Aquatic Plant Survey of
Lower Rib River and Lake Wausau
Marathon County, Wisconsin

December 2012

N. Turyk and R. Jaworski
UW-Stevens Point, Center for Watershed Science and Education

Center for Watershed Science and Education
College of Natural Resources
University of Wisconsin-Stevens Point

Acknowledgements

We sincerely appreciate the support received from the Lake Wausau Association, City of Wausau, City of Schofield, Village of Rothschild, Town of Rib Mountain, Marathon County, and the Wisconsin Department of Natural Resources.

We thank the following for help with the aquatic plant survey:

Paul Skawinski, Golden Sands RC&D, Inc.
Jen McNelly, Megan Radske, Chase Kasmerchak, and Stuart Lannoye, UW-Stevens Point staff and students.

Table of Contents

List of Tables

List of Figures

Introduction

This aquatic plant survey was part of a larger effort to collect the information necessary to make management decisions to improve Lake Wausau's water quality and recreational opportunities. This effort is a partnership between the Lake Wausau Association, City of Wausau, the towns of Rib Mountain and Wausau, the Wisconsin Department of Natural Resources, the U.S. Army Corps of Engineers, and the University of Wisconsin-Stevens Point Center for Watershed Science and Education.

The Lake Wausau system is 1,918 acres in size and is located in Marathon County, Wisconsin. Its shorelines connect the cities of Schofield and Wausau, the village of Rothschild, and the towns of Rib Mountain and Wausau (Figure 1). The population of this area is approximately 56,000 (2010 census). A survey of aquatic plants was conducted in Lake Wausau and the Rib River confluence during the summer of 2012. The survey was conducted to gain a better understanding of the aquatic plant communities in the system, which could then be used to develop an aquatic plant management plan for Lake Wausau.

The 1,918-acre Lake Wausau system is a special and important natural resource for Wausau and the surrounding towns, villages, and cities. The Rib River confluence alone provides wonderful recreational opportunities that include fishing, canoeing, and viewing wildlife. Many of the secluded areas within this portion of the system provide a natural escape near the heart of the city. The Lake Wausau system provides excellent recreational opportunities such as fishing, swimming, boating, canoeing and hunting. This contributes to a good quality of life in the Wausau area. An understanding of the reservoir's ecosystem and the importance of the aquatic plant community will help to meet current and future management objectives.

Aquatic plants play a significant role in a reservoir's ecosystem (Figure 2). They provide habitat and food for the fishery, turtles, waterfowl and other aquatic organisms, stabilize the sediment, reduce erosion, provide cooler temperatures during the heat of summer, reduce impacts from waves, infuse oxygen into the water, and utilize nutrients that may otherwise be used by algae. The species of plants that comprise an aquatic plant community can provide insight into the health of the aquatic ecosystem. Some species are present only in specific conditions and may not be tolerant of disturbance, while other species are very tolerant of disturbances. Abundant growth of non-native and sometimes invasive aquatic plant species (such as Eurasian watermilfoil and curly-leaf pondweed) may significantly alter the aquatic plant and fish communities in a lake. In Wisconsin, the spread of aquatic invasive species is occurring at an alarming rate as they are transported from lake to lake on boats, trailers, fishing equipment, and bait.

Figure 1. Lake Wausau in Marathon County with municipal boundaries and major boat landings.

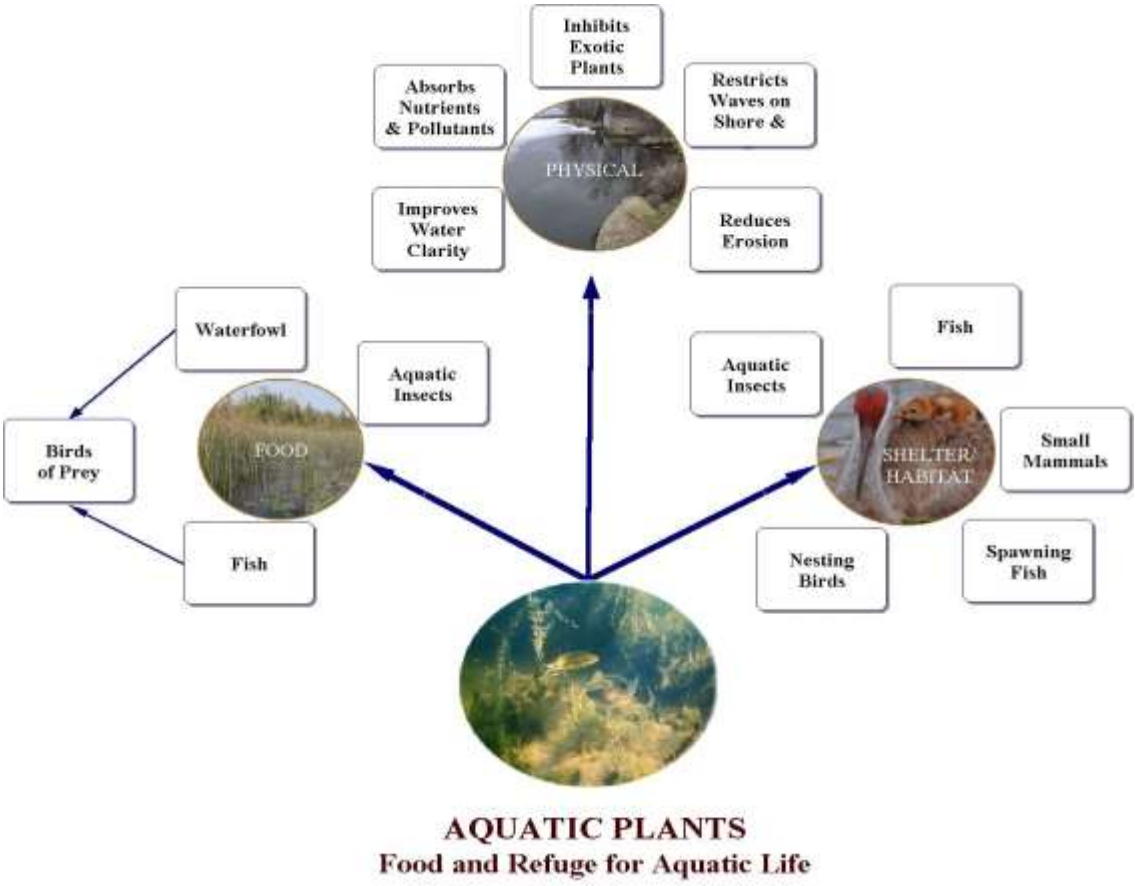

Figure 2. Diagram of the important roles of aquatic plants in a reservoir system.

Methods

Two aquatic plant surveys were conducted by University of Wisconsin-Stevens Point Center for Watershed Science and Education (CWSE) staff in summer 2012. The first survey evaluated the presence of non-native curly-leaf pondweed (*Potamogeton crispus*)(CLP) between June 12 and 19, 2012. CWSE staff chose this week because CLP plants mature, produce turions, and die off by late June. The second aquatic plant survey for Lake Wausau and the Rib River confluence took place between August 13 and 17, 2012. The surveys were conducted using the Wisconsin Department of Natural Resources (WDNR) point-intercept sampling protocol (Aron et al.).

The GPS coordinates for the grid were provided by WDNR biologists. The grid was laid out with equal spacing between all points and was adjusted for improved coverage in shallow water. Two grid sizes were used. A 45m x 45m grid was used for upper Lake Wausau and the Rib River confluence above the County Trunk Highway N bridge, resulting in 291 sampling points (Figure 3). A 90m x 90m grid was used for Lake Wausau below the County Trunk Highway N bridge, resulting in 942 sampling points (Figure 4). The 45m x 45m grid used on upper Lake Wausau provided coverage of streams and backwaters that would have been missed if the 90m x 90m grid had been used. GPS coordinates of the sampling points were transferred onto aerial photographs, which were used to assist point location in the field. A Garmin GPSmap 78s handheld unit was used in the field.

Pole-mounted rakes were used to collect an aquatic plant sample at each accessible site that was shallower than the maximum rooting depth. The rakes were 13.8 inches wide, with fourteen tines on each side. After a sample was collected, each species present was assigned a fullness rating. Ratings ranged from 0 (plants not present) to 3 (plants overflowing the rake tines). At each site, depth and dominant sediment type were also recorded. These data were provided to researchers creating bottom maps and bathymetric maps for inclusion in their datasets.

Two two-person crews used canoes to travel between sample points in areas with shallow water. A third crew of three people used a motorized boat to travel between sample points in the main stem of Lake Wausau. While every effort was made to access sample points, some sites were inaccessible. If the water was too shallow for a canoe or was on land, the point was listed as inaccessible and any visual observations were recorded. The upper Lake Wausau/Rib River confluence had 93 points that were inaccessible. Lower Lake Wausau had 280 points that were either inaccessible or deeper than the maximum rooting depth of plants (9.8 feet). Additional points were added using GPS when a unique species was visibly identified between or around points.

Figure 3. Aquatic plant survey points on the upper Lake Wausau/Rib River confluence.

Figure 4. Aquatic plant survey points on Lake Wausau.

Results & Discussion

The complexity of an aquatic plant community in a lake or reservoir system often reflects the complexity of the lake: varying depths, bays, and backwaters all support different plant species. Like terrestrial plants, aquatic plants require light, sediment (soil), and nutrients to thrive. Limitation of light restricts the depth that aquatic plants can grow. Excess nutrients (nitrogen and phosphorus) will result in an increase in the amount of algal and aquatic plant growth.

The results of the aquatic plant surveys provide needed information about the composition of the aquatic plant community, where it is healthy, and where navigational challenges may exist. The survey was conducted using methods that can be replicated to provide feedback about natural or management-induced changes over time.

To ensure that all areas of Lake Wausau were surveyed, the survey for the Lake Wausau and Rib River confluence was based on 291 sites assigned by the WDNR; 198 of these points were accessible during this survey. Eighty-one percent (162) of the 198 sites had vegetation. The points that were not sampled were inaccessible by boat or canoe – causes included shallow water and points that were located on land. The deepest depth at which aquatic plant growth was observed in this section was 7.9 feet, related to the depth that sufficient light can penetrate through the water. Within upper Lake Wausau, there were relatively few points with depths exceeding 7 feet; therefore, aquatic plants can grow throughout most of the upper Lake Wausau/Rib River confluence. Twenty-nine species of aquatic plants were identified in upper Lake Wausau and the Rib River confluence during the 2012 survey (Table 1).

The survey for lower Lake Wausau (below the County Trunk Highway N bridge) was based on 942 sites assigned using the WDNR's point-intercept protocol. 662 of these points were accessible during this survey. Forty-five percent (301) of the 662 accessible sites had vegetative growth. Points that were not sampled were inaccessible either by boat or canoe – causes included shallow water and points that were located on land. The deepest depth at which aquatic plant growth was observed in this section of Lake Wausau was 9.8 feet. A number of sites in lower Lake Wausau exceeded 10 feet, especially in the main channel. Twenty-eight species of aquatic plants were identified in lower Lake Wausau during the 2012 survey (Table 1).

Dominant sediment type was assessed at each site. Using the WDNR protocol for aquatic plant surveys, the categories of sand, muck, or rock were given for dominant sediment type. Only one classification was allowed per site. Muck was the dominant sediment type throughout Lake Wausau and in the upper Lake

Wausau/Rib River confluence. Muck sediment is usually rich in nutrients, which favors the growth of aquatic plants.

The abundance of aquatic plant growth collected on the sampling rakes during the survey provided a reference for the density of the plant growth which can be mapped. In the Rib River/Upper Lake Wausau survey area, plant density varied throughout the system (Figure 5). In lower Lake Wausau, dense patches of aquatic plants were observed in the upper and lower reaches (Figure 6).

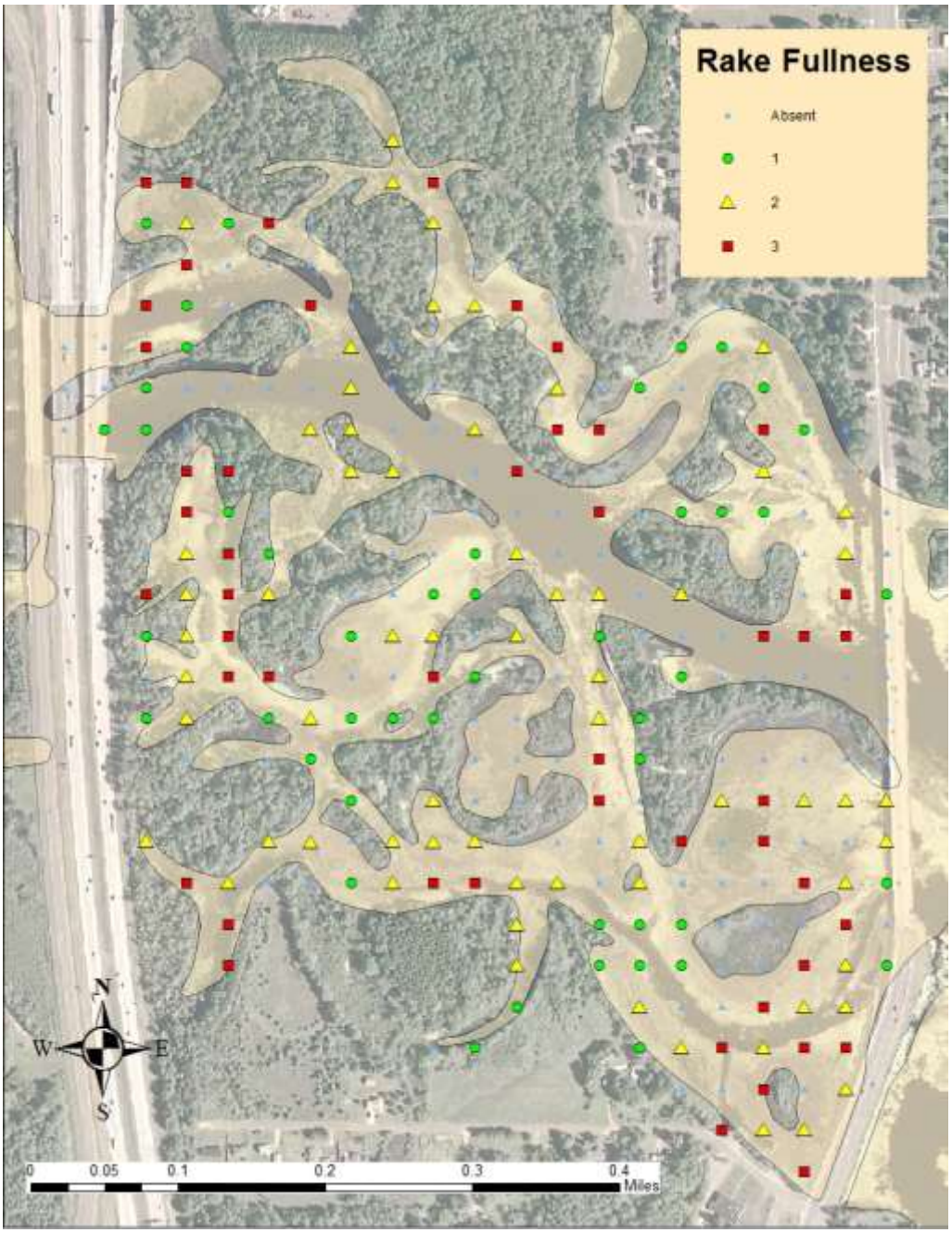

Figure 5. Map showing total rake fullness for aquatic plants in upper Lake Wausau/Rib River confluence. August 2012. 1=sparse 2=medium 3=dense

