P O R T A G E C O U N T Y

EURASIAN WATER MILFOIL ASSESSMENT

Eurasian Water Milfoil
Lake Pacawa

Prepared for:
Land Conservation Division of Portage County Planning & Zoning Department

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Portage County
Eurasian Water Milfoil Assessment

I. INTRODUCTION

Eurasian water milfoil (EWM) (*Milfolium spicatum*) is an exotic aquatic plant that has been gaining notoriety across the United States for its extremely aggressive invasive nature. Native to the Eurasian continent, it has been inadvertently introduced to water bodies across the U.S. by boaters, recreationalists and various aquatic industries. Once introduced, EWM, a champion of reproductive ingenuity, spreads rapidly via stolons or fragmentation. The submersed aquatic plant goes through two flowering periods each summer, after which, it fragments into many pieces. Each fragment may sprout roots and can remain afloat and stay viable for several weeks until it drifts to a suitable site, where it can become another plant. A perennial, the plant may wait out the winter under the ice, intact, and will be growing and well established by April or May, much sooner than native aquatics. It will grow rapidly, reach the water surface and then spread into a dense, tangled mat, shading out the sunlight the other plants need. This dense mat also increases the dissolved oxygen fluxuations, carbon dioxide fluxuations, pH fluxuations and the temperature stratification of the water, and it inhibits water circulation. The EWM aggressively out-competes the native aquatic plants, which rapidly decreases the diversity of the lake's plant community. This in turn decreases the diversity of the insect and fish populations. Dense growth of EWM can impede predator-prey relationships between fish, stunting the growth of the larger fishes as it reduces their ability to see prey. The tangled mats at the water surface can become dense enough to strand boaters, become a safety hazard for swimmers, and create a stagnant breeding ground for mosquitoes. (Jester 1998)

The cumulative effect of EWM impacts creates a chain reaction of changes in to the lake's ecology, decreasing the recreational value, sporting value and aesthetic value of the water body, which may in turn result in decreased property values (Jester 1998). Therefore, there is a strategic benefit to understanding a lake or pond's processes and preventing and/or remedying an EWM infestation. Various types of treatments are available, depending on the extent and density of the infestation, including trained manual removal, bottom barriers, mechanical removal/harvesting, water level drawdowns, herbicides and biological controls. Choosing the best treatment option is also dependant on the individual qualities of the particular water body, economic feasibility and the restrictions/allowances of local and state ordinances.

This assessment was initiated by Portage County's Land Conservation Division of the Planning and Zoning Department to determine the extent and density of the EWM infestations on water bodies in Portage County where EWM is documented to exist at the present time and to explore the best treatment options. EWM has been documented on six Portage County water bodies, including Bear Lake, Lake Emily, McDill Pond, Lake Pacawa, Springville Pond and Thomas Lake. In October of 2003, field mapping of EWM was completed for four of the six lakes using GPS equipment. Due to time constraints, field mapping of McDill Pond and Lake Emily was not possible during this assessment. Recommendations are given in this report for mapping and planning that should be conducted for those water bodies in 2004.

II. METHODS

EWM surveys on Bear Lake, Lake Pacawa, Springville Pond and Thomas Lake were conducted from a canoe. In the cases of Lake Pacawa and Springville Pond, where the waterbody is shallow enough for EWM to grow at any given point, observers paddled slowly, coursing back and forth across the waterbody until the entire waterbody had been visually searched. On Bear Lake and Thomas Lake, the depth at the centers of these lakes precludes EWM from growing anywhere but around the periphery of the lakes. In this situation, observers circled the lakes twice, once close to shore, and a second time closer to the maximum depth for weed growth, paddling slowly while visually searching for EWM.

Wherever EWM was found, GPS coordinates were recorded to sub-meter accuracy with a Trimble Pro XR. If it was a single plant or a very small colony of plants, a point feature was used to log the location. If the EWM colony was large enough to be recorded accurately as an area feature, the outline of the colony was traced, or corner points were recorded, to map the area feature. The mapping features were then overlain on aerial photographs to create GIS maps of EWM locations. If depth contours were available, contour lines were also overlain onto the aerial photographs. Please note that in the case of Bear Lake, no EWM was located during field exercises, therefore no GIS maps were created.

Where EWM was found, several samples of EWM plants were collected randomly, bagged in water and kept refrigerated. These were later examined for possible evidence of the aquatic milfoil weevil, *Euhrychiopsis lecontei*. Although this was not the primary focus of this assessment, evidence of this naturally occurring weevil that preferentially feeds on EWM would present the opportunity to explore the possibility of using natural biological control methods. With this in mind, observers felt it practical to grab samples for this purpose. The chilled samples that showed possible signs of the presence of the weevil (pinholes, underdeveloped growing tips, etc….) were mailed for confirmation, on ice, to Laura Jester, of Jester Consulting in Eden Prairie, Minnesota.

Background lake data was gathered for each lake from multiple sources, including records maintained by WDNR, the UW-Stevens Point Robert W. Freckman Herbarium and preliminary research reports from the University of Wisconsin-Stevens Point and Portage County. Please note that the UWSP and Portage County report cited *(Portage County Lake Study-Preliminary Results 2003)* is indeed a preliminary report, and some reported statements may change as data is further collected and compiled for the final report. The release of the final report is anticipated to come in summer of 2004.

III. COUNTY–WIDE RECOMMENDATIONS

a. Exotic Species Signage at All Landings

"Help prevent the spread…" signage at Bear Lake public boat landing.

Under Wisconsin Statutes, Chapter 30.715, it is illegal to transport boats or equipment that have aquatic plants attached. (Wisconsin Legislature: Infobases) To increase boater awareness, signage should be in place at every public boat landing warning boaters to clean off their boats to the prevent transfer of exotic species from lake to lake. This is important because a single boater transporting a single piece of EWM can be responsible for introducing the exotic plant to a previously uninfested lake.

"Exotic Species Advisory" sign at McDill Pond public boat landing.

Signage is being placed by the WDNR as quickly as funding and time permits. Efforts should be made by Portage County and interested parties (lake associations, boating groups, etc…) to assist with more speedy placement of these signs, which are available free of charge from the WDNR. For lakes that are currently not infested by any exotic species, there are "Help Prevent the Spread…" signs available, which instruct boaters to clean equipment before entering that lake. For lakes already infested by one or more exotic species, there are "Exotic Species Advisory" signs, warning of the presence of each exotic species known to be in that lake. (See Appendix A for "Clean Boats, Clean Waters" tips and guidelines.)

b. Trained Volunteer Watercraft Inspectors

Clean Boats, Clean Waters

Information cannot help if it does not get into the right hands. Because the public plays such a key role in spreading or preventing the spread of aquatic invasive species, information about invasive species *must* get into the hands of every boater. One option is to start a volunteer watercraft inspector program. Under the new Clean Boat, Clean Waters Program, a network of volunteers is being trained and organized by the Wisconsin Lakes Partnership (WDNR, UW-Extension and Wisconsin Association of Lakes). Workshops will train enthusiastic individuals in identifying aquatic invasive species, how to properly purge and clean a boat and how to teach this information to the public. Once trained, volunteers can spend time at public boat landings distributing informational pamphlets, talking with boaters about invasive species and showing boaters the steps for inspecting and cleaning their boats. While there, these volunteers can also inspect the area near the boat landing (a hot spot for new infestations) for EWM and other invasive species. Information about the WDNR training workshops in the Portage County area is available from the Contact for Volunteer Watercraft Inspector Training at (715) 241-6372. Assistance starting a volunteer watercraft inspection program is available from the Volunteer Monitoring Coordinator at (715) 346-3366. More detailed contact information is given in Appendix B.

c. Public Awareness of Current Infestations

Property owners around the six subject lakes, as well as Portage County lake associations, lake protection groups and Town boards, should be informed of the EWM sighting at Bear Lake and the EWM infestations in the other five lakes (Lake Emily, McDill Pond, Lake Pacawa, Springville Pond and Thomas Lake). These key groups should be educated about EWM problems, trained in EWM identification and made aware of the Volunteer Watercraft Inspector workshops that are part of the Clean Boats, Clean Waters Program with the WDNR and UW-Extension.

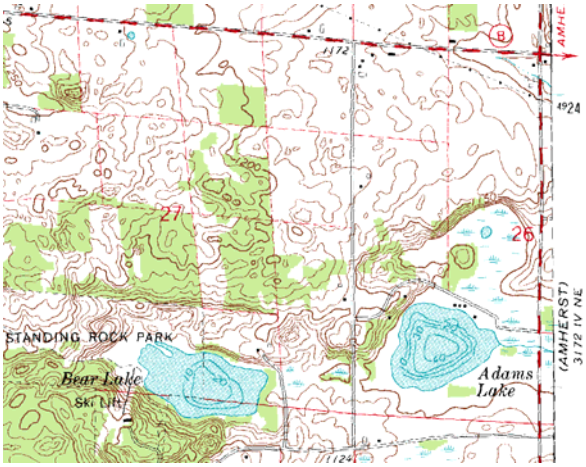
d. Local Contact Point

The information disseminated to the public, lake property owners, lake associations, etc…should have **local contact information** with it. Although the WDNR has knowledgeable personnel available to help the public with aquatic plant issues, the average citizen often does not know about these services or has difficulty finding out which office to call. A designated contact point at a familiar, nearby location may be helpful for citizens to easily and quickly report any potential new EWM sightings at previously uninfected lakes. Also, a local contact point would make it easier for citizens to bring pieces of the plant, chilled in water, to the contact point for species identification confirmation. The contact point, if unable to confirm the specie's identity, would know how to properly preserve the specimen and send it to appropriate WDNR personnel for confirmation. The contact point should also know how to facilitate the follow-up efforts for treatment.

The Land Conservation Division of the Portage County Planning and Zoning Department has agreed to serve as the local contact point for EWM reports. That office, if unable to answer questions directly, will contact the appropriate WDNR, University or other agency personnel who can supply the expertise needed for each situation. The Land Conservation Division is located in the Planning and Zoning Department office of the Portage County Courthouse Annex Building at 1462 Strongs Avenue, Stevens Point, WI 54481, (715) 346-1334.

IV. BEAR LAKE

a. Lake Background



Bear Lake on USGS topographic map.

Located approximately one mile south of County Highway B in the Town of Arnott, Bear Lake is a small seepage lake with a surface area of 28 acres and a maximum depth of 28 feet. The water in Bear Lake comes from groundwater, runoff and precipitation. Water leaves the lake via evaporation and seepage to groundwater. Because Bear Lake's water comes from multiple sources, one must think of its watershed in terms of a surface watershed and a groundwater shed. (See Appendix C for definitions of terms.) In the case of Bear Lake, the surface watershed is dominated by forest cover, and the groundwater shed is dominated by both forest cover and non-irrigated cropland. [University of Wisconsin-Stevens Point (UWSP) and Portage County 2003, Preliminary Results] There is a non-trailerable public boat landing on Bear Lake.


Bear Lake boat landing.

