Eurasian water milfoil (*Myriophyllum spicatum*) and Curly-leaf pondweed (*Potamogeton crispus*)

Pre/Post Herbicide and Fall Bed Mapping Surveys

Long Trade Lake – WBIC: 2640500

Polk County, Wisconsin

EWM (Berg 2005)

2013 EWM Treatment Areas

Project Initiated by:

Round-Trade Lakes Improvement Association Inc., Short Elliott Hendrickson Inc., and the Wisconsin Department of Natural Resources

Secchi Reading During Fall EWM Bed Mapping

Survey Conducted by and Report Prepared by:

Endangered Resource Services, LLC
Matthew S. Berg, Research Biologist
St. Croix Falls, Wisconsin

May 16-17, June 23, and September 19, 2013

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INTRODUCTION:

Long Trade Lake (WBIC 2640500) is a 150 acre drainage lake in northwest/north-central Polk County, Wisconsin in the Town of Laketown (T36N R18W S4 SE NE). It reaches a maximum depth of 13ft in two spots in the south basin and has an average depth of approximately 8ft. Long Trade Lake is eutrophic bordering on hypereutrophic in nature with very poor water clarity. From 1986 to 2009, summer Secchi readings have ranged from 1.2-3.0ft with an average of 2.1ft (WDNR 2013). The bottom substrate is primarily sand and gravel in the main basin with organic muck in sheltered bays (Miller et al. 1965).

Figure 1: 2013 EWM and CLP Treatment Areas on Long Trade Lake

In 1995, the Wisconsin Department of Natural Resources (WDNR) identified the presence of Hybrid water milfoil – a cross between Northern and Eurasian water milfoils (*Myriophyllum sibiricum* X *Myriophyllum spicatum*) in Long Trade Lake. However, a 2006 WDNR point intercept survey turned up no milfoil of any kind in the lake. By 2011, the situation had changed again with milfoil that morphologically looks like and grows like Eurasian water milfoil (EWM) having taken over most of the lake's summer littoral areas. 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 species that dominates the lake's spring littoral zone, the Round-Trade Lake Improvement Association, Inc. (RTLIA) began actively managing these infestation with herbicides in 2013. Using bed mapping surveys from 2011 and 2012, SEH biologists scheduled 16 areas totaling 9.31 acres (6.2% of the lake's surface area) to be treated for CLP. Nine of these areas (5.24 acres) were simultaneously treated for EWM (Figure 1).

On May 16th and 17th, we conducted a pretreatment survey to gather baseline data from the scheduled treatment areas and to allow SEH biologists to finalize treatment plans. Following the June 6th herbicide application, we conducted a June 23rd posttreatment survey to evaluate the effectiveness of the treatment. We also conducted a September 19th EWM bed mapping survey to determine where EWM control might be considered in 2014. This report is the summary analysis of these three field surveys.

METHODS:

Pre/Post Herbicide Survey:

SEH biologists generated 159 pre/post survey points based on the size and shape of the proposed treatment areas. This was well above the 4-10 pts/acre required by WDNR protocol, but the lake's narrow littoral zone and resulting thin treatment areas justified this extra effort (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 also noted if they occurred within 6ft of the point. In addition to plant data, we recorded the lake depth using a hand held sonar (Vexilar LPS-1) and the bottom 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). These data were then analyzed using the linked statistical summary sheet and the WDNR pre/post analysis worksheet (UWEX 2010). Pre/post treatment differences were determined to be significant at $p < .05$, moderately significant at $p < .01$, and highly significant at $p < .005$.

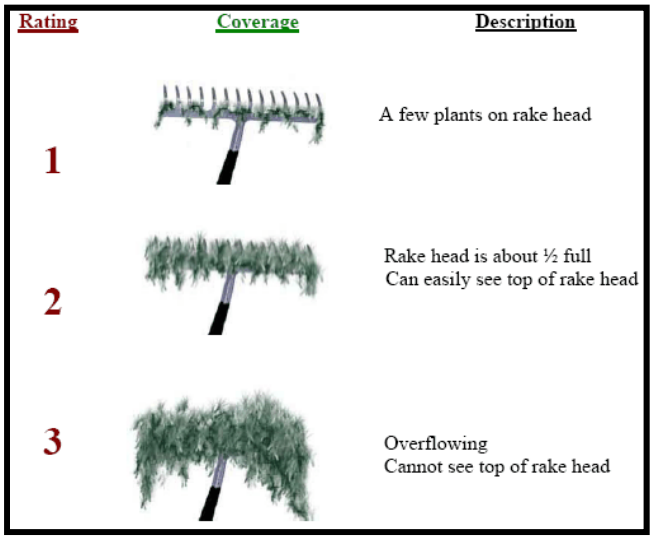


Figure 2: Rake Fullness Ratings

Fall Eurasian Water Milfoil Bed Mapping:

On September 19th, we searched the entire 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 the average rake fullness rating of EWM within the bed (Figure 2). Using the WDNR's Forestry Tool's Extension to ArcGIS 9.3.1, we used these coordinates to generate bed shapefiles and determine the acreage to the nearest hundredth of an acre.

RESULTS AND DISCUSSION:

Finalization of Treatment Areas:

Initial expectations were to treat 16 beds totaling 9.31 acres with Endothall (Aquathol K) at a concentration of 2ppm and 9 beds totaling 5.24 acres with liquid 2, 4-D (Navigate) at a concentration of 3 ppm (Table 1). Following the pretreatment survey at 159 points, it was decided to maintain all treatment areas as initially proposed (Figure 3) (Appendix I).

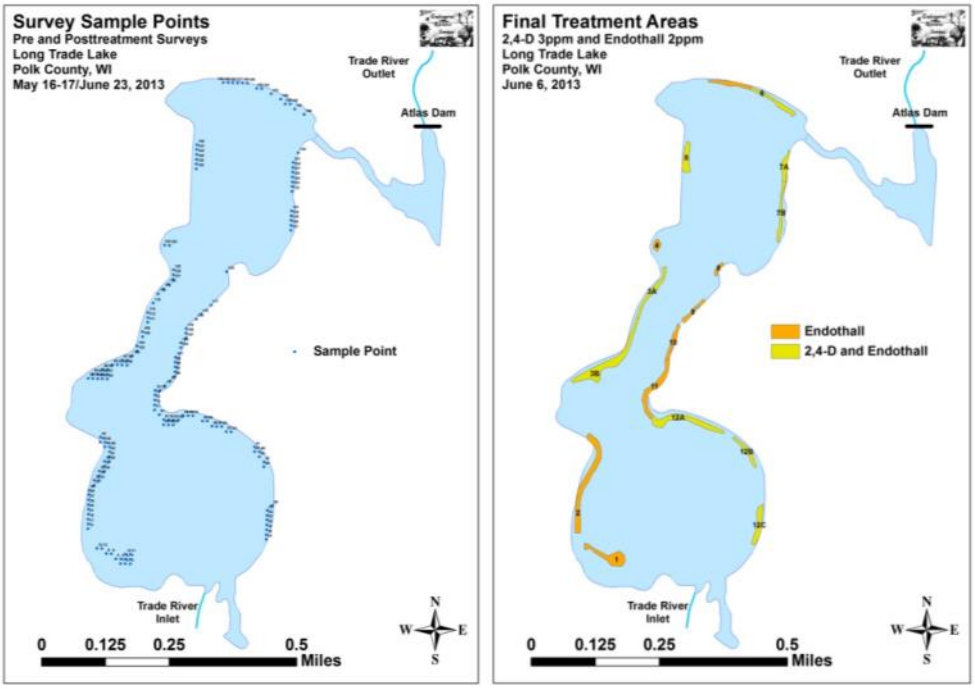


Figure 3: 2013 Survey Sample Points and Final Treatment Areas

Table 1: Spring EWM Treatment Summary
Long Trade Lake – June 6, 2013

Bed Number	Proposed Acreage	Final Acreage	Difference +/-	Treatment
1	0.74	0.74	0	Endothall
2	1.34	1.34	0	Endothall
3A	0.45	0.45	0	2, 4-D and Endothall
3B	1.40	1.40	0	2, 4-D and Endothall
4	0.15	0.15	0	Endothall
5	0.43	0.43	0	2, 4-D and Endothall
6	0.82	0.82	0	2, 4-D (0.43 acres) and Endothall
7A	0.32	0.32	0	2, 4-D and Endothall
7B	0.41	0.41	0	2, 4-D and Endothall
8	0.12	0.12	0	Endothall
9	0.24	0.24	0	Endothall
10	0.32	0.32	0	Endothall
11	0.77	0.77	0	Endothall
12A	0.99	0.99	0	2, 4-D and Endothall
12B	0.33	0.33	0	2, 4-D and Endothall
12C	0.48	0.48	0	2, 4-D and Endothall
Total Acres	**9.31**	**9.31**	**0.00**	

EWM and CLP Pre/Post Herbicide Survey:

The treatment area littoral zone extended to a maximum of 6.0ft during the pretreatment survey and 5.5ft during the posttreatment survey. Mean and median depths for all plants were 3.5ft during the pretreatment survey before declining to 3.3ft and 3.0ft in the posttreatment survey (Table 2). Most EWM and CLP plants were established over muck with only scattered patches occurring on firm sand and rock (Figure 4) (Appendix III).

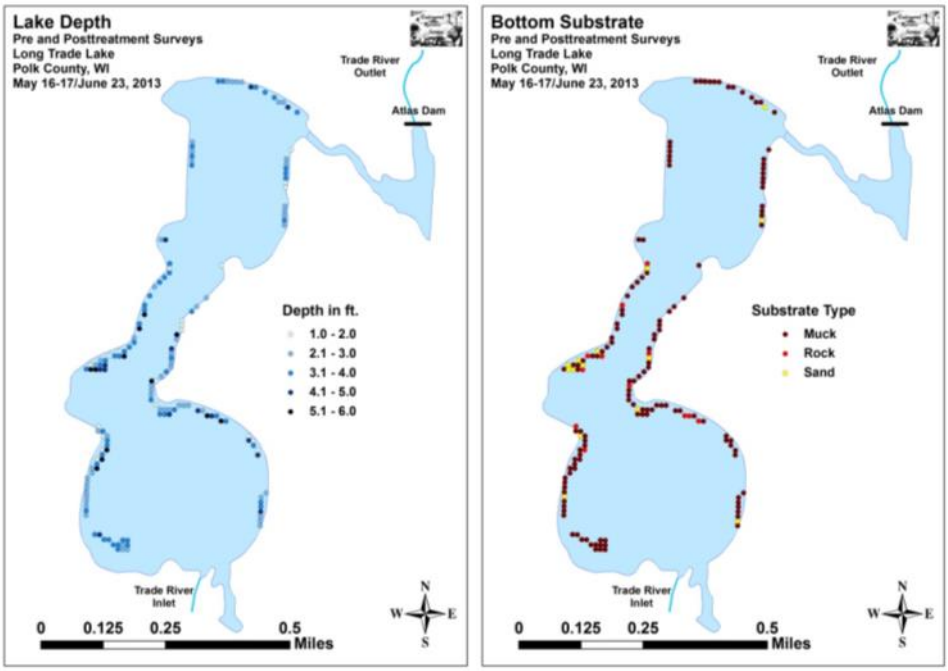


Figure 4: Treatment Area Depths and Bottom Substrate

Table 2: Pre/Post Survey Summary Statistics
Long Trade Lake, Polk County
May 16-17 and June 23, 2013

Summary Statistics:	Pre	Post
Total number of points sampled	159	159
Total number of sites with vegetation	156	102
Total number of sites shallower than the maximum depth of plants	159	156
Frequency of occurrence at sites shallower than maximum depth of plants	98.11	65.38
Simpson Diversity Index	0.37	0.79
Floristic Quality Index	3.0	10.6
Maximum depth of plants (ft)	6.0	5.5
Average number of all species per site (shallower than max depth)	1.23	1.46
Average number of all species per site (veg. sites only)	1.25	2.23
Average number of native species per site (shallower than max depth)	0.20	1.33
Average number of native species per site (native veg. sites only)	1.00	2.14
Species richness	3	8
Mean depth of plants (ft)	3.5	3.3
Median depth of plants (ft)	3.5	3.0
Mean rake fullness (veg. sites only)	1.66	1.39
Mean Coefficient of Conservatism	3.0	4.3

Initial diversity within the beds was extremely low with a Simpson Diversity Index of 0.37. This value increased significantly to 0.79 posttreatment. The Floristic Quality Index, a measure of only native species, also increased from 3.0 to 10.6. Mean native species richness at sites with vegetation was only 1.00/site pretreatment, but this also increased to 2.14/site posttreatment (Figure 5). Total rake fullness declined from a low to moderate 1.66 pretreatment to a very low 1.39 posttreatment (Figure 6) (Appendix IV).

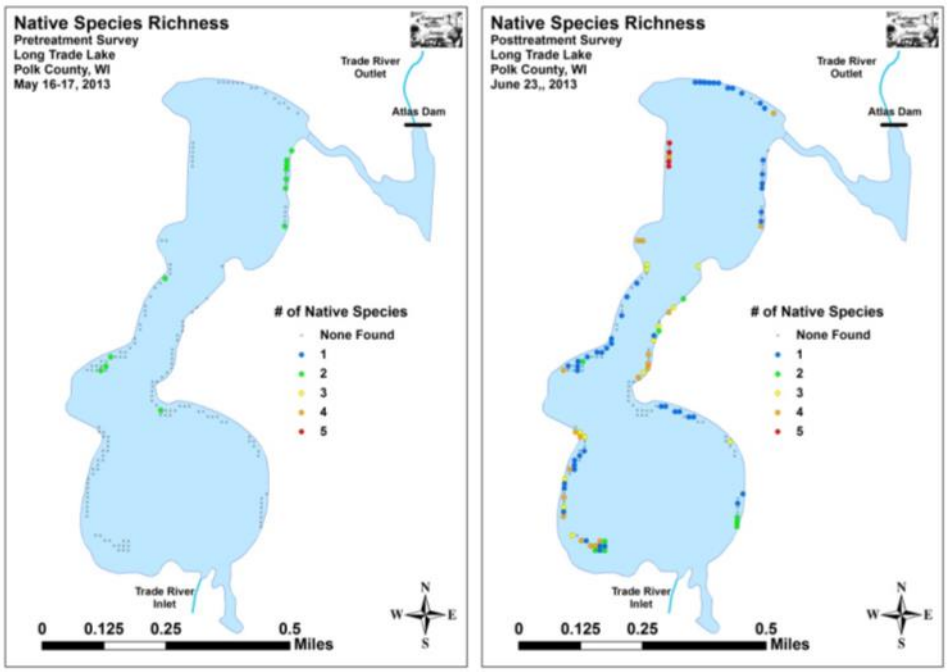


Figure 5: Pre/Post Native Species Richness

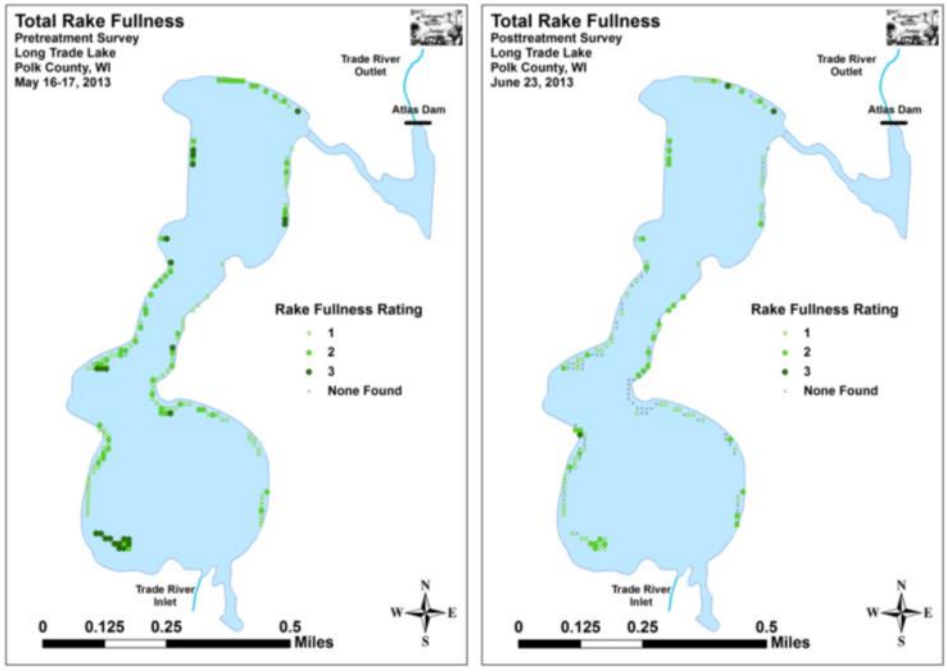


Figure 6: Pre/Post Total Rake Fullness

We found EWM at 12 total sites during the pretreatment survey all of which had a rake fullness of 1. We also noted EWM as a visual at four additional points. During the posttreatment survey, we found EWM at five total sites all of which again rated a 1 (Figure 7) (Appendix V). This reduction in EWM was not significant (Figure 8).