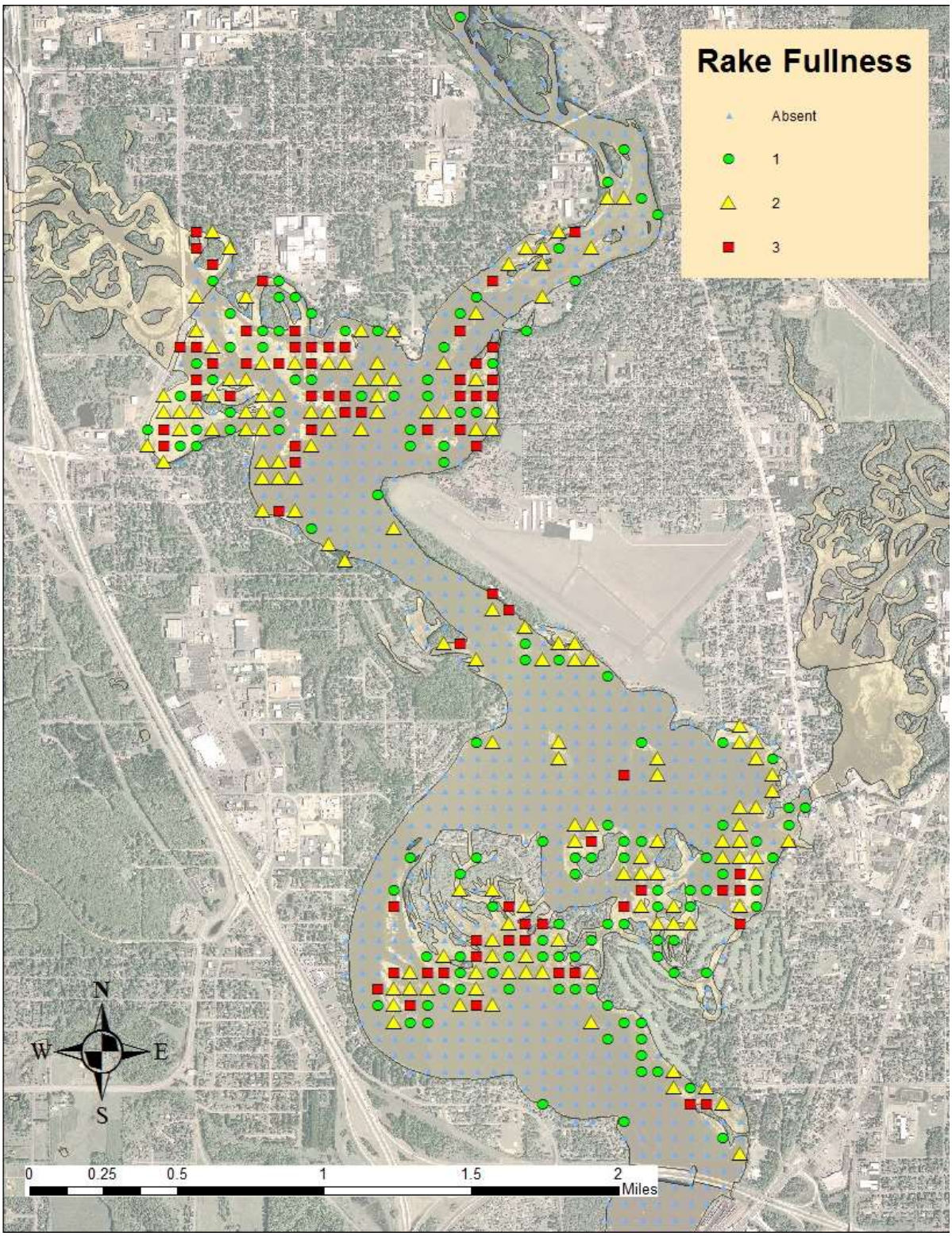

Figure 6. Map showing total rake fullness in Lake Wausau (below Highway N). August 2012. 1=sparse 2=medium 3=dense

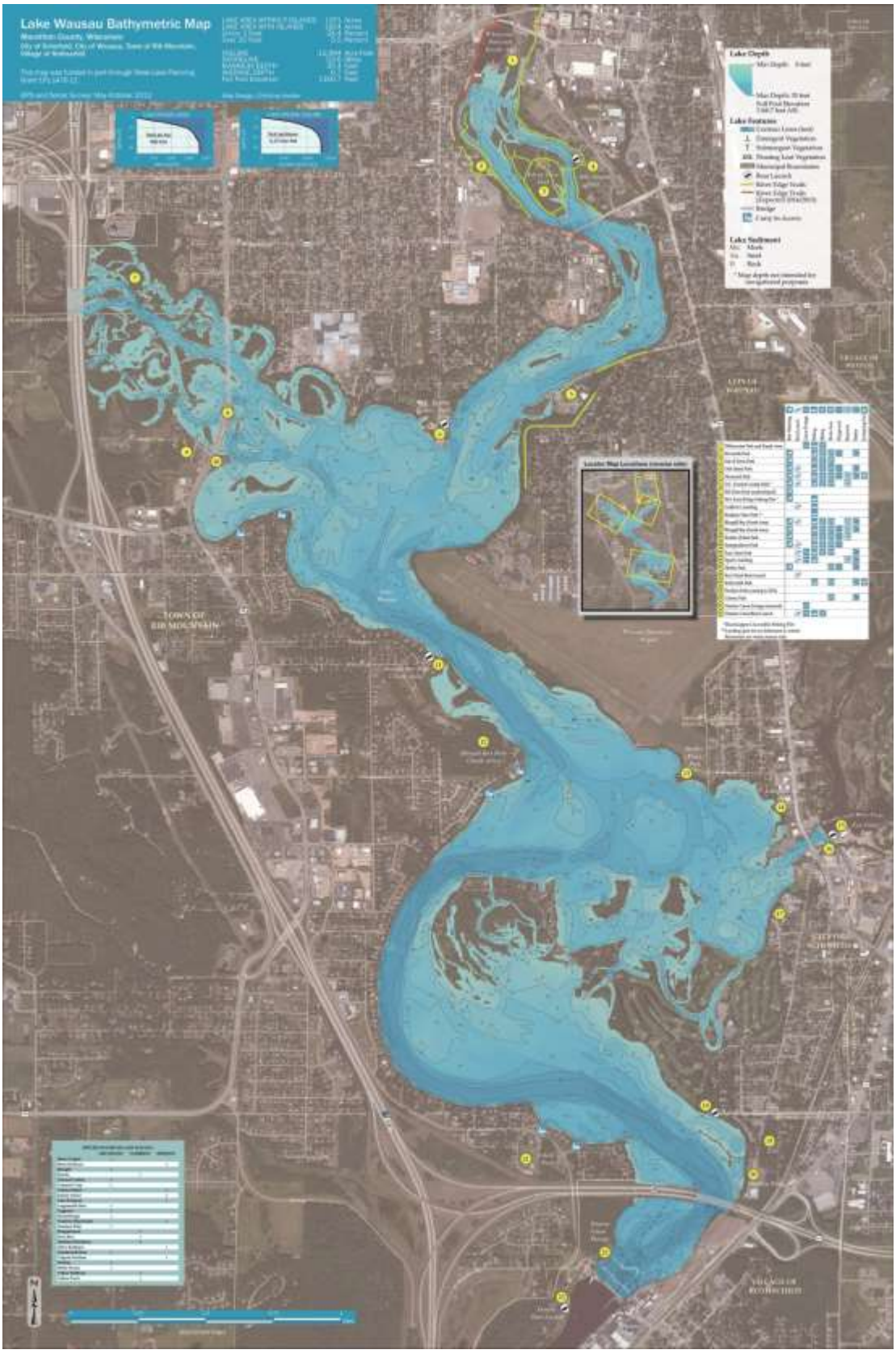

Figure 7. Map showing water depths in Lake Wausau.

Table 1. Aquatic plant species and the associated C values for plants identified in the upper Lake Wausau/Rib River confluence and Lake Wausau (below Highway N). August 2012.

Species	Common Name	C	Rib River Species Present=x	Lake Wausau Species Present=x
Bidens beckii	Water marigold	8	x	
Ceratophyllum demersum	Coontail	3	x	x
Ceratophyllum echinatum	Spiny hornwort	10	x	x
Chara	Muskgrasses	7	x	x
Elodea canadensis	Common waterweed	3	x	x
Elodea nuttallii	Slender waterweed	7		x
Equisetum fluviatile	Water horsetail	7		
Heteranthera dubia	Water star-grass	6	x	x
Lemna minor	Small duckweed	4	x	x
Lemna trisulca	Forked duckweed	6	x	
Myriophyllum sibiricum	Northern water-milfoil	6		x
Najas flexilis	Slender naiad	6	x	x
Nitella	Nitella	7	x	x
Nuphar variegata	Spatterdock	6	x	x
Nymphaea odorata	White water lily	6	x	x
Potamogeton amplifolius	Large-leaf pondweed	7	x	x
Potamogeton epihydrus	Ribbon-leaf pondweed	8	x	x
Potamogeton gramineus	Variable pondweed	7		x
Potamogeton natans	Floating-leaf pondweed	5	x	x
Potamogeton nodosus	Long-leaf pondweed	7	x	x
Potamogeton oakesianus	Oakes' pondweed	10		x
Potamogeton pusillus	Small pondweed	7	x	x
Potamogeton richardsonii	Clasping-leaf pondweed	5	x	x
Potamogeton robbinsii	Fern pondweed	8	x	x
Potamogeton strictifolius	Stiff pondweed	8	x	x
Potamogeton zosteriformis	Flat-stem pondweed	6	x	x
Riccia fluitans	Slender riccia	7	x	
Spirodela polyrhiza	Large duckweed	5	x	x
Typha sp.	Cattail	1		
Utricularia gibba	Creeping bladderwort	9		x
Utricularia minor	Small bladderwort	10	x	
Utricularia vulgaris	Common bladderwort	7	x	
Vallisneria americana	Wild celery	6	x	x
Wolffia borealis	Northern watermeal	6	x	x
Wolffia columbiana	Common watermeal	5	x	x
Zizania sp.	Wild rice	8	x	
Total number species present			29	28
mean C			6	6
FQI			35	34
Species highlighted have C value ≥ 8				

Frequency of Occurrence

The frequency of occurrence (FO) is a measure of the percentage of the sampling points with vegetation and/or the frequency that a particular species occurred in a lake. For the Lake Wausau survey, the FO of all plants was 56%. Aquatic plants only occurred at a little more than half of the sites due to many deep areas and lower water clarity in Lake Wausau which limits aquatic plant growth. The FO for the upper Lake Wausau/Rib River confluence survey was 89.5%, which is relatively high and tells us that more suitable conditions exist for aquatic plants. The aquatic plant species that occurred at over 15% of the sites in each segment of Lake Wausau are shown in Figure 8 and Figure 9.

The most common aquatic plant species found in Lake Wausau was wild celery (*Vallisnaria americana*) which occurred at 69.1% of the sites. Wild celery is an important food for many species of waterfowl. The second most abudant aquatic plant species was Coontail (*Ceratophyllum demersum*) which occurred at 59.5% of the sites. Coontail provides habitat for many small creatures including fish, and food for waterfowl. Coontail uses phosphorus that otherwise would fuel algal blooms. Since it is not rooted, it can appear as a nuisance when it is blown together into clumps. All plant species that occurred at more than 15% of the sites in lower Lake Wausau are displayed in Figure 8.

The most common aquatic plant species found in upper Lake Wausau and the Rib River confluence section were tiny plants called common watermeal (*Wolffia columbiana)* and northern watermeal (*Wolffia borealis).* These two watermeals occurred at 82.7% of the sites. The second most abundant aquatic plant species was small duckweed (*Lemna minor)* which occurred at 79.6% of the sites. Dense areas of watermeal and duckweed can provide shade and cover for fish and other invertebrates. Both types of duckweed provide a highly nutritious food source for a variety of ducks, geese, muskrats, beaver, and fish. All plant species that occurred at more than 15% of the sites are displayed in Figure 9.

Eurasian watermilfoil, EWM (*Myriophyllum spicatum*), had a frequency of 32% in Lake Wausau (below Highway N). EWM is an invasive plant that can spread very rapidly throughout a water body and cause problems for boaters and fishers. Curly-leaf pondweed, CLP (*Potamogeton crispus*), had a frequency of 34.5% during the June survey of Lake Wausau. CLP can pose a serious problem for a waterbody at high frequencies because of its early die-back in late June and the resulting phosphorus release which leads to increased nutrient availability for algal growth. The significant filamentous algae present in parts of Lake Wausau during the summer are partially due to the abundance of CLP in those areas. EWM had a frequency of 11.7% and CLP had a frequency of 26.7% in the upper Lake Wausau/Rib River confluence.

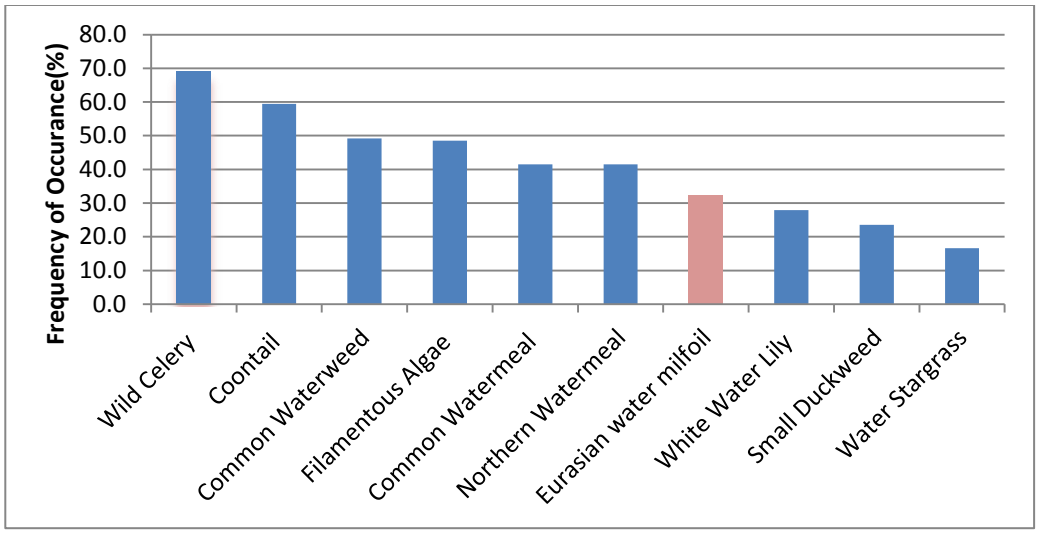

Figure 8. Frequency of occurrence for aquatic plant species (found at >15% of the sites) in Lake Wausau (below Highway N). August 2012.

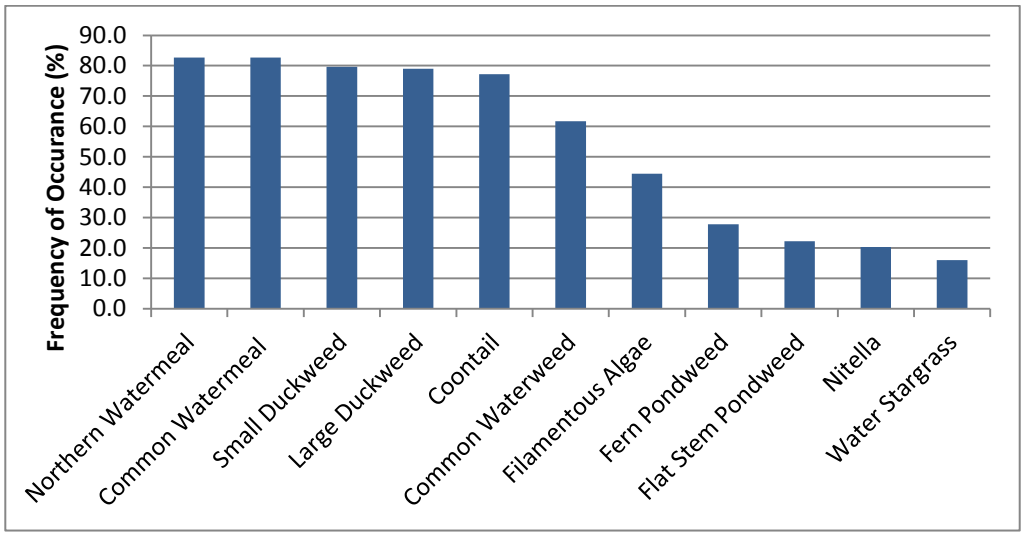

Figure 9. Frequency of occurrence for aquatic plant species (found at >15% of the sites) in the upper Lake Wausau/Rib River confluence. August 2012.

Floristic Quality Index

The Floristic Quality Index (FQI) evaluates the closeness of a plant community to undisturbed conditions. Each plant is assigned a coefficient of conservatism (C value) that reflects its sensitivity to disturbance. The C values are used to calculate the FQI for the whole lake or reservoir. C values range from 0 to 10 – the higher the number, the more intolerant the plant is of disturbance. A C value of 0 is assigned to exotic species. The FQI for for both study areas were very similar: the upper Lake Wausau/Rib River confluence value was 34.7, and the value for Lake Wausau below Hwy N was 34.0 (Table 1). The species most freqently observed in

Lake Wausau (below Highway N) was wild celery (*Valisneria americana*), with a C value of 6. Wild celery can be found in a variety of depths ranging from ankle-deep to six feet. It tolerates a range of water chemistries, as well as turbid conditions. Patches of wild celery provide good fish habitat because of the increase in shade, shelter and feeding opportunities. In addition to fish habitat, wild celery is an excellent food source for waterfowl. Canvasback ducks (*Aythya valisneria*) are most closely associated with wild celery for a food source (Borman, Korth and Temte, 2007).