Total phosphorus levels of 30 ppb or higher categorizes a lake as eutrophic, resulting in more aquatic plant growth, which makes the lake more productive for fish and wildlife than a mesotrophic or oligotrophic lake, but less desirable for swimming. Bear Lake is a eutrophic lake, with total phosphorus levels historically averaging approximately 32 parts per billion (ppb) and average phosphorus levels for the year 2002 of approximately 36 ppb. (UWSP and Portage County 2003, Preliminary Results)

Water clarity in Bear Lake is considered fair, with average historic Secchi depth (a measure of water clarity) being best in June (13 feet) and poorest in September (6 ½ feet). Fluctuations in water clarity are normal, due to increases and decreases of algae population and sedimentation. Average Secchi depth for 2002 (5-13 feet) indicated poorer water clarity than the historic average. (UWSP and Portage County 2003, Preliminary Results)

b. History of Aquatic Plant Control in Bear Lake

No records of previous aquatic plant treatments were found to report for this assessment. Table 1 lists aquatic vegetation species documented in Bear Lake.

Table 1 - List of Documented Aquatic Vegetation
(Submergent and Floating Leaf Aquatics Only)

	Herbarium Records for Bear Lake [1]	
	Scientific Name	Common Name
1	*Brasenia shreberi*	Watershield
2	*Ceratophylum demersum*	Coontail
3	*Elodea Canadensis*	Waterweed
4	*Lemna turionifera*	Perennial duckweed
5	*Megalodonta beckii*	Water beggar-ticks
6	*Myriophyllum sibiricum*	Northern water milfoil
7	*Myriophyllum spicatum* (?) (*e)	Eurasian water milfoil
8	*Najas flexilis*	Slender naiad
9	*Nuphar variegata*	Bullhead pond lily
10	*Nymphea odorata*	White water lily
11	*Polygonum amphibium*	Amphibious smartweed
12	*Potamogeton amplexifolius*	Large leaf pondweed
13	*Potamogeton crispus* (*e)	Curly leaf pondweed
14	*Potamogeton gramineus*	Variable pondweed
15	*Potamogeton illinoensis*	Illinois pondweed
17	*Potamogeton natans*	Floating leaf pondweed
18	*Potamogeton praelongus*	White stem pondweed
19	*Utricularia gibba*	Creeping bladderwort
20	*Utricularia intermedia*	Flat leaved bladderwort
21	*Utricularia minor*	Small bladderwort
22	*Utricularia vulgaris*	Common bladderwort

[1] Robert W. Freckman Herbarium records through November 2003, University of Wisconsin-Stevens Point. (Note: These herbarium records are historical documentation of what has been identified to date at Bear Lake. *This is not an exclusive list.* Further, it cannot be stated with certainty that because a species has not been recorded at that lake recently that the species is no longer present in that lake. However, it has been well documented that as exotic invasives infest a lake, native vegetation is progressively less able to compete and the number of species (diversity) in the lake declines. Anecdotally, this is what has been seen at lakes in Portage County where EWM is present, however it would require quantitative vegetation surveys to confirm this.)

(*e) Exotic invasive

(?) Eurasian Water Milfoil (*Milfolium spicatum)* was sighted washed-up at the boat landing during 2003 plant surveys, and was collected for a voucher specimen to be retained at the Robert W. Freckman Herbarium on the University of Stevens Point campus. However, no other EWM (washed-up, rooted or floating) could be located within the lake.

c. Mapping Results

Field mapping efforts for this assessment on October 8, 2003 could not locate EWM, either rooted, floating or washed-up. **Therefore, no mapping could be done.** It is possible that the EWM collected was a lone piece, removed from a boat before being launched, however, this is hopeful speculation, and Bear Lake should be monitored frequently to catch any EWM infestations early. Until an infestation site can be located and confirmed, management must still focus on the prevention phase.

d. Recommended Management Plan for Eurasian Water Milfoil:

Prevention and Annual Monitoring

1. **Maintain Invasive Species Information Sign**

The best way to control EWM is to prevent it from entering the water body in the first place. As stated in the introduction, the main method of introduction is from boats and recreational equipment transferring pieces of EWM from an infected water body to an uninfected one. Prominent warning signage reminding boaters to clean their equipment is an important part of prevention. While the Bear Lake public boat landing is a non-trailerable boat landing, trailers are not the only transporters of EWM plant parts, and it is still important to remind boaters to check other equipment, such as anchors and fishing lines.

Bear Lake public boat landing. Signs are posted in a visible location.

Close-up of signage.

Currently, "Help Prevent the Spread…" signs, designed for uninfected lakes, is posted at the Bear Lake boat landing. If EWM is found in the lake in the future, this signage should then be changed to "Exotic Species Advisory" signs, warning of the presence of EWM.

2. **Annual Surveying**

Annual surveying should be done to search for potential EWM outbreaks.

a. Notify Contact Point

If even one live EWM plant is found, rooted or floating, the local contact point should be notified immediately. If possible, a sample of the plant should be collected, kept in

chilled water and delivered to the contact point for species identification confirmation. The contact point should then notify WDNR personnel to facilitate evaluation and implementation of treatment options. **Treatment options should be implemented by trained volunteers or professionals, at the direction of WDNR personnel.** If a floating or washed-up plant was found, the plant should be removed and disposed of and the source infestation (rooted, live EWM plants) searched for. If no source is found, no further treatment is necessary, but if a source can be located, treatment should be implemented as soon as possible.

b. Implement Best Treatment Option

With the direction and permission of the WDNR, new infestations may be handled by trained volunteers or professionals. Individual plants or small colonies can be cut at the sediment line or hand pulled, roots and all. If cutting is done, it is best to time this early in the year, when the plant is expending its winter reserves sprouting new growth. Monthly follow-up cuttings must then be done to continue draining the plants of energy.

c. Dispose of Plants Removed

ALL PLANT PARTS cut or pulled must be removed and destroyed or disposed of. If hand pulling is done, the sediment may need to be loosened with a pitchfork to make total removal of the roots possible.

d. Follow-up Monitoring

Follow-up monitoring must be done to check for re-sprouts. Again, ALL PLANT PARTS must be removed and destroyed or disposed of. Hand removal of exotic species does not require a permit from the WDNR. Annual monitoring should be continued, since *EWM eradication is never permanent*.

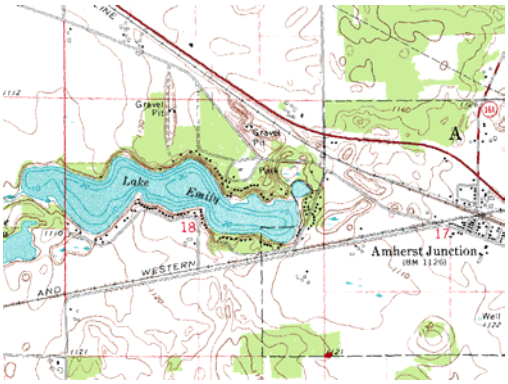
3. **Watercraft Inspectors**

Information cannot help if it does not get into the right hands. Because the public plays such a key role in spreading or preventing the spread of aquatic invasive species, information about invasive species *must* get into the hands of every boater. If the presence of EWM is found and confirmed at Bear Lake in the future, the WDNR should be notified and Bear Lake added to the list of lakes for WDNR personnel to spend time at for boater education. Of course, WDNR personnel have many other lakes in Central Wisconsin to visit as well. In contrast, a trained volunteer watercraft inspector may be able to spend more time at the Bear Lake landing, especially on major boating weekends.

Residents of Bear Lake, as well as other conservation groups in Portage County, should be encouraged to participate in the volunteer watercraft inspector training workshops and the support network offered by the Clean Boats, Clean Water Program through the Wisconsin Lakes Partnership. More information about this program is given in Section IIIc.

V. LAKE EMILY

a. Lake Background



Lake Emily on USGS topographic map.

Located approximately 1/5 mile south of State Highway 10 in the Town of Amherst, Lake Emily is a medium-sized seepage lake with a surface area of 95.5 acres and a maximum depth of 35 feet. The water in Lake Emily comes from groundwater, runoff, precipitation and one intermittent inlet from Mud Lake at the west end. Water leaves the lake via evaporation and seepage to groundwater. Because Lake Emily's water comes from multiple sources, one must think of its watershed in terms of its surface watershed and its groundwater shed. (See Appendix C for definitions of terms.) In the case of Lake Emily, the surface watershed and groundwater shed are both dominated by non-irrigated agriculture. Although residential land use is a small percentage of land area in these watersheds, most of these properties are concentrated directly around the lake shoreline, which heightens their potential to impact the health of the lake. Residential land use has increased significantly since 1948. (UWSP and Portage County 2003, Preliminary Results) This is a highly recreated lake with high resident usage and a county campground, park, beach and trailerable boat landings.

Lake Emily is historically a mesotrophic lake, with Total Phosphorus Levels historically averaging approximately 26 parts per billion (ppb), but average phosphorus levels for the year 2002 were approximately 33 ppb, 3 ppb above the eutrophic level. (UWSP and Portage County 2003, Preliminary Results)

Water clarity in Lake Emily is considered fair, with average historic Secchi depth (a measure of water clarity) being best in May (17 feet) and poorest in July (8 feet). Fluctuations in water clarity are normal, due to increases and decreases of algae population and sedimentation. Average secchi depth readings for 2002 indicated poorer water clarity in late summer than the historic average. (UWSP and Portage County 2003, Preliminary Results)

b. History of Aquatic Plant Control in Lake Emily

No records of previous aquatic plant treatments were found to report for this assessment. WDNR records show EWM was first reported in this lake in 1993. (WDNR website) Table 2 lists aquatic vegetation species documented in Lake Emily.

Table 2 - List of Documented Aquatic Vegetation
(Submergent and Floating Leaf Aquatics Only)

	Herbarium Records for Lake Emily [1]	
	Scientific Name	Common Name
1	*Brasenia shreberi*	Watersheild
2	*Ceratophylum demersum*	Coontail
3	*Elodea Canadensis*	Waterweed
4	*Lemna minor*	Small duckweed
5	*Lemna turionifera*	Perennial duckweed
6	*Megalodonta beckii*	Water beggar-ticks
7	*Myriophyllum sibiricum*	Northern water milfoil
8	*Myriophyllum spicatum* (*e)	Eurasian water milfoil
9	*Najas flexilis*	Slender naiad
10	*Nuphar variegata*	Bullhead pond lily
11	*Nymphea odorata*	White water lily
12	*Potamogeton friesii*	Fries's pondweed
13	*Potamogeton gramineus*	Variable pondweed
14	*Potamogeton illinoensis*	Illinois pondweed
15	*Potamogeton natans*	Floating leaf pondweed
16	*Vallisneria americana*	Water celery

[1] Robert W. Freckman Herbarium records through November 2003, University of Wisconsin-Stevens Point. (Note: These herbarium records are historical documentation of what has been identified to date at Lake Emily. *This is not an exclusive list.* Further, it cannot be stated with certainty that because a species has not been recorded at that lake recently that the species is no longer present in that lake. However, it has been well documented that as exotic invasives infest a lake, native vegetation is progressively less able to compete and the number of species (diversity) in the lake declines. Anecdotally, this is what has been seen at lakes in Portage County where EWM is present, however it would require quantitative vegetation surveys to confirm this.)

