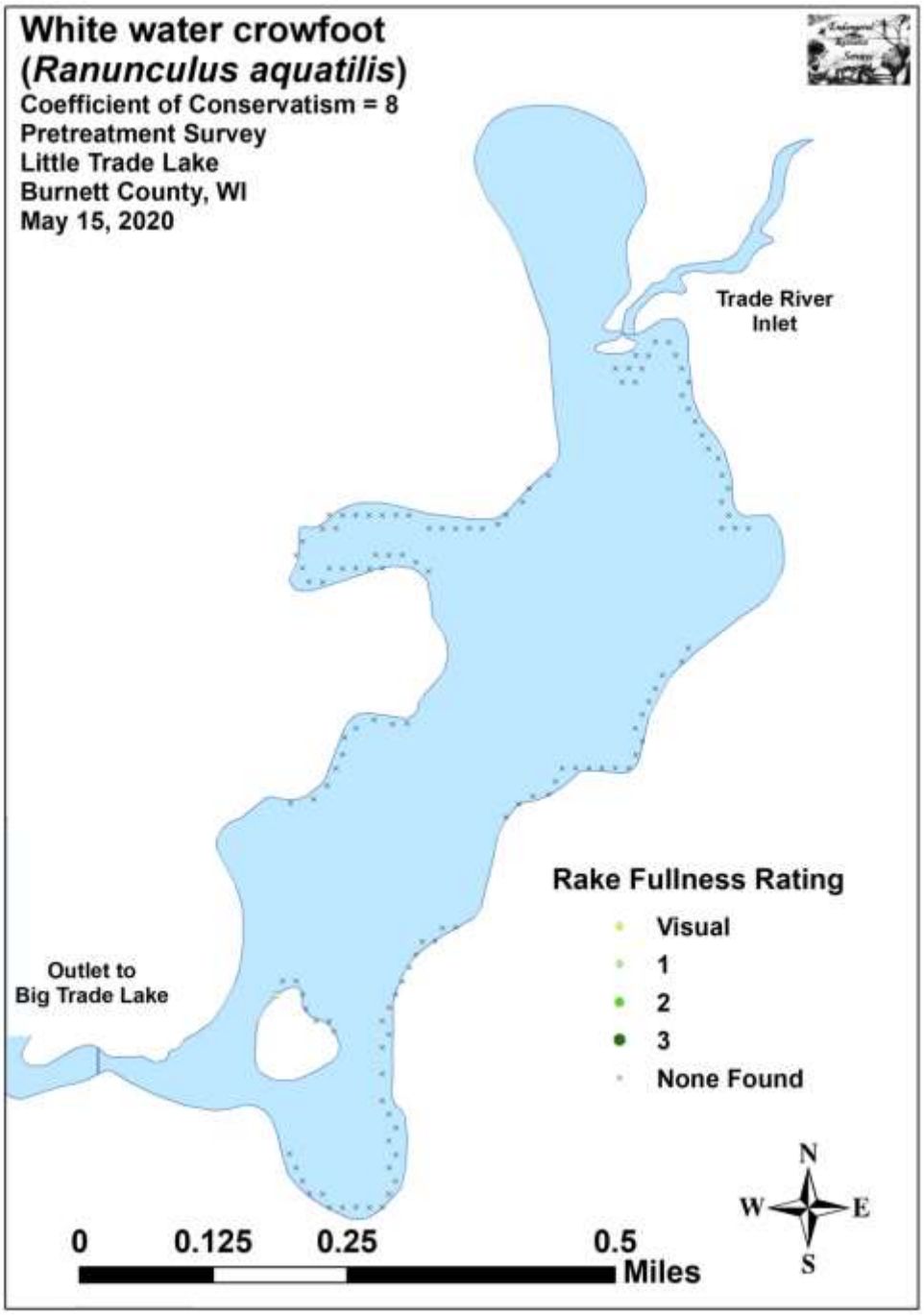

Coontail
(Ceratophyllum demersum)
Coefficient of Conservatism = 3
Pretreatment Survey
Little Trade Lake
Burnett County, WI
May 15, 2020
Trade River
Inlet
Outlet to
Big Trade Lake
Rake Fullness Rating
Visual
1
2
3
None Found
N
W
E
S
0
0.125
0.25
0.5
Miles


Common waterweed
(Elodea canadensis)
Coefficient of Conservatism = 3
Pretreatment Survey
Little Trade Lake
Burnett County, WI
May 15, 2020
Trade River
Inlet
Outlet to
Big Trade Lake
Rake Fullness Rating
Visual
1
2
3
None Found
N
W
E
S
0
0.125
0.25
0.5
Miles

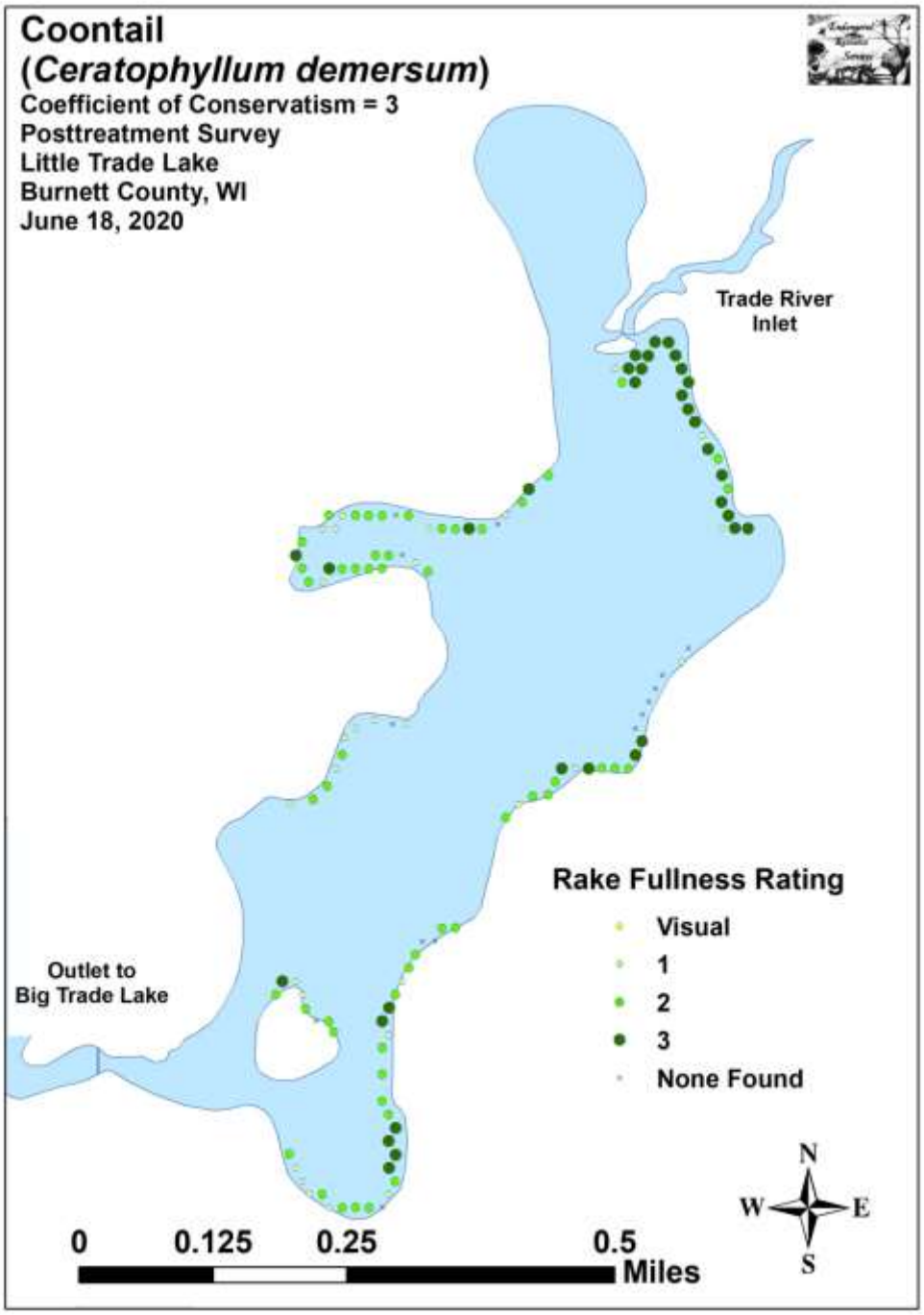

Filamentous algae
Pretreatment Survey
Little Trade Lake
Burnett County, WI
May 15, 2020
Trade River
Inlet
Outlet to
Big Trade Lake
Rake Fullness Rating
Visual
1
2
3
None Found
N
W
E
S
0
0.125
0.25
0.5
Miles