The species found most frequently in the upper Lake Wausau/Rib River confluence was watermeal (*Wolfia* spp.), small duckweed (*Lemna minor*), and large duckweed (*Spirodela polyrhiza*). These plants are often found together in aquatic ecosystems. Watermeal has a C value of 6 and is a good food source for ducks, geese, muskrats, and fish. Small duckweed has a C value of 4 and large duckweed has a C value of 5, also providing food for wildlife. Maps for aquatic plant species with C values greater than or equal to 8 can be found in the appendix.

Non-Native Aquatic Invasive Species

Aquatic invasive plant species are present in the entire Lake Wausau/Rib River system. They are typically transported on boats and gear previously used in a "contaminated" lake. In Lake Wausau, there are many boat launches on the lake and upstream where aquatic invasive species can be introduced.

In June 2012, a point-intercept survey was conducted to locate and identify curly-leaf pondweed (*Potamogeton crispus*)(CLP) (Figure 10). CLP has a unique life cycle, so sampling is required late in the spring to assess its population. CLP produces its reproductive parts and then dies off in late June. The decaying plant tissue releases phosphorus into the water. The timing of this nutrient release can be problematic when combined with warm water, as the phosphorus will help to fuel the growth of filamentous and other algae for the balance of summer. The CLP turions, or winter buds, establish themselves in a suitable substrate shortly after the parent plants die off. When conditions are right, the new plant will begin growing later in the summer and into the fall. It resumes growth shortly after ice out. This unique life cycle gives it a head start and a competitive advantage over other aquatic plants.

Figure 10. Curly-leaf pondweed (*Potamogeton crispus*).

The survey of Lake Wausau indicated the most abundant CLP beds were located in two areas: in the northwest near the Highway N bridge and in the southeast in the bay near the country club (Figure 12). During the survey for Lake Wausau below Highway N, low densities of CLP comprised approximately 113 acres (rake fullness of 1), medium densities of CLP comprised approximately 138 acres (rake fullness of 2), and high densities of CLP comprised approximately 39 acres (rake fullness of 3).

The survey of the upper Lake Wausau/Rib River confluence section showed the most abundant regions for CLP growth just above the Highway N bridge near the landing by Gulliver's, and also in scattered areas throughout the river (Figure 11). For this section, 6 acres had low densities of CLP (rake fullness of 1), 4 acres had medium densities of CLP (rake fullness of 2), and approximately 1 acre had high densities of CLP (rake fullness of 3). Phosphorus release to the water from these stands during die-off depends on the density of the plants. At a minimum, these stands should be monitored and action to control additional spread should be seriously considered in order to reduce algal blooms.

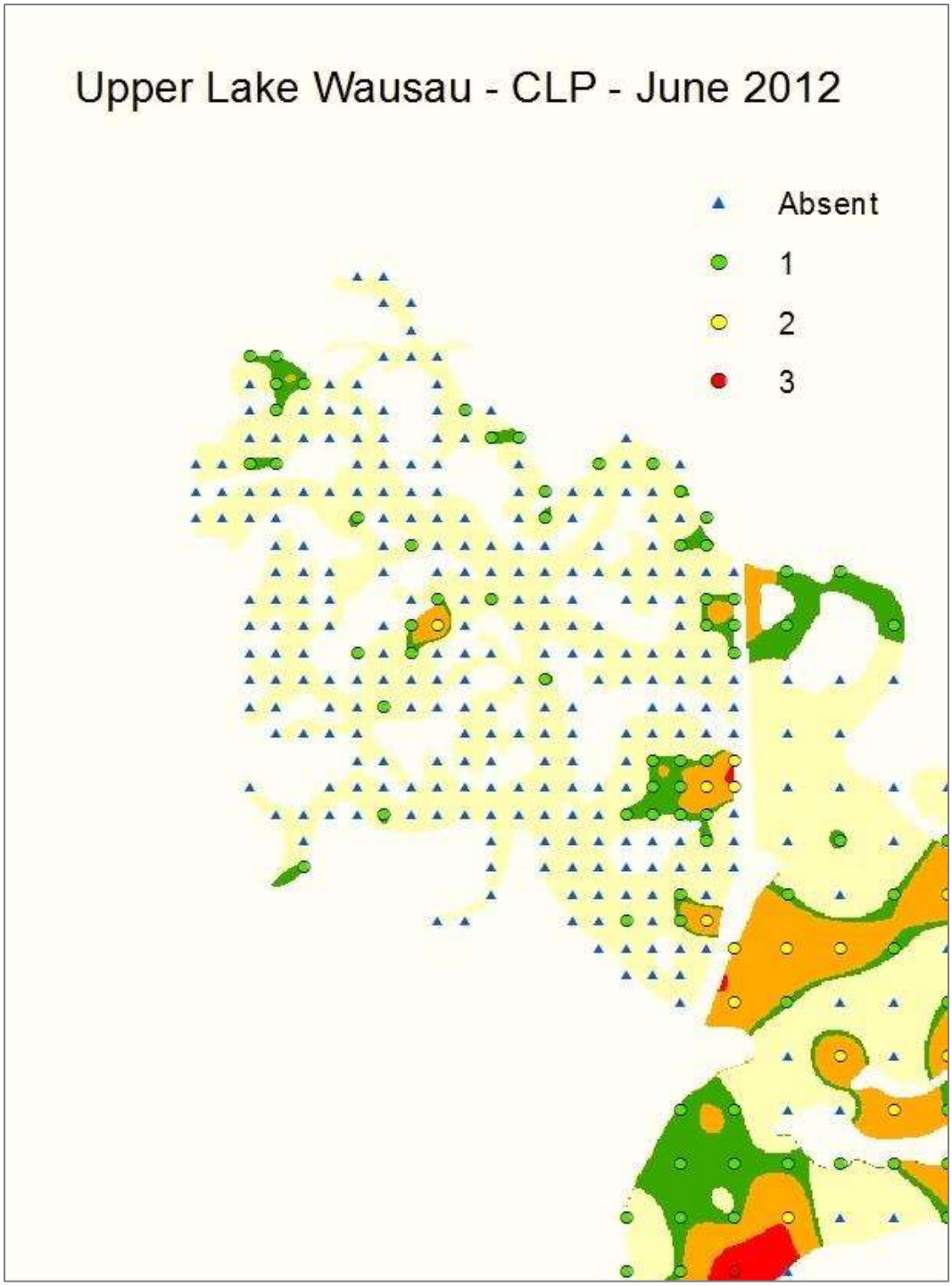

Figure 11. Results of curly-leaf pondweed (*Potamogetan crispus*) survey in the upper Lake Wausau/Rib River confluence. June 2012. 1=sparse 2=medium 3=dense

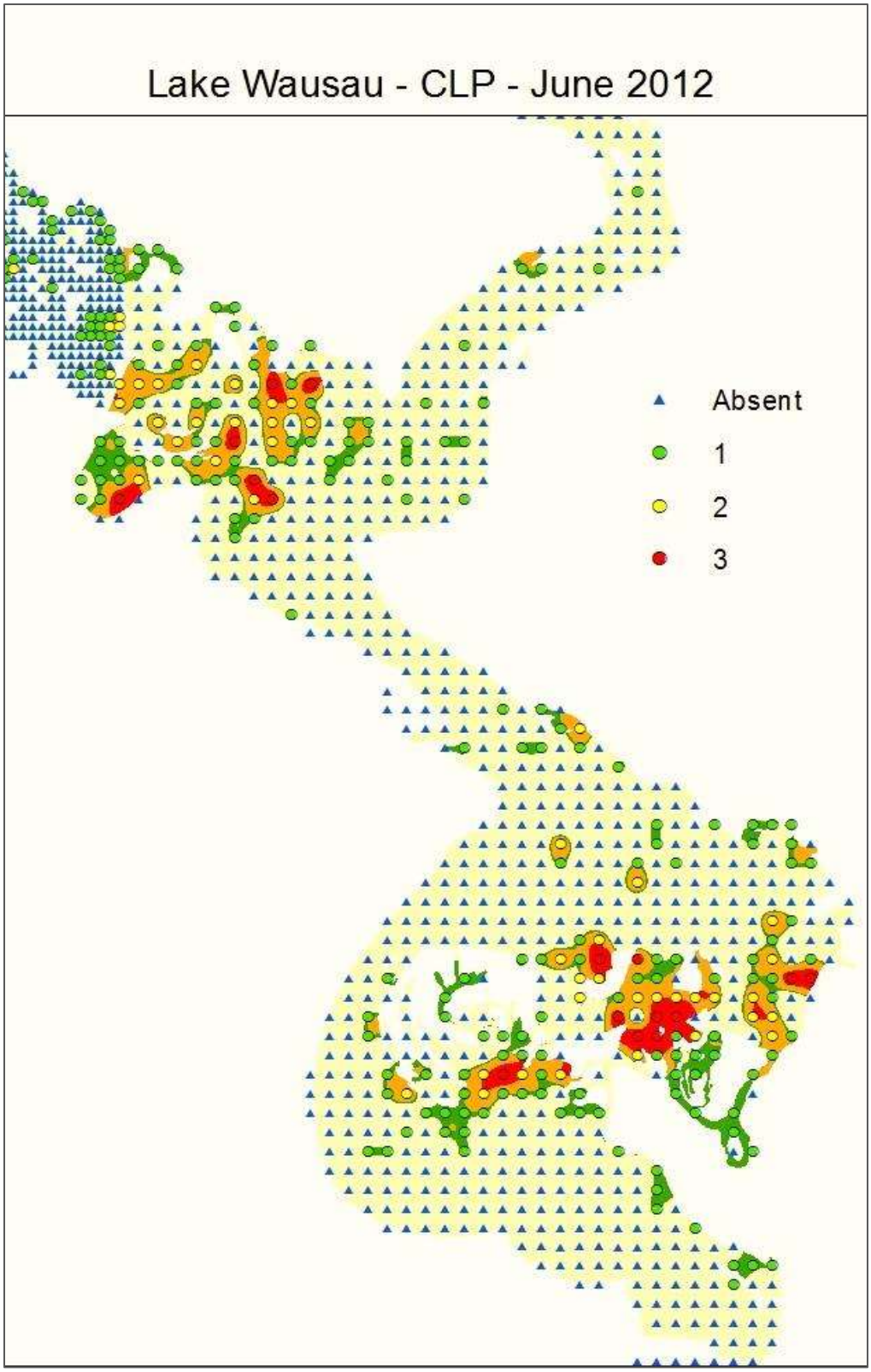

Figure 12. Results of curly-leaf pondweed (*Potamogetan crispus*) point-intercept survey in Lake Wausau below Hwy N. June 2012. 1=sparse 2=medium 3=dense

Eurasian watermilfoil, EWM (*Myriophyllum spicatum*), is an exotic plant species that was introduced to the United States from its native range in Europe and Asia. While this plant resembles its native counterpart, northern watermilfoil, the stem of EWM is more limp and has 12-21 pairs of leaflets (Figure 13). EWM has the ability to become established in disturbed conditions and has the potential for extensive growth that can dominate an aquatic plant community. If dense beds form, EWM also interferes with the fishery. During the August 2012 point-intercept survey, EWM was identified sporadically throughout the Lake Wausau system; however, it appeared to be coexisting with the aquatic plant community and was not observed in large beds (Figure 14 and Figure 15).

Figure 13. Eurasian watermilfoil (*Myriophyllum spicatum*).

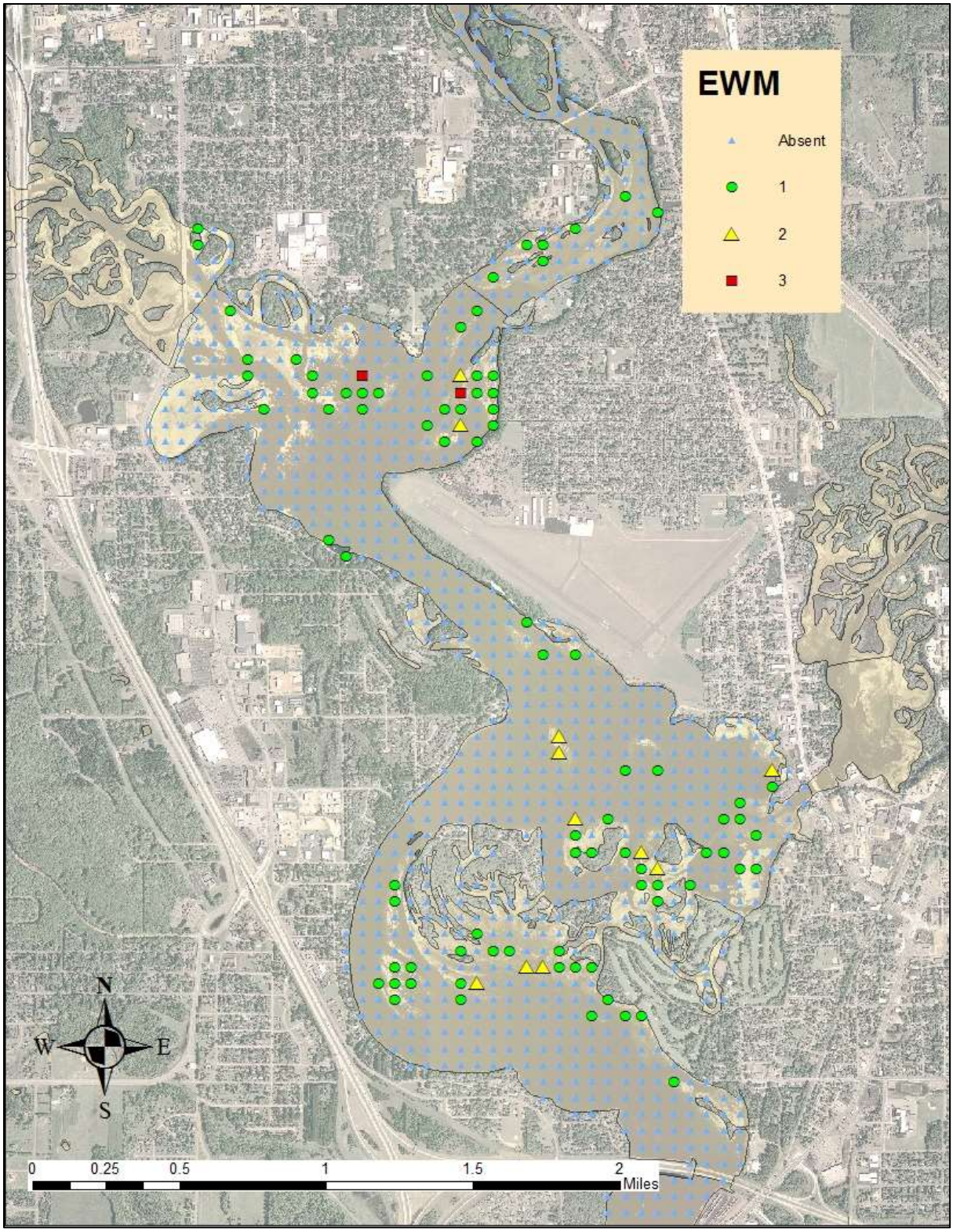

Figure 14. Survey results of Eurasian watermilfoil in Lake Wausau (below Highway N). August 2012. 1=sparse 2=medium 3=dense