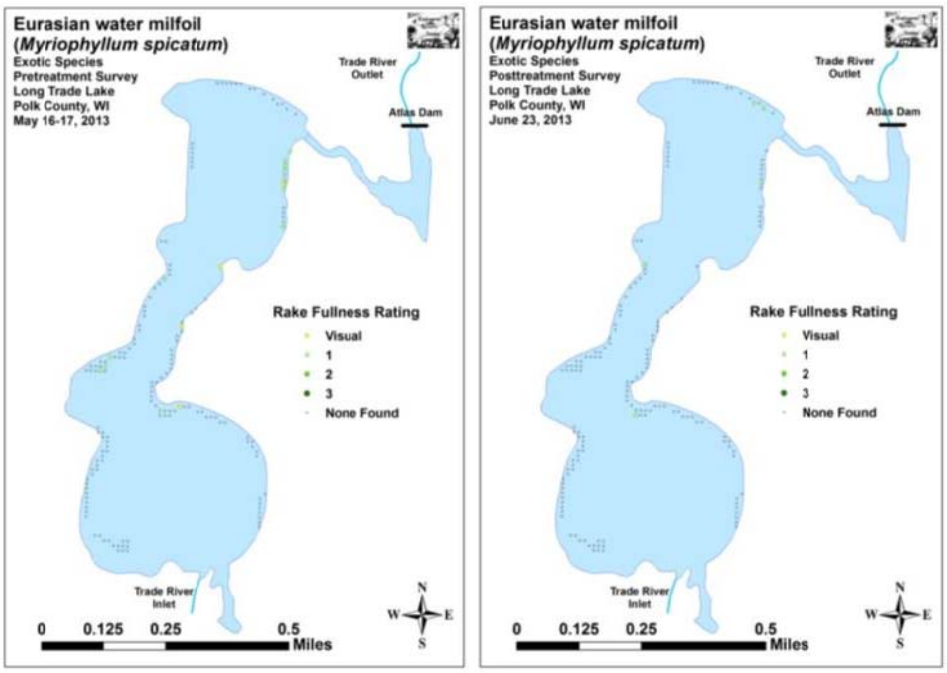
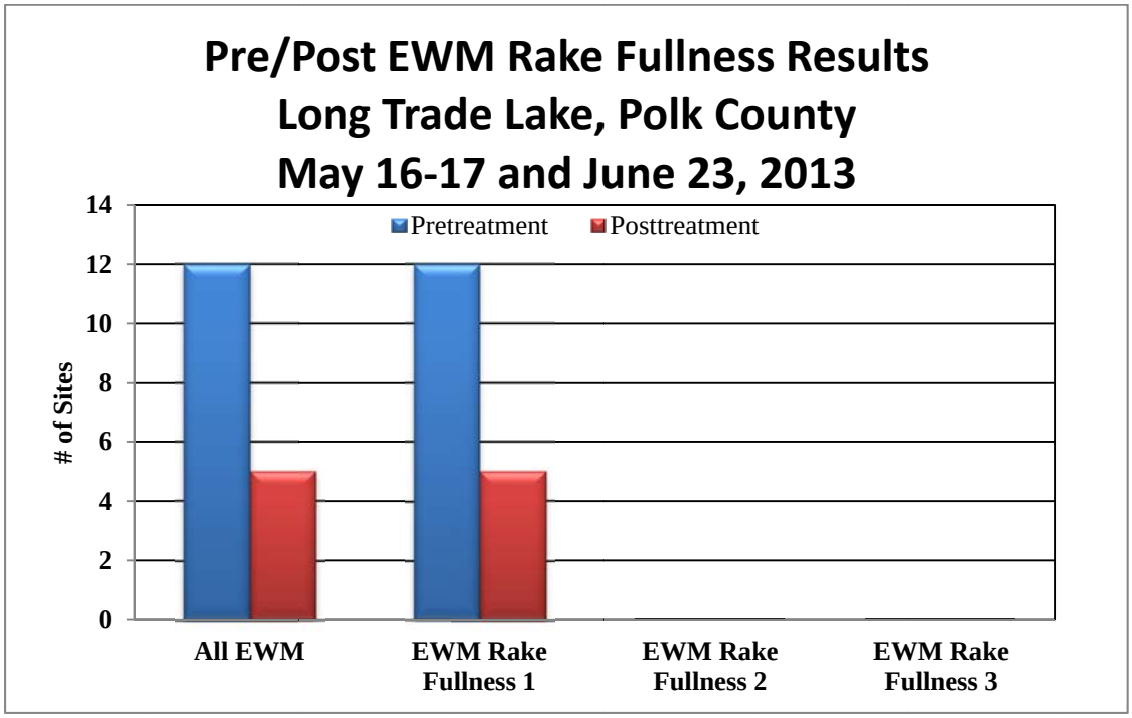


Figure 7: Pre/Post EWM Density and Distribution



Significant differences = * p <. 05, ** p <. 01, *** p <. 005

Figure 8: Pre/Post Changes in EWM Rake Fullness

Curly-leaf pondweed (*Potamogeton crispus*) dominated the treatment areas being found at 151 points of which 25 rated a 3, 50 rated a 2, and 71 rated a 1 with three additional visual sightings. During the posttreatment survey, we found CLP at 14 with none rating a 3, one rating a two, and 13 rating a 1(Figure 9). This reduction was highly significant for total CLP as well as for rake fullness values 3, 2, and 1 (Appendix V).

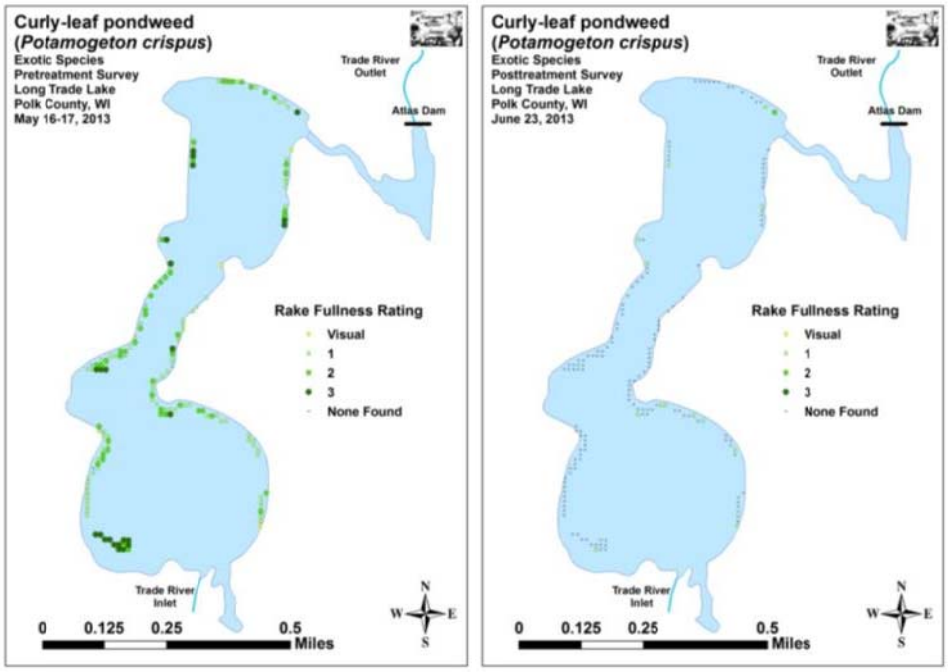
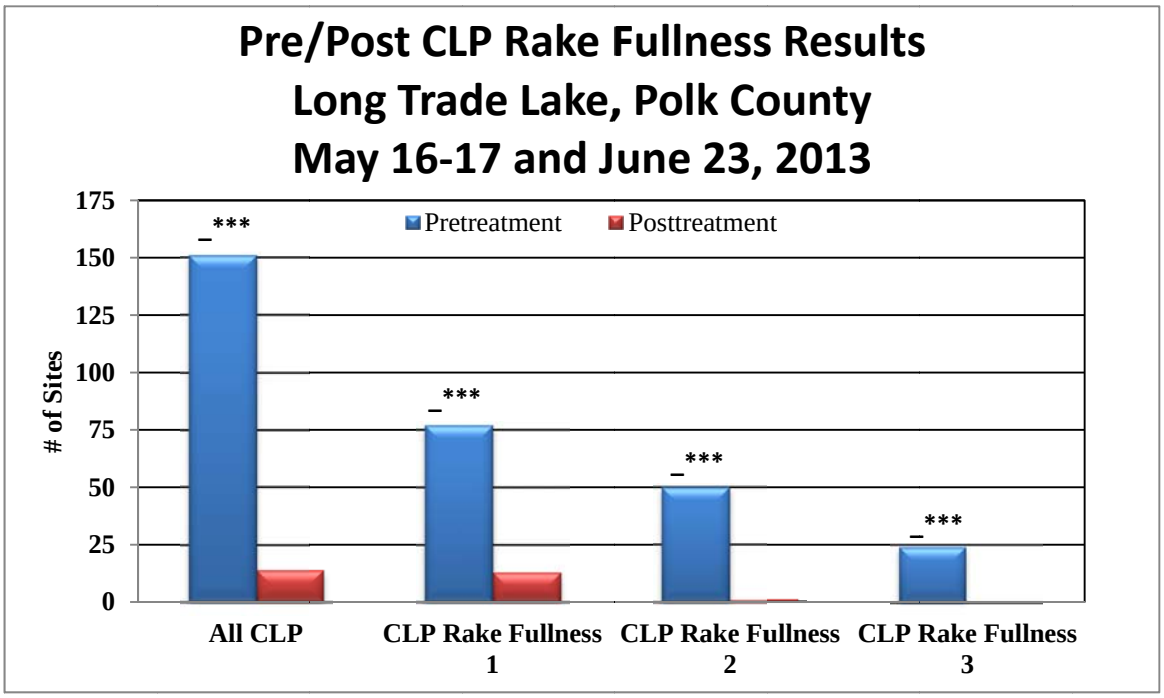


Figure 9: Pre/Post CLP Density and Distribution



Significant differences = * p <. 05, ** p <. 01, *** p <. 005

Figure 10: Pre/Post Changes in CLP Rake Fullness

Coontail (*Ceratophyllum demersum*) was the only native species found in the pretreatment survey, and it showed a highly significant increase following treatment (Tables 3 and 4) (Figure 11). Although not present in the pretreatment survey, Large duckweed (*Spirodela polyrhiza*), Small duckweed (*Lemna minor*), White water lily (*Nymphaea odorata*), and Common watermeal (*Wolffia columbiana*) also all showed a highly significant increase and were found in many places that CLP and EWM had dominated prior to treatment (Figure 12). Maps for all species from the pre and posttreatment surveys are available in Appendixes VI and VII.

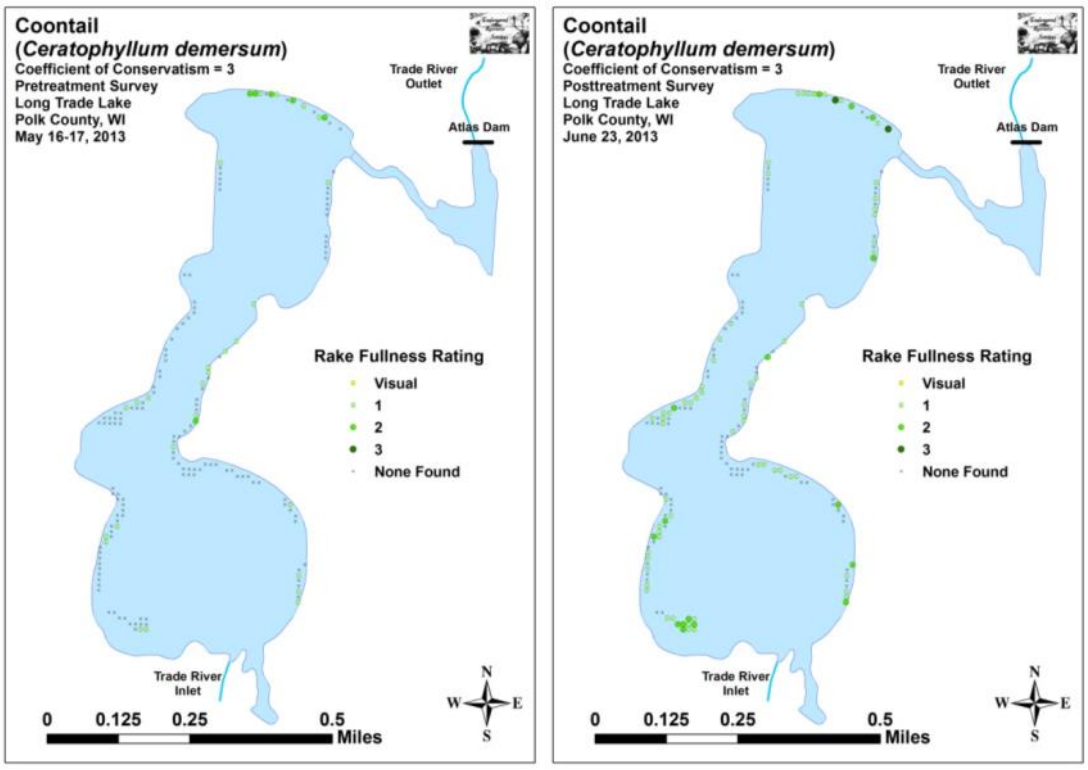
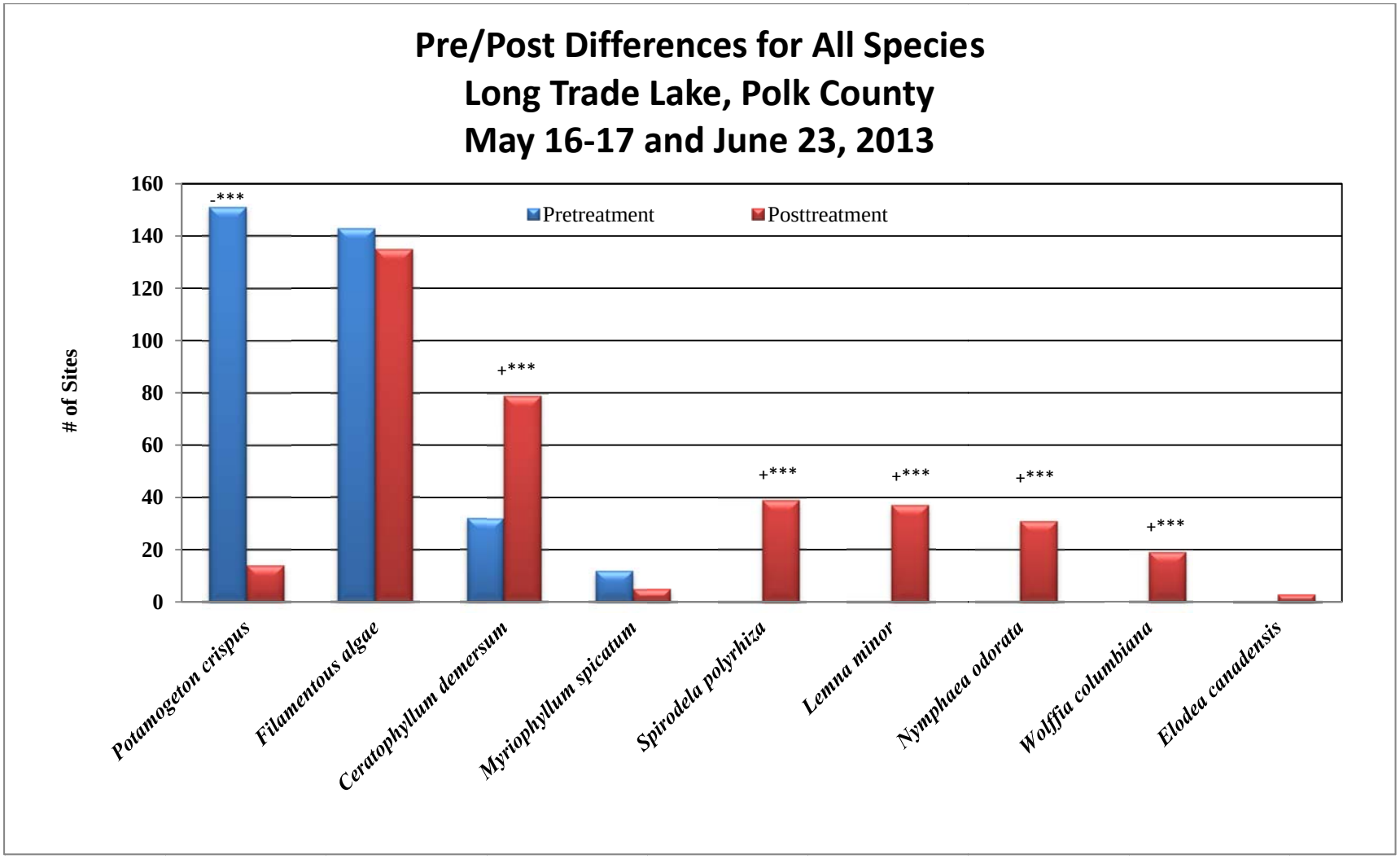