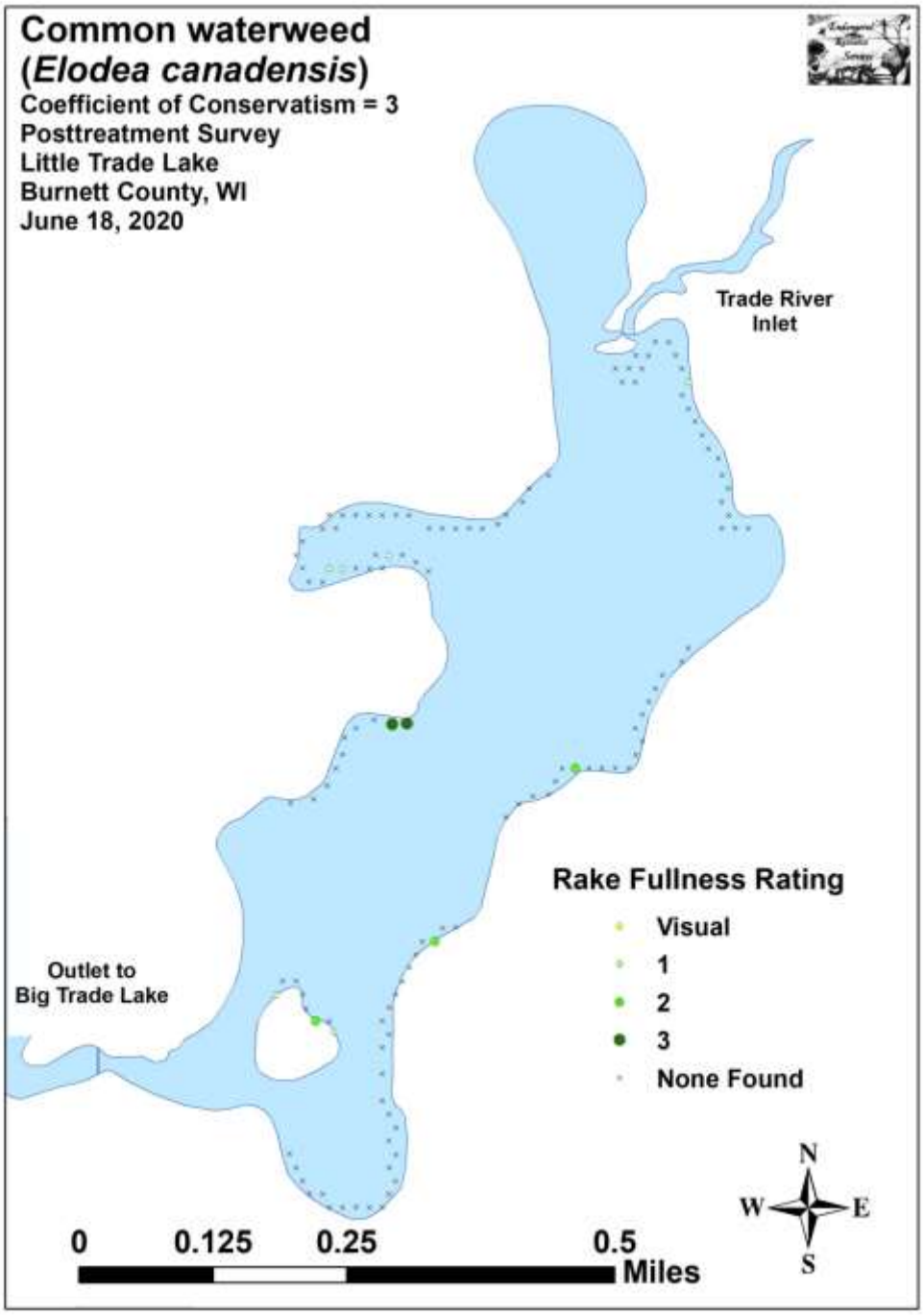

Spatterdock
(Nuphar variegata)
Coefficient of Conservatism = 6
Pretreatment Survey
Little Trade Lake
Burnett County, WI
May 15, 2020
Trade River
Inlet
Outlet to
Big Trade Lake
Rake Fullness Rating
Visual
1
2
3
None Found
N
W
E
S
0
0.125
0.25
0.5
Miles

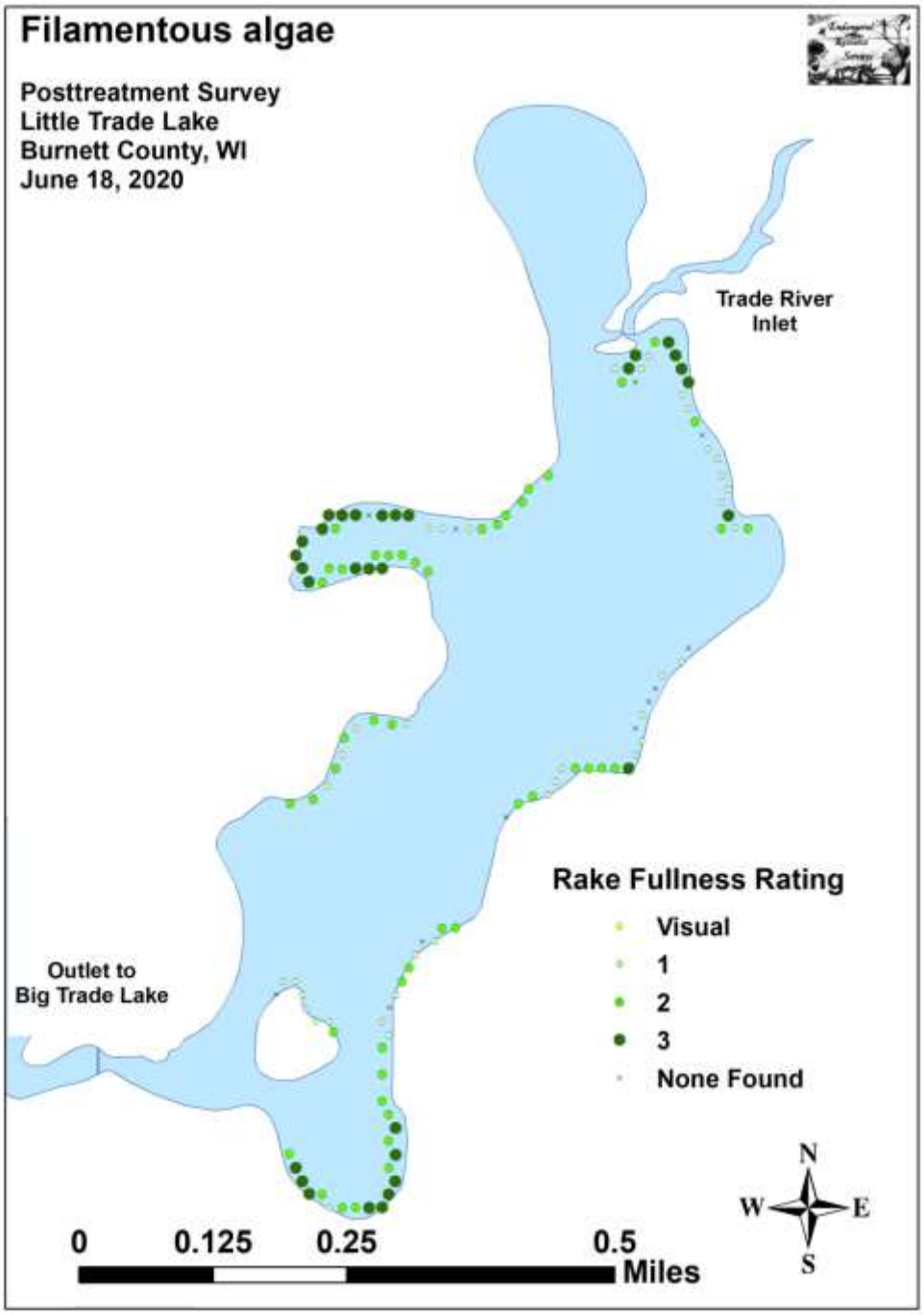

White water lily
(Nymphaea odorata)
Coefficient of Conservatism = 6
Pretreatment Survey
Little Trade Lake
Burnett County, WI
May 15, 2020
Trade River
Inlet
Outlet to
Big Trade Lake
Rake Fullness Rating
Visual
1
2
3
None Found
N
W
E
S
0
0.125
0.25
0.5
Miles