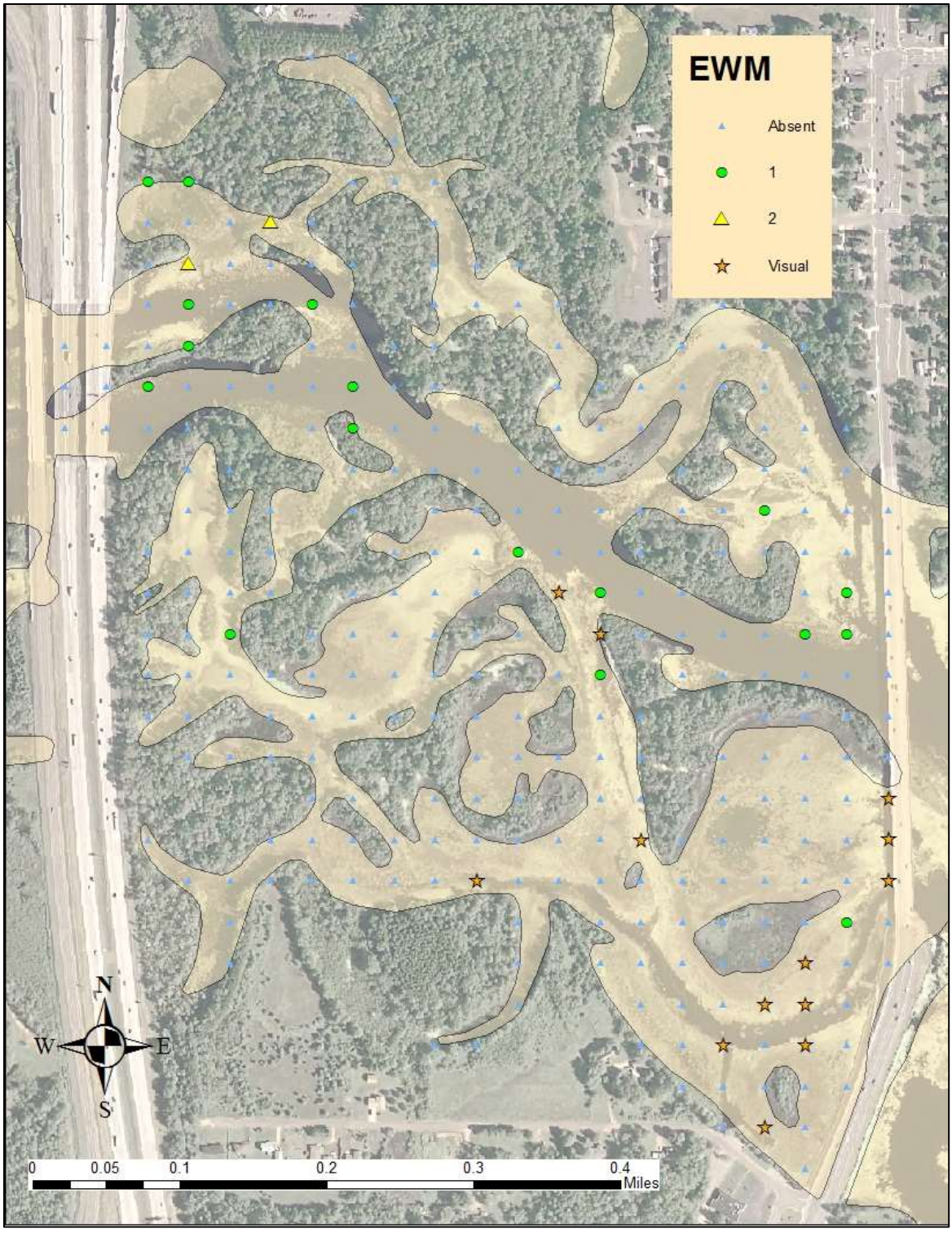

Figure 15. Survey results of Eurasian watermilfoil in upper Lake Wausau/Rib River confluence. August 2012. 1=sparse 2=medium 3=dense

Conclusions

Aquatic plants play a critical role in the Lake Wausau aquatic ecosystem by providing quality habitat and food for fish, invertebrates, birds, and mammals. The plants utilize nutrients which may otherwise be available to algae. Any management activities should be planned to minimize disturbance of the native species and maintain the balance between aquatic plants and algae.

In general, a healthy aquatic plant community exists in Lake Wausau. During the August 2012 survey of aquatic plants, 34 species were identified. Since the study area exceeds 1,918 acres, the plant communities varied throughout the system. While shallows and bays may support some aquatic plant species, deeper parts of the channels support other species. Common and northern watermeal, small and large duckweed, and coontail were the most abundant aquatic plant species in the Rib River/upper Lake Wausau reaches. Since these species are not rooted, wind or waves may pile them on shore, making them appear to be a nuisance. Water celery, coontail, common waterweed, and filamentous algae were the most abundant species in lower Lake Wausau.

Some aquatic invasive species have become established in Lake Wausau. In June 2012, curly leaf pondweed, CLP (*Potamogeton crispus*) covered approximately 11 acres in upper Lake Wausau and approximately 290 total acres in lower Lake Wausau (below Highway N). This plant can become invasive and the release of nutrients into the water when the plant decays in late June is often problematic. Although eradication is not realistic, management of large continuous beds should be considered. Mechanical harvesting of CLP provides an excellent option to also remove phosphorus found in plant tissue. Harvesting should be done prior to the formation of turions in late spring. To determine the success of management strategies, CLP should be monitored annually in June.

On Lake Wausau, areas that have high CLP densities in the beginning of summer develop severe algal blooms after CLP dieback occurs and phosphorous is released into the water. Additionally, sediment and nutrients accelerate algae and aquatic plant growth in the flowage. Sediments and nutrients occur naturally in the watershed, but can be increased by disturbing near shore land and/or applying agricultural/lawn/garden fertilizer. Protection of the near shore regions in upper and lower Lake Wausau will help to reduce the amount of sediment and phosphorus released into the water. A minimum distance of 35 feet from the water's edge onto shore should have a vegetative buffer in place to provide sufficient filtering of runoff. Healthy vegetated shore land buffers are comprised of grasses/forbs, shrubs, and trees.

Eurasian watermilfoil is another invasive that needs to be monitored on a consistent basis throughout Lake Wausau. Presently, EWM is sparsely scattered throughout

Lake Wausau and has not yet become a significant issue. EWM has the ability to grow in cool water quickly, and extensive growth of shoots and canopy can hinder recreation and navigation. EWM also interferes with fish habitat and native aquatic plant growth because of its extensive growth and density. EWM grows readily in disturbed conditions, so care should be taken to minimize the amount of denuded lakebed.

Care should be taken to minimize the amount of disturbed lake bed around docks and recreational areas, as these open spaces provide ideal conditions for aquatic invasive species to become established.

Boats and trailers that have visited other lakes can be a primary vector for the transport of aquatic invasive species. Implementing activities at the boat landings by volunteers through the WDNR Clean Boats/Clean Waters program is essential to prevent the spread of invasive species from other lakes. In addition to the spread of exotic species from other lakes, Lake Wausau is subject to further exotic species spread because it is part of a river system. Invasive species that may have taken a foothold in the river or tributaries of the Wisconsin River upstream of Lake Wausau can become a source of aquatic invasives. Therefore, surveillance for the spread of aquatic invasive species should be conducted routinely throughout the water system by either trained citizen volunteers or paid personnel. Additionally, point-intercept surveys should be conducted periodically by professionals to monitor the changes in the aquatic plant community in Lake Wausau.

References Cited

Aron, Kathy, Jeff, Bode, et al. *Aquatic Plant Management in Wisconsin.* UW-Extension, n.d. Web. 24 Oct 2012
http://www.uwsp.edu/cnr-ap/UWEXLakes/Pages/ecology/aquaticplants/default.aspx

Borman, Susan, Robert Korth, and Jo Temte. Through the Looking Glass: A Field Guide to Aquatic Plants. Merrill, WI: Reindl Printing, Inc., 2001.

Skawinski, Paul M. Aquatic Plants of Wisconsin: A Photographic Field Guide to Submerged and Floating-leaf Aquatic Plants. UWSP, WI.

Appendices

Maps with greater than 40% frequency of occurrence.

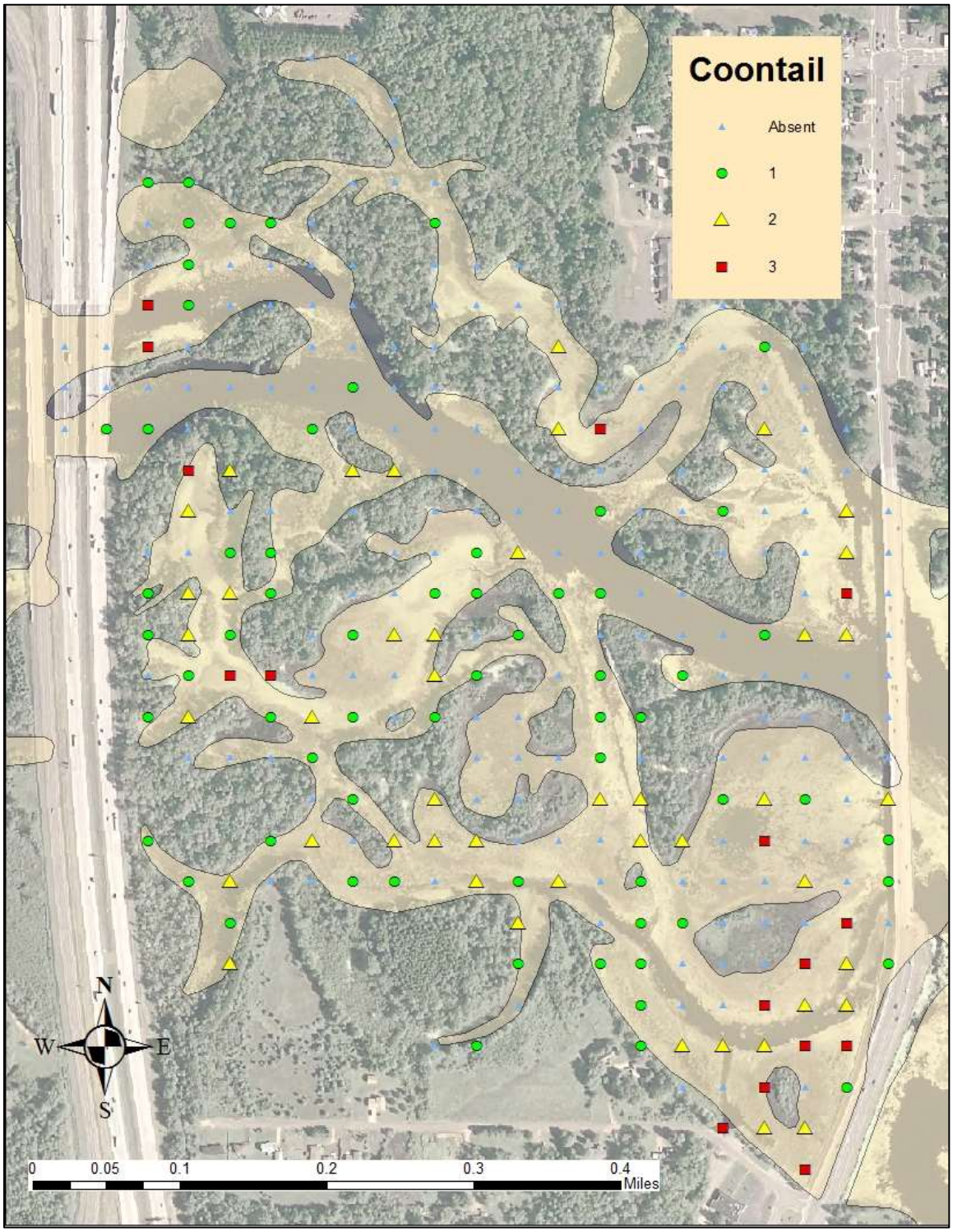

Figure 16. Coontail in upper Lake Wausau/Rib River confluence.

1=sparse 2=medium 3=dense

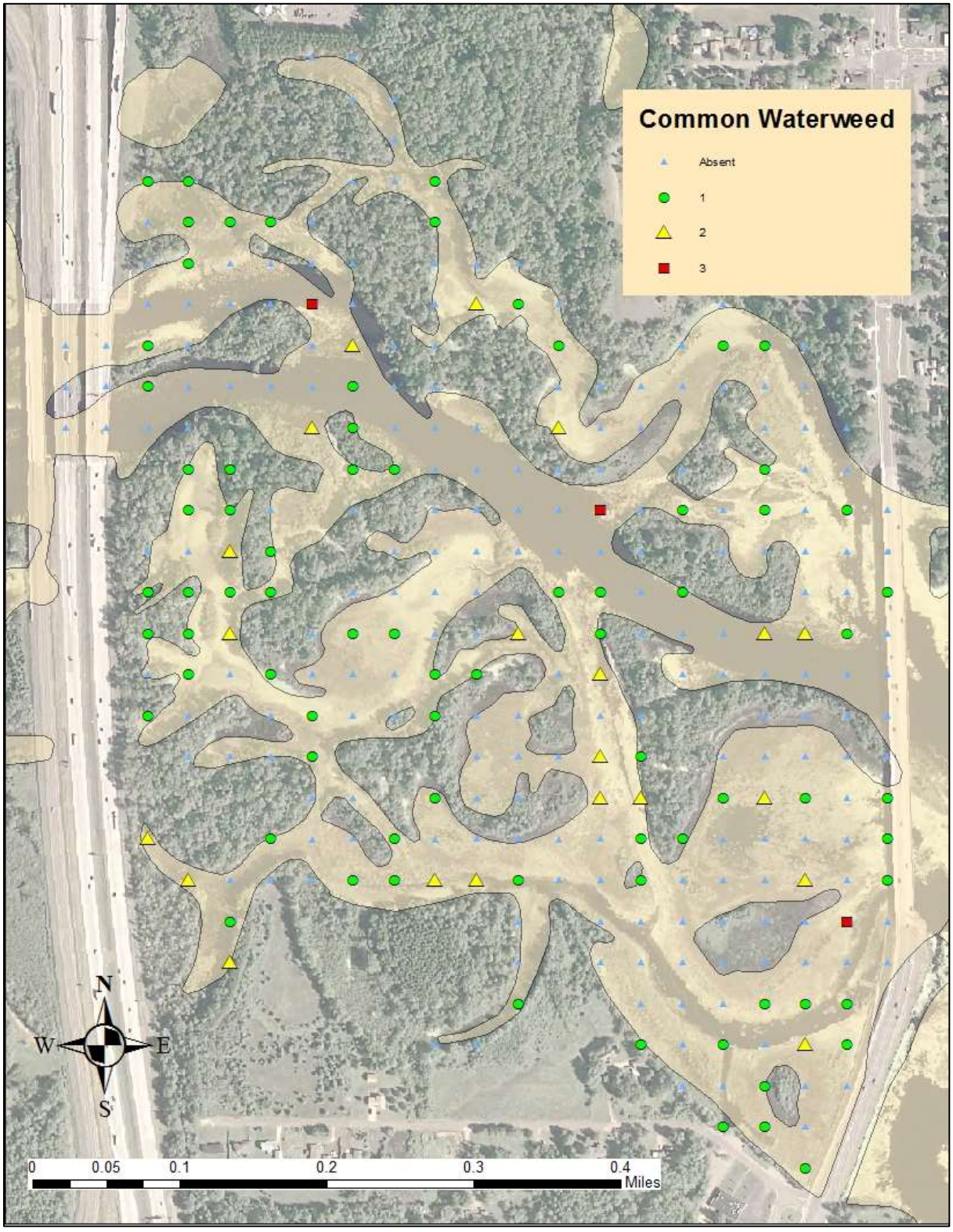

Figure 17. Common waterweed in upper Lake Wausau/Rib River confluence. 1=sparse 2=medium 3=dense