Figure 11: Pre/Post Coontail Density and Distribution



Significant differences = * p <. 05, ** p <. 01, *** p <. 005

Figure 12: Pre/Post Macrophyte Changes

Table 3: Frequencies and Mean Rake Sample of Aquatic Macrophytes
Pretreatment Survey Long Trade Lake, Polk County
May 16-17, 2013

Species	Common Name	Total Sites	Relative Freq.	Freq. in Veg.	Freq. in Lit.	Mean Rake	Visual Sightings
Potamogeton crispus	Curly-leaf pondweed	151	77.44	96.79	94.97	1.65	3
	Filamentous algae	143	*	91.67	89.94	2.04	0
Ceratophyllum demersum	Coontail	32	16.41	20.51	20.13	1.19	0
Myriophyllum spicatum	Eurasian water milfoil	12	6.15	7.69	7.55	1.00	4

Table 4: Frequencies and Mean Rake Sample of Aquatic Macrophytes
Posttreatment Survey Long Trade Lake, Polk County
June 23, 2013

Species	Common Name	Total Sites	Relative Freq.	Freq. in Veg.	Freq. in Lit.	Mean Rake	Visual Sightings
	Filamentous algae	135	*	86.54	86.54	2.43	0
Ceratophyllum demersum	Coontail	79	34.80	77.45	50.64	1.25	0
Spirodela polyrhiza	Large duckweed	39	17.18	38.24	25.00	1.15	0
Lemna minor	Small duckweed	37	16.30	36.27	23.72	1.16	0
Nymphaea odorata	White water lily	31	13.66	30.39	19.87	1.58	0
Wolffia columbiana	Common watermeal	19	8.37	18.63	12.18	1.16	0
Potamogeton crispus	Curly-leaf pondweed	14	6.17	13.73	8.97	1.07	0
Myriophyllum spicatum	Eurasian water milfoil	5	2.20	4.90	3.21	1.00	0
Elodea canadensis	Common waterweed	3	1.32	2.94	1.92	1.00	0

* Excluded from relative frequency analysis

Fall EWM Bed Mapping Survey:

On September 19th, 2013, we searched the visible littoral zone of the entire lake. We also took random rake samples in areas that had supported beds of Eurasian water milfoil in 2011 and 2012 (Figure 13) (Appendix VIII). Despite searching transects that covered over 6.5km, and doing 100's of random rake samples, we found only three rooted EWM plants in the whole lake. Each of these individuals was located in the outlet channel, and all appeared to be in poor health with most leaflets appearing to be dead or dying (Table 5). This nearly 100% decline in area coverage and total individuals over the past two years is likely some combination of extremely poor water clarity (Secchi reading at 1.5ft at the time of the fall survey) creating growing conditions that were unfavorable to EWM and the herbicide control in 2013.

Despite the near elimination of EWM in the lake over the past two years, we caution that this should not be taken to mean the plant has been eradicated. Rather, it likely continues to exist at some very low level and will reappear when growing conditions are more favorable. To support this hypothesis, we note that we found three floating fragments of EWM in the main lake. All were in very poor shape and nearly dead, but their presence indicates a few plants are still out there somewhere.

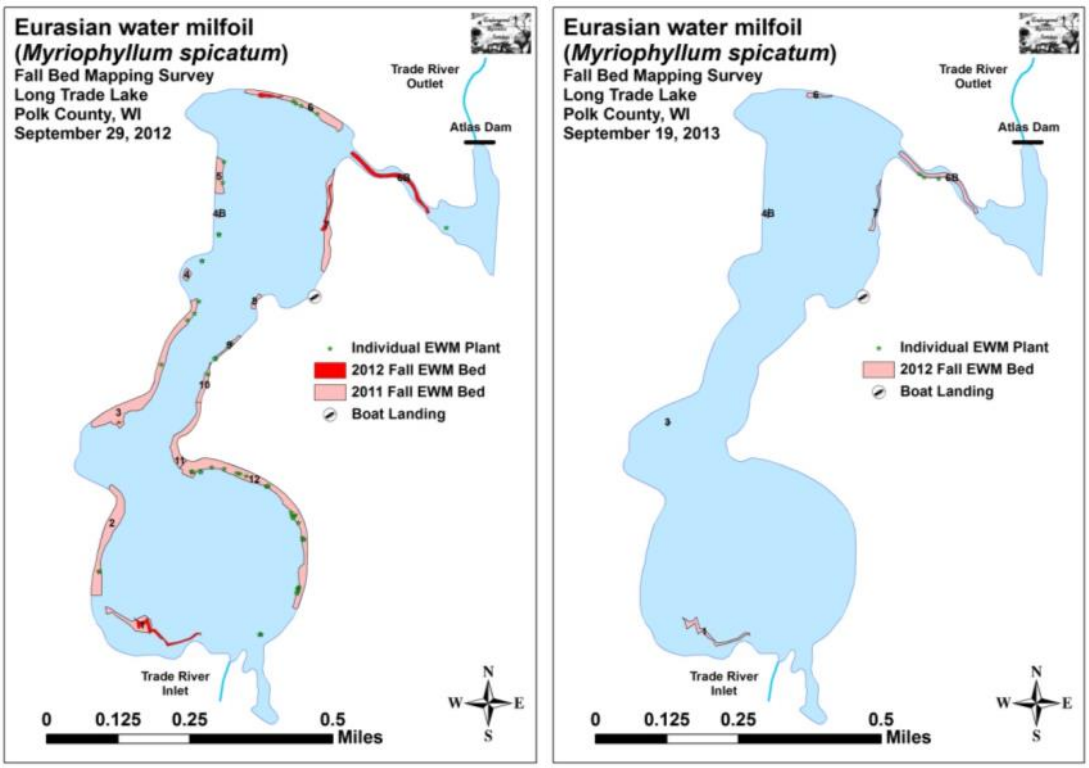


Figure 13: 2012 and 2013 Fall EWM Bed Maps

Table 5: Fall Eurasian Water Milfoil Bed Mapping Summary
Long Trade Lake, Polk County
September 19, 2013

Bed Number	2013 Area in Acres	2012 Area in Acres	2011 Area in Acres	2013 Change in Acreage	Estimated 2013 Mean Rake Fullness	2013 Bed Characteristics/Field Notes
1	**0.00**	0.45	0.70	**-0.45**	0	Area dominated by Coontail and CLP
2	**0.00**	**0.00**	1.89	**0.00**	0	Area dominated by Coontail and CLP
3	**0.00**	0.02	2.69	**-0.02**	0	Few plants of any kind other than WW Lilies
4	**0.00**	**0.00**	0.13	**0.00**	0	White water lily dominated area
4B	**0.00**	0.03	**0.00**	**-0.03**	0	White water lily dominated area
5	**0.00**	**0.00**	0.51	**0.00**	0	White water lily dominated area
6	**0.00**	0.13	1.23	**-0.13**	0	Two EWM fragments floating in this area
6B	**0.00**	0.76	**0.00**	**-0.76**	0	Three rooted EWM plants and several fragments
7	**0.00**	0.21	1.03	**-0.21**	0	Area dominated by Coontail and CLP
8	**0.00**	**0.00**	0.11	**0.00**	0	White water lily dominated area
9	**0.00**	**0.00**	0.16	**0.00**	0	Area dominated by Coontail and CLP
10	**0.00**	**0.00**	0.29	**0.00**	0	Area dominated by Coontail and CLP
11	**0.00**	**0.00**	0.88	**0.00**	0	Area dominated by Coontail and CLP
12	**0.00**	**0.00**	3.35	**0.00**	0	Area dominated by Coontail and CLP
Total Acres	**0.00**	**1.60**	**12.97**	**-1.60**		

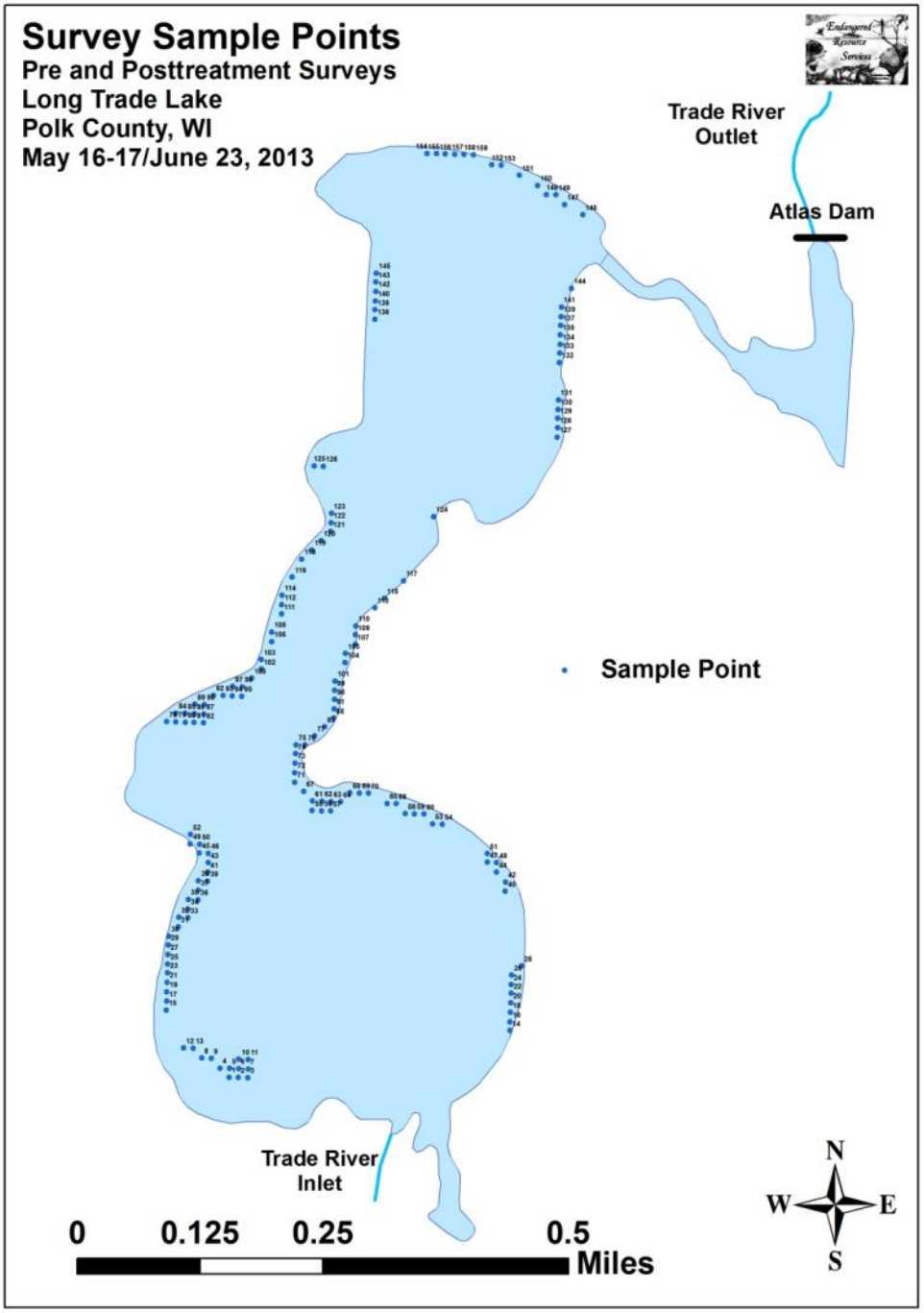
LITERATURE CITED

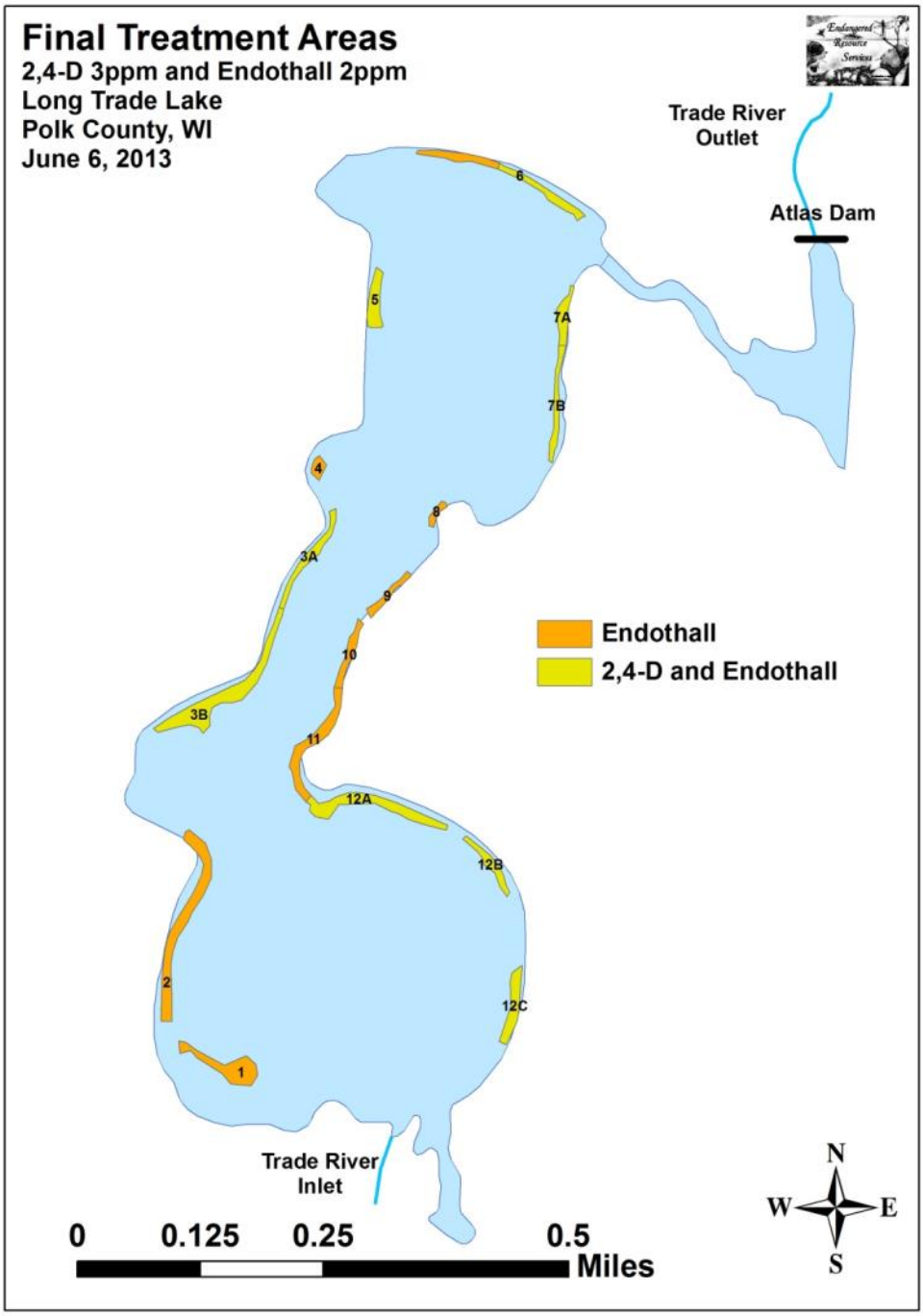
UWEX Lakes Program. [online]. 2010. Aquatic Plant Management in Wisconsin. Available from http://www.uwsp.edu/cnr/uwexlakes/ecology/APMguide.asp (2013, September).

UWEX Lakes Program. [online]. 2010. Pre/Post Herbicide Comparison. Available from http://dnr.wi.gov/org/water/fhp/lakes/PrePostEvaluation.pdf (2013, September).

WDNR. [online]. 2013. Long Trade Lake - Citizen Lake Water Quality Monitoring Database. Available from http://dnr.wi.gov/lakes/waterquality/Station.aspx?id=493080 (2013, September).