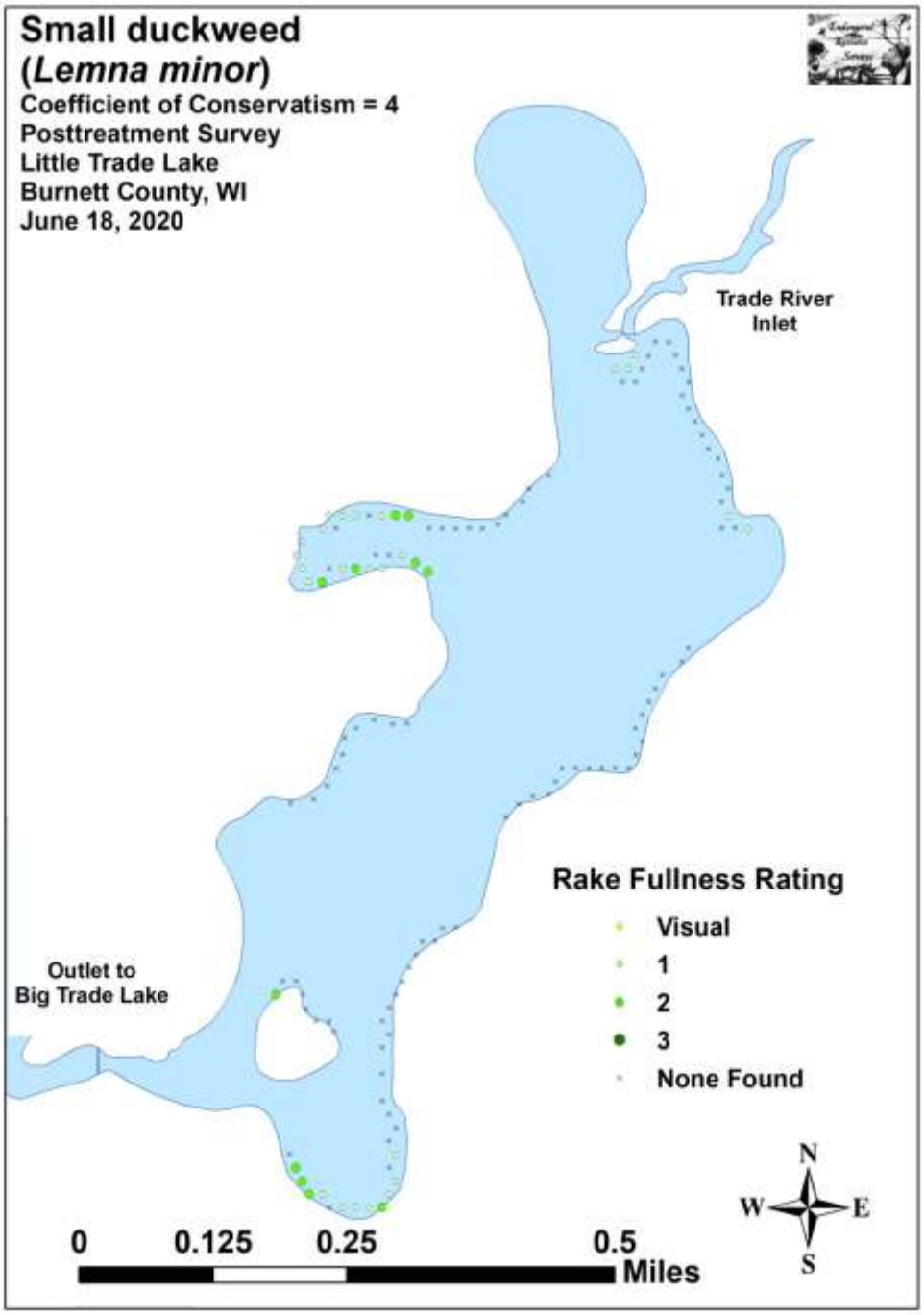

White water crowfoot
(Ranunculus aquatilis)
Coefficient of Conservatism = 8
Pretreatment Survey
Little Trade Lake
Burnett County, WI
May 15, 2020
Trade River
Inlet
Outlet to
Big Trade Lake
Rake Fullness Rating
Visual
1
2
3
None Found
N
W
E
S
0
0.125
0.25
0.5
Miles

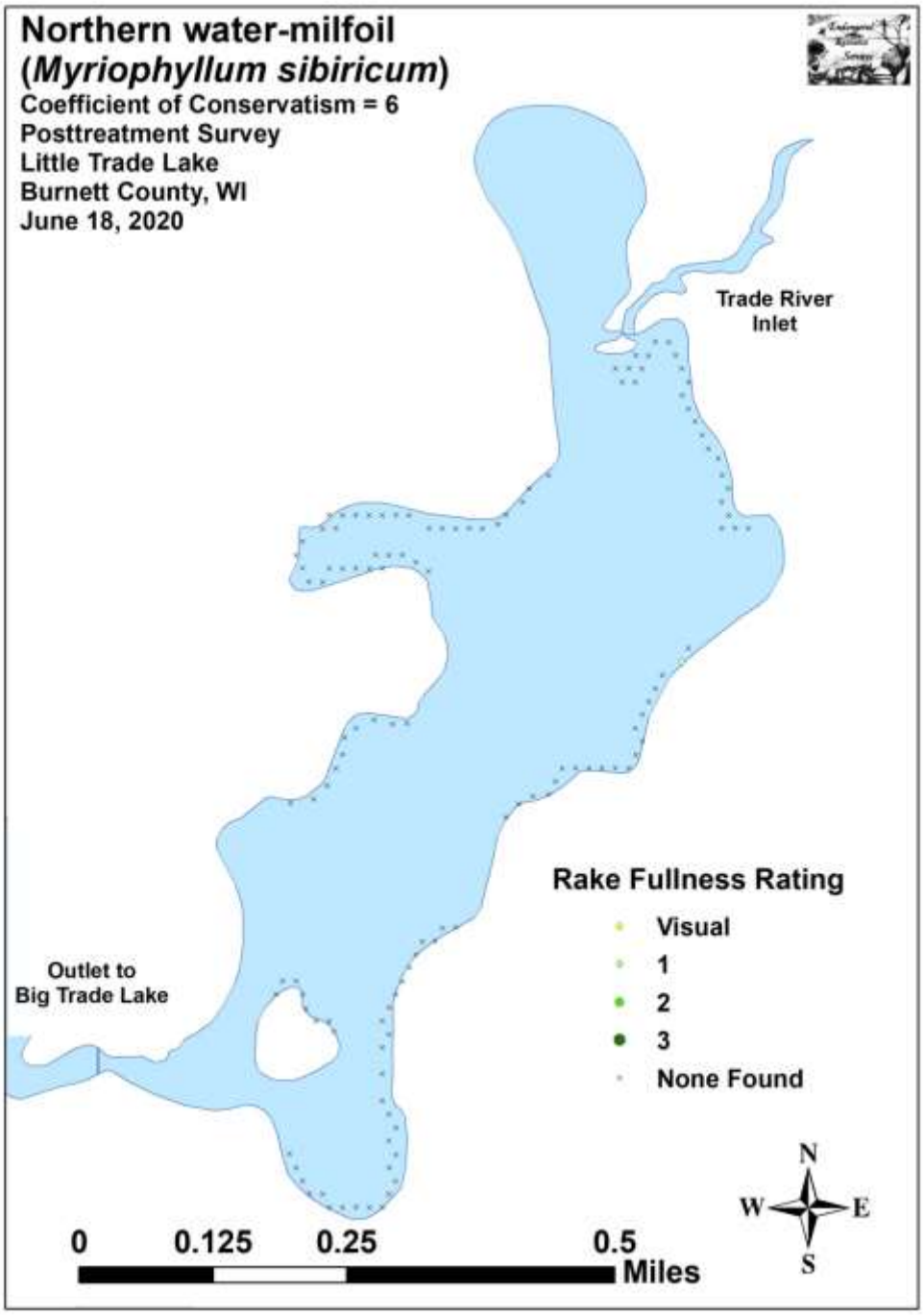
Appendix VII: Posttreatment Native Species Density and Distribution