(*e) Exotic invasive

c. Mapping Results

Due to time and seasonal constraints, **Lake Emily was not surveyed** for this EWM assessment. GIS mapping of the EWM locations and extent would be helpful and are recommended for determining EWM treatment options. See the following "Recommended Survey Plan for Eurasian Water Milfoil" for more details.

d. Recommended Survey Plan for Eurasian Water Milfoil:

2004 – Mapping in Spring, Create Management Plan

1. **EWM Mapping Surveys of Lake Emily**

   It is recommended that EWM mapping surveys of Lake Emily be done in late May or early June of 2004, after EWM is well established, but *before* other plants are established and would complicate the survey.

2. **EWM Mapping Surveys of Mud Lake**

   Because the inlet from Mud Lake contributes water to Lake Emily, Mud Lake should also be surveyed for EWM.

3. **Sample for aquatic weevil, *Euhrychiopsis lecontei***

   Plant samples should be taken at the time of survey to determine the presence or absence of the naturally occurring aquatic weevil, *Euhrychiopsis lecontei*. *E. lecontei* is a naturally occurring weevil, usually found where native milfoils occur, and can keep EWM populations in check. The weevil can effectively impact the health of the milfoil plants by removing vascular tissue and destroying apical growing tips (Jester 1998). If appropriate conditions exist, the presence of *E. lecontei* may present a biological control option.

4. **Create Aquatic Plant Management Plan**

   EWM eradication should be considered to be just one part of a larger goal of total lake health. It is recommended that the 2004 survey data be used to create a comprehensive aquatic plant management plan for Lake Emily. A great deal of data have already been collected for Lake Emily and will help to create a well-balanced lake management plan.

5. **Reposition and Maintain Exotic Species Advisory Signs**

View as entering the boat landing. Signs not visible from this view.

Under Wisconsin Statutes, Chapter 30.715, it is illegal to transport boats or equipment that have aquatic plants attached. (Wisconsin Legislature: Infobases) When EWM is present in a water body, there is always a risk of boaters inadvertently transporting pieces of EWM and infesting another lake. With so many uninfested lakes in Portage County, prominent signage at Lake Emily is important.

The Exotic Species Advisory signs are currently posted where they are not very visible, and can only be seen as boaters are *leaving* the ramp, turning onto the road. The signs are not visible to boaters *entering* the lake. Reminders to clean equipment before entering Lake Emily is still important for preventing the introduction of additional invasive species. Also, at the posted position and distance, it is unlikely that the signs are noticeable or legible from the passing vehicle, and it is unlikely that boaters

will stop to read signs, pull over, and perform the necessary cleaning checks. **Better posting with higher visibility is highly recommended to increase effectiveness.**

View as leaving the boat landing. Sign is too distant from entryway to be very noticeable or legible.

Close-up of posted signage.

6. **Initiate a Volunteer Watercraft Inspection Program**

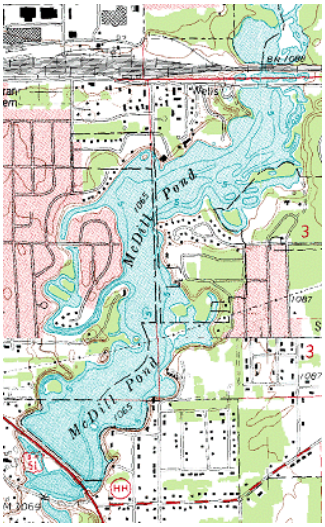
Information cannot help if it does not get into the right hands. Because the public plays such a key role in spreading or preventing the spread of aquatic invasive species, information about invasive species must get into the hands of every boater. The occasional presence of trained volunteer watercraft inspectors, especially on major boating weekends, would be helpful to educate boaters about the invasive nature of EWM and the importance of cleaning boats after recreating in Lake Emily.

Lake Emily has a high recreational value and is held in high regard by the area citizens and the Friends of Lake Emily protection group. This group, as well as other conservation groups in Portage County, should be encouraged to participate in the volunteer watercraft inspector training workshops and the support network offered by the Clean Boats, Clean Water Program through the Wisconsin Lakes Partnership. More information about this program is given in Section IIIc.

VI. McDILL POND

a. Lake Background

Straddling the Village of Whiting and City of Stevens Point border, McDill Pond is a large impoundment of the Plover River, with a surface area of 261 acres and a maximum depth of 8 feet. The water of McDill Pond mostly comes from the Plover River, with other contributions coming from runoff, groundwater, and precipitation. Much of the water exits the pond at the dam and some water moves to the groundwater. Because the majority of McDill Pond's water comes from the Plover River, one must think of the pond's watershed and the river's watershed as being one in the same. The Plover River's surface watershed has the most impact on the water quality of the river and the pond. (See Appendix C for definitions of terms.) The dominant landuse in that watershed is fairly evenly spread between forest (34%), agriculture (23%), wetland (20%) and grassland (18%). (UWSP and Portage County 2003, Preliminary Results)



McDill Pond on USGS topographic map.

McDill Pond's northern boat landing.

Perhaps of greater importance in the case of McDill Pond is the amount of development surrounding the pond. Land use within 1000 feet of the shoreline, which was dominated by open field and forest in 1960, is now 0% forest or open field and is 100% residential, streets, parks and commercial land uses. (UWSP and Portage County 2003, Preliminary Results) This is a highly recreated waterbody with dense residential land, four public parks and two trailerable boat landings.

McDill Pond historically has been a mesotrophic lake. Total phosphorus levels historically average approximately 21 parts per billion (ppb) but average phosphorus levels for the year 2002 were approximately 28.5 ppb, which is just under the eutrophic level of 30 ppb. (UWSP and Portage County 2003, Preliminary Results)

b. History of Aquatic Plant Control in McDill Pond

Nuisance aquatic plant control and heavy sedimentation has been an ongoing problem in McDill Pond. It's very nature as an impoundment of the Plover River makes it a settling area for sediment and nutrients being carried by the river, including phosphorus, the nutrient most responsible for excessive plant and algae growth. In the 1950's, a small aquatic plant harvester was operated by the Stevens Point Sportsman Club. (McDill Inland Lake Protection District 1995) From 1959 to 1962, the pond was drained, and several disjointed improvement efforts were made by waterfront property owners, developers and the Village of Whiting. Plant material was collected and burned, channels were straightened and deepened and mucky,

sediment-filled areas were scraped. The nuisance plant problem was greatly reduced by these efforts, but by 1966 weed growth was again approaching nuisance levels. (McDill Lake District Technical Committee 1978)

Herbicide use for weed control began in 1967. The list of chemicals (active ingredients) used included Arsenic, Diquat, Endothall and Silvex. (City of Stevens Point and McDill Pond Association 1992) The herbicides were first used in selected areas, then in increasingly larger areas until 1982, when annual plant harvesting was resumed with the goal of reducing available phosphorus in the pond by removing excess plant matter (McDill Inland Lake Protection and Rehabilitation District 1995, Shaw and Mealy 1983). Another less extensive drawdown, or drainage, was done in 1991 to allow for maintenance of the sediment-trapping areas at the pond's headwaters, but intense recreational pressures prevented a prolonged drawdown like that of the 1960's. (City of Stevens Point and McDill Pond Association 1992)

With drawdowns being impractical, extensive herbicide use having environmental impacts and manual control for such large infestations being overwhelming, the Aquatic Plant Management Plan written for McDill Pond in 1992 found that mechanical harvesting was the most practical, responsible and efficient method of weed control for McDill Pond. In addition to recommending the best control method for all uses of the pond, the plan also recommended a campaign for responsible riparian land practices to reduce nutrient inputs to McDill Pond and its watershed. (City of Stevens Point and McDill Pond Association 1992)

While the current management plan laid good groundwork, it is now over a decade old. Infestations can increase, decrease or appear in new locations around a water body. The 1996 Aquatic Plant Harvesting Summary showed that 21% of the plant matter removed is milfoil, but 61% is curly leaf pondweed (*Potamogeton crispus*, another invasive exotic specie). (McDill Inland Lake Protection and Rehabilitation District 1996) Anecdotal evidence suggests that this ratio has now changed, with EWM greatly out-competing curly leaf pondweed. Table 3 lists all aquatic vegetation species documented in McDill Pond.

[Note: A recent dredging operation, *unrelated to aquatic plant control*, was implemented in June-July of 2002 by the McDill Pond Inland Lake Protection & Rehabilitation District. Approximately 147,000 cubic yards of sand was removed from the upper end of the pond to create a sediment trap where the Plover River empties into the pond. (McDill Pond News)]

Table 3. List of Documented Aquatic Vegetation
(Submergent and Floating Leaf Aquatics Only)

	Herbarium Records for McDill Pond [1]	
	Scientific Name	Common Name
1	*Ceratophylum demersum*	Coontail
2	*Elodea Canadensis*	Waterweed
3	*Lemna turionifera*	Perennial duckweed
4	*Myriophyllum sibiricum*	Northern water milfoil
5	*Myriophyllum spicatum* (*e)	Eurasian water milfoil
6	*Nuphar variegata*	Bullhead pond lily
7	*Nymphea odorata*	White water lily
8	*Potamogeton amplexifolius*	Large leaf pondweed
9	*Potamogeton crispus* (*e)	Curly leaf pondweed
10	*Potamogeton foliosus*	Leafy pondweed
11	*Potamogeton natans*	Floating leaf pondweed
12	*Potamogeton nodosus*	Long leaf pondweed
13	*Potamogeton praelongus*	White stem pondweed
14	*Potamogeton richardsoni*	Clasping leaf pondweed
15	*Potamogeton robbinsii*	Robbin's pondweed
17	*Ranunculus aquatilis*	White water crowfoot
18	*Utricularia sp.*	Bladderwort
19	*Wolffia borealis*	Northern water-meal
20	*Wolffia columbiana*	Common water-meal
21	*Zosterella dubia*	Water stargrass

[1] WDNR records and Robert W. Freckman Herbarium records through November 2003, University of Wisconsin-Stevens Point. (Note: These herbarium records are historical documentation of what has been identified to date at McDill Pond. *This is not an exclusive list.* Further, it cannot be stated with certainty that because a species has not been recorded at that lake recently that the species is no longer present in that lake. However, it has been well documented that as exotic invasives infest a lake, native vegetation is progressively less able to compete and the number of species (diversity) in the lake declines. Anecdotally, this is what has been seen at lakes in Portage County where EWM is present, however it would require quantitative vegetation surveys to confirm this.)