Appendix I: Survey Sample Points and Treatment Areas


Survey Sample Points
Pre and Posttreatment Surveys
Long Trade Lake
Polk County, WI
May 16-17/June 23, 2013
Trade River
Outlet
Atlas Dam
Sample Point
Trade River
Inlet
0
0.125
0.25
0.5
Miles
N
W
E
S


Final Treatment Areas
2,4-D 3ppm and Endothall 2ppm
Long Trade Lake
Polk County, WI
June 6, 2013
Trade River Outlet
Atlas Dam
6
5
7A
7B
4
8
3A
9
10
3B
11
12A
12B
2
12C
1
Endothall
2,4-D and Endothall
Trade River Inlet
0
0.125
0.25
0.5
Miles
N
W
E
S

Appendix II: Vegetative Survey Data Sheet

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																									
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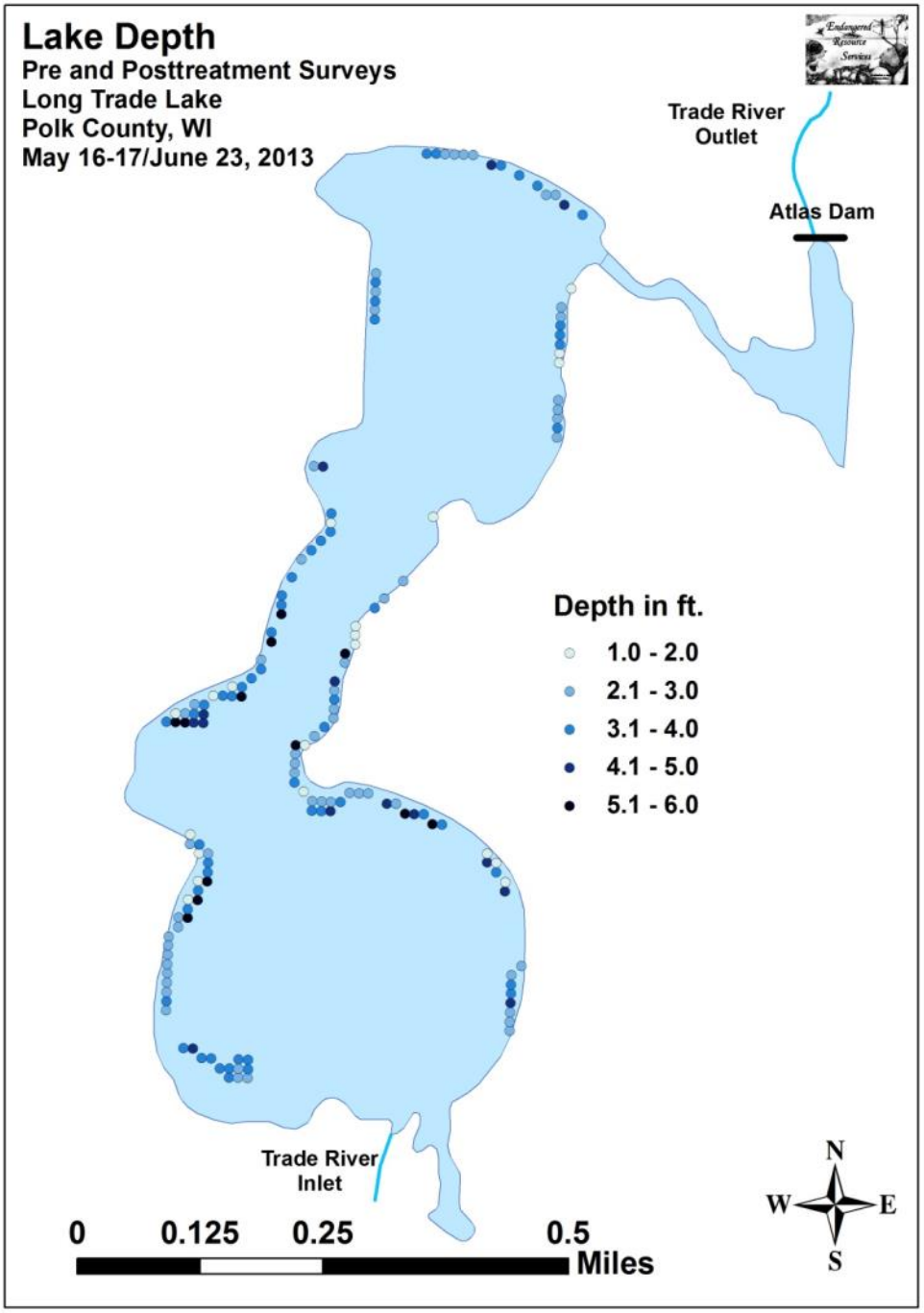
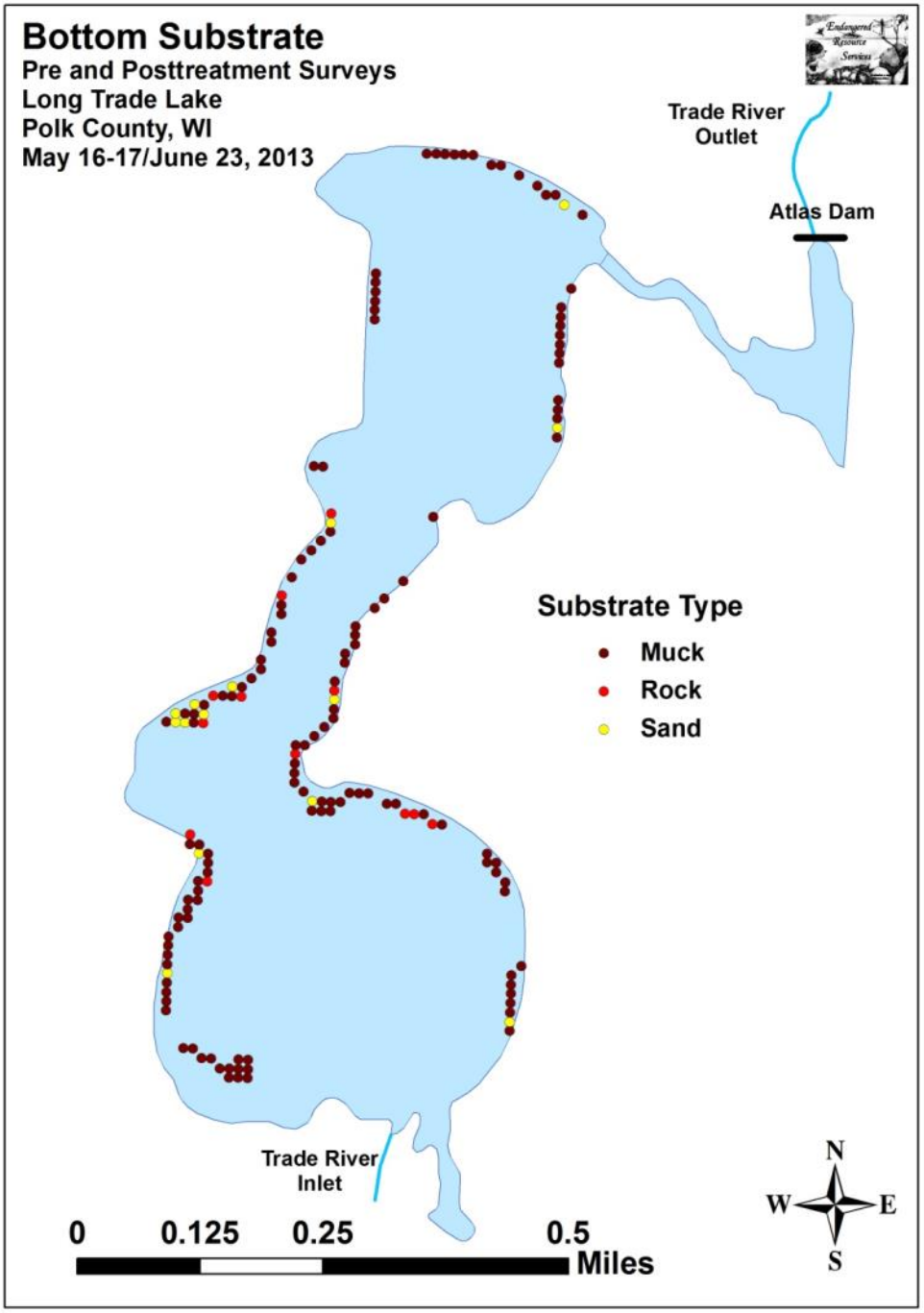
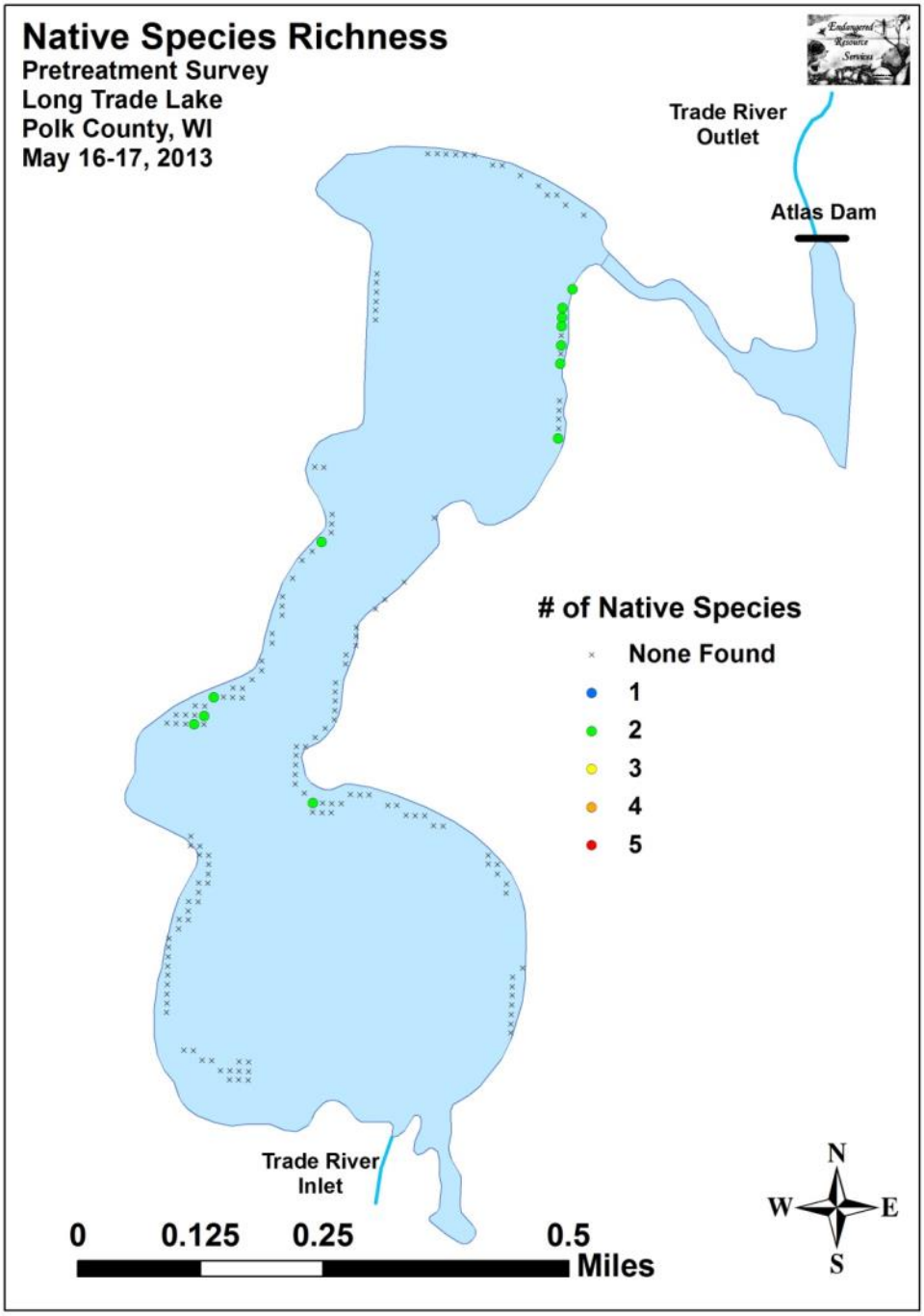
19																									
20																									

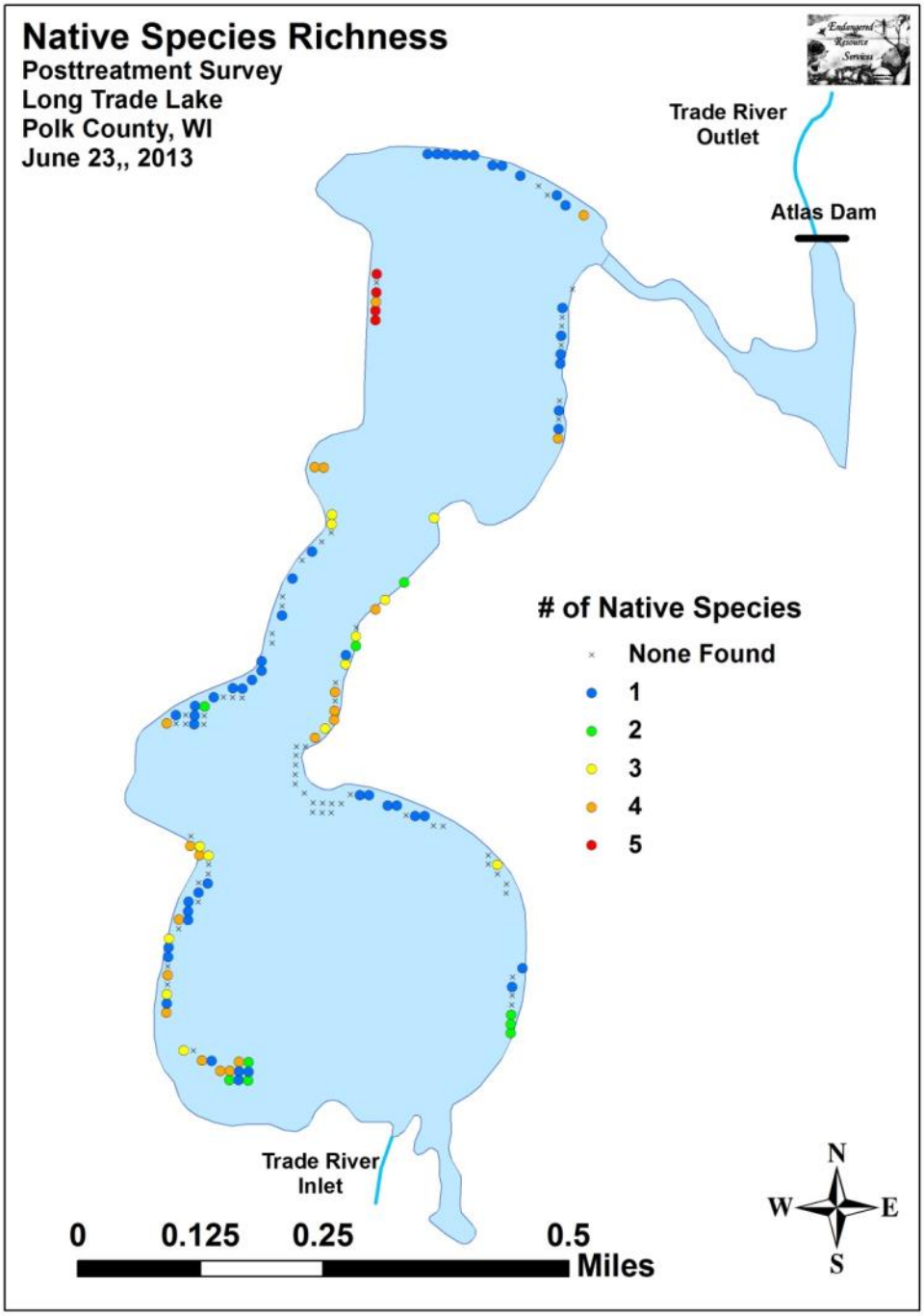
Appendix III: Pre/Post Habitat Variable Maps