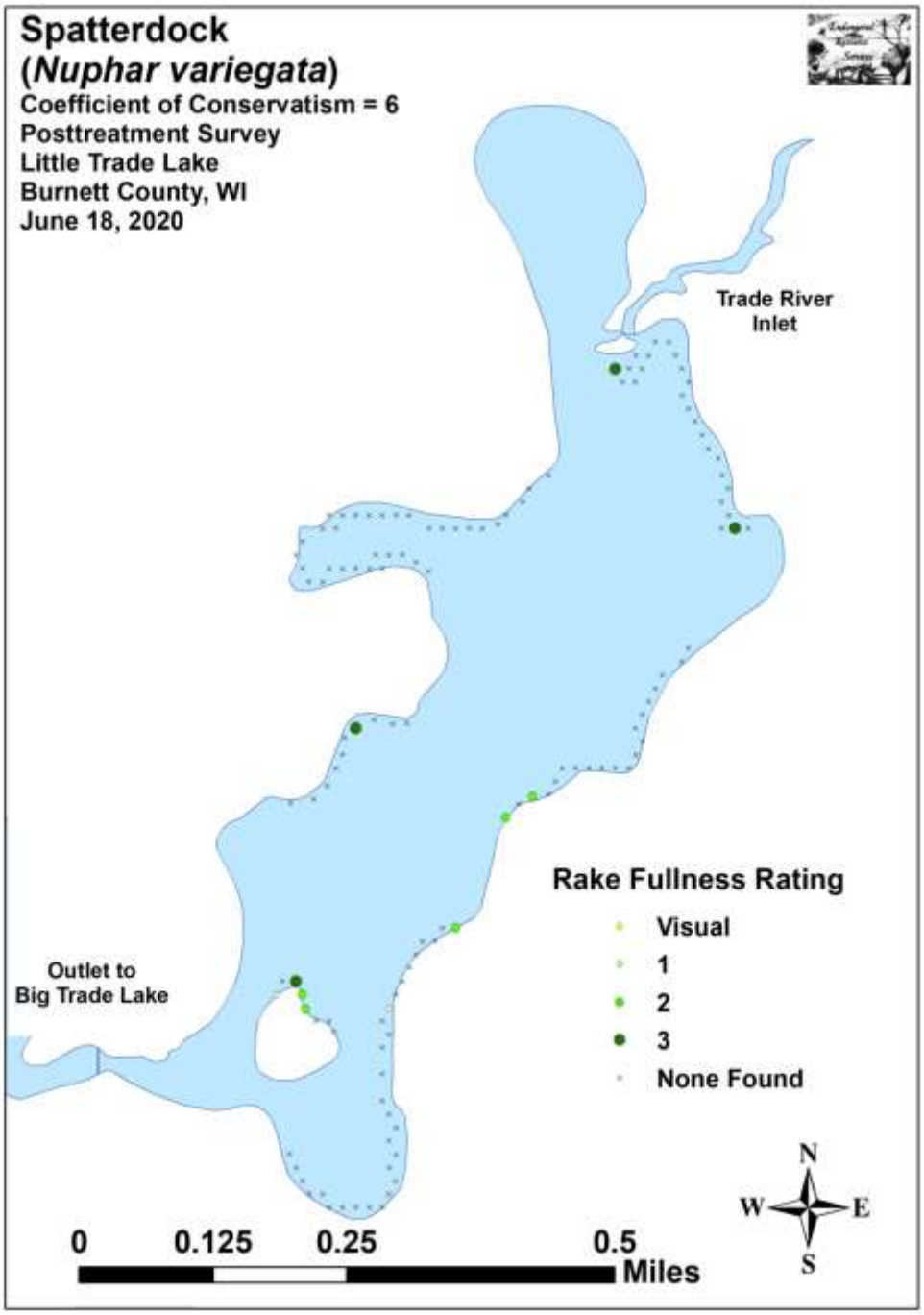

Coontail
(Ceratophyllum demersum)
Coefficient of Conservatism = 3
Posttreatment Survey
Little Trade Lake
Burnett County, WI
June 18, 2020
Trade River
Inlet
Outlet to
Big Trade Lake
Rake Fullness Rating
Visual
1
2
3
None Found
N
W
E
S
0
0.125
0.25
0.5
Miles

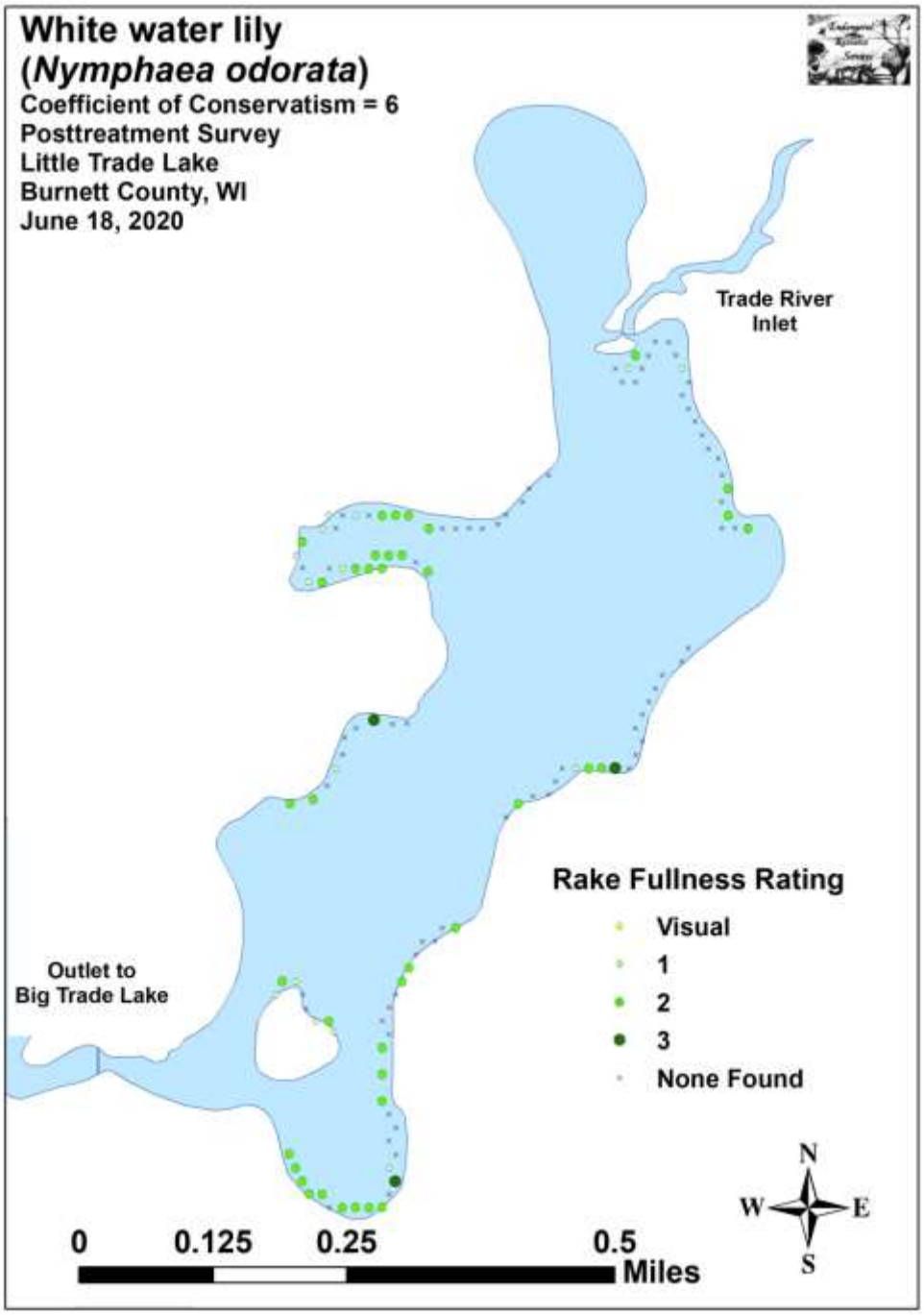

Common waterweed
(Elodea canadensis)
Coefficient of Conservatism = 3
Posttreatment Survey
Little Trade Lake
Burnett County, WI
June 18, 2020
Trade River
Inlet
Outlet to
Big Trade Lake
Rake Fullness Rating
Visual
1
2
3
None Found
N
W
E
S
0
0.125
0.25
0.5
Miles