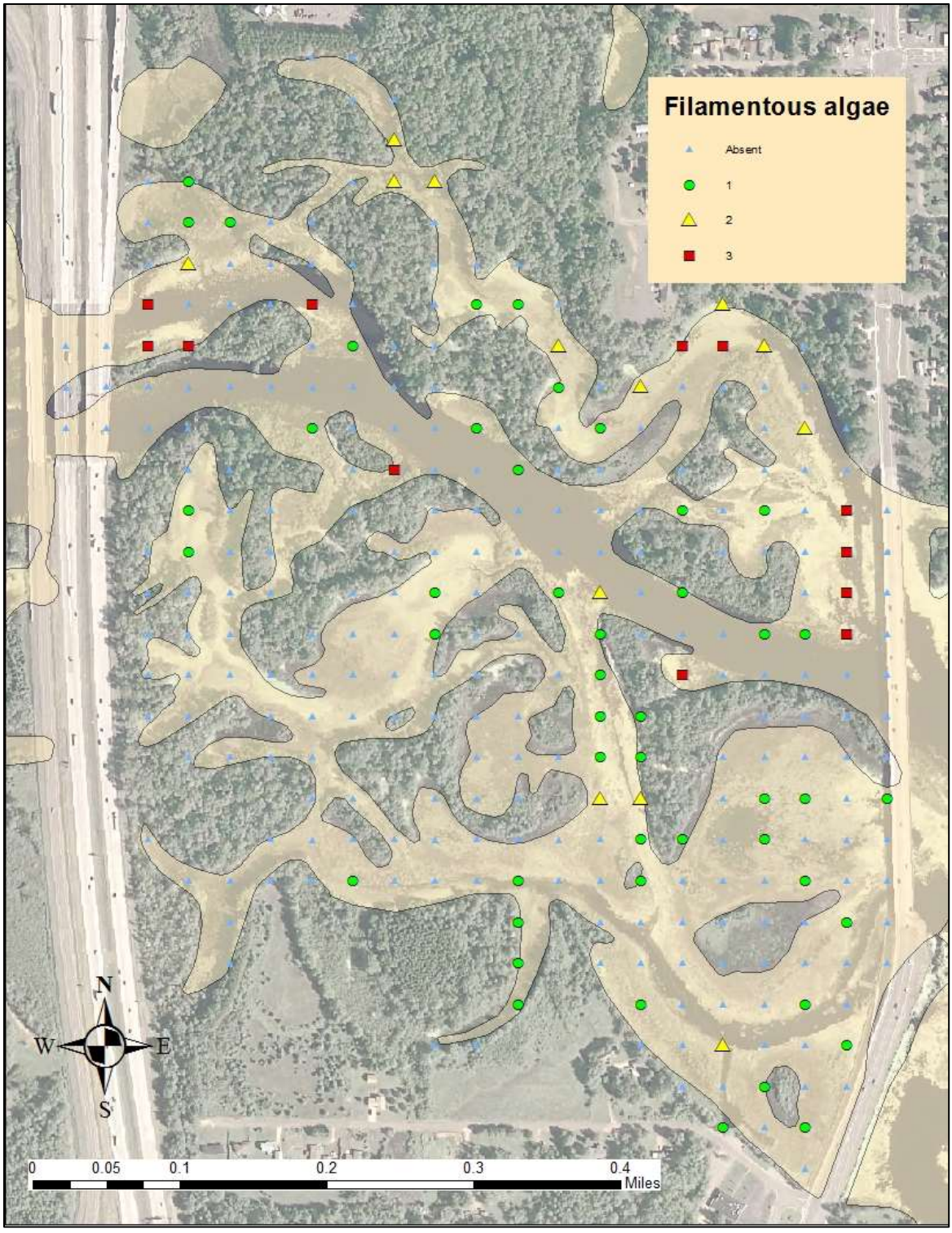

Figure 18. Filamentous algae in upper Lake Wausau/Rib River confluence. 1=sparse 2=medium 3=dense

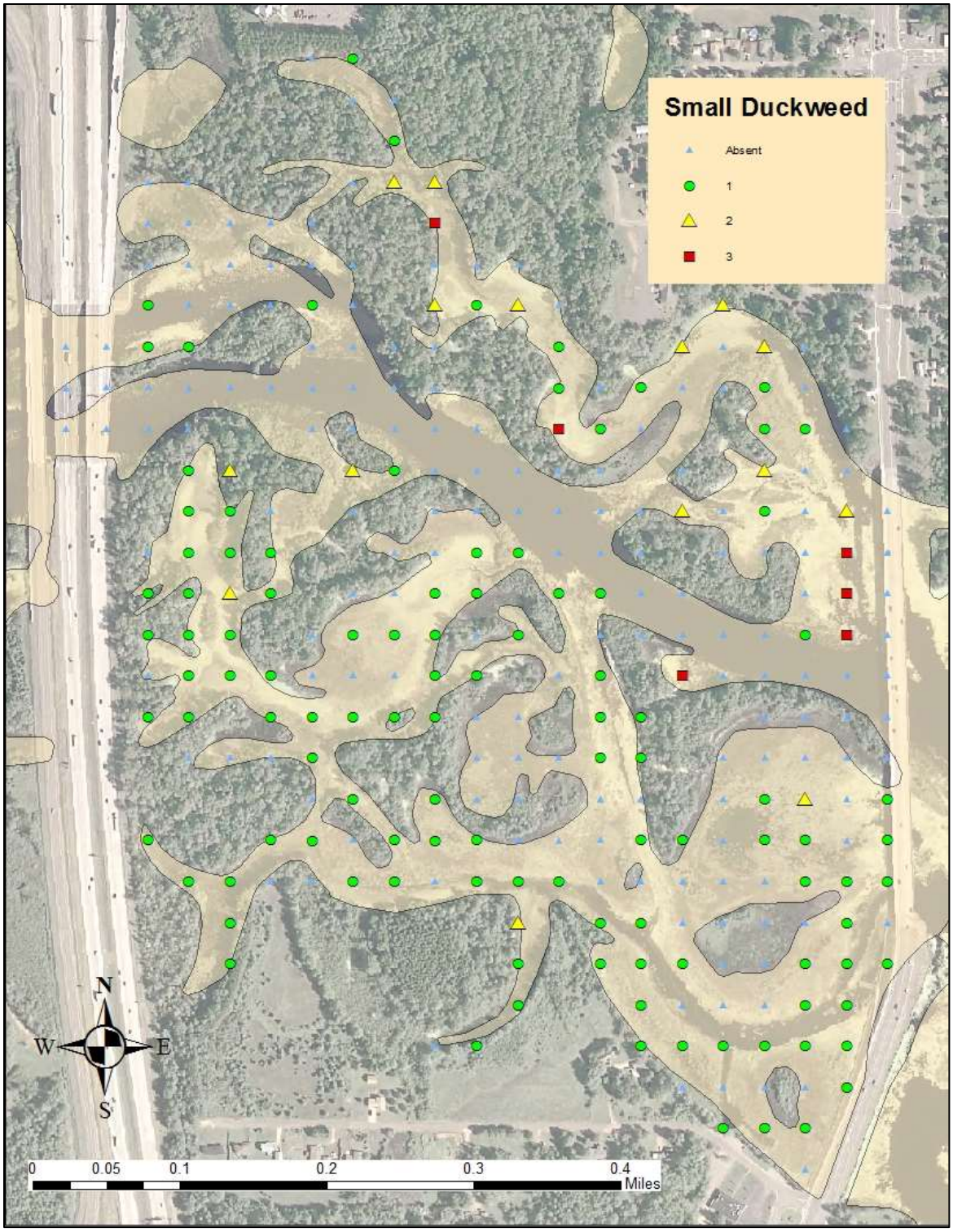

Figure 19. Small duckweed in upper Lake Wausau/Rib River confluence.

1=sparse 2=medium 3=dense

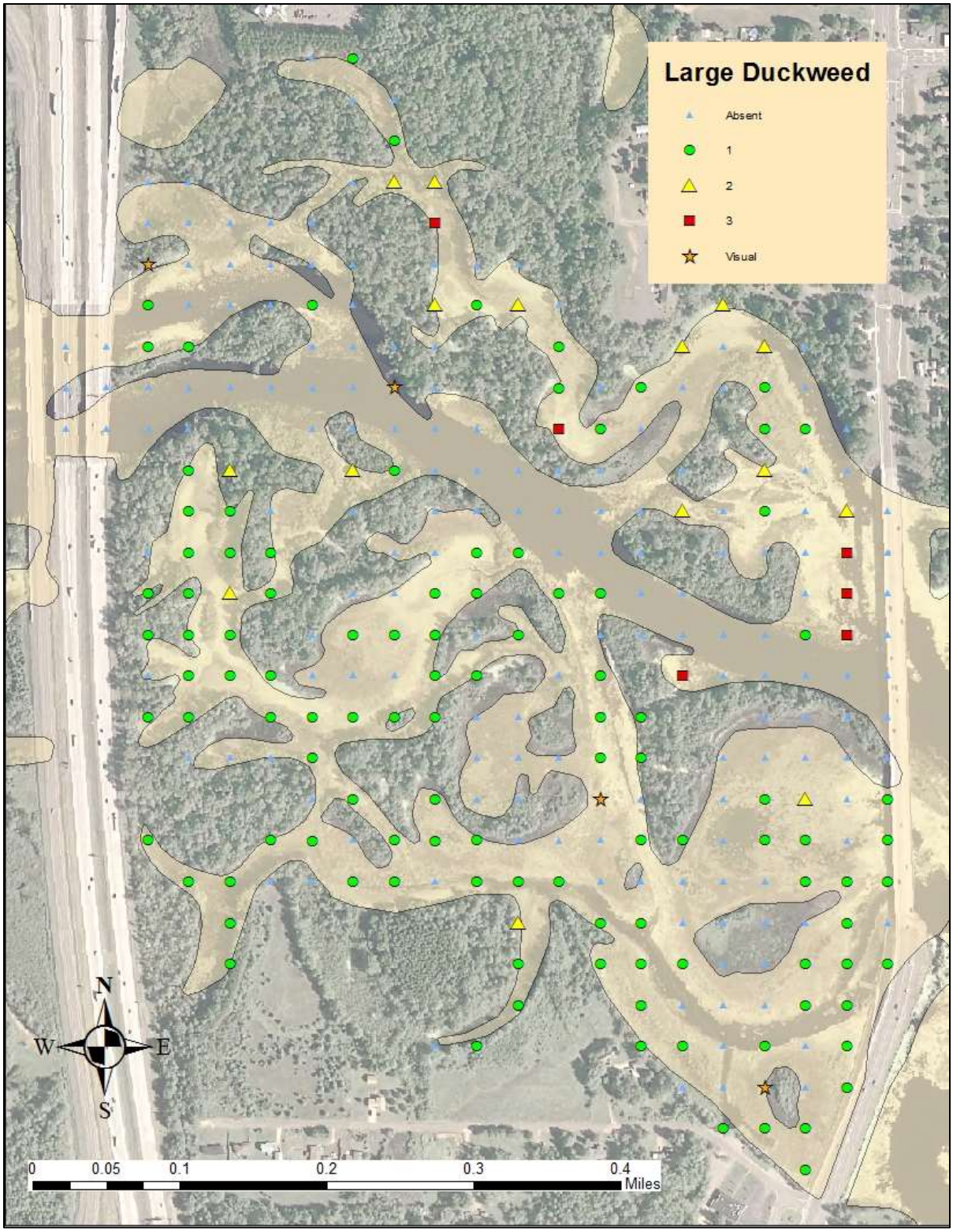

Figure 20. Large duckweed in upper Lake Wausau/Rib River confluence. 1=sparse 2=medium 3=dense

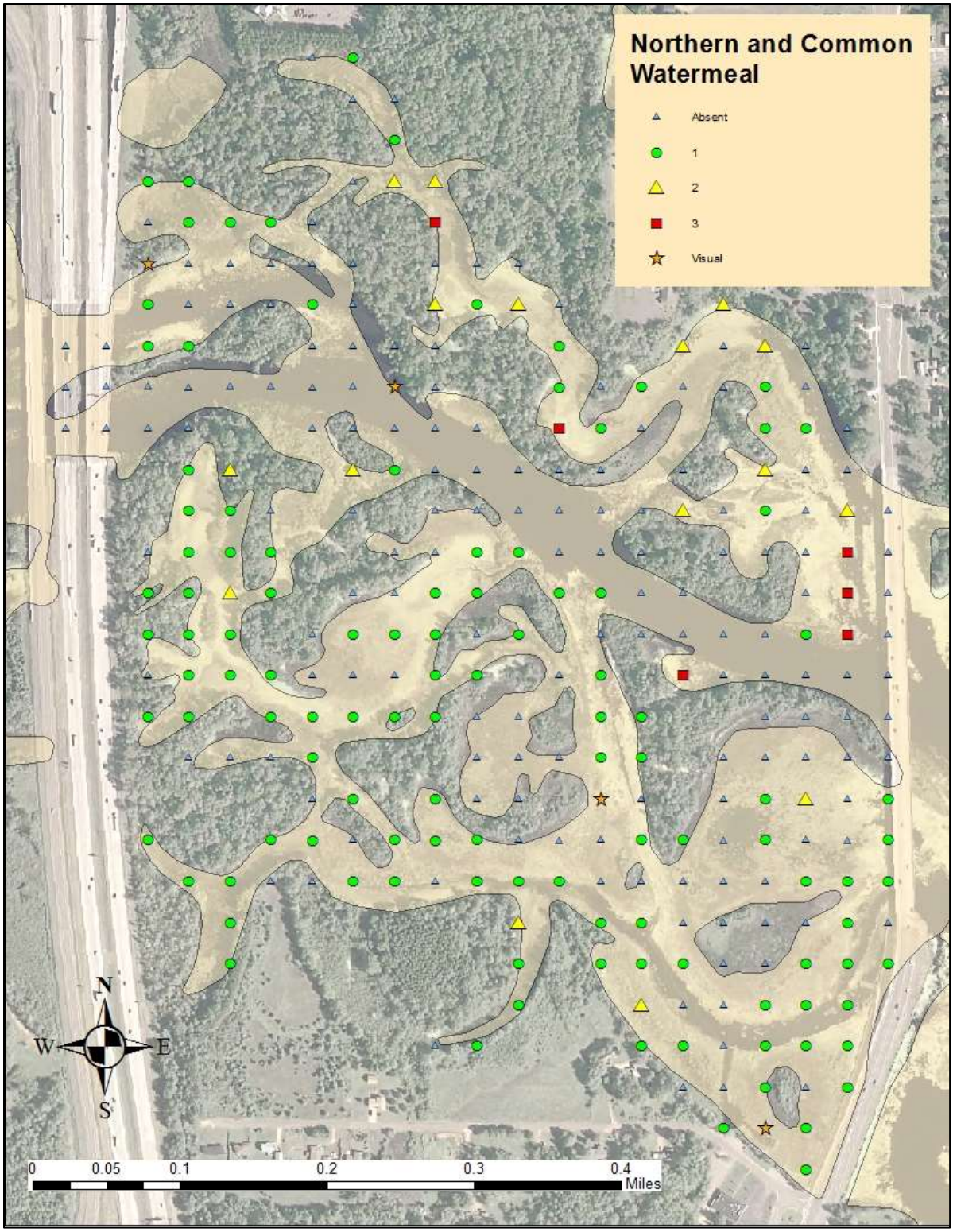

Figure 21. Northern watermeal and common watermeal in upper Lake Wausau/Rib River confluence. 1=sparse 2=medium 3=dense

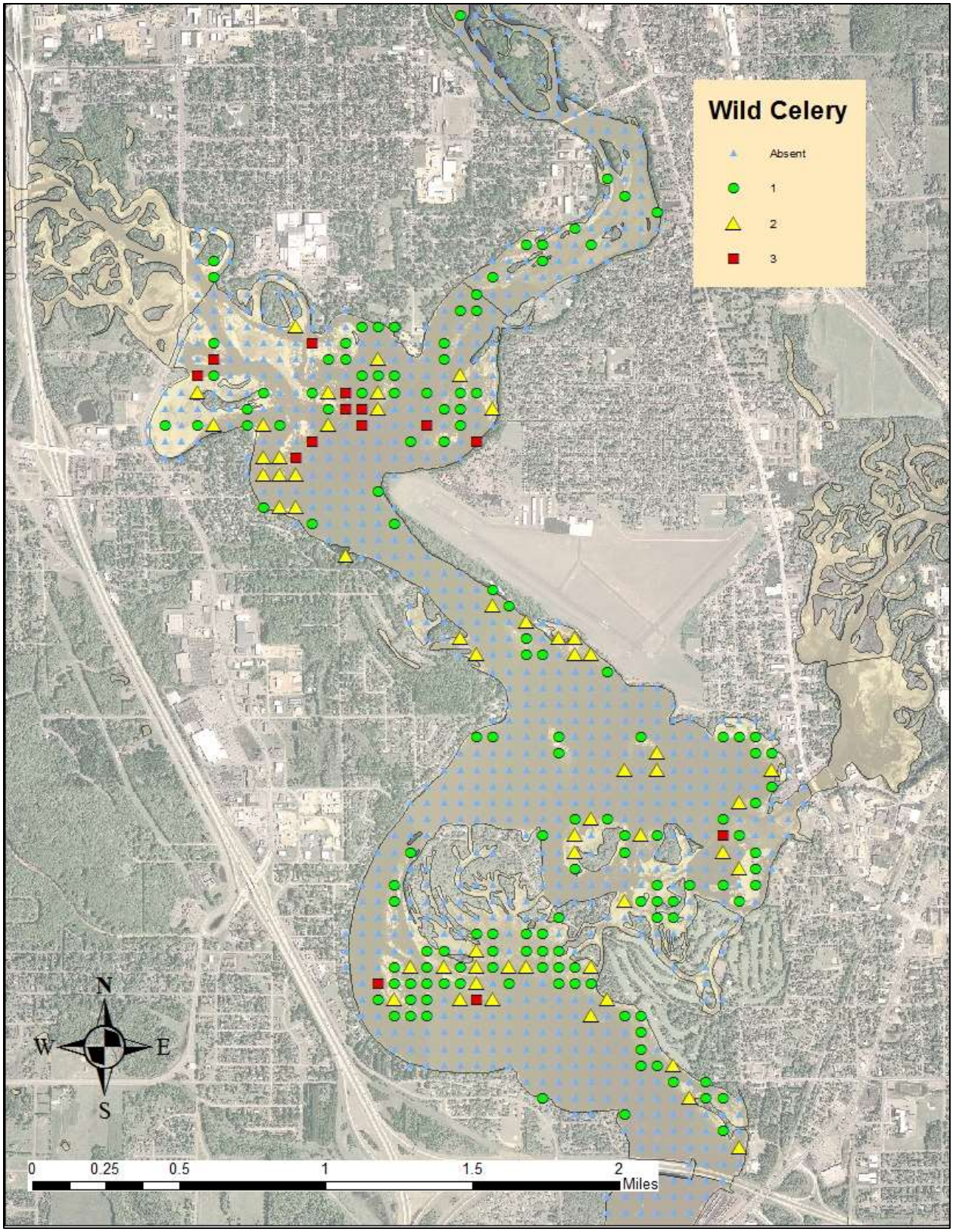

Figure 22. Wild celery rake fullness in Lake Wausau (below Highway N). 1=sparse 2=medium 3=dense