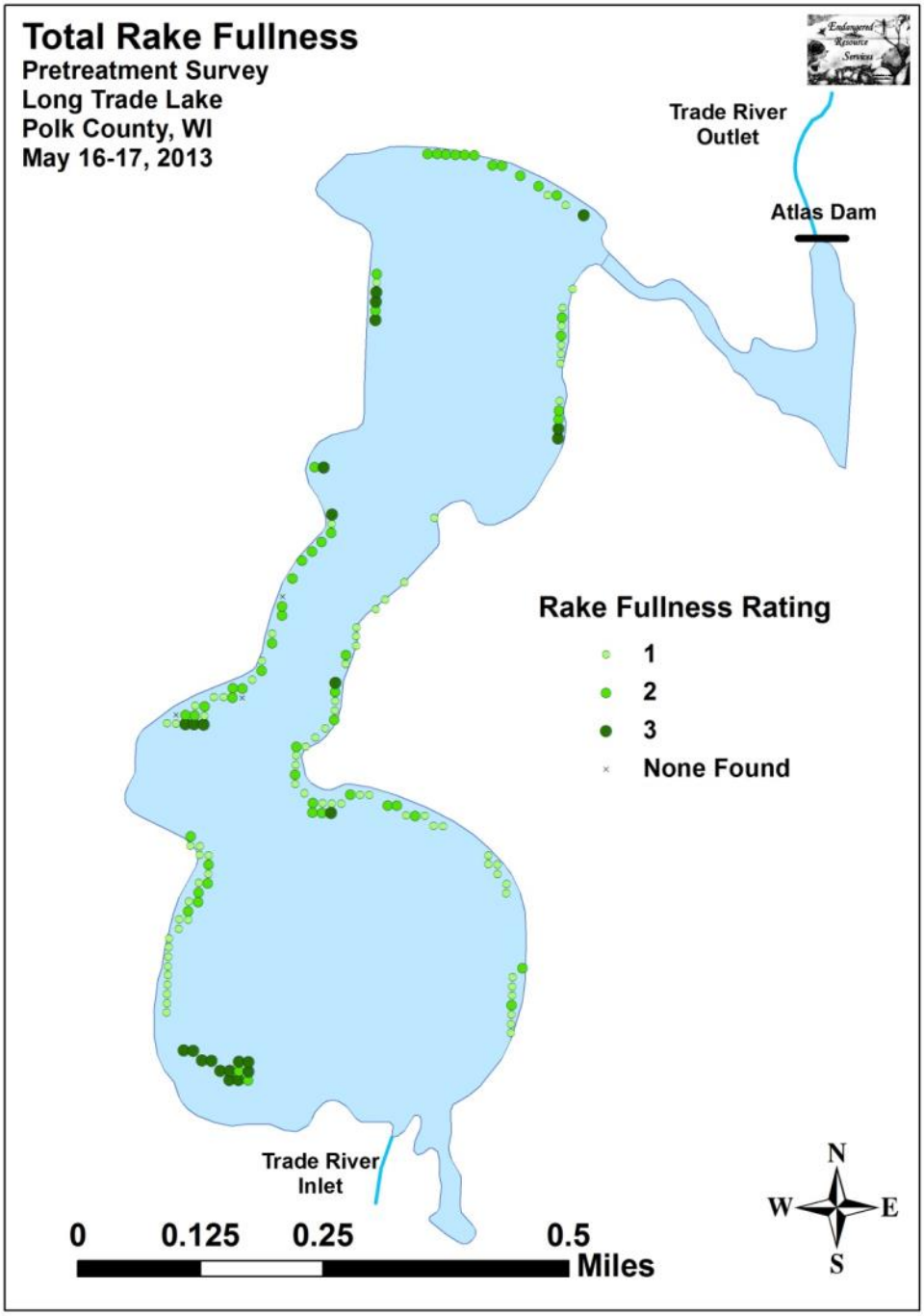

Lake Depth
Pre and Posttreatment Surveys
Long Trade Lake
Polk County, WI
May 16-17/June 23, 2013
Trade River
Outlet
Atlas Dam
Depth in ft.
1.0 - 2.0
2.1 - 3.0
3.1 - 4.0
4.1 - 5.0
5.1 - 6.0
Trade River
Inlet
0
0.125
0.25
0.5
Miles
N
W
E
S

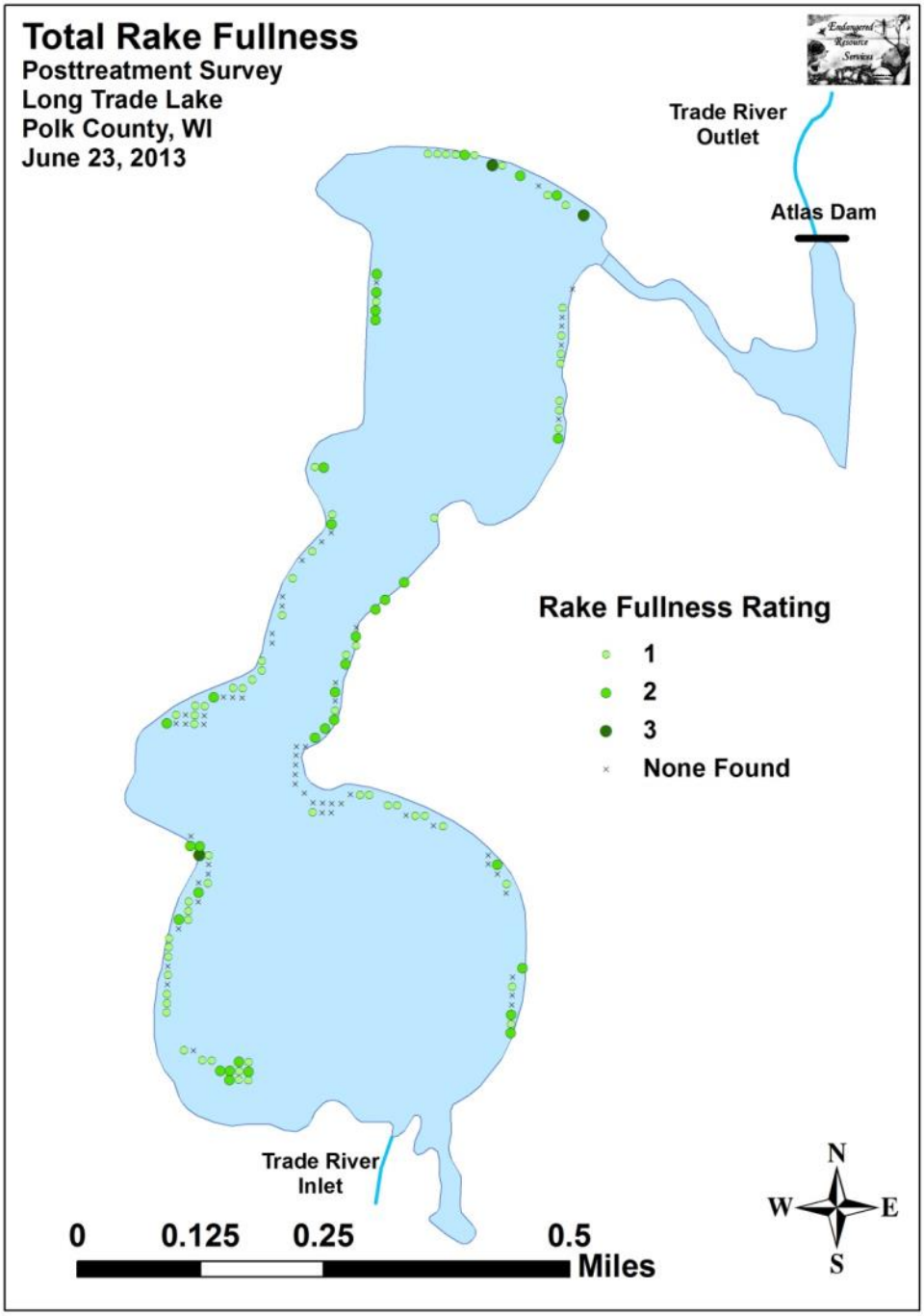

Bottom Substrate
Pre and Posttreatment Surveys
Long Trade Lake
Polk County, WI
May 16-17/June 23, 2013
Trade River
Outlet
Atlas Dam
Substrate Type
Muck
Rock
Sand
Trade River
Inlet
0
0.125
0.25
0.5
Miles
N
W
E
S

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

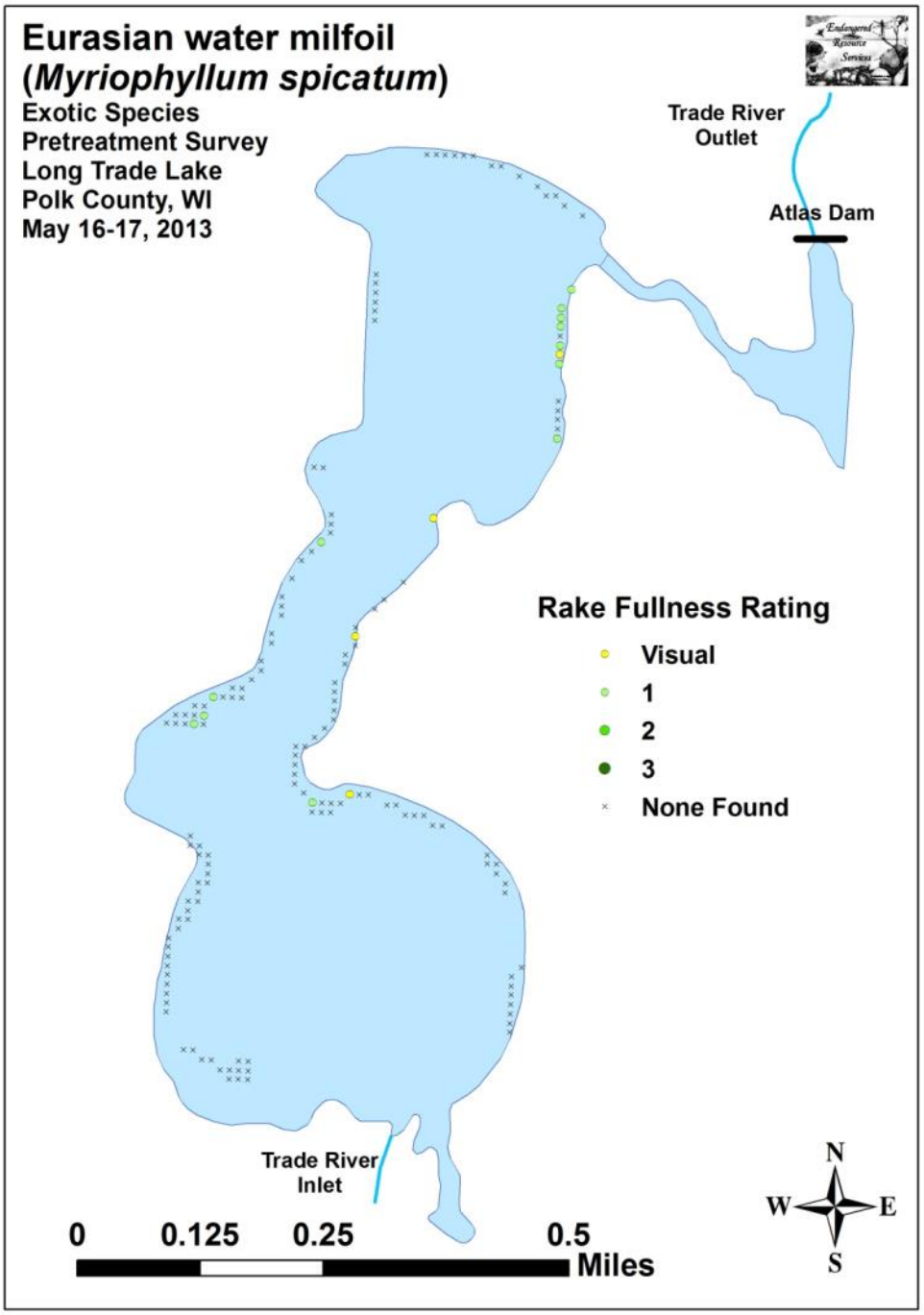

Native Species Richness
Pretreatment Survey
Long Trade Lake
Polk County, WI
May 16-17, 2013
Trade River
Outlet
Atlas Dam
# of Native Species
None Found
1
2
3
4
5
Trade River
Inlet
0
0.125
0.25
0.5
Miles
N
W
E
S

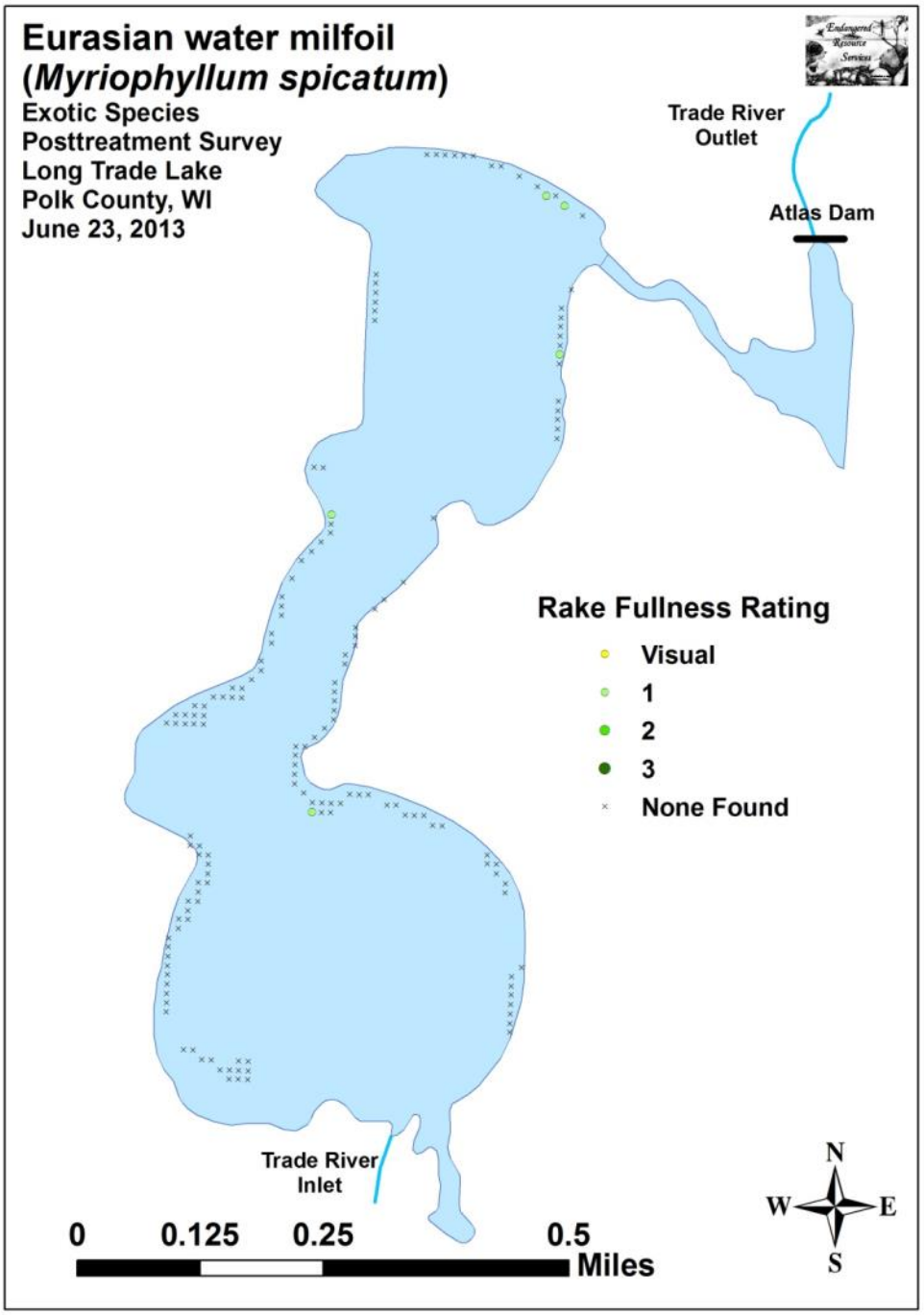

Native Species Richness
Posttreatment Survey
Long Trade Lake
Polk County, WI
June 23,, 2013
Trade River
Outlet
Atlas Dam
# of Native Species
None Found
1
2
3
4
5
Trade River
Inlet
0
0.125
0.25
0.5
Miles
N
W
E
S