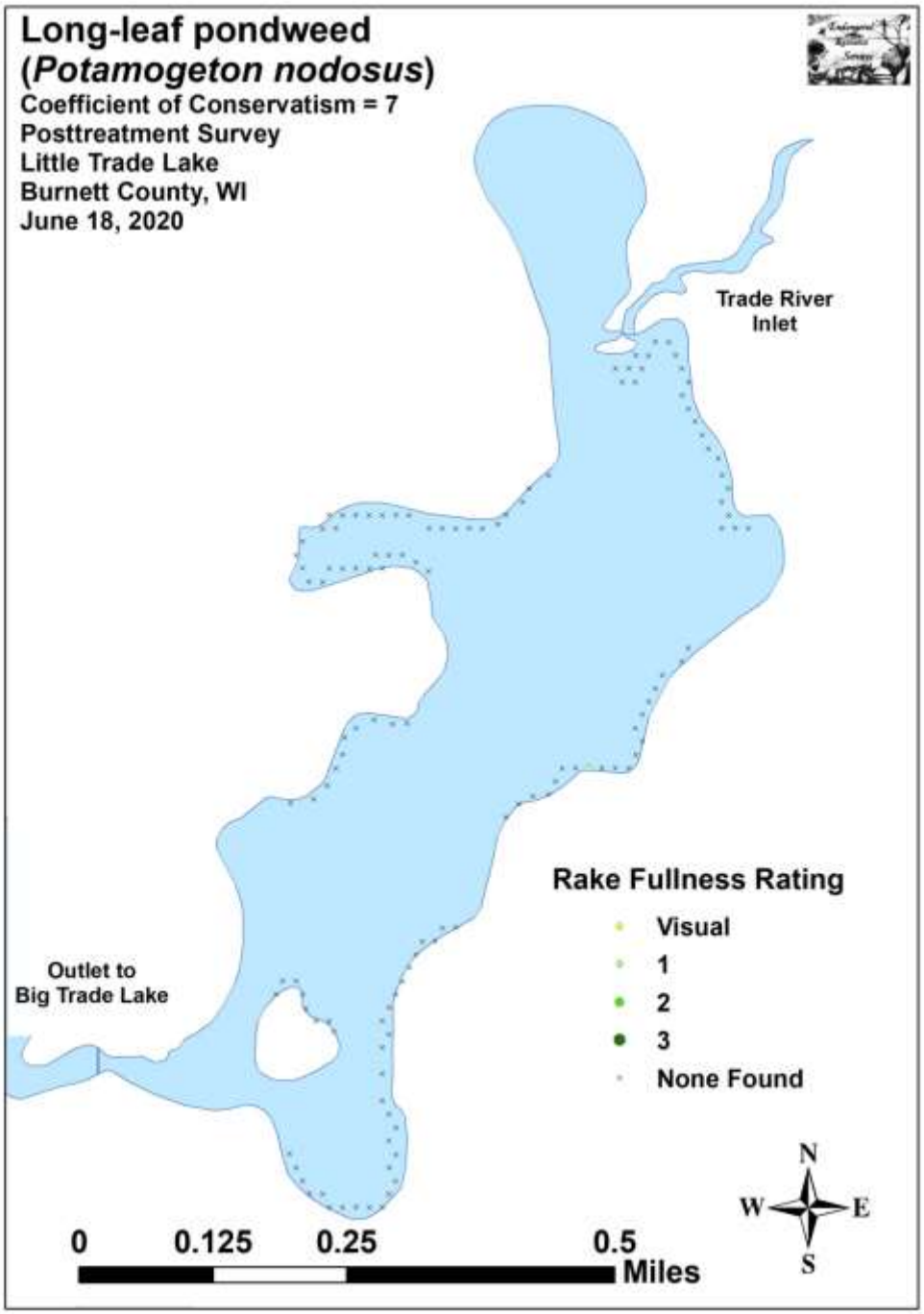

Filamentous algae
Posttreatment Survey
Little Trade Lake
Burnett County, WI
June 18, 2020
Trade River
Inlet
Outlet to
Big Trade Lake
Rake Fullness Rating
Visual
1
2
3
None Found
N
W
E
S
0
0.125
0.25
0.5
Miles

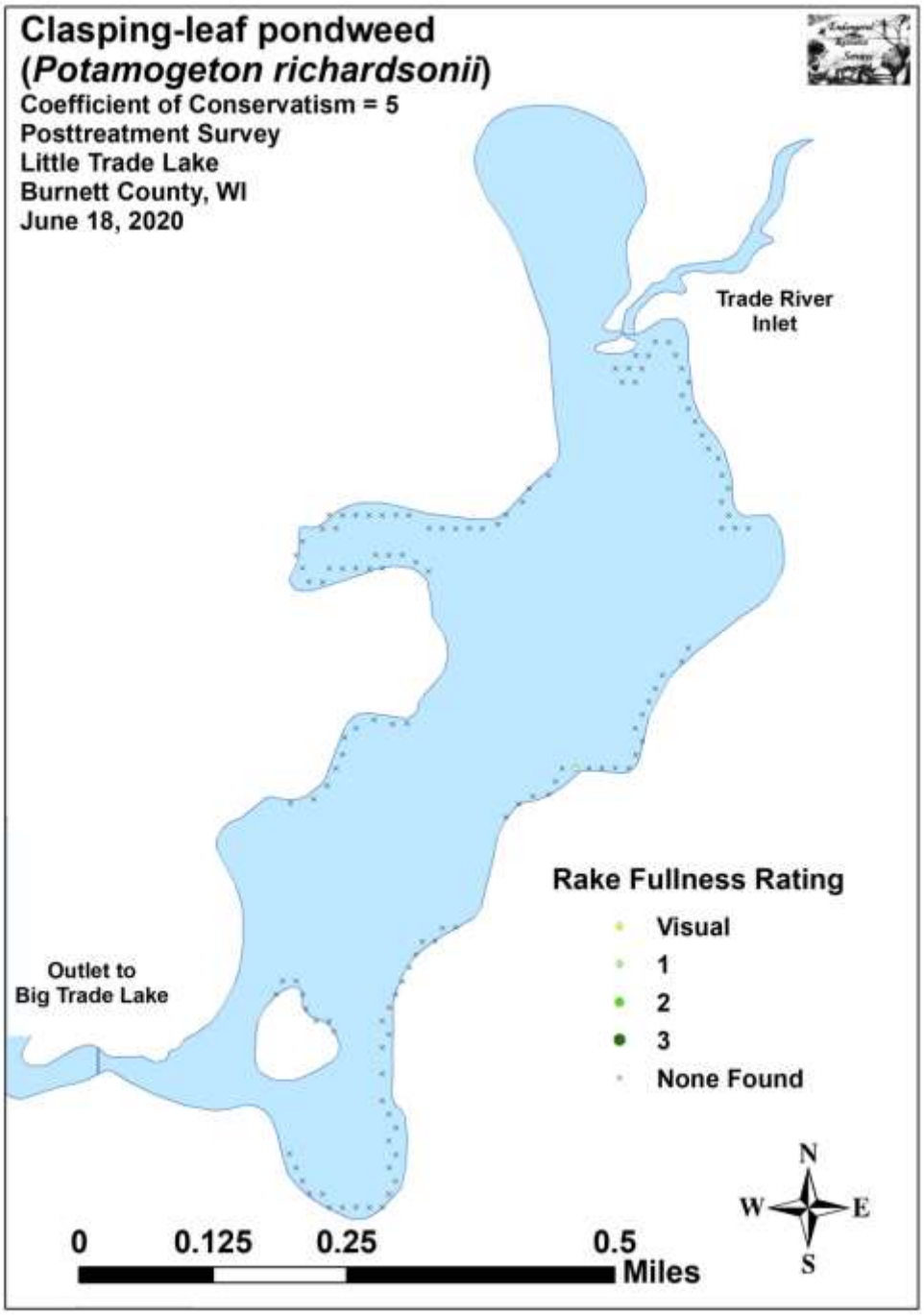

Small duckweed
(Lemna minor)
Coefficient of Conservatism = 4
Posttreatment Survey
Little Trade Lake
Burnett County, WI
June 18, 2020
Trade River
Inlet
Outlet to
Big Trade Lake
Rake Fullness Rating
Visual
1
2
3
None Found
N
W
E
S
0
0.125
0.25
0.5
Miles