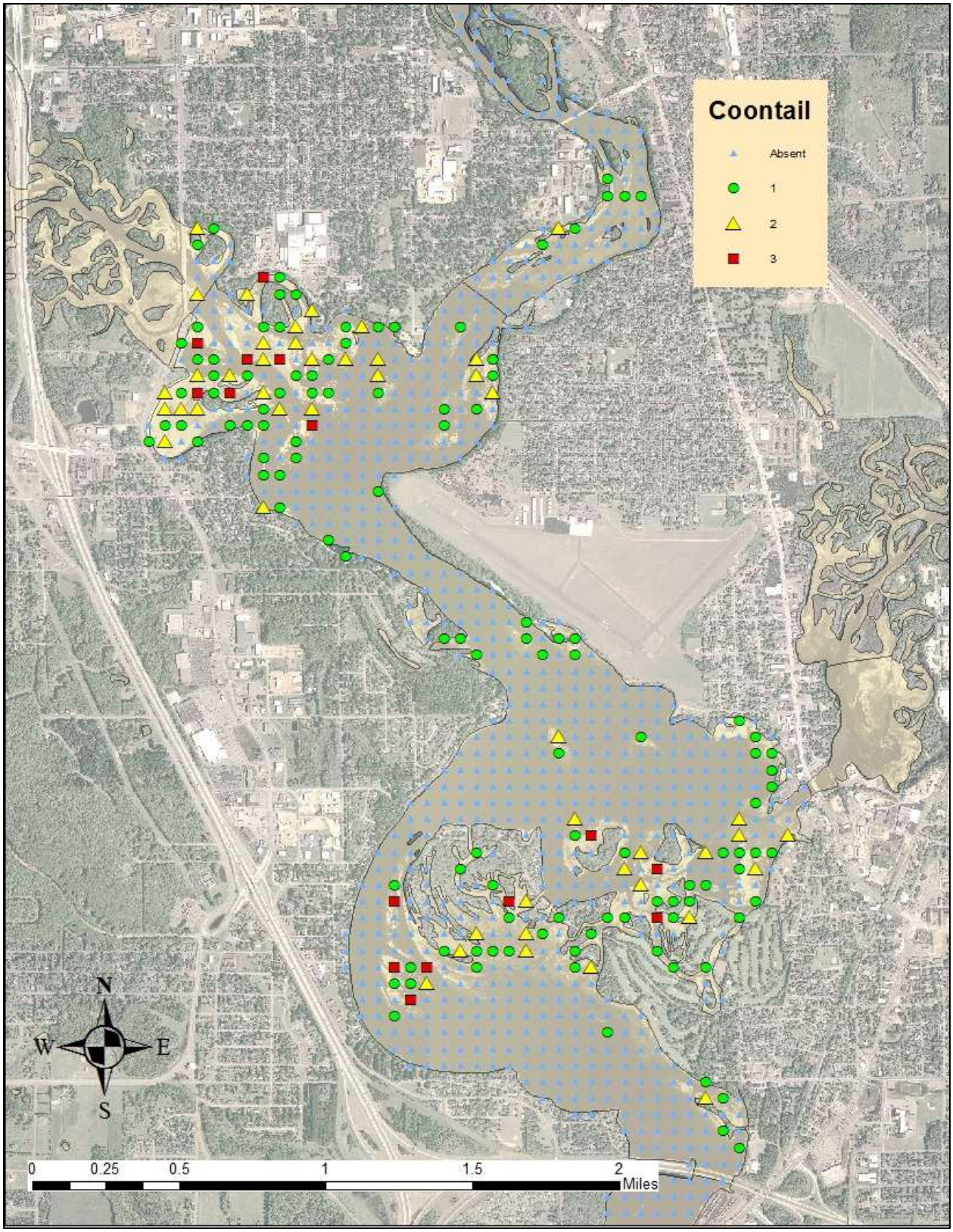

Figure 23. Coontail rake fullness in Lake Wausau (below Highway N). 1=sparse 2=medium 3=dense

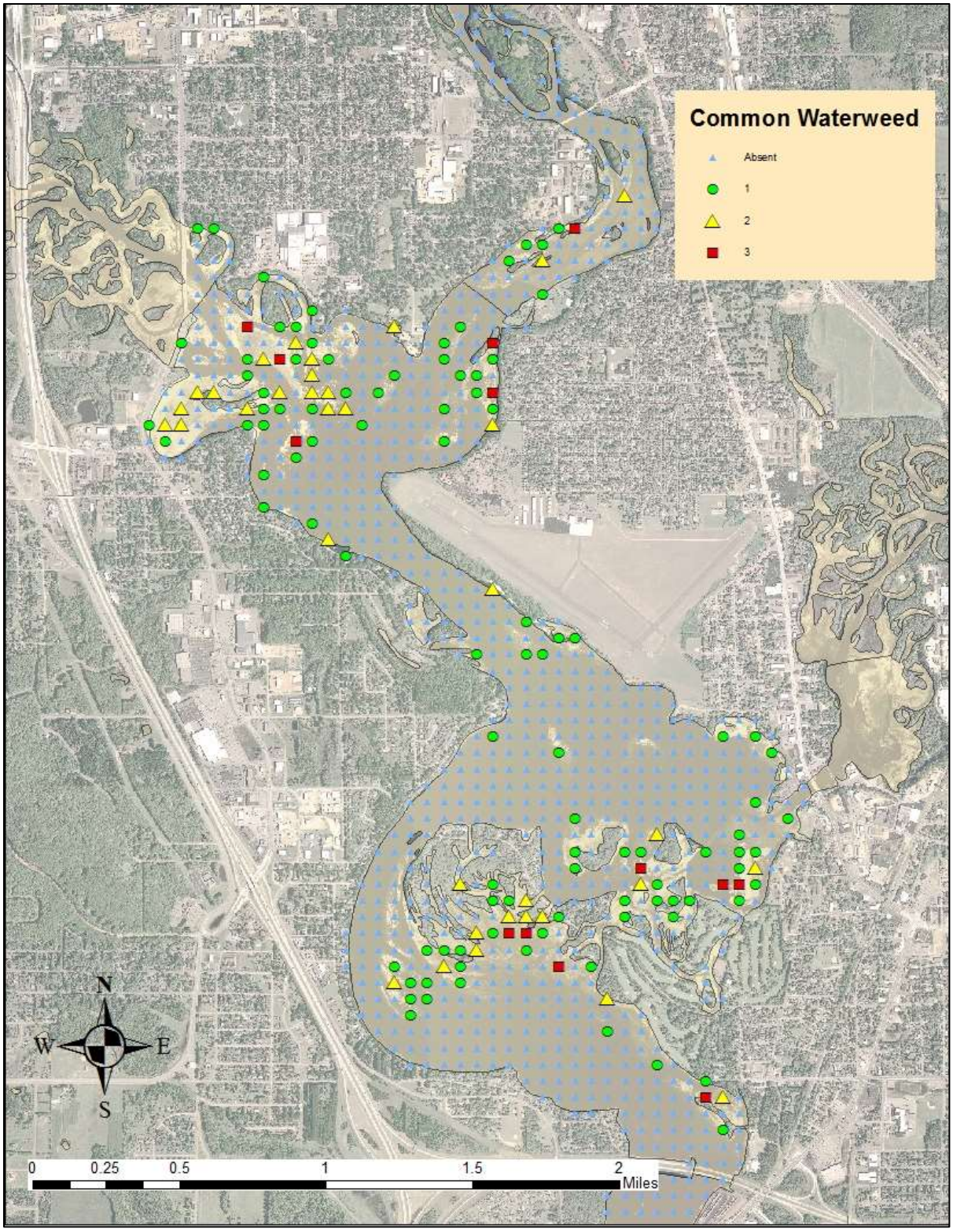

Figure 24. Common waterweed rake fullness in Lake Wausau (below Highway N). 1=sparse 2=medium 3=dense

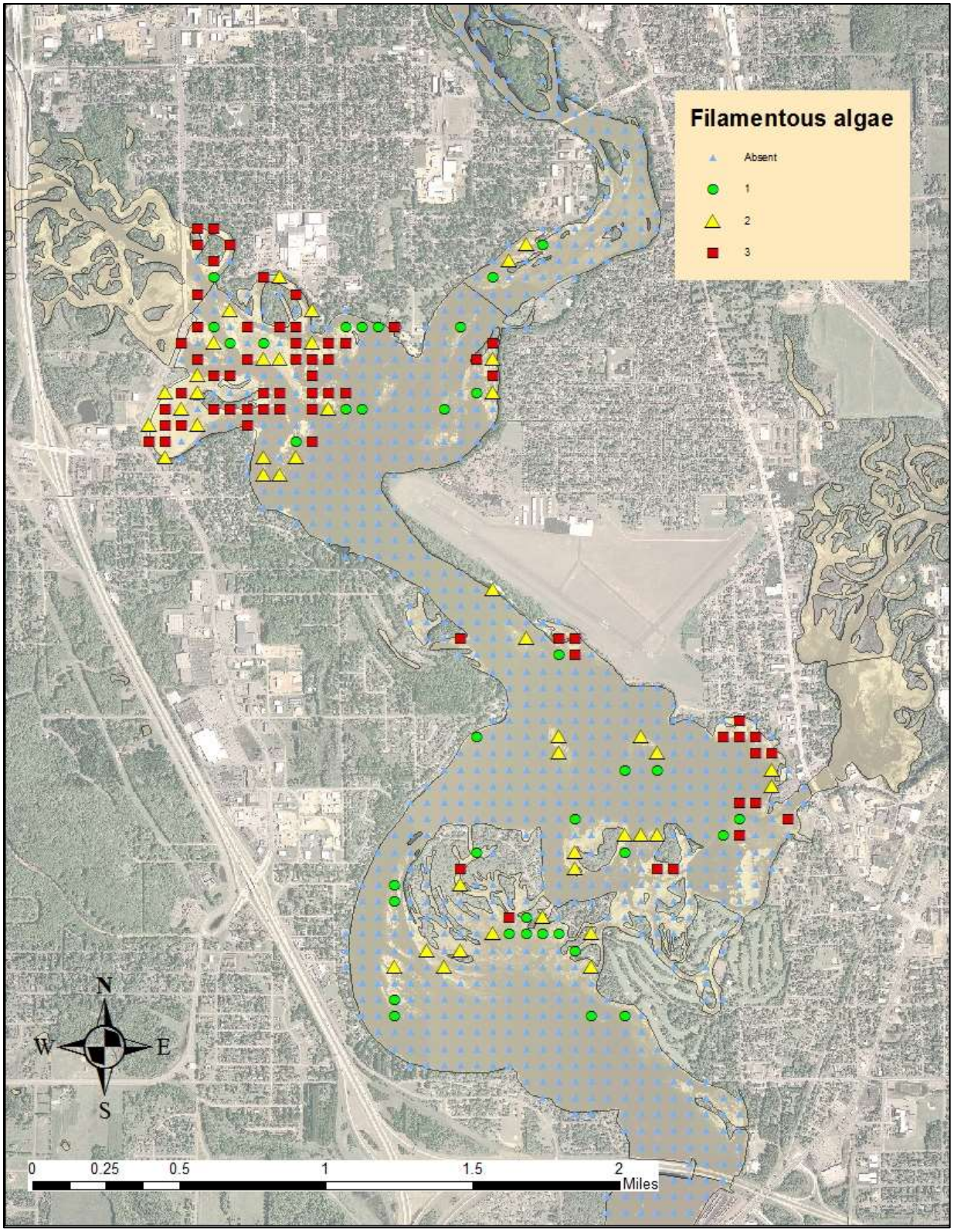

Figure 25. Filamentous algae rake fullness in Lake Wausau (below Highway N). 1=sparse 2=medium 3=dense

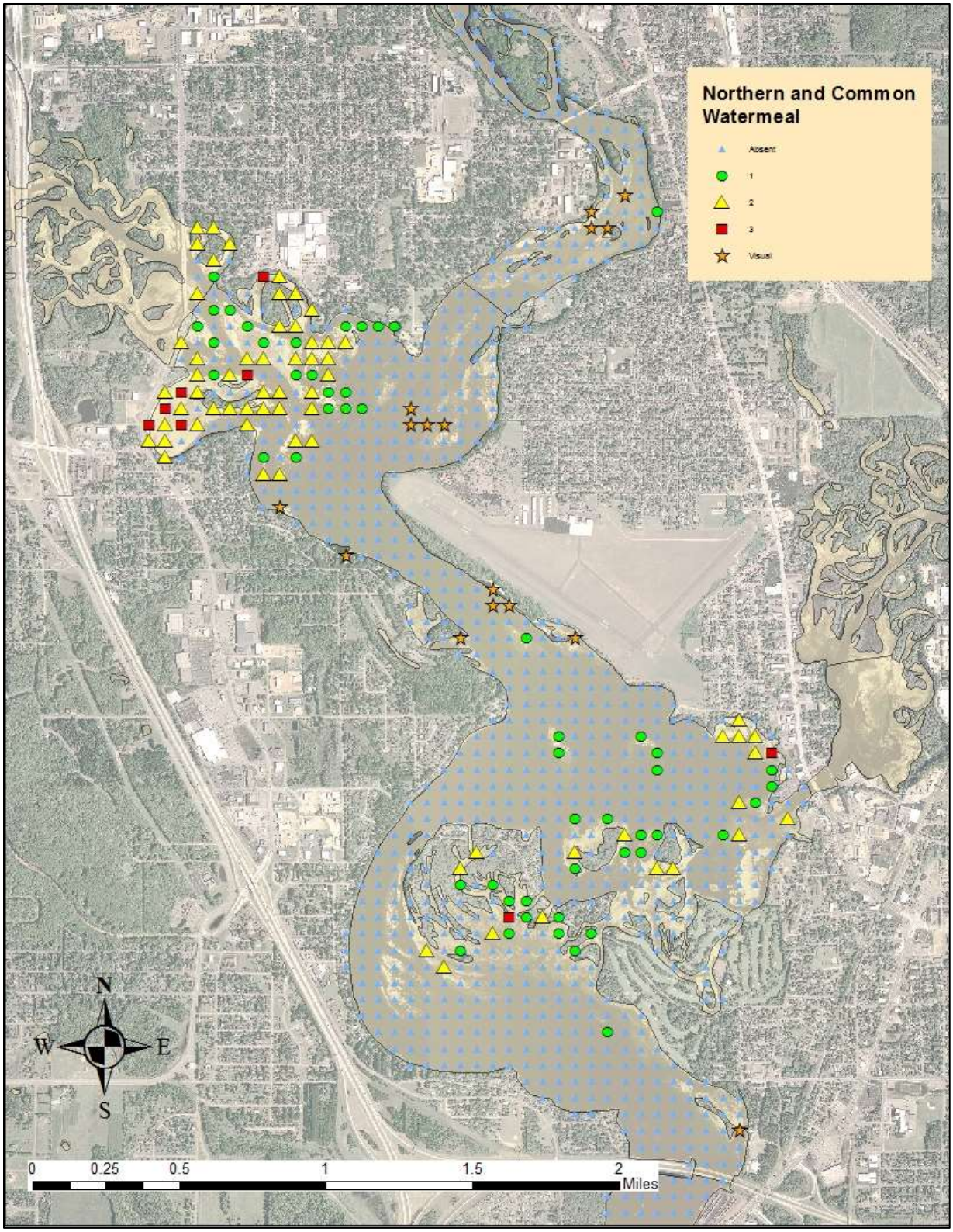

Figure 26. Northern watermeal and common watermeal rake fullness in Lake Wausau (below Highway N). 1=sparse 2=medium 3=dense