(*e)Exotic invasive

c. Mapping Results

Due to time and seasonal constraints, **McDill Pond was not surveyed** for this EWM assessment. Updated GIS mapping of the EWM locations and extent would be helpful in evaluating the success of on-going treatment efforts. See the following "Recommended Survey Plan for Eurasian Water Milfoil" for more details.

d. Recommended Survey Plan for Eurasian Water Milfoil:

2004 – Mapping in Spring, Re-evaluate Management Plan

1. **EWM Mapping Surveys of McDill Pond**

   It is recommended that EWM mapping surveys be conducted in late May to early June of 2004, after EWM is well established, but *before* other plants are established and would complicate the survey.

2. **Curly Pond Weed Surveys of McDill Pond**

   It is also recommended that curly leaf pondweed be added to the mapping efforts. This will increase the workload, but a complete aquatic plant management plan should focus on *both* of these troublesome plants.

3. **Evaluate Control Options**

   An EWM infestation the magnitude of that in McDill Pond cannot, with our current tools available, be eradicated but *can* be successfully controlled with a comprehensive management plan. Infestations can increase, decrease or appear in new locations around a water body. Updated GIS mapping will help in evaluating current treatment methods.

4. **Evaluate Success of Public Education Efforts**

   While evaluating the success of current control methods and exploring all future options, the successes or failures of the campaign for responsible riparian land practices should also be evaluated.

5. **Maintain Exotic Species Advisory Sign at Northern Boat Landing**

   Exotic Species Advisory signs are currently posted at the southern boat landing, warning boaters of the presence of EWM. When EWM is present in a water body, there is always a risk of boaters inadvertently transporting pieces of EWM and infesting another lake. With many uninfested lakes in Portage County, it is important that prominent signage at McDill Pond be maintained.

Highly visible signage at McDill Pond's southern boat landing.

6. **Place Exotic Species Advisory Sign at Northern Boat Landing**

The northern boat landing, at the eastern end of Heffron Street, currently has no exotic species signage. With many uninfested lakes in Portage County, it is important that prominent signage be posted at BOTH McDill Pond boat landings. **Exotic Species Advisory signs are available from the WDNR and should be placed immediately at the north landing.**

McDill Pond's northern boat landing. No signage is present.

7. **Initiate Volunteer Watercraft Inspection Program**

Information cannot help if it does not get into the right hands. Because the public plays such a key role in spreading or preventing the spread of aquatic invasive species, information about invasive species must get into the hands of every boater. The occasional presence of trained volunteer watercraft inspectors at both of McDill Pond's boat landings, especially on major boating weekends, would be helpful to educate boaters about the invasive nature of EWM and the importance of cleaning boats after recreating in McDill Pond.

McDill Pond has a high recreational value to the surrounding communities and has an active protection organization, the McDill Pond Association. This group, as well as other conservation groups in Portage County, should be encouraged to participate in the volunteer watercraft inspector training workshops and the support network offered by the Clean Boats, Clean Water Program through the Wisconsin Lakes Partnership. More information about this program is given in Section IIIc.

VII. LAKE PACAWA

a. Lake Background

Located approximately 200 feet west of U.S. Highway 39 and 1,600 feet south of the County Highway B and US 39 interchange in the Village of Plover, Lake Pacawa is a small man-made lake with a surface area of 12 acres. (*"EWM in WI as of 2002"*) The lake was a borrow-pit for highway improvement projects that eventually filled with groundwater. Because of the lake's small size and man-made origin, it has not been included in many lake studies performed on Portage County lakes. Watershed information, lake depth contour maps or maximum depth records were not available to include in this assessment.

Lake Pacawa on USGS topographic map. (Numbered 1078)

The water in Lake Pacawa comes mainly from groundwater, with nominal inputs from run off and precipitation. Water leaves the lake via evaporation and seepage to groundwater. Lake Pacawa is a hard water lake and appears to have excellent clarity, but no secchi depth readings could be found to report in this assessment. Phosphorus levels were also not available to report. Thorough sampling and testing would be necessary to truly evaluate the lake's health.

Lake Pacawa with Korean War Memorial on island.

Lake Pacawa is a highly recreated lake surrounded by public beaches, a park, a boat landing and two ball diamonds. A Korean War Memorial is located on the island in the center of Lake Pacawa, accessible by a causeway. The lake also plays host to a Village of Plover annual summertime celebration, called Lake Pacawa Days, as well as other events and festivals.

b. History of Aquatic Plant Control in Lake Pacawa

According to WDNR records, a herbicide treatment with Aquathol for "nuisance" plant growth was done in July of 1986 to clear the beaches and boating lanes. Table 4 lists aquatic vegetation species documented in Lake Pacawa.

Table 4. List of Documented Aquatic Vegetation
(Submergent and Floating Leaf Aquatics Only)

	Herbarium Records for Lake Pacawa [1]	
	Scientific Name	Common Name
1	*Myriophyllum spicatum* (*e)	Eurasian water milfoil
2	*Potamogeton pectinatus*	Sago pondweed

[1] Specimens were randomly collected during 10/22/03 field mapping activities and later preserved and submitted for record to the Robert W. Freckman Herbarium at University of Wisconsin-Stevens Point. **There were no previous records for Lake Pacawa.** Fieldwork on 10/22/03 was not focused on identifying all plant species in the lake. Therefore, this plant list is NOT an exclusive list. Because no historical plant data is available, it cannot be said whether plant diversity in Lake Pacawa has been adversely affected by the presence of EWM. However, it has been well documented that as invasive species infest a lake, native vegetation is progressively less able to compete and the number of species (diversity) in the lake declines. Anecdotally, this is what has been seen at lakes in Portage County where EWM is present, however it would require quantitative vegetation surveys to confirm this.)

(*e) Exotic invasive

c. Mapping Results

A dense EWM growth in Lake Pacawa.

Multiple areas of sparse to dense EWM growth were mapped during 10/22/03 field activities. Dense EWM growth totaled 0.4 acres and sparse growth totaled 0.4 acres. (See Figure 1.) EWM specimens were randomly collected to examine for evidence of the presence of the aquatic weevil, *Euhrychiopsis lecontei*. *E. lecontei* is a naturally occurring weevil, usually found where native milfoils occur, and can keep milfoil populations in check. The weevil can effectively impact the health of the milfoil plants by removing vascular tissue and destroying apical growing tips. (Jester 1998) Although no evidence of weevils could be found from the samples collected, a more thorough survey would be required to conclusively determine the presence or absence of *E. lecontei*.

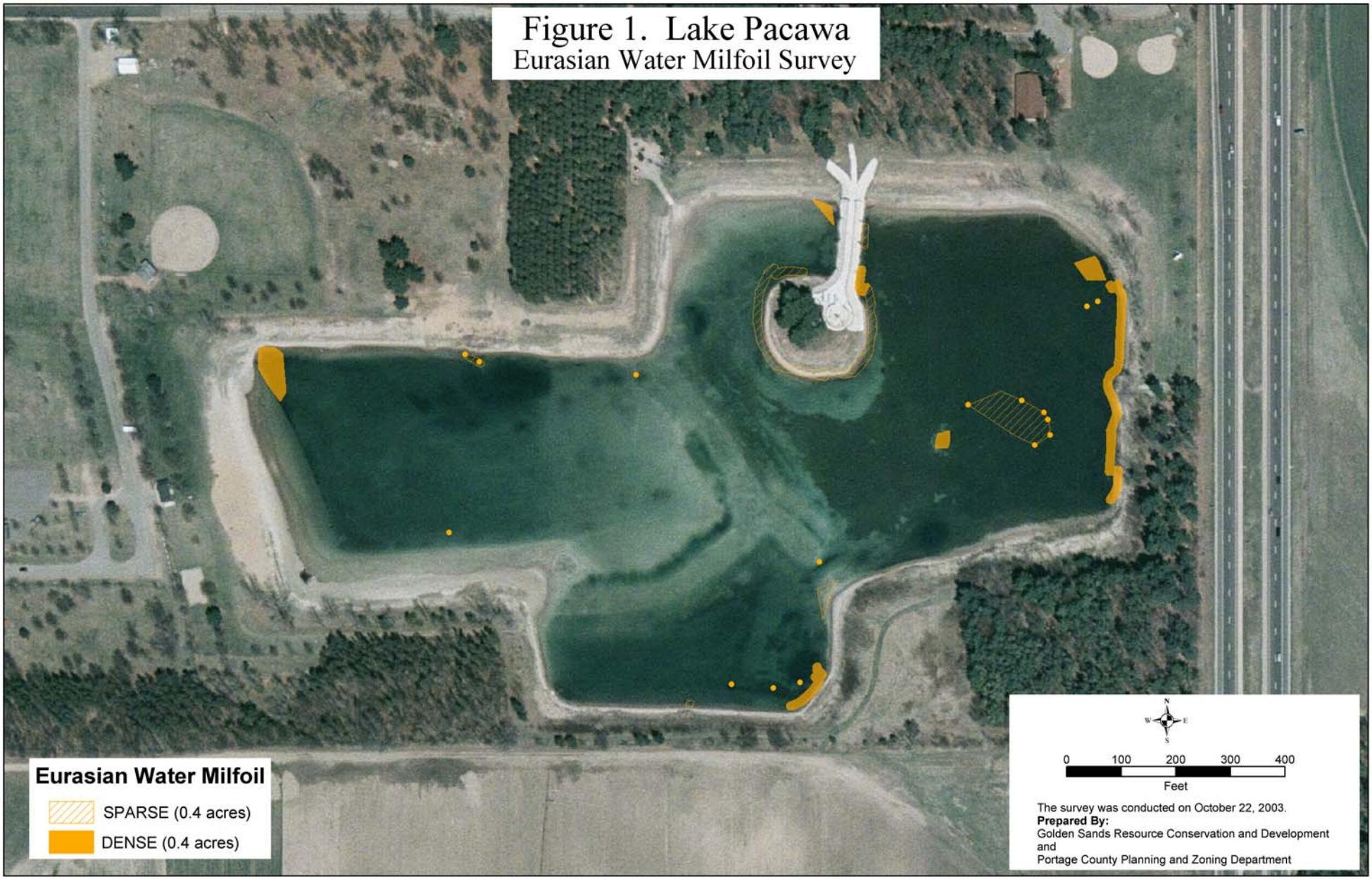


Figure 1. Lake Pacawa
Eurasian Water Milfoil Survey
Eurasian Water Milfoil
SPARSE (0.4 acres)
DENSE (0.4 acres)
N
W
E
S
0
100
200
300
400
Feet
The survey was conducted on October 22, 2003.
Prepared By:
Golden Sands Resource Conservation and Development
and
Portage County Planning and Zoning Department

While the largest beds of dense EWM growth observed on 10/22/03 were unsightly, Lake Pacawa does not appear to be "weed-choked", even 17 years after the only herbicide treatment performed there. It is possible that something in Lake Pacawa's chemistry may be naturally inhibiting the spread of EWM. A white, slimy substance coating the aquatic plants was observed during field mapping activities, which may be impeding the plant's ability to photosynthesize, thereby reducing plant vigor and ability to reproduce. Further investigation to identify what this "white slime" is may be helpful in the future.

d. Recommended Management Plan for Eurasian Water Milfoil:

Background Sampling and Biological Control

1. **Background Sampling**

More data about lake characteristics would be helpful in determining the best EWM control method to use. (If the "white slime" observed coating the plants during field mapping activities is present year-round, it may impede the success of herbicide treatments.) Additionally, EWM eradication should be considered to be just one part of a larger goal of total lake health. Sampling should be done in 2004 to collect more information about Lake Pacawa's lake's background parameters to create a well-balanced lake management plan.