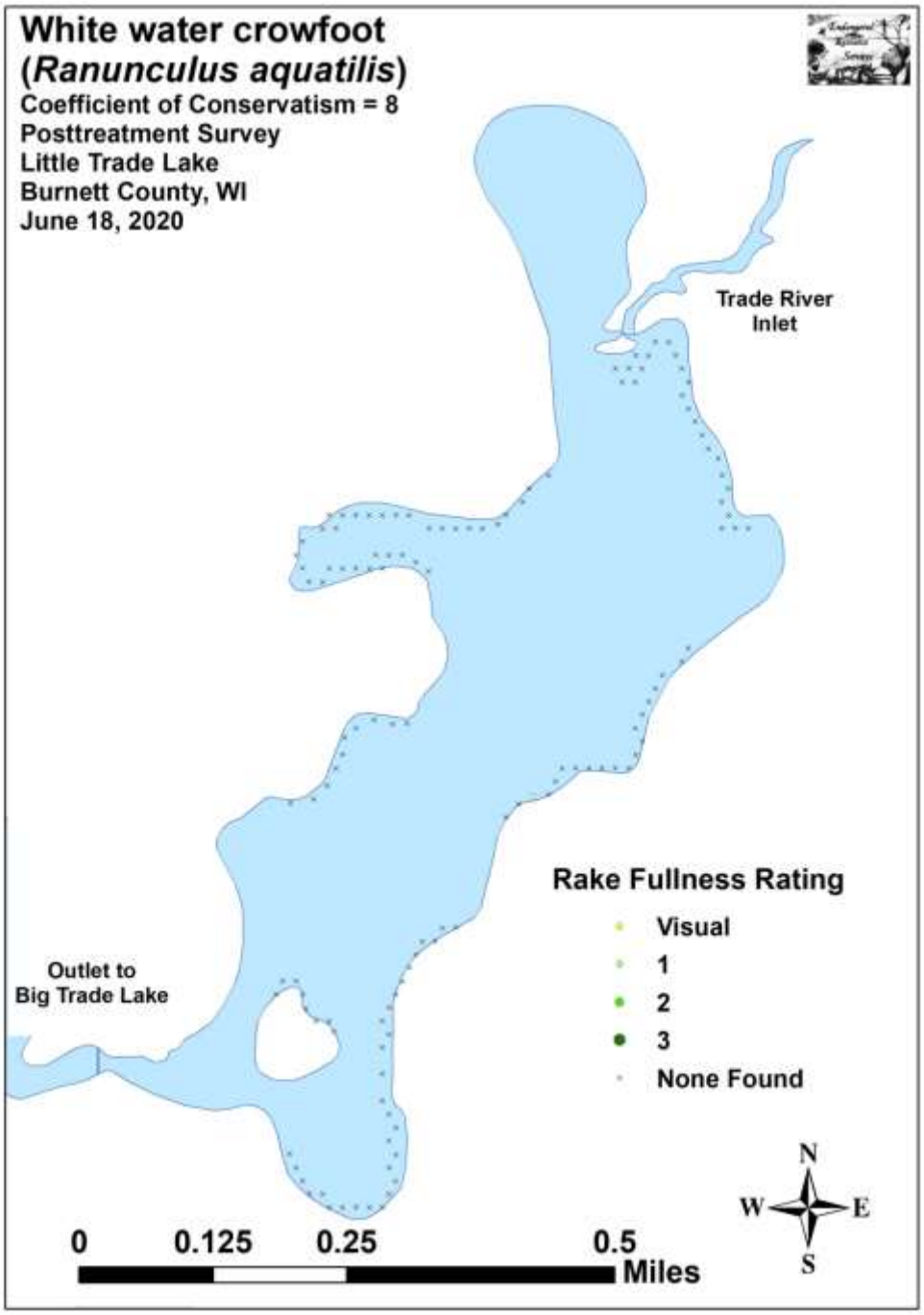

Northern water-milfoil
(Myriophyllum sibiricum)
Coefficient of Conservatism = 6
Posttreatment Survey
Little Trade Lake
Burnett County, WI
June 18, 2020
Trade River
Inlet
Outlet to
Big Trade Lake
Rake Fullness Rating
Visual
1
2
3
None Found
N
W
E
S
0
0.125
0.25
0.5
Miles

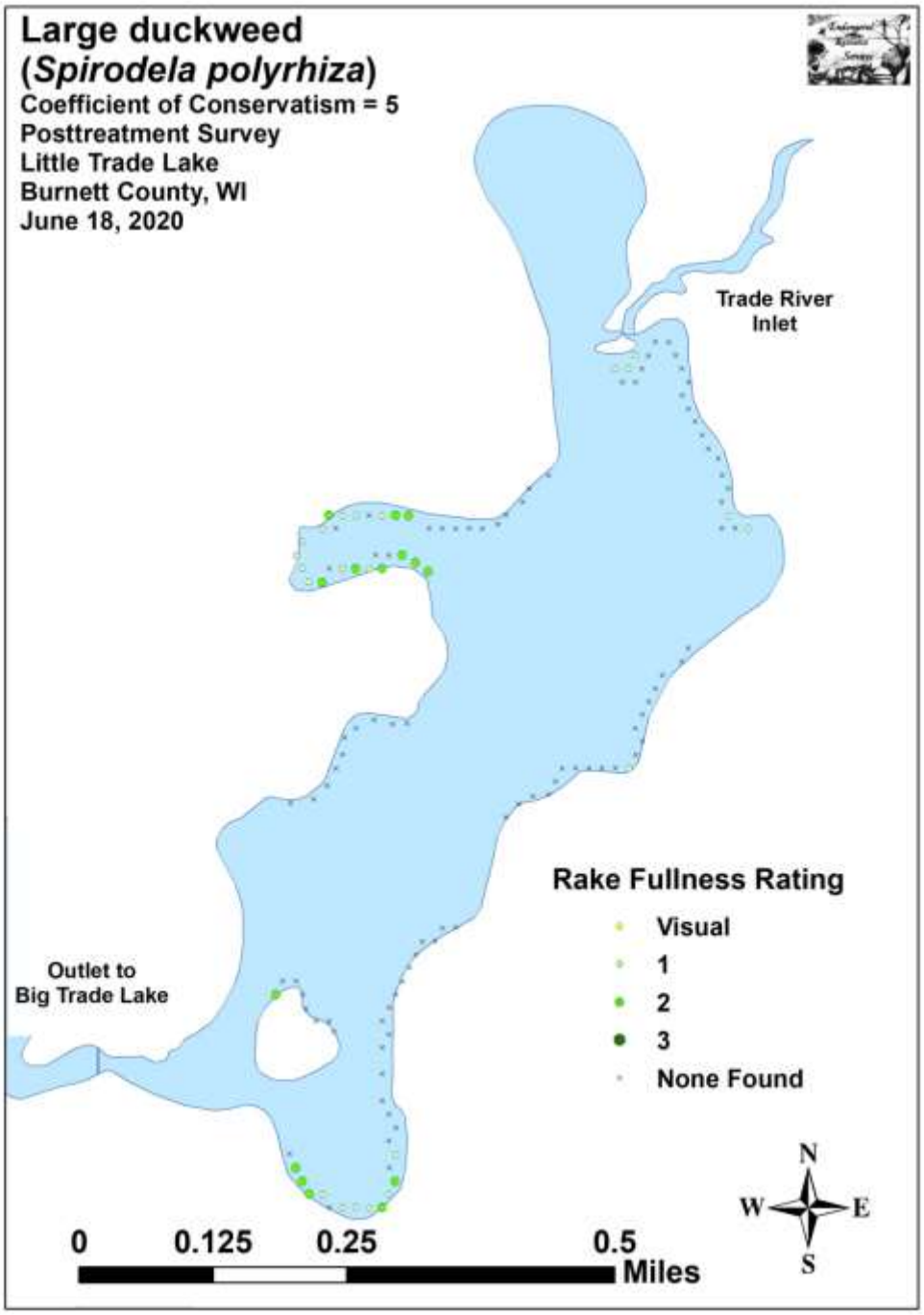

Spatterdock
(Nuphar variegata)
Coefficient of Conservatism = 6
Posttreatment Survey
Little Trade Lake
Burnett County, WI
June 18, 2020
Trade River
Inlet
Outlet to
Big Trade Lake
Rake Fullness Rating
Visual
1
2
3
None Found
N
W
E
S
0
0.125
0.25
0.5
Miles