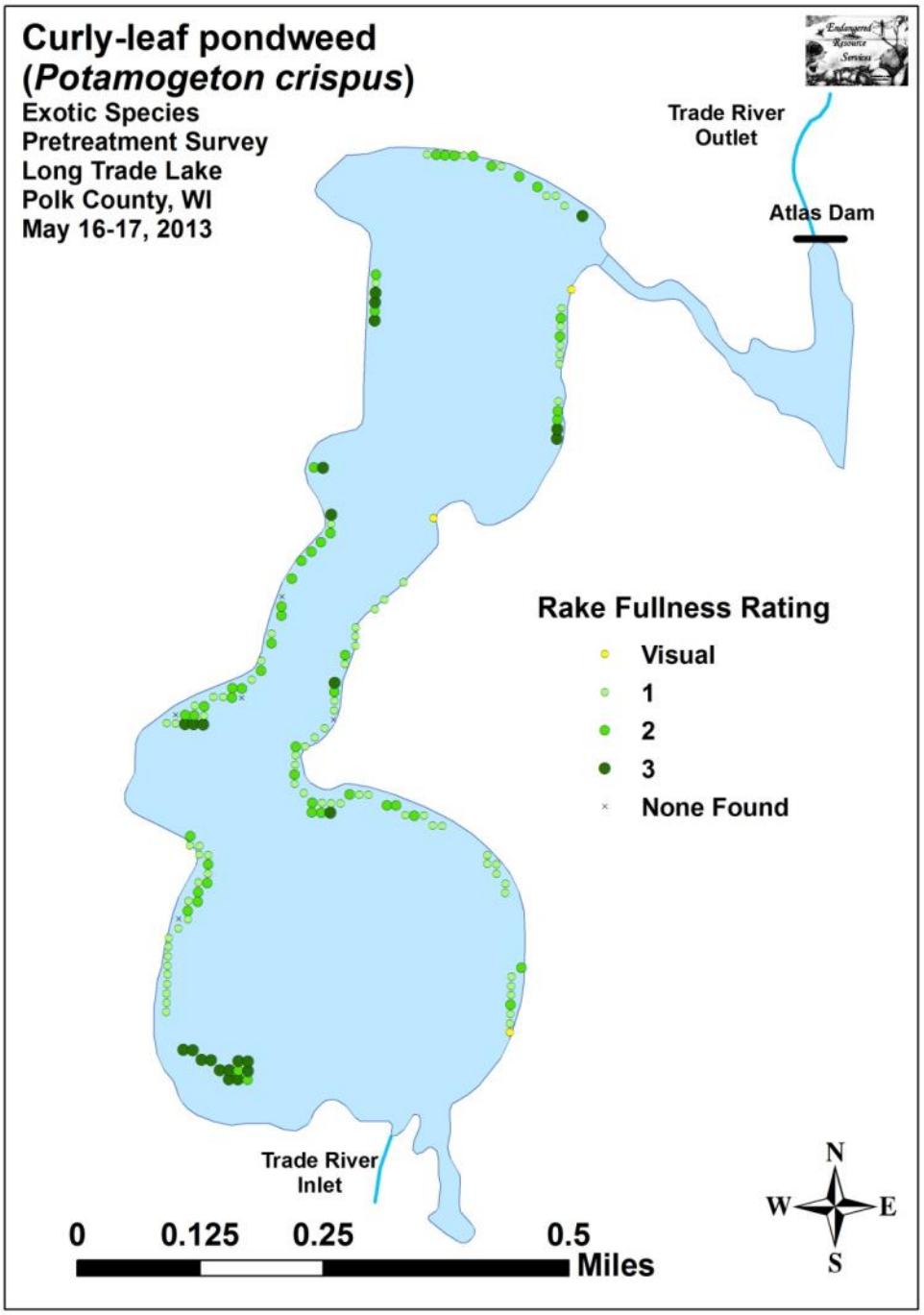

Total Rake Fullness
Pretreatment Survey
Long Trade Lake
Polk County, WI
May 16-17, 2013
Trade River
Outlet
Atlas Dam
Rake Fullness Rating
1
2
3
None Found
Trade River
Inlet
0
0.125
0.25
0.5
Miles
N
W
E
S

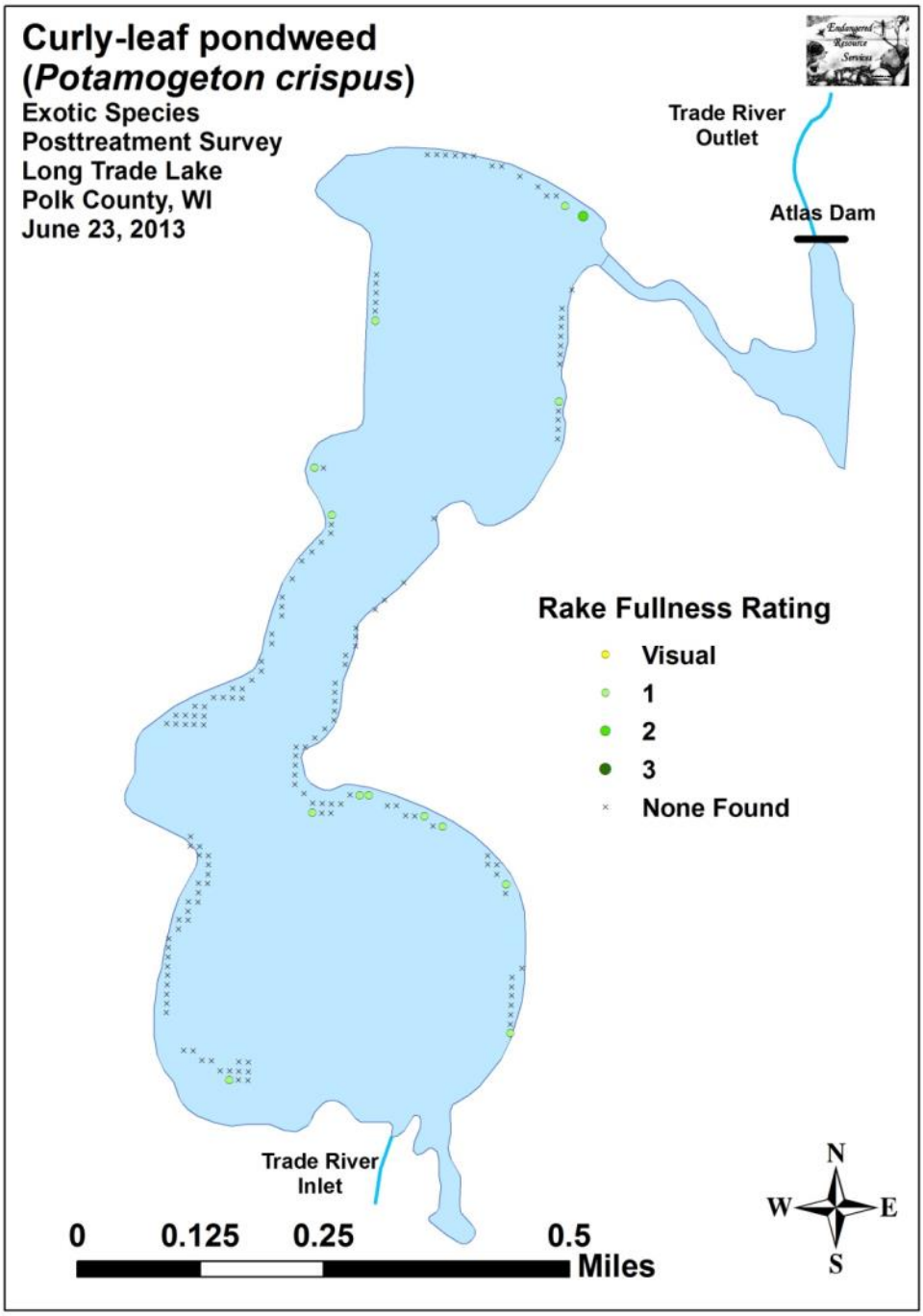

Total Rake Fullness
Posttreatment Survey
Long Trade Lake
Polk County, WI
June 23, 2013
Trade River
Outlet
Atlas Dam
Rake Fullness Rating
1
2
3
None Found
Trade River
Inlet
0
0.125
0.25
0.5
Miles
N
W
E
S

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

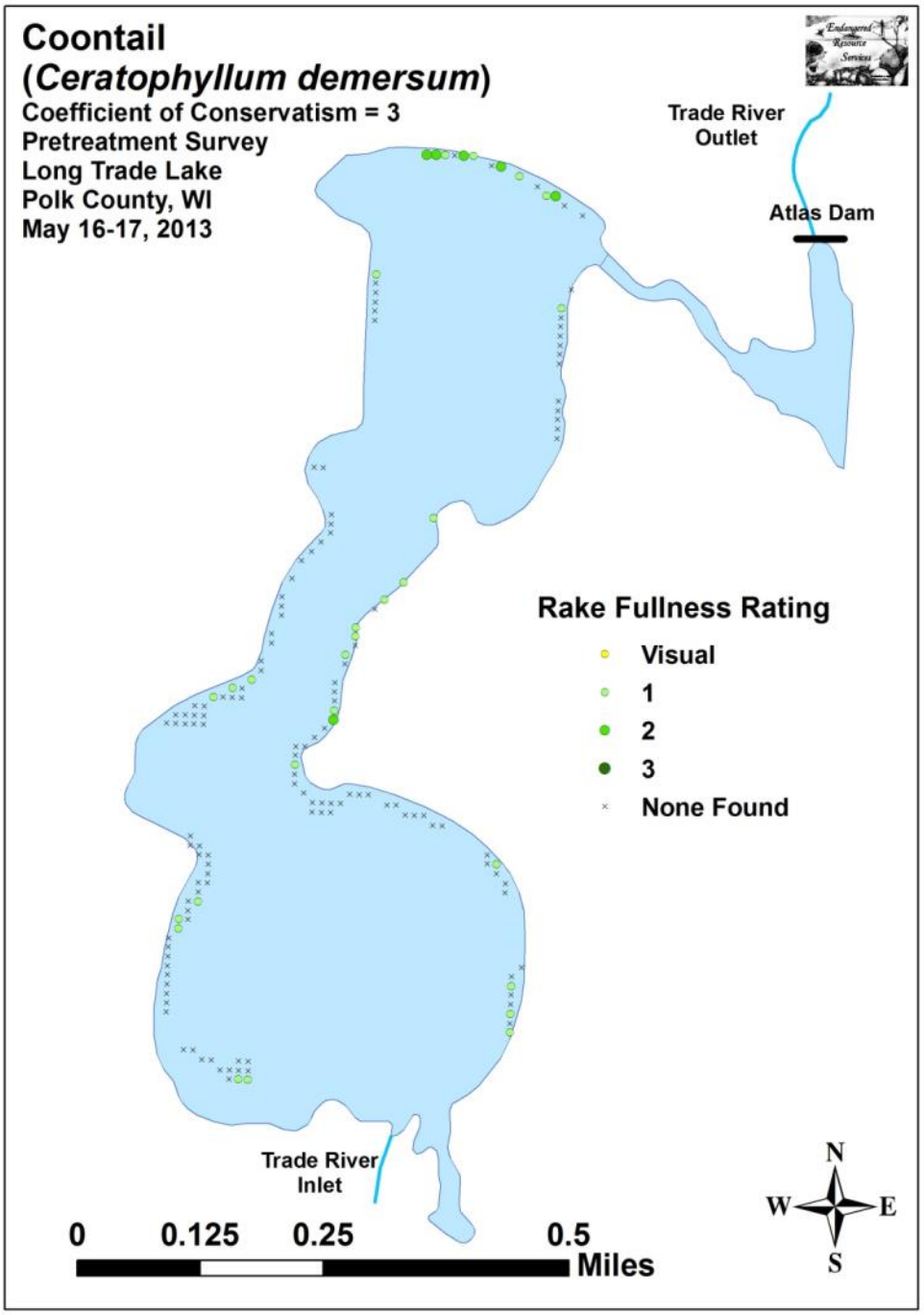

Eurasian water milfoil
(Myriophyllum spicatum)
Exotic Species
Pretreatment Survey
Long Trade Lake
Polk County, WI
May 16-17, 2013
Trade River
Outlet
Atlas Dam
Rake Fullness Rating
Visual
1
2
3
None Found
Trade River
Inlet
0
0.125
0.25
0.5
Miles
N
W
E
S

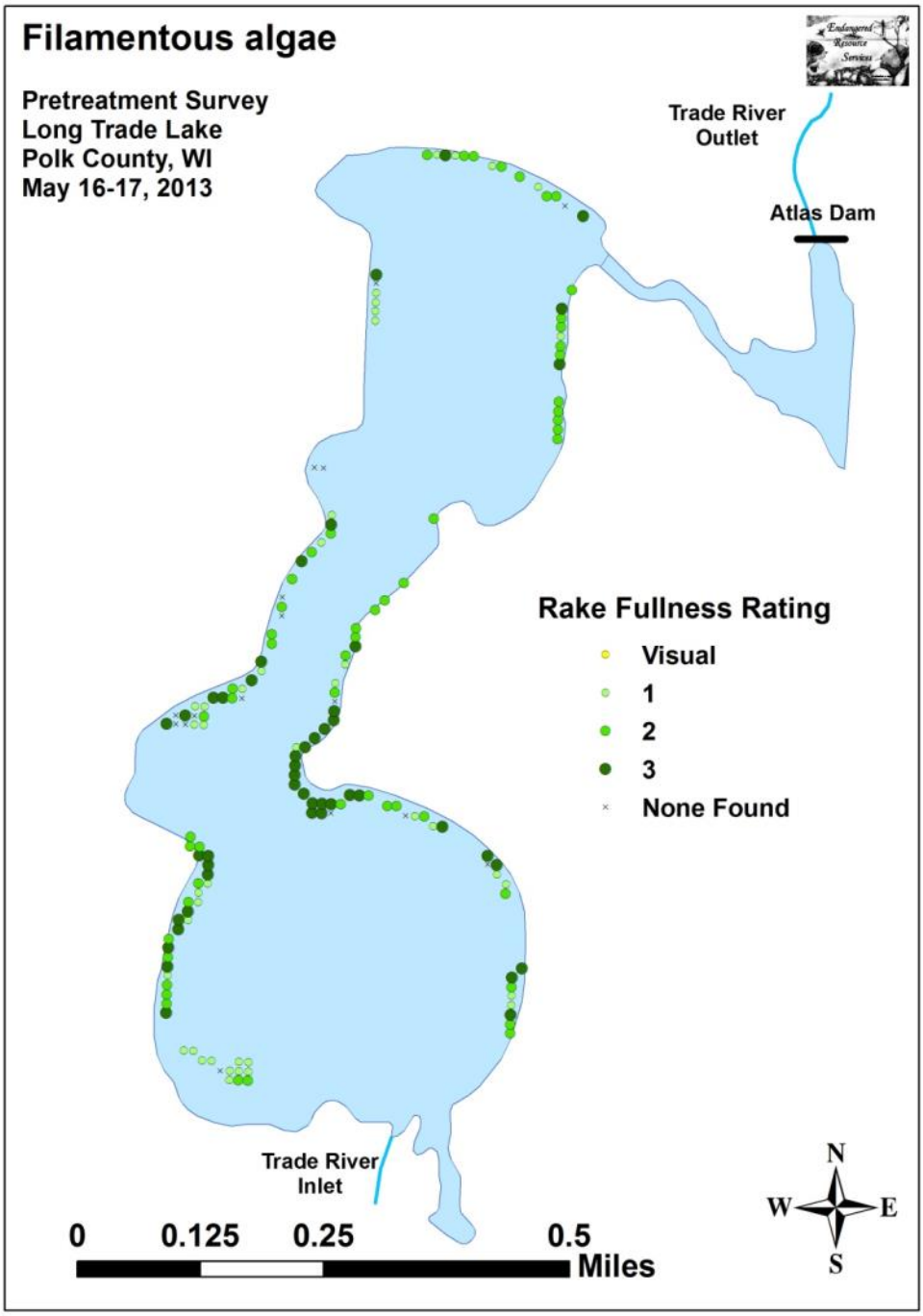

Eurasian water milfoil
(Myriophyllum spicatum)
Exotic Species
Posttreatment Survey
Long Trade Lake
Polk County, WI
June 23, 2013
Trade River
Outlet
Atlas Dam
Rake Fullness Rating
Visual
1
2
3
None Found
Trade River
Inlet
0
0.125
0.25
0.5
Miles
N
W
E
S


Curly-leaf pondweed
(Potamogeton crispus)
Exotic Species
Pretreatment Survey
Long Trade Lake
Polk County, WI
May 16-17, 2013
Trade River
Outlet
Atlas Dam
Rake Fullness Rating
Visual
1
2
3
None Found
Trade River
Inlet
0
0.125
0.25
0.5
Miles
N
W
E
S