2. **Option #1: Biological Control**

Biological control requires approval from the WDNR. (See Appendix D.)

The EWM infestation in Lake Pacawa is too big for hand-cutting/pulling, too small for mechanical harvesting and chemical controls come with drawbacks. It may be possible to use the native aquatic milfoil weevil, *E. lecontei*, as a natural biological control of EWM. Successful biological control would *control* EWM, not *eradicate* it, but biological control would be an investment in a long-term, permanent, natural control method. Most control methods provide only temporary reductions in EWM populations.

a. **Quantitative Survey of *Euhrychiopsis lecontei* Population in 2004**

A thorough survey is recommended for midsummer of 2004 to determine weevil density and potential for naturally existing biological control.

b. **Augment Local Population OR Introduce From Nearby Population**

If weevils are found to be present in Lake Pacawa…

i. Propagate From Local Stock

Research in the introduction of *E. lecontei* to a lake has shown low success rates, but where the weevil already exists, success in augmenting the population increases. If the weevil is present in the lake, the existing population, which is already acclimated to the lake's conditions, could be used to propagate additional numbers and boost the current population.

If weevils are found to be absent in Lake Pacawa…

ii. Propagate From Nearby Stock

If weevils are absent in the lake, another source will have to be used to propagate weevils for introduction. The cost of purchasing weevils from out-of-state suppliers may be a risky investment, not knowing the success will be. Also, introducing weevils from another state may lower the chances for successful introduction if the weevils have a hard time acclimating to local conditions. Other lakes in Portage County that do have the weevil, such as Springville Pond, may be able to provide nearby propagation stock that would have a better success rate. Propagating from nearby stock is the option recommended.

c. **Establish Native Vegetation at Lake's Edge**

Native vegetation should first be established in the riparian zone of the lake. The aquatic weevil over-winters in leaf litter and vegetation debris at the edge of the lake. The current "mow-to-the-edge" practice at the park would severely diminish the weevil's survival rate. Establishing vegetation to the lake's edge may be as simple as delineating a "buffer zone" around the lakeshore where mowing is discontinued, or vegetation may need to be seeded or planted.

d. **No Additional Control Treatments**

If weevil density is found to be sufficient to provide a natural control for EWM, no additional control methods (cutting, pulling or chemical) should be implemented in the pond. The chemicals would kill the existing weevil population and cutting/pulling would reduce the number of EWM growing tips, which would hamper weevil reproduction success.

e. **Exception: Control Around Beach/Boat Landing**

The exception to the above guideline would be in areas immediately around the beach or boat landing where recreational usage is most affected. Here, hand-cutting/pulling would benefit recreational usage without significantly impeding weevil success.

f. **Follow-up Monitoring**

Biological control may take multiple tries over several seasons for the weevils to become established. Only by monitoring the progress with **quantitative sampling** can it be determined whether the biological control is succeeding or failing. **If biological control fails, the chemical herbicide option should be implemented.**

3. **Option#2: Chemical Herbicide Treatment**

Chemical treatment requires a permit from the WDNR. (See Appendix D.)

Chemical treatment using a *selective* herbicide may be another option. Chemical treatment will require strategic timing to ensure success while accommodating Lake Pacawa's high recreational pressures. The treatment should be done early in the year while EWM is established but native vegetation is still dormant. Treatment should be contracted with service providers who provide pre-treatment surveys, precise dosing, accuracy of delivery and follow-up monitoring services.

a. Follow-up Monitoring

While the goal of biological control is to *control* the EWM population, the goal of chemical treatment is *eradication*. To achieve this, follow-up monitoring is a MUST. Contracted services for herbicide treatments should include the follow-up surveys needed to evaluate the success of the treatment.

b. Re-treatment When Necessary

If even one live EWM plant is found, rooted or floating, the local contact point should be notified immediately. If possible, a sample of the plant should be collected, kept in chilled water and delivered to the contact point for species identification confirmation. The contact point should then notify WDNR personnel to facilitate evaluation and implementation of treatment options. **Treatment options should be implemented by trained volunteers or professionals, at the direction of WDNR personnel.**

i. Large Colonies

Sizeable infestations may necessitate re-treatment with herbicides.

ii. Small Colonies or Individual Plants

Individual plants or small colonies of exotic species can be cut at the sediment line or hand-pulled, roots and all, without a permit from the WDNR. This should only be done by trained volunteers or professionals. If cutting is done, it is advantageous to time this early in the year, when the plant is expending its winter reserves sprouting new growth. Monthly follow-up cuttings must then be done to continue draining the plants of energy. ALL PLANT PARTS must be removed and destroyed or disposed of. If hand-pulling is done, the sediment may need to be loosened with a pitch fork to make total removal of the roots possible. Follow-up monitoring must then be done to check for re-sprouts. Again, ALL PLANT PARTS must be removed and destroyed or disposed of.

4. **Annual Monitoring**

EWM control or eradication is never permanent. It will be critical to identify the problem early if the biological control begins to fail, or new colonies begin to appear after herbicides had achieved eradication.

5. **Post Exotic Species Advisory Sign**

No signage is currently in place at the boat landing warning boaters of the presence of EWM in Lake Pacawa. When EWM is present in a water body, there is always a risk that a boater may inadvertently transport bits of the plant and infest another lake. Although Lake Pacawa does not allow motorized watercraft, and motors are the most likely place to snag EWM, pieces of EWM plants can also get snagged on other equipment. With many uninfested lakes in Portage County, prominent signage at Lake Pacawa is important. **Exotic Species Advisory signs are available from the WDNR and should be put in place immediately at Lake Pacawa.**

6. **Trained Volunteer Watercraft Inspectors**

Information cannot help if it does not get into the right hands. Because the public plays such a key role in spreading or preventing the spread of aquatic invasive species, information about invasive species must get into the hands of every boater. The occasional presence of trained volunteer watercraft inspectors, especially on major boating weekends, would be helpful to educate boaters about the invasive nature of EWM and the importance of cleaning boats after recreating in Lake Pacawa. Additionally, these trained

volunteers could play a critical role in the annual monitoring of the success of EWM control or eradication.

Lake Pacawa has a very high recreational value to the Lions Club, Village of Plover and surrounding communities. These groups, as well as other conservation groups in Portage County, should be encouraged to participate in the volunteer watercraft inspector training workshops and the support network offered by the Clean Boats, Clean Water Program through the Wisconsin Lakes Partnership. More information about this program is given in Section IIIc.

VIII. SPRINGVILLE POND

a. Lake Background

Springville Pond on USGS topographic map.

Located on the east side of Business 51 in the Village of Plover, Springville Pond is a small impoundment of the Little Plover River, a Class I trout stream. Total surface area of the pond is 18 acres and maximum depth is 12 feet. The water of Springville Pond mostly comes from the Little Plover River, with other contributions coming from runoff, groundwater, and precipitation. Much of the water exits the pond at the dam and some water seeps back to the groundwater. (UWSP and Portage County 2003, Preliminary Results) Because the majority of Springville Pond's water comes from the Little Plover River, the pond's watershed and the river's watershed are one in the same, with 90-95% of the water coming from groundwater (Weeks et al. 1965). The Springville Pond/Little Plover River watershed lies within the porous, sandy groundwater recharge area for some of the Village of Plover's municipal wells, and groundwater studies and protection efforts have been ongoing for decades. Extensive efforts have been made by many agencies to increase public education regarding groundwater protection.


Fall colors on Springville Pond.

The three dominant land uses (nearly equal) within the surface watershed are forest, agriculture and residential. Perhaps of greater importance in the case of Springville Pond is the amount of development surrounding the pond. Land use within 1000 feet of the shoreline, which was dominated by open field and forest in 1960, is now primarily residential, parks, streets and commercial land uses. (UWSP and Portage County 2003, Preliminary Results) This is a modestly recreated pond lake with low-impact resident usage (non-motorized watercraft) and one small public park. One trailerable boat landing existed at the public park, which was removed in recent years.

b. History of Aquatic Plant Control in Springville Pond

Nuisance weed treatment and heavy sedimentation has been an ongoing problem in Springville Pond. Its very nature as an impoundment of the Little Plover River makes it the settling area for sediment and nutrients being carried by the river, including phosphorus, the nutrient most responsible for excessive plant and algae growth. WDNR Aquatic Plant Management Treatment Records show herbicide treatments for

nuisance aquatic plant growth were used in the pond in 1967, 1991, 1992, 1993, 1994 and 1999. The list of chemicals used included Cutrine Plus, Diquat, Aquathol, Aquathol K, 2, 4-D and X77 surfactant. Sediment dredging was done in 1983, 1985 and 1991. Drawdowns were done in 1985, 1988, 1991, 1996 and 1999. Mechanical harvesting was done in 1987. Planting of native aquatic vegetation was done in 1992 and 1993. (Lampert-Lee & Associates 1997 and WDNR records) Table 5 lists aquatic vegetation species documented in Springville Pond.

(Note: A drawdown *unrelated to plant control* was done in 2003 for dam repairs. According to personnel at the Village of Plover, no dredging or plant control work was done during this drawdown.)

The Little Plover River and Springville Pond Watershed Management Plan, written by Lampert-Lee & Associates in 1997, stated that while chemical treatments may have been the most effective method used in Springville Pond (no quantitative study was done to confirm this), the use of chemical treatments has drawbacks, such as toxicity to animals, excessive plant decay causing oxygen depletion, residual by-products and unintended drift. The plan suggested that good environmental practices in the watershed may help to reduce the nutrient loading that boosts nuisance plant growth, thereby reducing the need for chemical treatments. Also, the plan recommended against dredging, since exotics usually have an advantage over native species in denuded substrate.

The watershed management plan and WDNR records show that herbicide treatments usually focused on the eastern third of the pond, which is shallowest and accumulates the most sediment and nutrients. A heavy population of EWM and some curly leaf pondweed (*Potamogeton crispus*, also an exotic invasive plant) persists there. Herbicide treatments also focused on one large, dense patch in the deeper water of the western end, which has been persistent throughout treatment efforts and was present in October 2003.