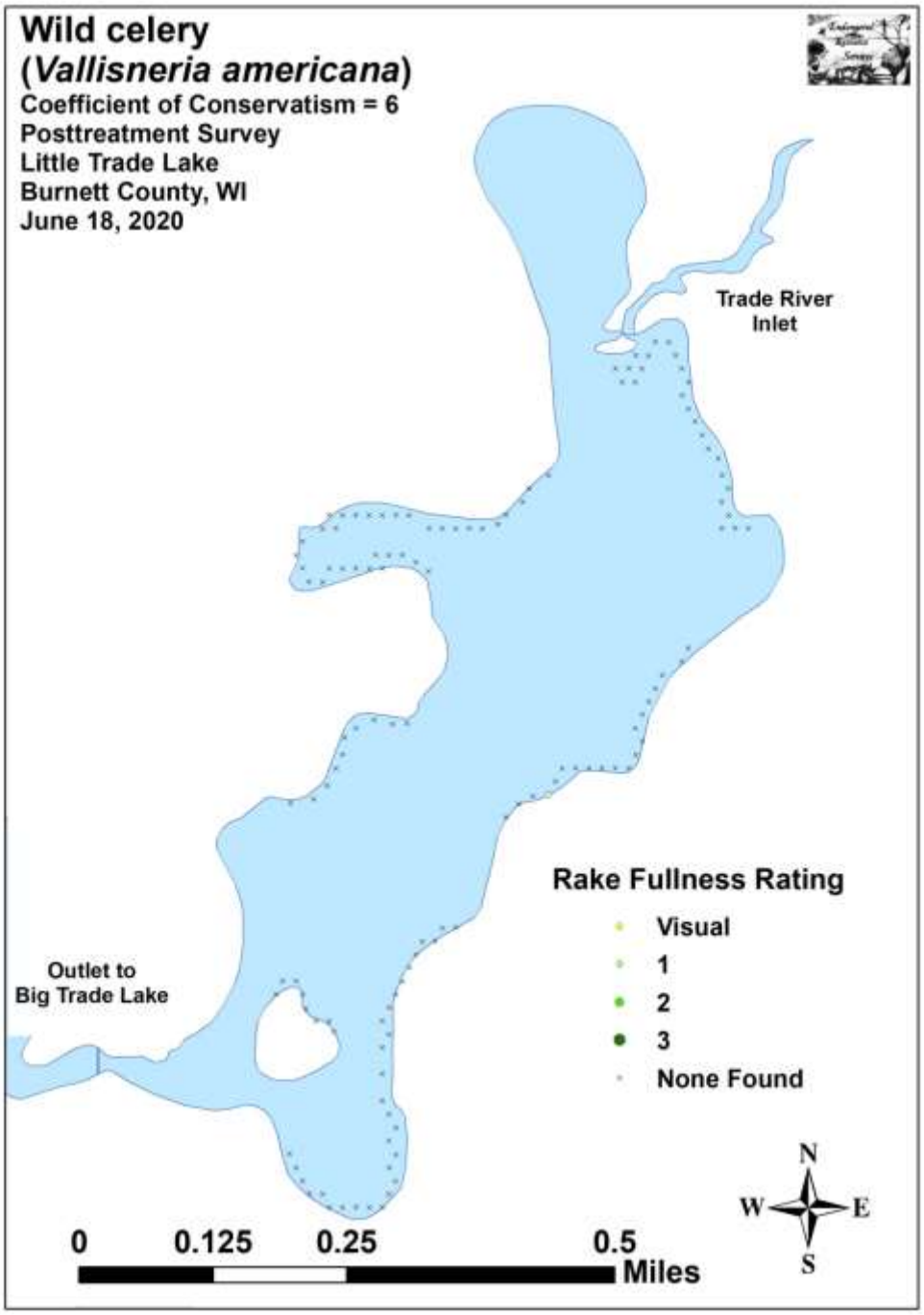

White water lily
(Nymphaea odorata)
Coefficient of Conservatism = 6
Posttreatment Survey
Little Trade Lake
Burnett County, WI
June 18, 2020
Trade River
Inlet
Outlet to
Big Trade Lake
Rake Fullness Rating
Visual
1
2
3
None Found
N
W
E
S
0
0.125
0.25
0.5
Miles

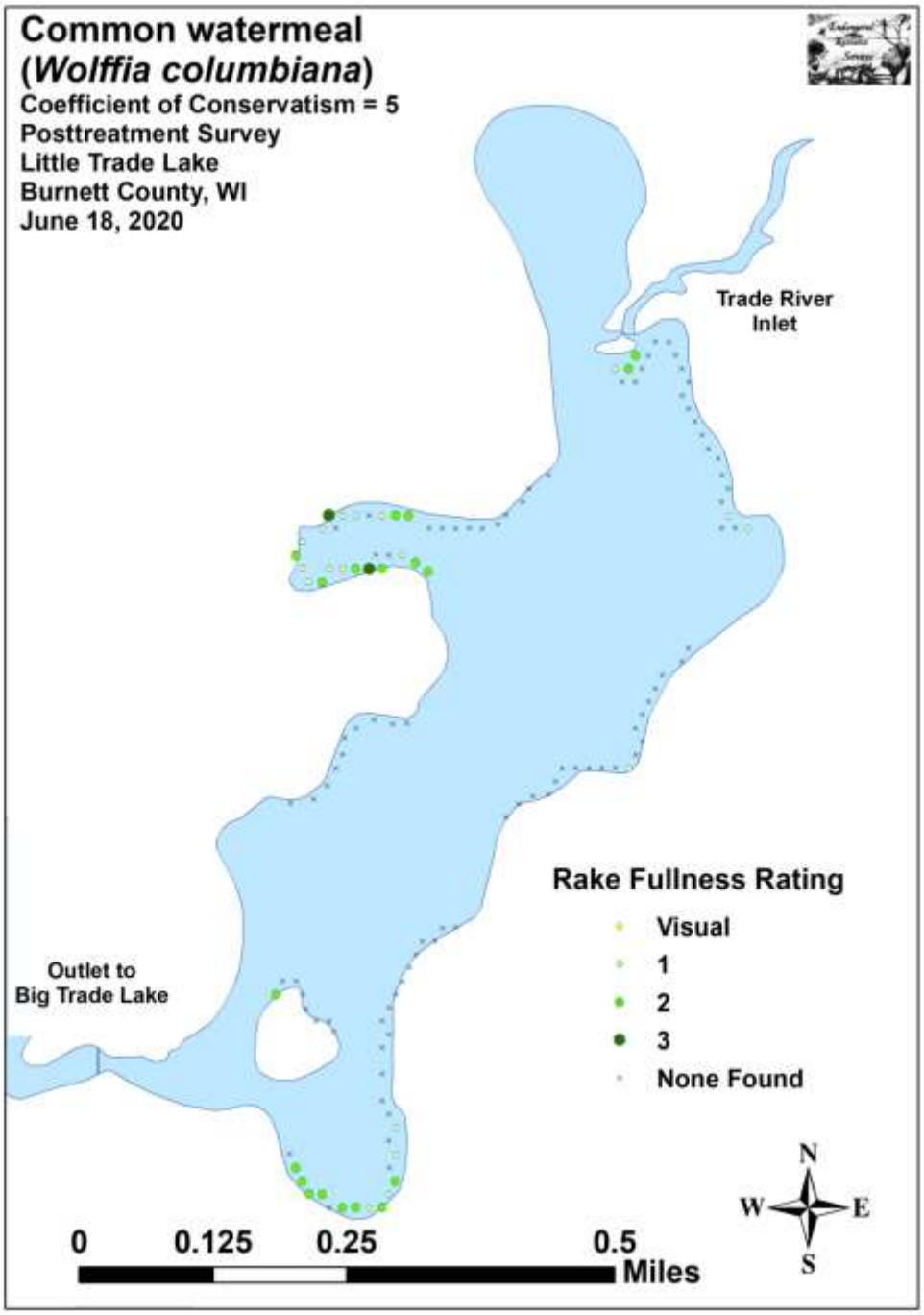

Long-leaf pondweed
(Potamogeton nodosus)
Coefficient of Conservatism = 7
Posttreatment Survey
Little Trade Lake
Burnett County, WI
June 18, 2020
Trade River
Inlet
Outlet to
Big Trade Lake
Rake Fullness Rating
Visual
1
2
3
None Found
N
W
E
S
0
0.125
0.25
0.5
Miles


Clasping-leaf pondweed
(Potamogeton richardsonii)
Coefficient of Conservatism = 5
Posttreatment Survey
Little Trade Lake
Burnett County, WI
June 18, 2020
Trade River
Inlet
Outlet to
Big Trade Lake
Rake Fullness Rating
Visual
1
2
3
None Found
N
W
E
S
0
0.125
0.25
0.5
Miles