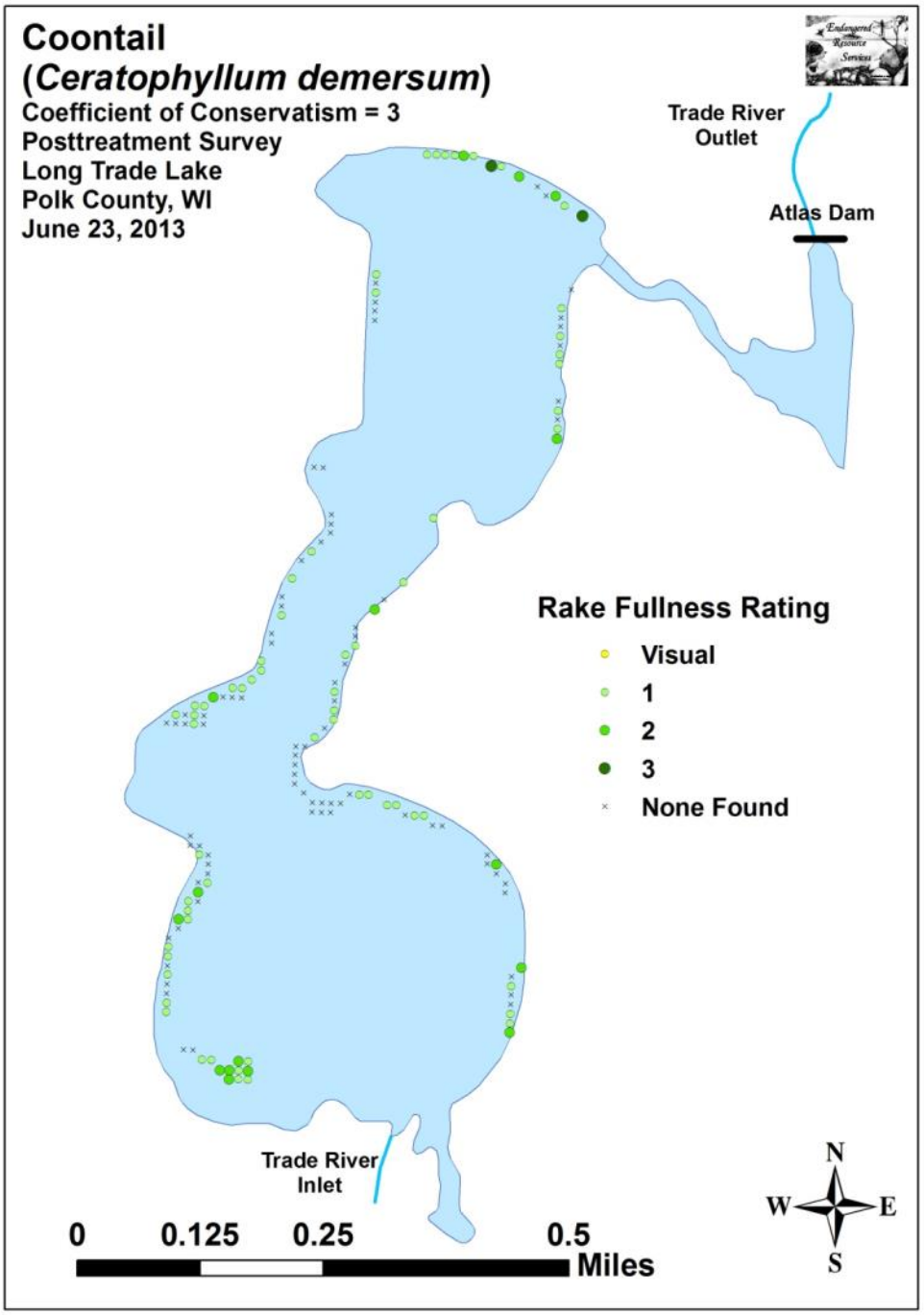

Curly-leaf pondweed
(Potamogeton crispus)
Exotic Species
Posttreatment Survey
Long Trade Lake
Polk County, WI
June 23, 2013
Trade River
Outlet
Atlas Dam
Rake Fullness Rating
Visual
1
2
3
None Found
Trade River
Inlet
0
0.125
0.25
0.5
Miles
N
W
E
S

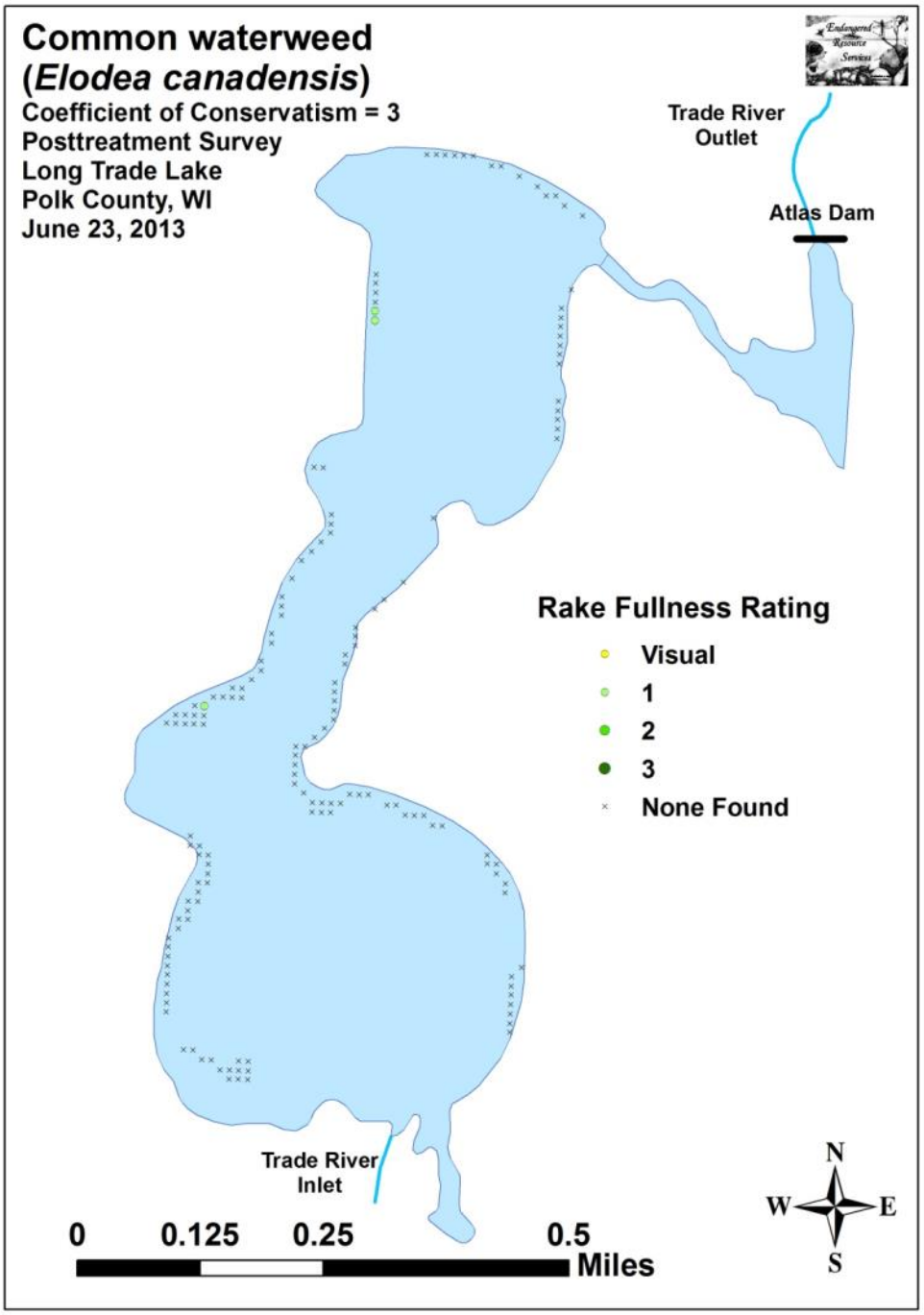
Appendix VI: Pretreatment Native Species Density and Distribution

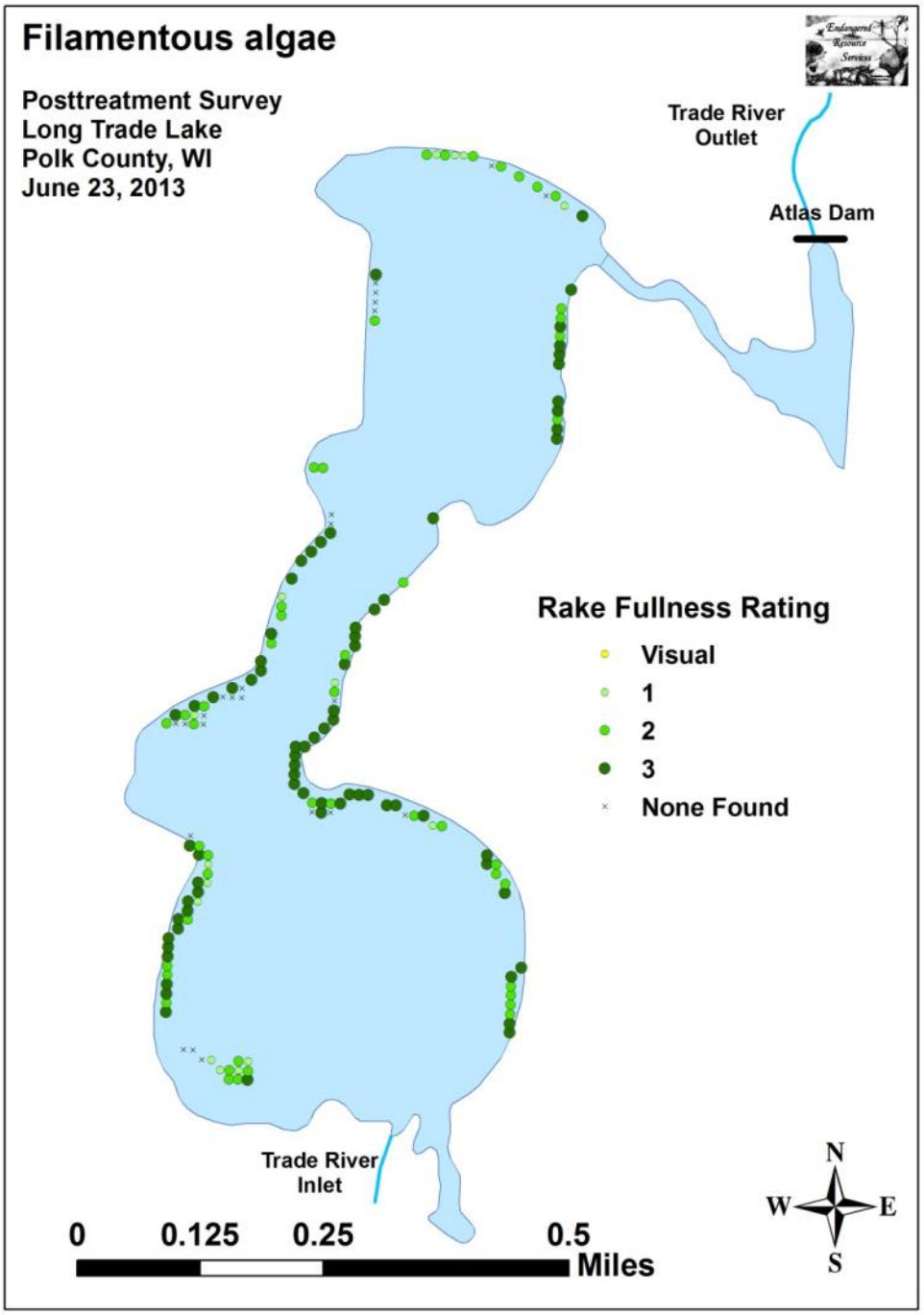

Coontail
(Ceratophyllum demersum)
Coefficient of Conservatism = 3
Pretreatment Survey
Long Trade Lake
Polk County, WI
May 16-17, 2013
Trade River Outlet
Atlas Dam
Rake Fullness Rating
Visual
1
2
3
None Found
Trade River Inlet
0
0.125
0.25
0.5
Miles
N
W
E
S

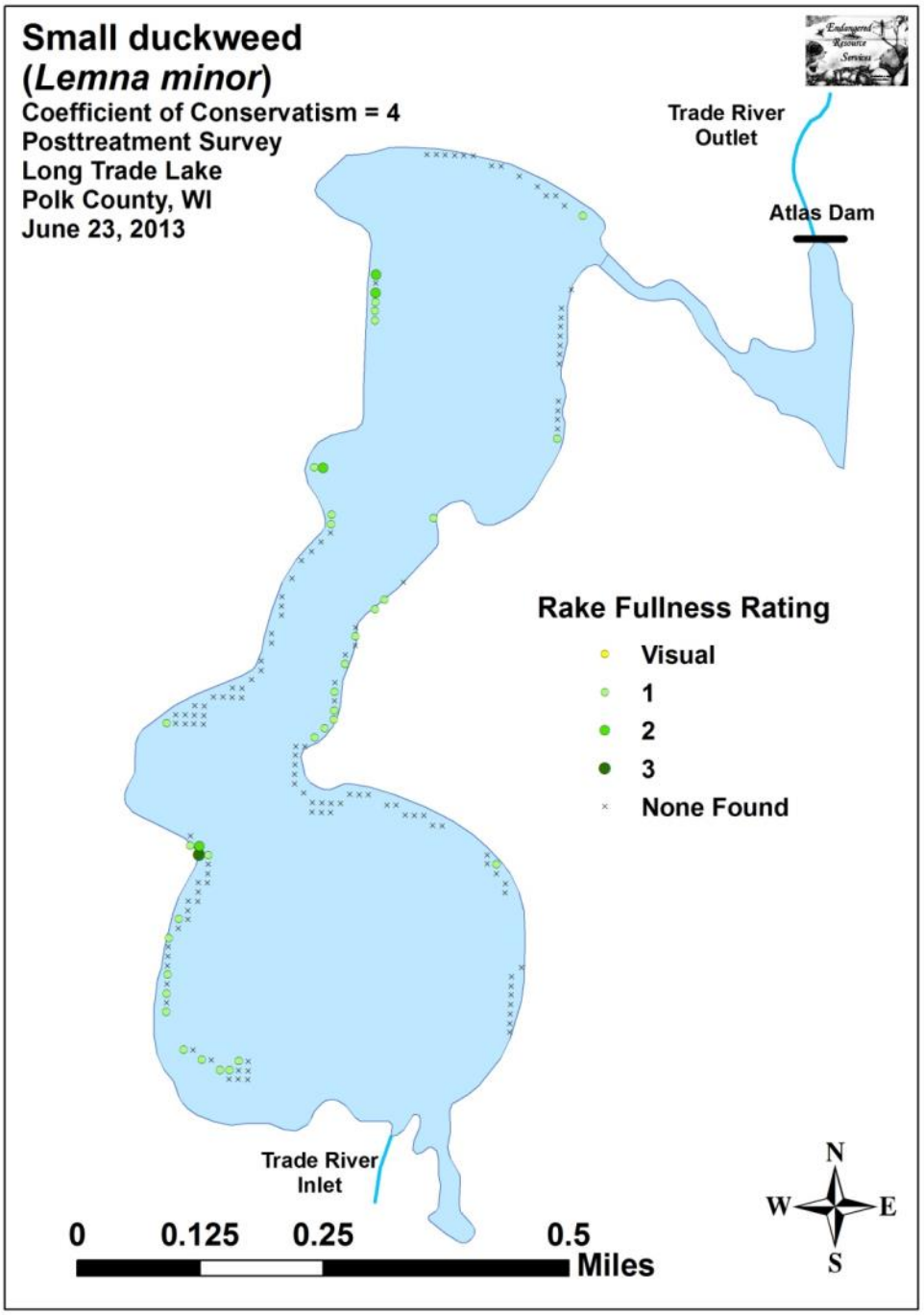

Filamentous algae
Pretreatment Survey
Long Trade Lake
Polk County, WI
May 16-17, 2013
Trade River
Outlet
Atlas Dam
Rake Fullness Rating
Visual
1
2
3
None Found
Trade River
Inlet
0
0.125
0.25
0.5
Miles
N
W
E
S