Table 5. List of Documented Aquatic Vegetation
(Submergent and Floating Leaf Aquatics Only)

	Herbarium Records for Springville Pond [1]	
	Scientific Name	Common Name
1	*Elodea Canadensis*	Waterweed
2	*Lemna minor*	Small duckweed
3	*Myriophyllum sibiricum*	Northern water milfoil
4	*Myriophyllum spicatum* (*e)	Eurasian water milfoil
5	*Potamogeton crispus* (*e)	Curly leaf pondweed
6	*Potamogeton pectinatus*	Sago pondweed
7	*Zannichellia palustris*	Horned pondweed

[1] Robert W. Freckman Herbarium records through November 2003, University of Wisconsin-Stevens Point. (Note: These herbarium records are historical documentation of what has been identified to date at Springville Pond. *This is*

not an exclusive list. Further, it cannot be stated with certainty that because a species has not been recorded at that lake recently that the species is no longer present in that lake. However, it has been well documented that as exotic invasives infest a lake, native vegetation is progressively less able to compete and the number of species (diversity) in the lake declines. Anecdotally, this is what has been seen at lakes in Portage County where EWM is present, however it would require quantitative vegetation surveys to confirm this.)

(*e)Exotic invasive

c. Mapping Results

A dense EWM growth in Springville Pond.

Multiple areas of sparse to dense EWM growth were mapped during October 2003 field activities. Dense EWM growths totaled 2.1 acres and sparse growths totaled 0.7 acres. (See Figure 2.) EWM specimens were randomly collected to examine for evidence of the presence of the aquatic milfoil weevil, *Euhrychiopsis lecontei*. *E. lecontei* is a naturally occurring weevil, usually found where native milfoils occur, and can keep milfoil populations in check. The weevil can effectively impact the health of the milfoil plants by removing vascular tissue and destroying apical growing tips. (Jester 1998) Examination of the EWM samples collected at Springville Pond found an *E. lecontei* pupae, identified by Laura Jester, of Jester Consulting in Eden Prairie, Minnesota, confirming the presence of the aquatic weevil. This is the first record of *E. lecontei* identified in Springville Pond, therefore the specimen was preserved, labelled and submitted to the UW-Stevens Point as a voucher specimen. It will be retained with the *E. lecontei* voucher specimens collected during Laura Jester's *E. lecontei* research in 1996-97.

d. Recommended Survey Plan for Eurasian Water Milfoil:

Biological Control and Evaluate Management Plan

1. **Option #1: Biological Control**

Biological control requires approval from the WDNR. (See Appendix D.)

The use of chemical treatments has drawbacks, such as toxicity to animals, excessive plant decay causing oxygen depletion, residual by-products and unintended drift. Chemical use has been unsuccessful in eradicating EWM and has become increasingly controversial with residents and area citizens. Biological control, however, would be a permanent, non-toxic control method.

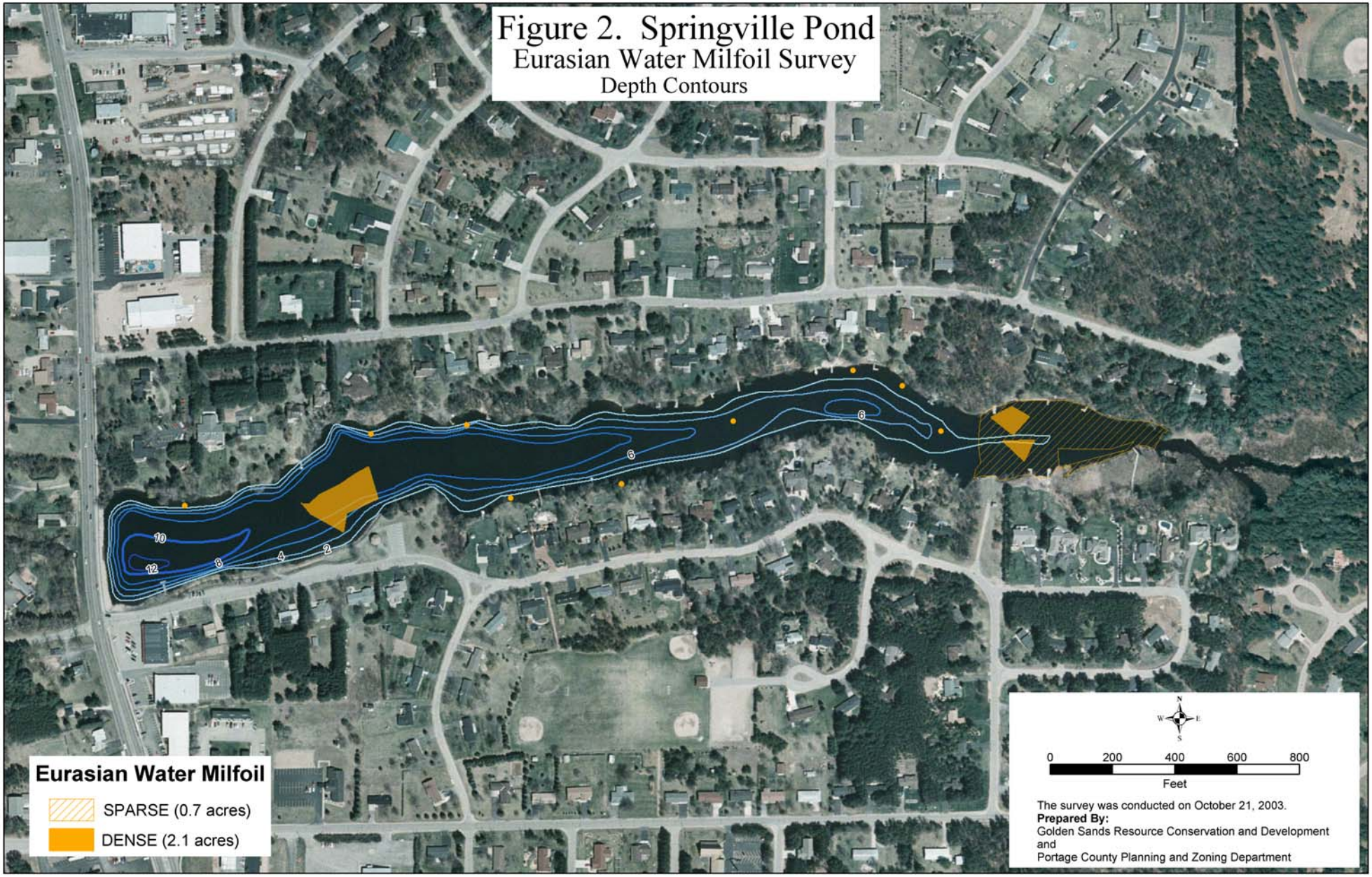


Figure 2. Springville Pond
Eurasian Water Milfoil Survey
Depth Contours
Eurasian Water Milfoil
SPARSE (0.7 acres)
DENSE (2.1 acres)
2
4
6
8
10
12
N
W
E
S
0
200
400
600
800
Feet
The survey was conducted on October 21, 2003.
Prepared By:
Golden Sands Resource Conservation and Development
and
Portage County Planning and Zoning Department

Even though previous treatment efforts have not been successful in eradicating EWM the pond did not appear thoroughly "weed-choked" during field mapping activities. This suggests that something, perhaps *E. lecontei*, may be inhibiting the spread of EWM. Research on the introduction of *E. lecontei* to a lake has shown low success rates, but where the weevil already exists, success in augmenting the population is increased. This is thought to be related to the conditions required for the weevil life cycle. (Jester 1998) Springville Pond has one of the most critical requirements: the natural shoreline the weevil needs to over-winter and survive from year to year.

a. **Quantitative Survey of *Euhrychiopsis lecontei* Population in 2004**

A thorough survey is recommended for midsummer of 2004 to determine weevil density and potential for naturally existing biological control. The weevil is known to be present in the waterbody and quantitative surveys may find the population density already adequate to control EWM. If the density is *not* adequate, additional weevils can be added to the pond to boost the population. The cost of purchasing additional weevils from out-of-state suppliers may be a risky investment, not knowing the success will be. Also, introducing weevils from another state may risk affecting the current, native population, even though they are the same species. It may be possible to use some of the existing weevils, which is already acclimated to the pond's conditions, to propagate larger quantities. Propagating from local stock is the option recommended. No matter the source, *biological control requires a permit from the WDNR*.

b. **Preservation and Restoration of Natural Shoreline**

E. lecontei requires natural shoreline with leaf litter and vegetation debris to over-winter. To maximize the success of weevil augmentation, *preservation and restoration of natural shoreline is strongly recommended*.

c. **No Additional Control Treatments**

If weevil density is found to be sufficient to provide a natural control for EWM, no additional control methods (cutting, pulling or chemical) should be implemented in the pond. The chemicals would kill the existing weevil population and cutting/pulling would reduce the number of EWM growing tips, which would hamper weevil reproduction success.

d. **Exception: Control Around Docks**

The exception to the above guideline would be in areas immediately around docks where recreational usage is most affected. Here, hand-cutting/pulling or the use of plant barriers (a fabric placed on top of the sediment), marked with buoys to prevent navigational hazards, would benefit recreational usage without significantly impeding weevil success. Use of plant barriers involves placing a structure in a navigable waterway and requires a Chapter 30 permit from the WDNR.

e. **Follow-up Monitoring**

Biological control may take multiple tries over several seasons for the weevils to become established. Only by monitoring the progress with **quantitative sampling** can it be determined whether the biological control is succeeding or failing.

2. **Option 2: Combination Treatments**

If attempts to augment *E. lecontei* populations fail, initiate a combination of treatment methods (drawdown, divers and hand cutting) to deal with sparse/dense and shallow/deep situations. With the extent of EWM infestation in Springville Pond, vigilant efforts may make complete EWM eradication possible, but control is more likely. These methods may be used as on-going control.

a. Shallow/Near shore Areas

A winter drawdown is recommended for control of growths in shallow areas, which will require a Waterway & Wetland Permit Application Form 3500 and a great deal of assistance from the WDNR. Timing and extent of drawdown is critical to accommodate the needs of the amphibians, fish and other wildlife residents. Winter drawdowns have been effective in the past with the infestations in the shallower areas of the pond. This is where a great deal of the sparse growths are located, which are currently too numerous for hand-pulling.

b. Deep Areas

To handle the growth in the deeper areas of the pond, it is recommended that divers be contracted to cut plants at the sediment line in the spring following the winter drawdown. Schedule a re-cut monthly throughout growing season to continually drain the energy stored in the plant's roots and eventually kill them. A local diving club may be able to

provide a reasonable contract for this service. A permit is not required for hand pulling or cutting of exotic species.

c. Follow-up Monitoring with Hand-cutting

Follow up monitoring should be done to search for potential EWM recovery. The divers should be contracted for "touch-up" work in deep areas. Landowners should be trained to identify EWM and learn how to hand pull/cut EWM plants they find near their shoreline. If even one live EWM plant is found, rooted or floating, treatment options should be evaluated and implemented immediately. Individual plants or small colonies can be cut at the sediment line or hand-pulled, roots and all. If cutting is done, it is best to time this early in the year, when the plant is expending its winter reserves sprouting new growth. Monthly follow-up cuttings must then be done to continue draining the plants of energy. ALL PLANT PARTS must be removed and destroyed or disposed of. If hand pulling is done, the sediment may need to be loosened with a pitchfork to make total removal of the roots possible. Follow-up monitoring must then be done to check for re-sprouts. Again, ALL PLANT PARTS must be removed and destroyed or disposed of. A permit is not required for hand pulling or cutting of exotic species.