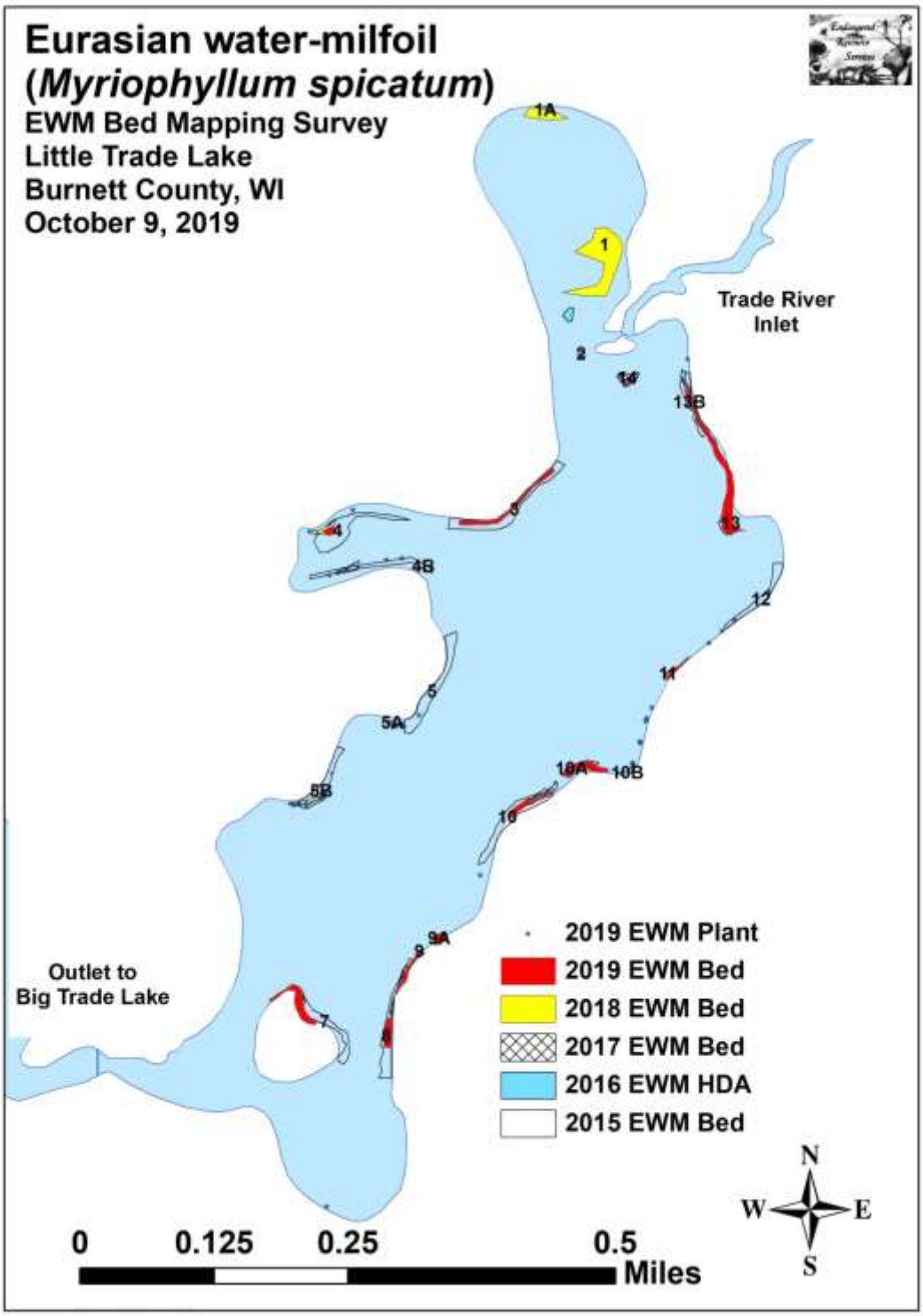

White water crowfoot
(Ranunculus aquatilis)
Coefficient of Conservatism = 8
Posttreatment Survey
Little Trade Lake
Burnett County, WI
June 18, 2020
Trade River
Inlet
Outlet to
Big Trade Lake
Rake Fullness Rating
Visual
1
2
3
None Found
N
W
E
S
0
0.125
0.25
0.5
Miles

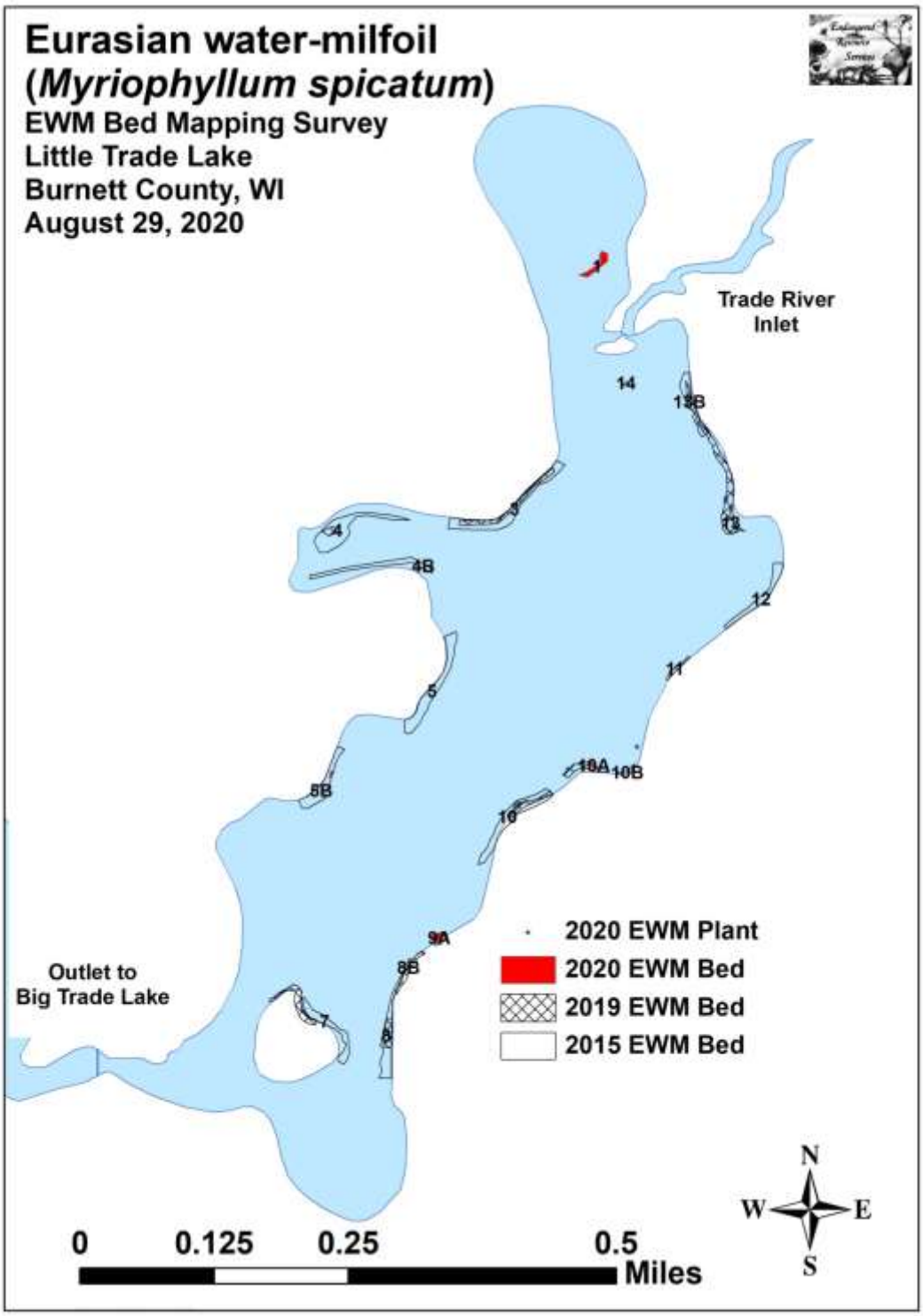

Large duckweed
(Spirodela polyrhiza)
Coefficient of Conservatism = 5
Posttreatment Survey
Little Trade Lake
Burnett County, WI
June 18, 2020
Trade River
Inlet
Outlet to
Big Trade Lake
Rake Fullness Rating
Visual
1
2
3
None Found
N
W
E
S
0
0.125
0.25
0.5
Miles


Wild celery
(Vallisneria americana)
Coefficient of Conservatism = 6
Posttreatment Survey
Little Trade Lake
Burnett County, WI
June 18, 2020
Trade River
Inlet
Outlet to
Big Trade Lake
Rake Fullness Rating
Visual
1
2
3
None Found
N
W
E
S
0
0.125
0.25
0.5
Miles


Common watermeal
(Wolffia columbiana)
Coefficient of Conservatism = 5
Posttreatment Survey
Little Trade Lake
Burnett County, WI
June 18, 2020
Trade River
Inlet
Outlet to
Big Trade Lake
Rake Fullness Rating
Visual
1
2
3
None Found
N
W
E
S
0
0.125
0.25
0.5
Miles

Appendix VIII: Fall 2019 and Late Summer 2020 EWM Bed Maps


Eurasian water-milfoil
(Myriophyllum spicatum)
EWM Bed Mapping Survey
Little Trade Lake
Burnett County, WI
October 9, 2019
Trade River Inlet
Outlet to Big Trade Lake
1A
1
2
13B
13
4
4B
12
11
5
5A
10A
10B
5B
10
9A
9
7
2019 EWM Plant
2019 EWM Bed
2018 EWM Bed
2017 EWM Bed
2016 EWM HDA
2015 EWM Bed
N
W
E
S
0
0.125
0.25
0.5
Miles


Eurasian water-milfoil
(Myriophyllum spicatum)
EWM Bed Mapping Survey
Little Trade Lake
Burnett County, WI
August 29, 2020
Trade River
Inlet
Outlet to
Big Trade Lake
1
14
13B
13
4
4B
12
11
5
10A
10B
5B
10
9A
8B
7
6
2020 EWM Plant
2020 EWM Bed
2019 EWM Bed
2015 EWM Bed
N
W
E
S
0
0.125
0.25
0.5
Miles