Species with C value greater than/equal to 8

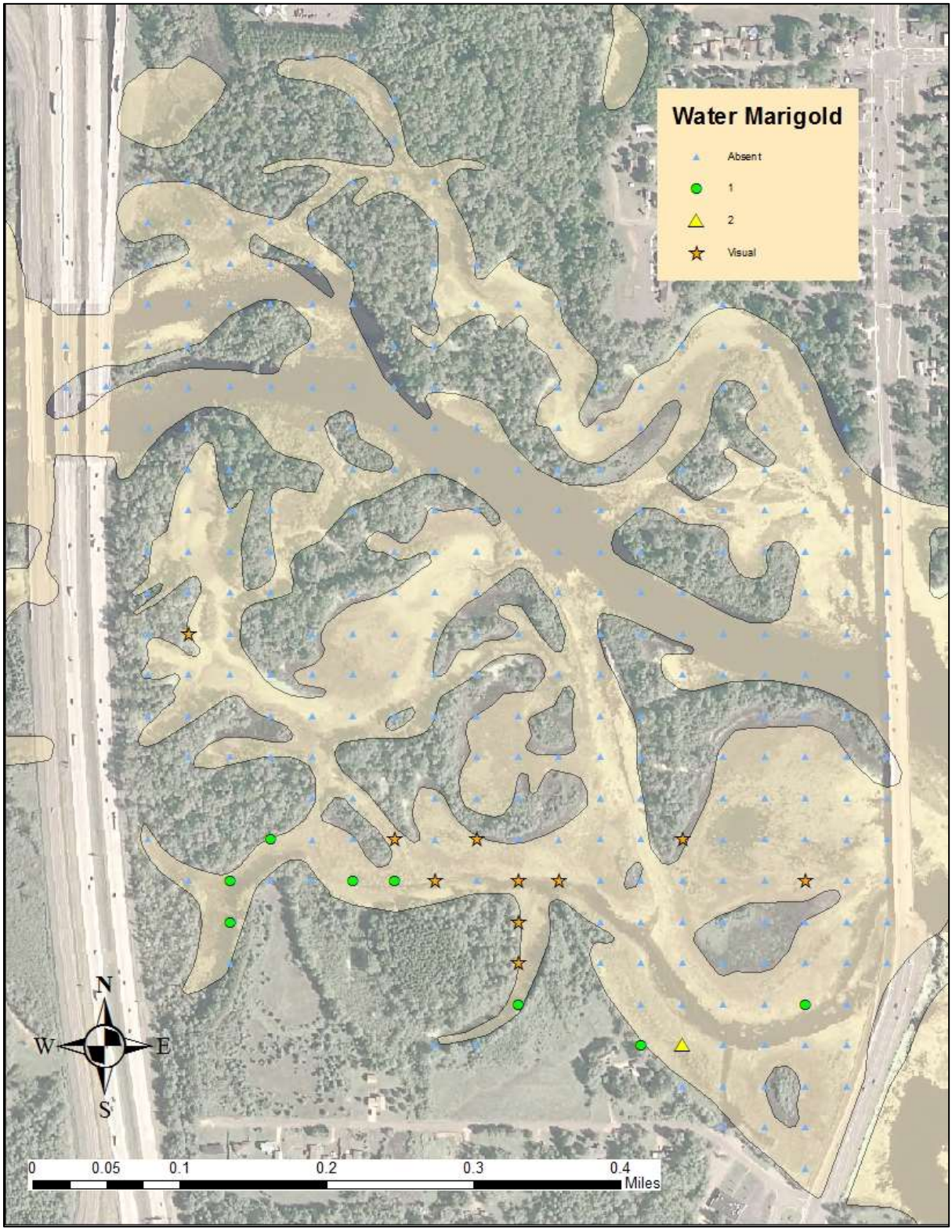

Figure 27. Water marigold (*Bidens beckii*) in upper Lake Wausau/Rib River confluence. (C value = 8) 1=sparse 2=medium

Figure 28. Spiny hornwort (*Ceratophyllum echinatum*) in upper Lake Wausau/Rib River confluence. (C value = 10) 1=sparse

Figure 29. Spiny hornwort (*Ceratophyllum echinatum*) in Lake Wausau (below Highway N). (C value = 10) 1=sparse


Ribbon Leaf Pondweed
Absent
1
N
W
E
S
0
0.05
0.1
0.2
0.3
0.4
Miles

Figure 30. Ribbon leaf pondweed (*Potamogeton epihydrus*) in upper Lake Wausau/Rib River confluence. (C value = 8) 1=sparse

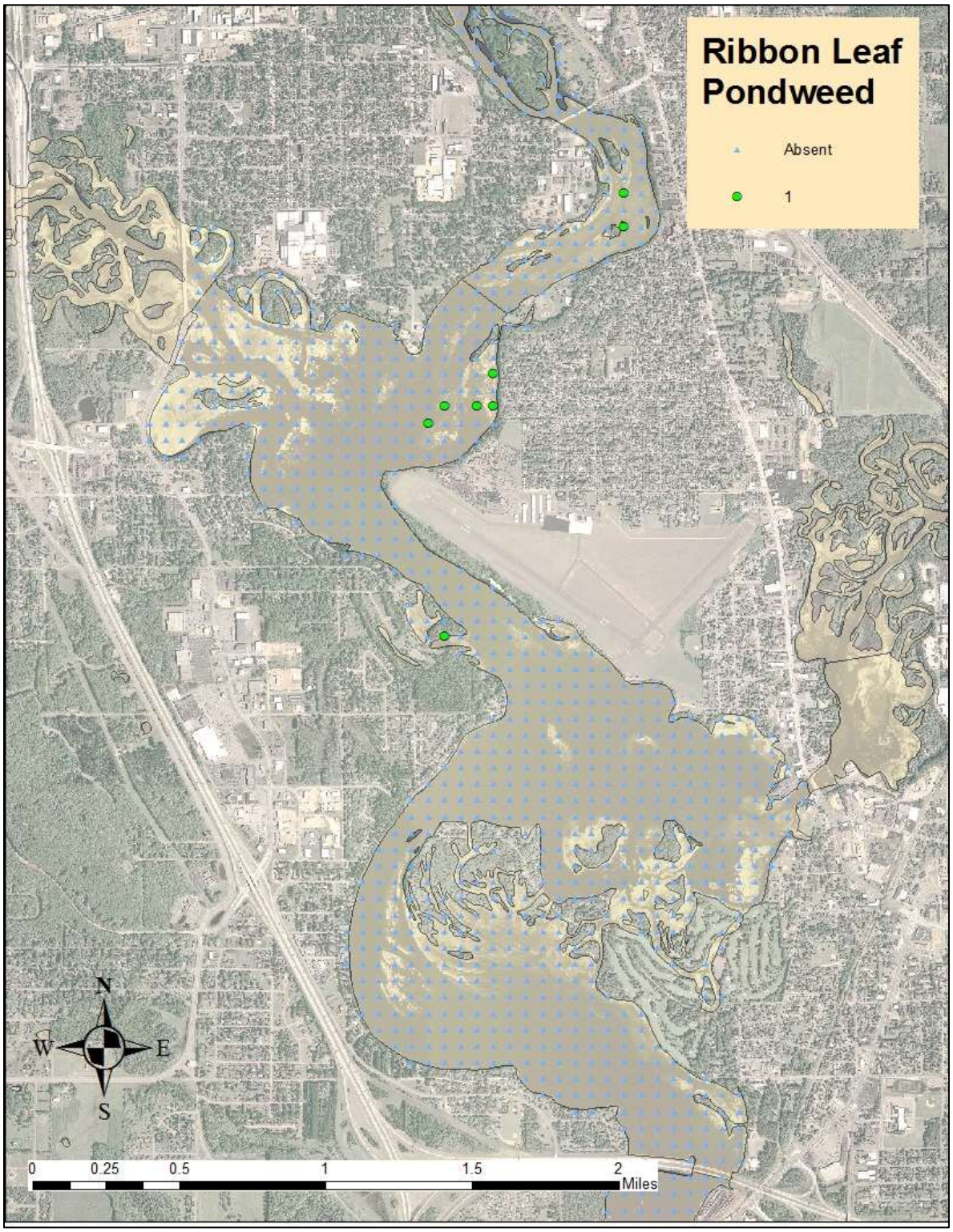

Figure 31. Ribbon leaf pondweed (*Potamogeton epihydrus*) in Lake Wausau (below Highway N). (C value = 8) 1=sparse

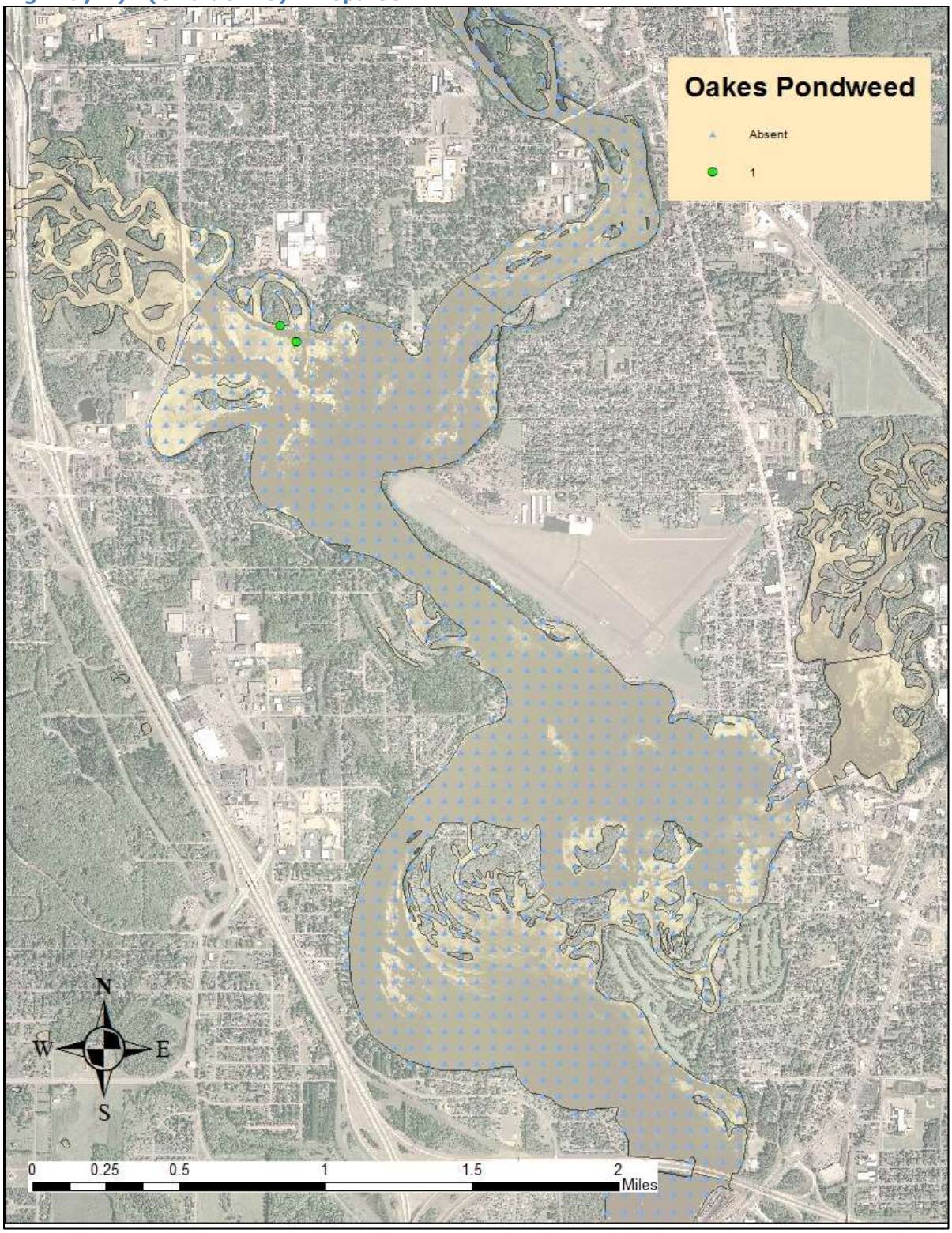

Figure 32. Oakes pondweed (*Potamogeton oakesianus*) in Lake Wausau (below Highway N). (C value = 10) 1=sparse

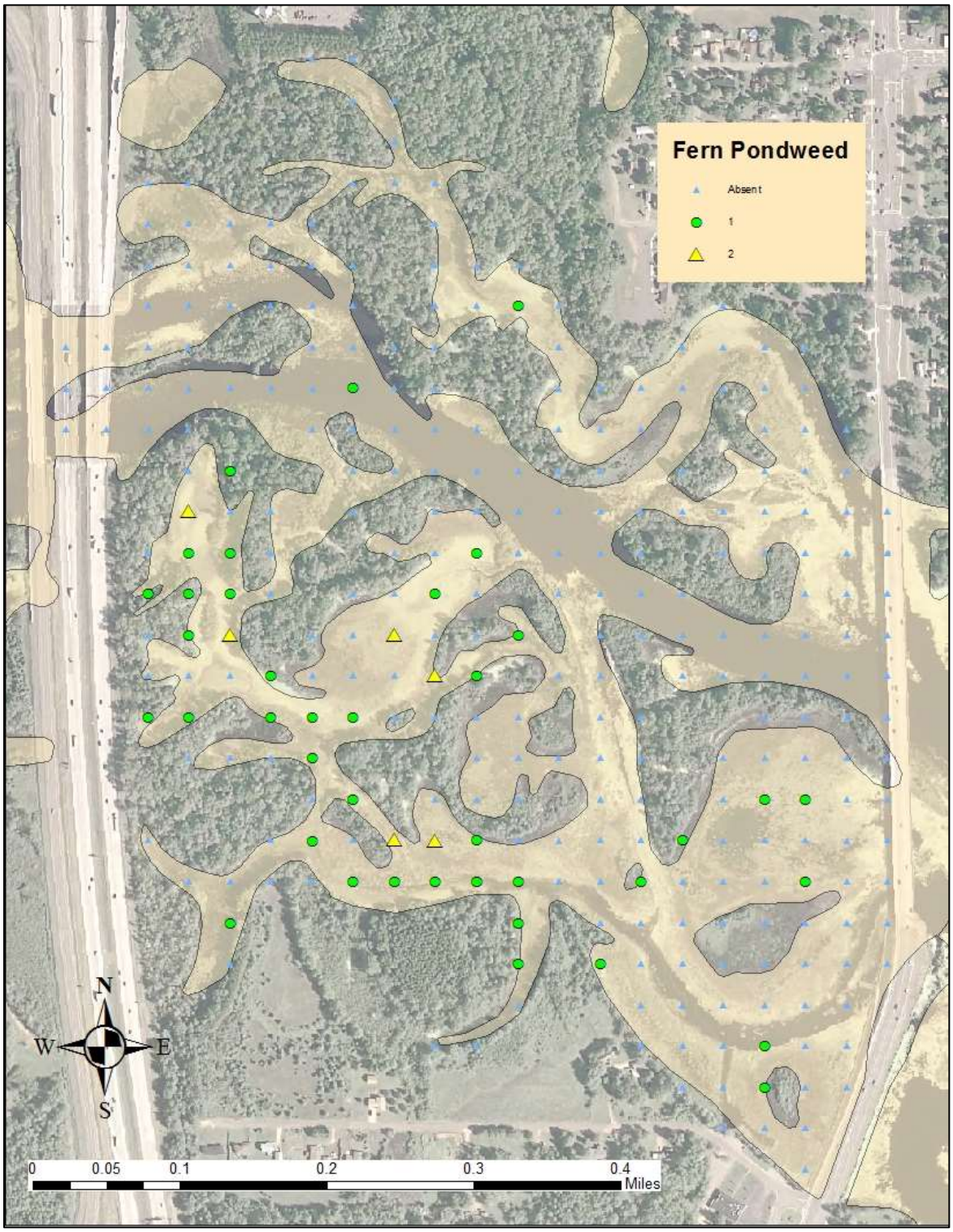

Figure 33. Fern pondweed (*Potamogeton robbinsii*) in upper Lake Wausau/ Rib River confluence. (C value = 8) 1=sparse 2=medium