3. **Annual Monitoring**

EWM control or eradication is never permanent. It will be critical to identify the problem early if the biological control begins to fail, or new colonies begin to appear after cutting efforts had achieved eradication.

4. **Clean Boat, Clean Waters Reminder**

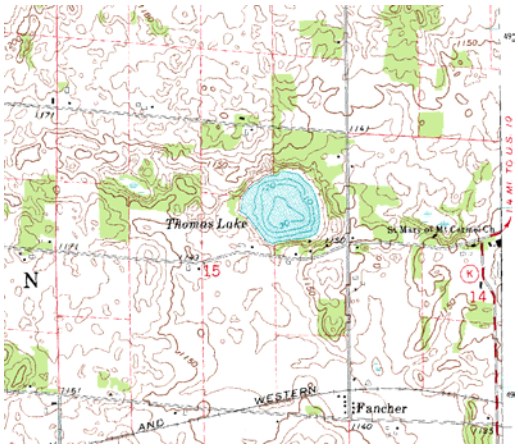
A former public boat landing was recently dismantled and no longer exists. Therefore, no signage is posted warning boaters of the presence of EWM. Waterfront property owners around the pond use non-motorized watercraft (canoes, paddleboats, etc…) on the pond and should be reminded of the need to clean their canoes and equipment if they use it on other waters.

5. **Evaluate Management Plan**

EWM eradication should be considered to be just one part of a larger goal of total lake health. The Little Plover River and Springville Pond Watershed Management Plan covers many areas for comprehensive water quality improvement. This management plan should be reviewed with new survey data in mind to update and fine-tune the recommendations. Continued conservation, restoration and public education efforts should show slow but steady results.

IX. THOMAS LAKE

a. Lake Background



Thomas Lake on USGS topographic map.

Located approximately three miles west of Amherst Junction in the Town of Stockton, Thomas Lake is a small seepage lake with a surface area of 32 acres and a maximum depth of 28 feet. The water in Thomas Lake comes from groundwater, runoff and precipitation. Water leaves the lake via evaporation and seepage to groundwater. Because Thomas Lake's water comes from multiple sources, one must think of its watershed in terms of a surface watershed and a groundwater shed. (See Appendix C for definition of terms.) In the case of Thomas Lake, the surface watershed and groundwater shed were historically dominated by non-irrigated agriculture, which has been on the decline since 1948 land use surveys. Currently, the surface watershed is dominated by forest cover, and the groundwater shed is dominated by shrub cover. Residential land use has increased steadily in both watersheds, but remains a lesser component. (UWSP and Portage County 2003, Preliminary Results)

Thomas Lake with mats of aquatic vegetation visible at water surface.

Total phosphorus levels of 30 ppb or higher categorizes a lake as eutrophic, resulting in more aquatic plant growth. Thomas Lake is a eutrophic lake, with total phosphorus levels above this threshold. (UWSP et al. 2003)

b. History of Aquatic Plant Control in Thomas Lake

No records of previous aquatic plant treatments were found to report for this assessment. Table 6 lists aquatic vegetation species documented in Thomas Lake.

Table 6. List of Documented Aquatic Vegetation
(Submergent and Floating Leaf Aquatics Only)

	Herbarium Records for Thomas Lake [1]	
	Scientific Name	Common Name
1	*Ceratophylum demersum*	Coontail
2	*Elodea canadensis*	Waterweed
3	*Elodea nuttallii*	Slender waterweed
4	*Myriophyllum sibiricum*	Northern water milfoil
5	*Myriophyllum spicatum* (*e)	Eurasian water milfoil
6	*Najas flexilis*	Slender naiad
7	*Nuphar variegata*	Bullhead pond lily
8	*Nymphea odorata*	White water lily
9	*Polygonum amphibium*	Amphibious smartweed
10	*Potamogeton amplexifolius*	Large leaf pondweed
11	*Potamogeton foliosus*	Leafy pondweed
12	*Potamogeton gramineus*	Variable pondweed
13	*Potamogeton illinoensis*	Illinois pondweed
14	*Potamogeton pectinatus*	Sago pondweed
15	*Potamogeton robbinsii*	Robbin's pondweed
17	*Spirodela polyrrhiza*	Large duckweed
18	*Zosterella dubia*	Water stargrass

[1] Robert W. Freckman Herbarium records through November 2003, University of Wisconsin-Stevens Point. (Note: These herbarium records are historical documentation of what has been identified to date at Thomas Lake. *This is not an exclusive list.* Further, it cannot be stated with certainty that because a species has not been recorded at that lake recently that the species is no longer present in that lake. However, it has been well documented that as exotic invasives infest a lake, native vegetation is progressively less able to compete and the number of species (diversity) in the lake declines. Anecdotally, this is what has been seen at lakes in Portage County where EWM is present, however it would require quantitative vegetation surveys to confirm this.)

(*e) Exotic invasive

c. Mapping Results

EWM was not identified in Thomas Lake until recent years, but because of the high phosphorus levels in this eutrophic lake, the exotic plant spread rapidly. EWM has become a dense mass of weeds surrounding the entire periphery of the lake. In those areas, EWM has become so thick at the surface that canoeing is difficult and boating is nearly impossible. The troublesome weed is only precluded from growing in the center of the lake by the water depth. Field mapping efforts show the EWM growth to be mostly limited to a 10-12 foot depth or less. The total surface area of the infestation is approximately 10.0 acres. (See Figure 3.) An infestation of this size cannot be eradicated by methods currently available, however *control* may be possible.

Dense mats of EWM visible at water surface, entire circumference of lake.

A closer view of dense EWM growth in Lake Thomas.

Several random samples of EWM were collected during field mapping exercises and later examined for evidence of the presence of the native aquatic milfoil weevil, *Euhrychiopsis lecontei*. Although no evidence of weevils could be found from these samples, a more thorough survey would be required to conclusively determine the presence or absence of *E. lecontei*.

E. lecontei is a naturally occurring weevil, usually found where native milfoils occur, and can keep milfoil populations in check. The weevil can effectively impact the health of the milfoil plants by removing vascular tissue and destroying apical growing tips (Jester 1998). Because northern water milfoil (*Myriophyllum sibiricum*), a native milfoil, is present in Thomas Lake, this increases the likelihood that a natural population of *E. lecontei* already exists in the lake. Where the weevil exists naturally augmentation of the population is more likely to be successful. Another good indicator is Thomas Lake's high percentage of natural shoreline, which the weevils need to over winter.

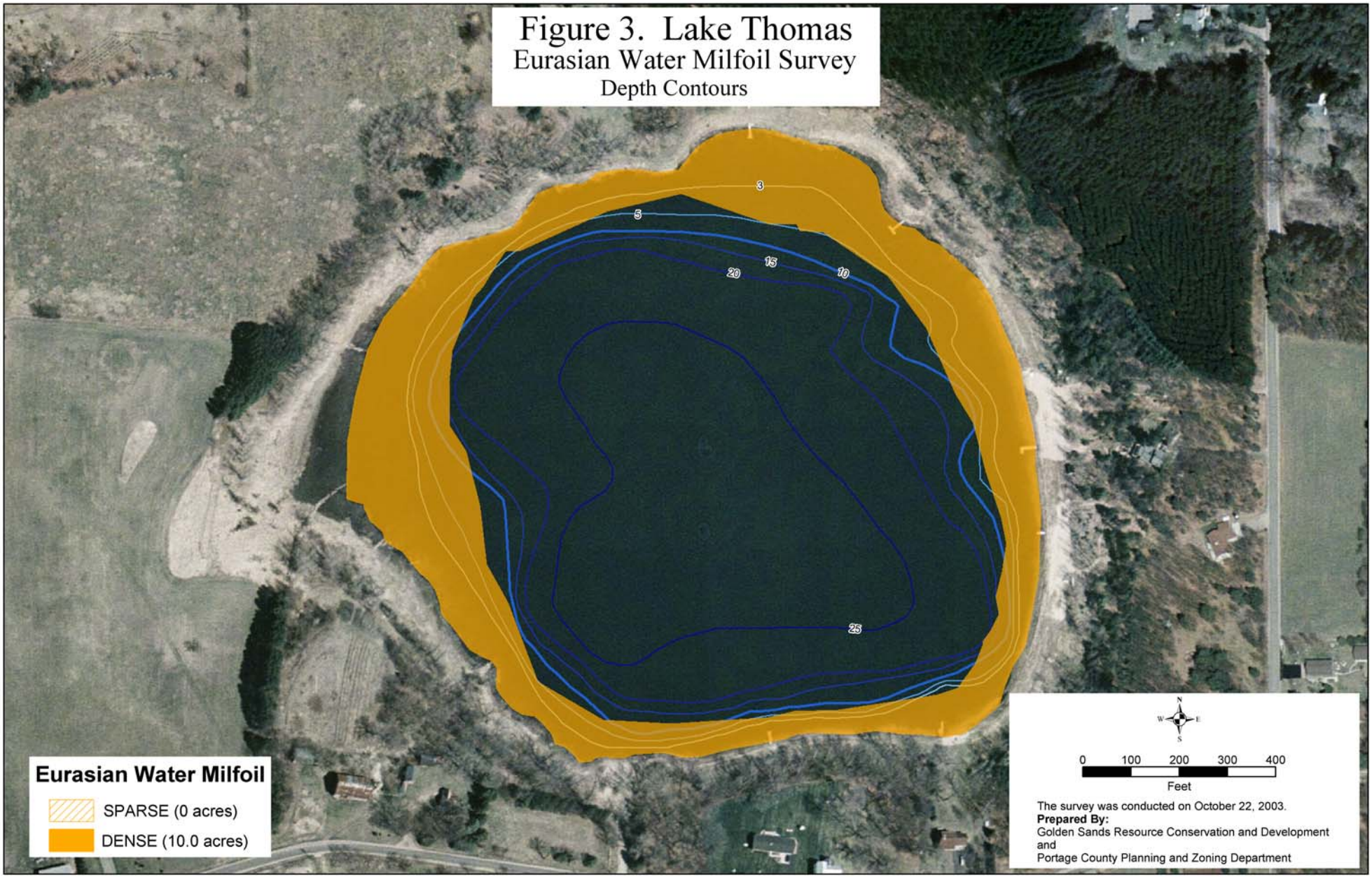


Figure 3. Lake Thomas
Eurasian Water Milfoil Survey
Depth Contours
3
5
15
20
10
25
Eurasian Water Milfoil
SPARSE (0 acres)
DENSE (10.0 acres)
N
W
E
S
0
100
200
300
400
Feet
The survey was conducted on October 22, 2003.
Prepared By:
Golden Sands Resource Conservation and Development
and
Portage County Planning and Zoning Department

d. Recommended Management Plan for Eurasian Water Milfoil:

Biological Control and Mechanical Harvesting

Two control methods are recommended to be implemented concurrently.