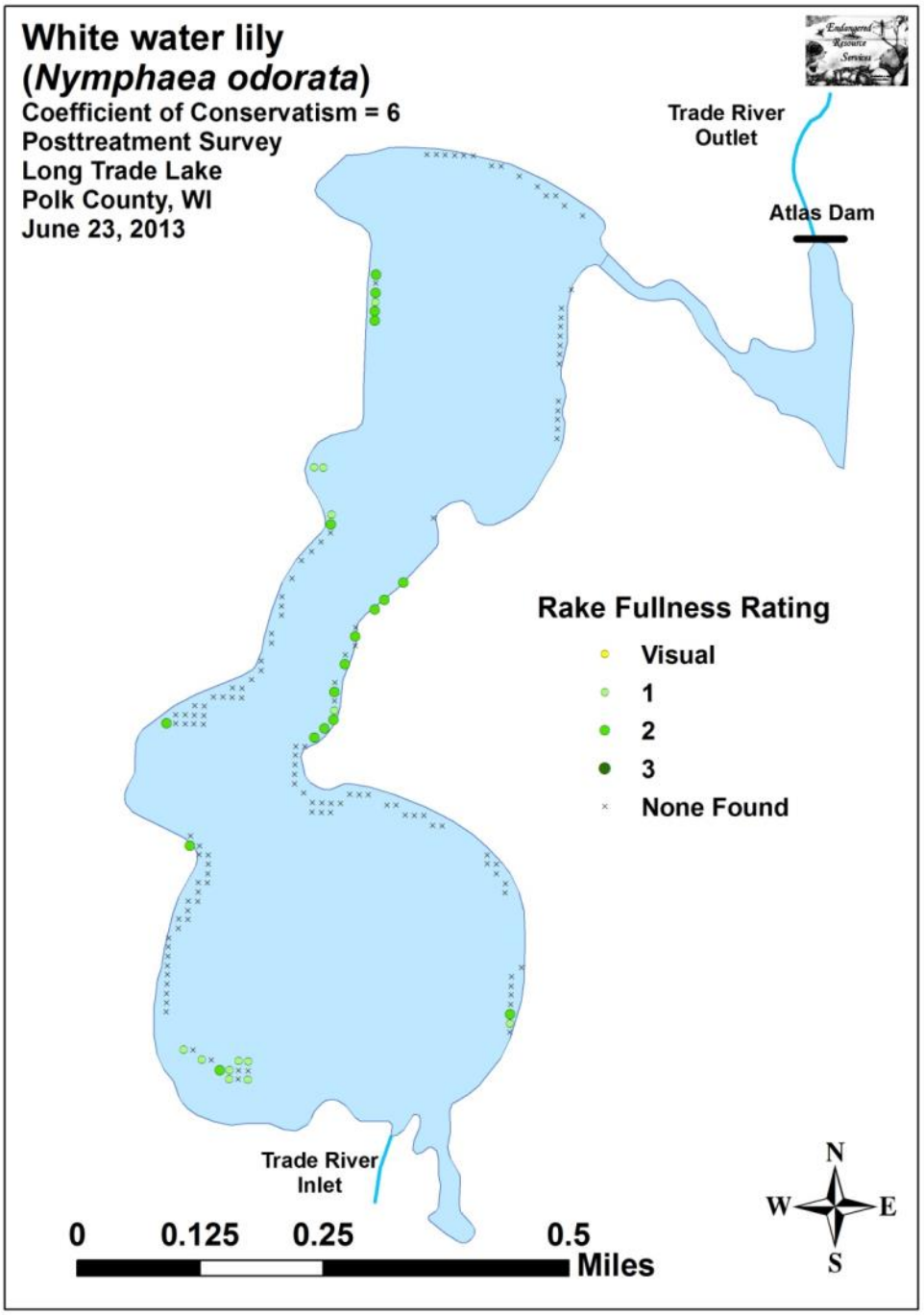
Appendix VII: Posttreatment Native Species Density and Distribution

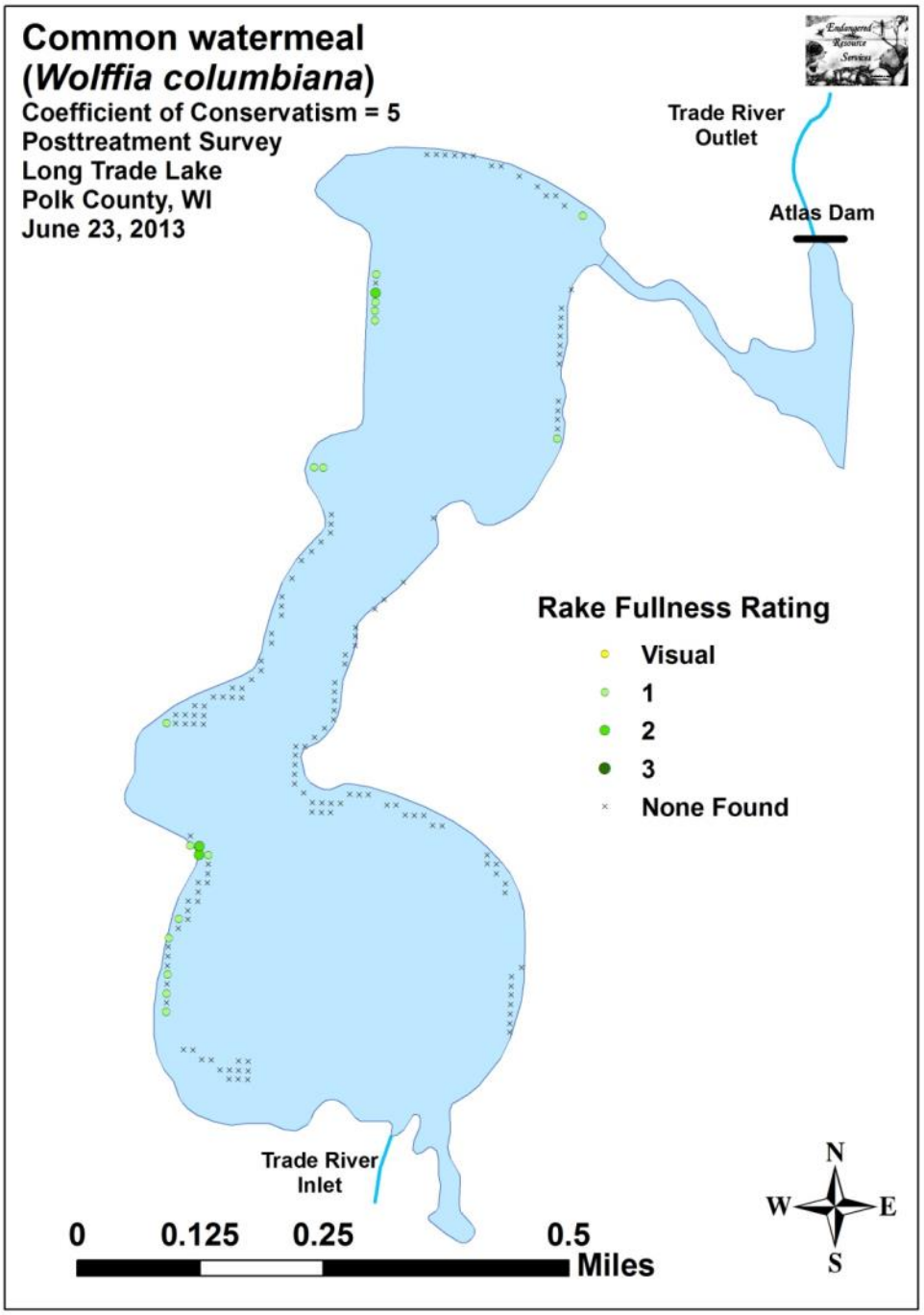

Coontail
(Ceratophyllum demersum)
Coefficient of Conservatism = 3
Posttreatment Survey
Long Trade Lake
Polk County, WI
June 23, 2013
Trade River
Outlet
Atlas Dam
Rake Fullness Rating
Visual
1
2
3
None Found
Trade River
Inlet
0
0.125
0.25
0.5
Miles
N
W
E
S


Common waterweed
(Elodea canadensis)
Coefficient of Conservatism = 3
Posttreatment Survey
Long Trade Lake
Polk County, WI
June 23, 2013
Trade River
Outlet
Atlas Dam
Rake Fullness Rating
Visual
1
2
3
None Found
Trade River
Inlet
0
0.125
0.25
0.5
Miles
N
W
E
S

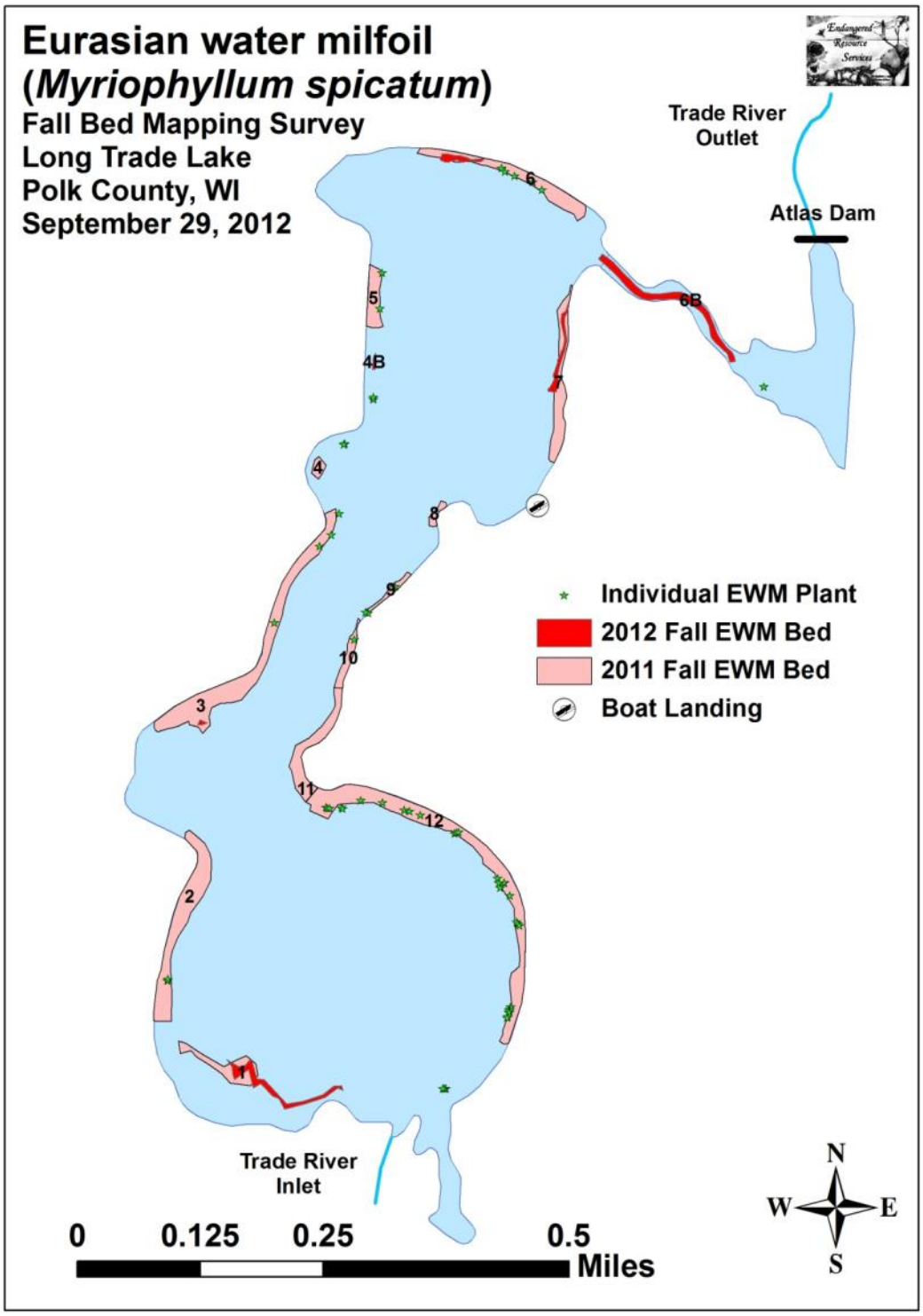

Filamentous algae
Posttreatment Survey
Long Trade Lake
Polk County, WI
June 23, 2013
Trade River
Outlet
Atlas Dam
Rake Fullness Rating
Visual
1
2
3
None Found
Trade River
Inlet
0
0.125
0.25
0.5
Miles
N
W
E
S

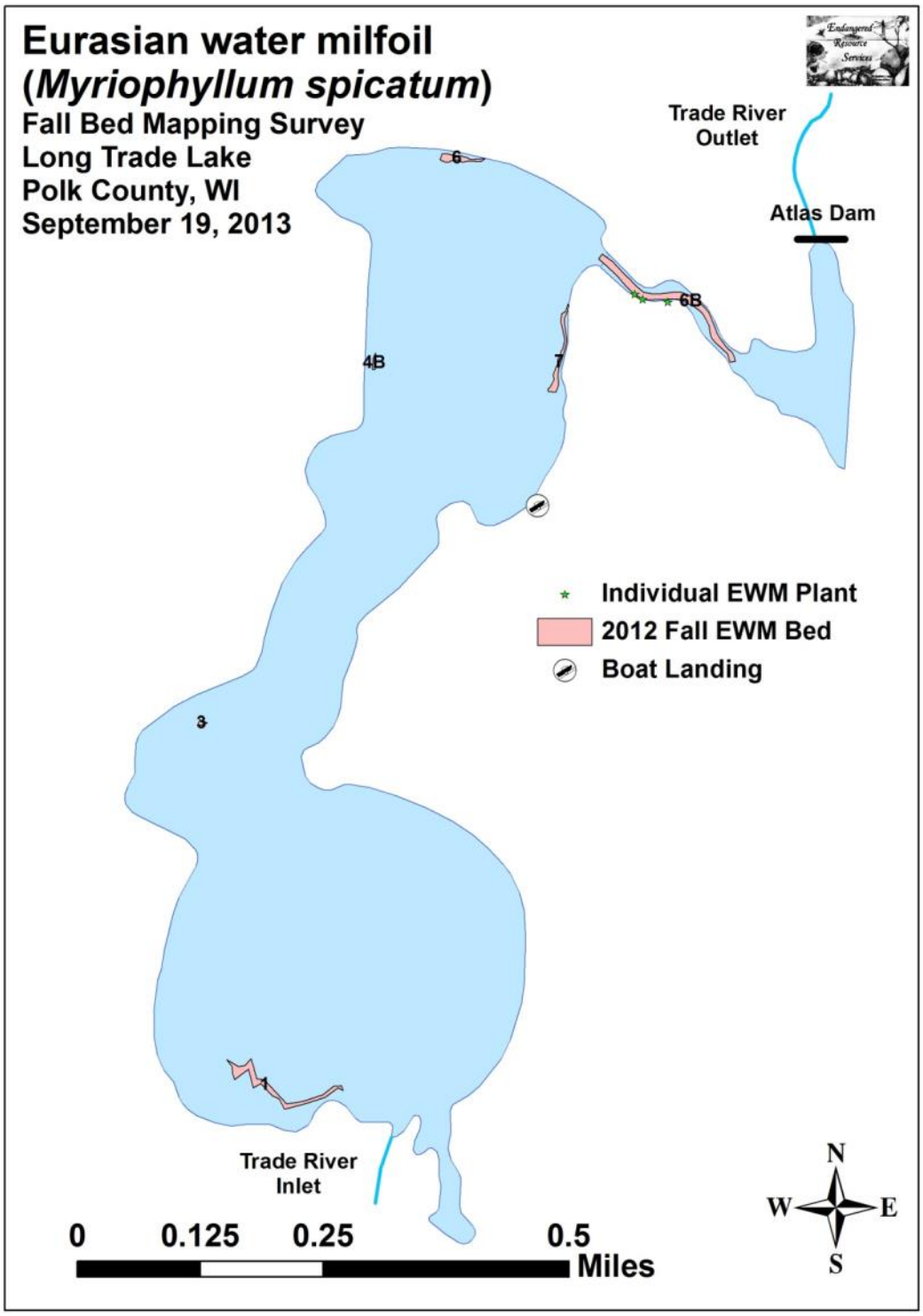

Small duckweed
(Lemna minor)
Coefficient of Conservatism = 4
Posttreatment Survey
Long Trade Lake
Polk County, WI
June 23, 2013
Trade River Outlet
Atlas Dam
Rake Fullness Rating
Visual
1
2
3
None Found
Trade River Inlet
0
0.125
0.25
0.5
Miles
N
W
E
S


White water lily
(Nymphaea odorata)
Coefficient of Conservatism = 6
Posttreatment Survey
Long Trade Lake
Polk County, WI
June 23, 2013
Trade River
Outlet
Atlas Dam
Rake Fullness Rating
Visual
1
2
3
None Found
Trade River
Inlet
0
0.125
0.25
0.5
Miles
N
W
E
S


Common watermeal
(Wolffia columbiana)
Coefficient of Conservatism = 5
Posttreatment Survey
Long Trade Lake
Polk County, WI
June 23, 2013
Trade River
Outlet
Atlas Dam
Rake Fullness Rating
Visual
1
2
3
None Found
Trade River
Inlet
0
0.125
0.25
0.5
Miles
N
W
E
S

Appendix VIII: Long Trade Lake Fall 2012 and 2013 EWM Bed Maps


Eurasian water milfoil
(Myriophyllum spicatum)
Fall Bed Mapping Survey
Long Trade Lake
Polk County, WI
September 29, 2012
Trade River Outlet
Atlas Dam
Individual EWM Plant
2012 Fall EWM Bed
2011 Fall EWM Bed
Boat Landing
Trade River Inlet
0 0.125 0.25 0.5
Miles
N
W
E
S


Eurasian water milfoil
(Myriophyllum spicatum)
Fall Bed Mapping Survey
Long Trade Lake
Polk County, WI
September 19, 2013
Trade River Outlet
Atlas Dam
6
6B
4B
7
3
1
Trade River Inlet
Individual EWM Plant
2012 Fall EWM Bed
Boat Landing
0
0.125
0.25
0.5
Miles
N
W
E
S