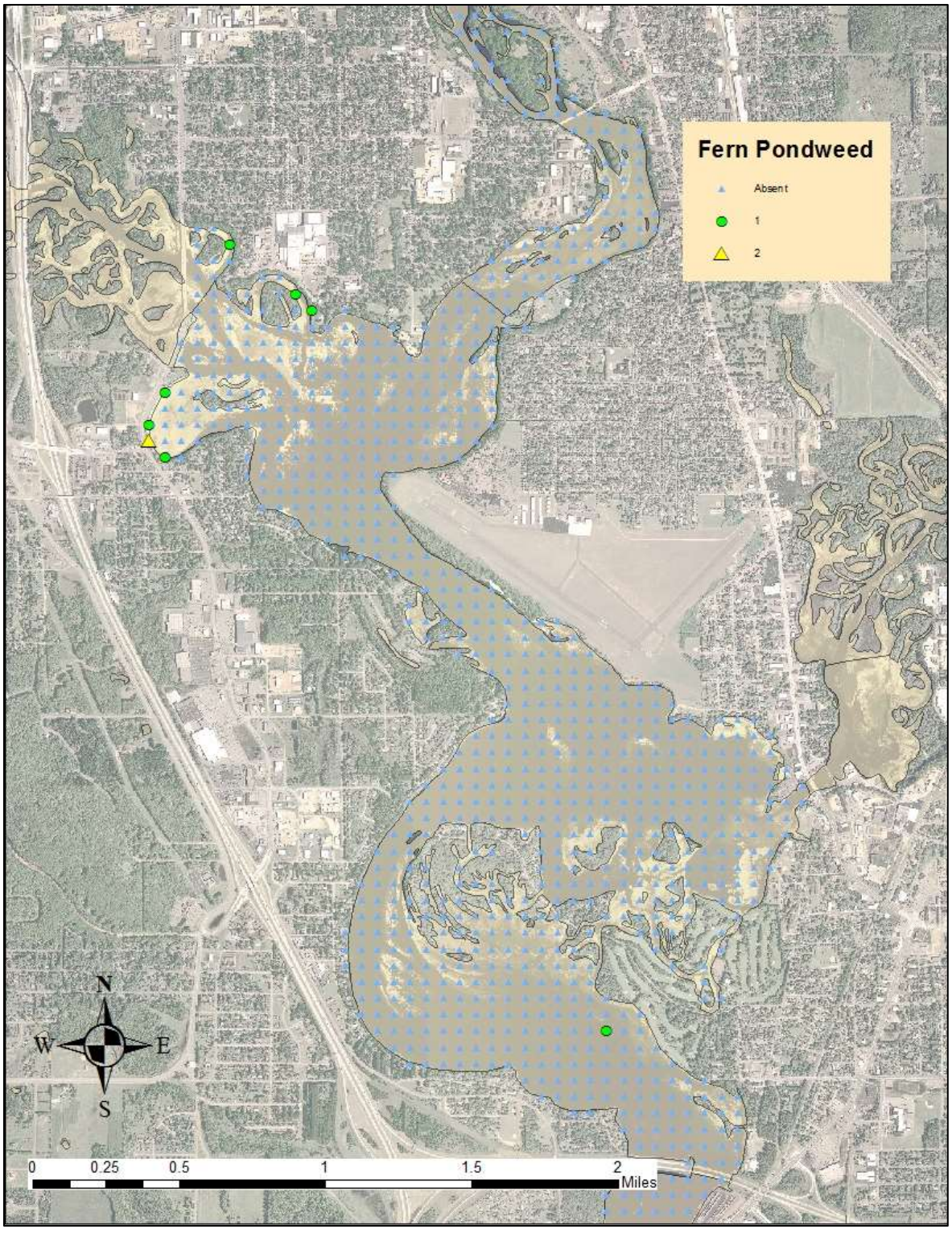

Figure 34 . Fern pondweed (*Potamogeton robbinsii*) in Lake Wausau (below Highway N). (C value = 8) 1=sparse 2=medium

Figure 35. Stiff pondweed (*Potamogeton strictifolius*) in upper Lake Wausau/Rib River confluence. (C value = 8) 1=sparse

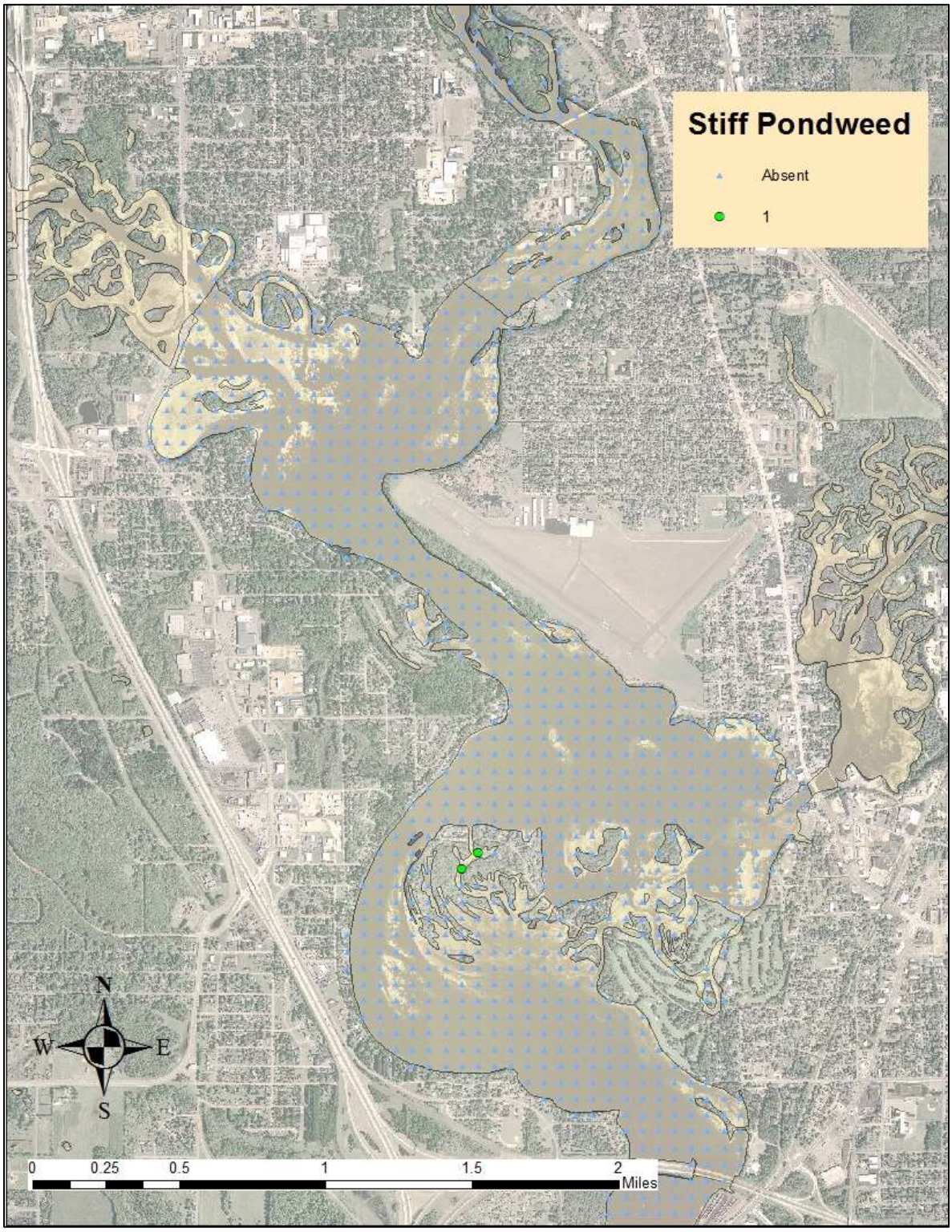

Figure 36. Stiff pondweed (*Potamogeton strictifolius*) in Lake Wausau (below Highway N). (C value = 8) 1=sparse

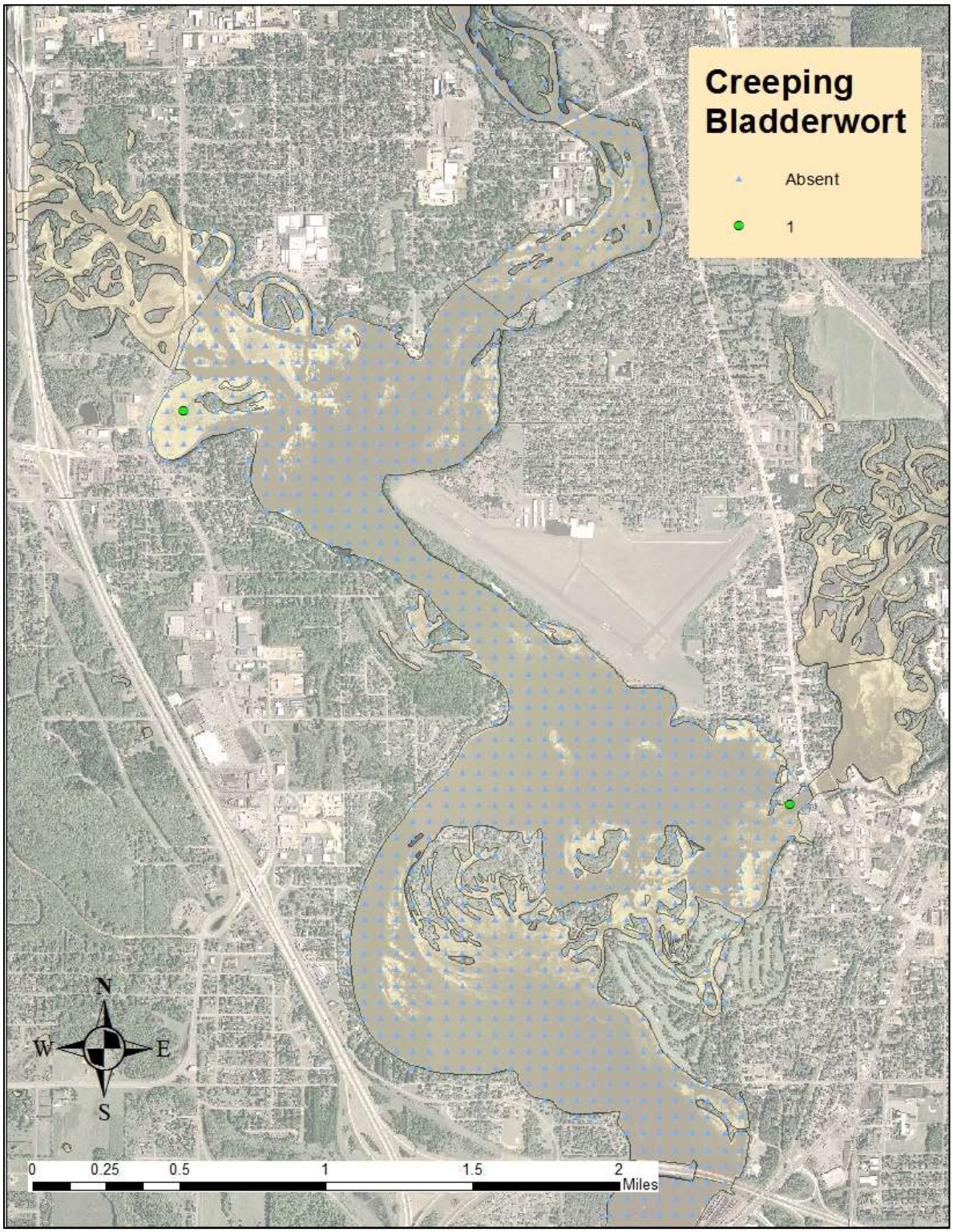

Figure 37. Creeping bladderwort (*Utricularia gibba*) in Lake Wausau (below Highway N). (C value = 9) 1=sparse

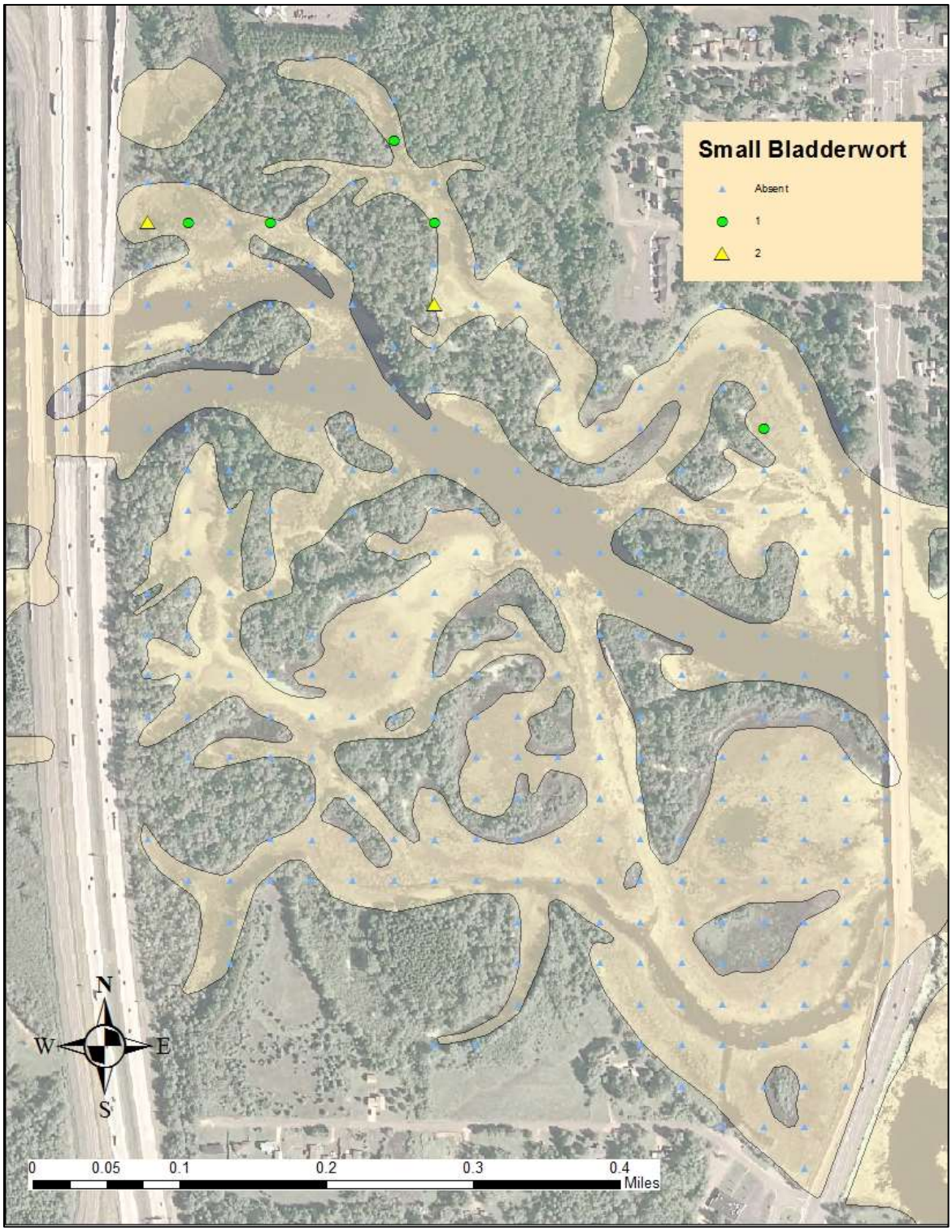

Figure 38. Small bladderwort (*Utricularia minor*) in upper Lake Wausau/Rib River confluence. (C value = 10) 1=sparse 2=medium

Figure 39. Wild rice (*Zizania* spp.) in upper Lake Wausau/Rib River confluence. (C value = 8) 1=sparse