1. **Method 1: Biological Control**

Biological control requires approval from the WDNR. (See Appendix D.)

Although research in biological control of EWM using E. lecontei has shown mixed results, the method would be an investment in a long-term, permanent, natural control method. Most control methods provide only temporary reductions in EWM populations.

a. Survey for *Euhrychiopsis lecontei*

The random EWM samples taken during field mapping activities were not enough to conclusively determine the presence or absence of *E. lecontei*. A more thorough, conclusive survey should be performed in the summer months (June – August) of 2004.

b. Augment Local Population OR Introduce From Nearby Population

If weevils are found to be present in Lake Thomas…

i. Propagate From Local Stock

If the weevil is present in the lake, the existing population, which is already acclimated to the lake's conditions, could be used to propagate additional numbers and boost the current population.

If weevils are found to be absent in Lake Thomas…

ii. Propagate From Nearby Stock

If weevils are absent in the lake, another source will have to be used to propagate weevils for introduction. The cost of purchasing weevils from out-of-state suppliers may be a risky investment, not knowing the success will be. Also, introducing weevils from another state may lower the chances for successful introduction if the weevils have a hard time acclimating to local conditions. Other lakes in Portage County that do have the weevil, such as Springville Pond, may be able to provide nearby propagation stock that would have a better

success rate. Propagating from nearby stock is the option recommended.

c. **Preservation of Natural Shoreline**

E. lecontei requires natural shoreline with leaf litter and vegetation debris to over-winter. Lake Thomas currently has a good deal of natural shoreline. To maximize the success of weevil augmentation, *preservation of the natural shoreline is strongly recommended*.

d. **Follow-up Monitoring**

Biological control may take multiple tries over several seasons for the weevils to become established. Only by monitoring the progress with **quantitative sampling** can it be determined whether the biological control is succeeding or failing.

2. **Method 2: Mechanical Harvesting of Fish Lanes**

Mechanical harvesting requires a permit from the WDNR. (See Appendix D.)

The second control method, mechanical harvesting, would be a strategic tool for improving the success of the biological control. Heavy pan fish predation on the weevils would greatly impact the weevil population. Mechanical harvesting can be used to create “fish lanes”, or travel lanes, for larger fish to use when patrolling for smaller prey fish, thereby reducing the population of the smaller-sized pan fish feeding on weevils. The fish lanes should be created in multiple locations around the lake, extending perpendicularly from shore out to the open water. Some of these fish lanes can be strategically located at docks to double as boating lanes for residents to access the open water. The WDNR can assist with recommendations for the best spacing or frequency of these fish lanes.

To reduce costs of mechanical harvesting, it may be possible to contract the shared use of the McDill Pond harvester. This water body also has EWM, therefore there would not be a risk of spreading the plant to an uninfected water body. Lake Helen has a harvester but does not have EWM, therefore sharing a harvester with Lake Helen is NOT recommended.

3. **Annual Monitoring**

EWM control is never permanent. It will be critical to identify problems early if biological control begins to fail.

4. **Maintain Exotic Species Advisory Signs**

Exotic Species Advisory signs at Lake Thomas boat landing

Well-placed signage is currently in place at the boat landing, warning boaters of the presence of EWM. When EWM is present in a water body, there is always a risk of boaters inadvertently transporting pieces of EWM and infesting another lake. With many uninfested lakes in the nearby area, good signage at Thomas Lake is important. The current signage is prominently placed and highly visible.

5. **Lake Resident Involvement**

The effects of these control methods may not be immediately visible. It will take years for weevil populations to increase enough to have an effect on the EWM population, and that effect will be *control*, not eradication. While this will be a measurable difference during follow-up monitoring, it may never be visually apparent to the casual observer. Residents should be informed of the processes and long-term goals of the control plans. Also, the success of the predator fish in controlling the pan fish populations may be a key factor. Residents should refrain from harvesting the larger predator fish for a few years for this phase of the control methods to work.

6. **Trained Volunteer Watercraft Inspectors**

Information cannot help if it does not get into the right hands. Because the public plays such a key role in spreading or preventing the spread of aquatic invasive species, information about invasive species must get into the hands of every boater. The occasional presence of trained volunteer watercraft inspectors at the Lake Thomas boat landing, especially on major boating weekends, would be helpful to educate boaters about the invasive nature of EWM and the importance of cleaning boats after recreating on Lake Thomas. Additionally, these trained volunteers could play a critical role in the annual monitoring of the success of EWM control.

Thomas Lake is a quiet, minimally developed lake with recreational value to its residents and area communities. Lake residents, as well as other conservation groups in Portage County, should be encouraged to participate in the volunteer watercraft inspector training workshops and the support network offered by the Clean Boats, Clean Water Program through the

Wisconsin Lakes Partnership. More information about this program is given in Section IIIc.

VII. REFERENCES

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VIII. APPENDICES

Appendix A. How to Prevent the Spread of Aquatic Invasive Species
(Modified from WDNR and UW-Extension Informational Materials)

Steps YOU Can Take to Help Stop the Spread of Aquatic Invasive Species

1. **Clean your boat**. Inspect your boat and other equipment, such as anchors, fishing lines and boat trailer for aquatic plants, animals and mud, and remove them before leaving the boat landing.

2. **Drain all water**. Drain the water from your boat, motor, live wells, bilge and other equipment before leaving the boat landing.

3. **Dispose of live bait**. Dispose of unwanted live bait in the trash or share it with a fellow angler. Do *not* transfer bait or water from one body of water to another.

Reminder sign at Lake Emily public boat landing

4. **Rinse your boat**. Rinse your boat and equipment with high pressure or hot water, especially if moored for more than one day,
OR
Dry everything for at least 5 days before entering another water body.

Appendix B. Eurasian Water Milfoil Contacts and Resources

- Local Contact Point for EWM Reports:
  Portage County Land Conservation Division, Planning & Zoning Department, Portage County Courthouse Annex, 1462 Strongs Avenue, Stevens Point, WI 54481, (715) 346-1334

- WDNR Aquatic Plants Contact:
  Deborah Konkel, Aquatic Plant Specialist, WDNR, 1300 West Clairemont Avenue, PO Box 4001, Eau Claire, WI 54702, (715) 839-2782

- Clean Boats, Clean Waters Program:
  Todd Kittel, Contact for Volunteer Watercraft Inspector Training, WDNR, 5301 Rib Mountain Drive, Wausau, WI 54401, (715) 241-6372

  Laura Felda, Volunteer Monitoring Coordinator, UW-Extension Lakes Program, UW-Stevens Point-CNR, 1900 Franklin Street, Stevens Point, WI 54481-3897, (715) 346-3366

- Contacts and Resources On-Line:
  The Wisconsin WDNR and Wisconsin Lakes Partnership have compiled a directory, "The Wisconsin Lakes Partnership Contacts", which lists the Wisconsin Association of Lakes, WDNR contacts, UW-Extension Statewide Lake Specialists, Self–Help Lake Monitors; Adopt-A-Lake contacts and other resources. It is Publ-FH-407 "**The Lake List"** and can also be viewed at http://www.dnr.state.wi.us/org/water/fhp/lakes/contacts.htm.

- Aquatic Plant Identification Guide:
  An excellent aquatic plant field guide, *Through the Looking Glass: A Field Guide to Aquatic Plants*, by S. Borman, R. Korth and J. Temte is available from the Wisconsin Lakes Partnership, UW-Extension Lakes Program, UW-Stevens Point-CNR, 1900 Franklin Street, Stevens Point, WI 54481-3897, (715) 346-3366.

- Grant Funding for Control of EWM:
  Lake Management Planning Grants Program: Provides state cost-sharing assistance for the collection, analysis and communication of information needed to protect and restore lakes and their watersheds. Contact the WDNR Lake Coordinator or Environmental Grant Specialist for the West Central Region at (715) 839-3700, or see www.dnr.state.wi.us/org/water/fhp/lakes/lakeplan.htm for more information about the grant programs.

  Aquatic Invasive Species Prevention & Control Grants Program: At the time of this assessment report, the WDNR is writing rules to administer this new funding program to increase support of local efforts to prevent the spread of introduced aquatic invasive species. When this program becomes available, the grant can be used for work that prevents the spread of aquatic invasive species OR for work that seeks to eradicate or control the impact of non-native species. Until this program is finalized, seek funding from the Lake Management Planning Grants Program.

Appendix C. Terms and Definitions

Watershed = Land surface over which water flows before reaching a lake or water body.

Surface Watershed = Land area where water runs off the surface of the land and drains toward the lake (UWSP and Portage County 2003, Preliminary Results).

Groundwater Shed = Land area where water soaks into the ground and travels underground to the lake (UWSP and Portage County 2003, Preliminary Results).

Oligotrophic = A waterbody poor in nutrients, biomass and plant life and rich in oxygen (Collins English Dictionary ©2000). Phosphorus is the limiting nutrient in over 80% of Wisconsin's lakes (UWSP and Portage County 2003, Preliminary Results). Usually a "young" lake with very clear water.

Mesotrophic = A waterbody of intermediate levels of nutrients, biomass, plant growth and water clarity.

Eutrophic = A waterbody rich in organic and mineral nutrients and supporting abundant biomass and plant life, which while living supplies the oxygen for animal life but in the process of decaying also depletes oxygen. (Collins English Dictionary ©2000) Phosphorus is the limiting nutrient in over 80% of Wisconsin's lakes, and levels of 30 parts-per-billion indicate a eutrophic status. Excessive phosphorus leads to nuisance plant growth and frequent algae blooms. Usually an "old" lake, but lakes can be prematurely aged by excessive phosphorus inputs from human activities. (UWSP and Portage County 2003, Preliminary Results)

Secchi Depth Reading = The depth to which a secchi disk can be lowered into the water and still be visible. A measurement of water clarity. A low secchi depth numbers indicate poor water clarity, which may be due to sedimentation, algae blooms, tannins and other dissolved or suspended materials.

Drawdown = To lower the water level of a water body by a desired amount using a water level control structure, such as a dam.

Appendix D. Permit Information*

METHOD	CHEMICAL	BIOLOGICAL (weevils)	MECHANICAL HARVESTING	HAND-PULLING OR CUTTING	DRAWDOWN	BARRIERS
Permit Required?	YES	YES (See notes)	YES	Exotic Species = NO	YES	YES
Responsible WDNR Section	Water Resource	Fisheries &/or Water Resources	Water Resources		Dam Safety & Floodplain	Water Regulation & Zoning
Permit Review Time	2 - 3 weeks	?	2 - 3 weeks		Variable	90-120 days review
Notes Regarding Permit Process	Approved permit good for 1 calendar year	WDNR cooperation and letter of approval required, but no actual permit application	Approved permit good for 1 calendar yr. (With WDNR approved mgt plan = good for 3-5 yrs)		Requires 30 days public notice	Requires 30 days public notice

*Permit requirements as of January 2004. Requirements may change in the future if applicable codes and statutes change.