Miller's Bay, Lake Winnebago

Winnebago County, Wisconsin

Aquatic Plant Management Plan

August 2010

Sponsored by:

City of Oshkosh

&

Wisconsin Dept. of Natural Resources

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Onterra LLC
Lake Management Planning

Miller's Bay, Lake Winnebago

Winnebago County, Wisconsin

Aquatic Plant Management Plan

June 2010

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Funded by: City of Oshkosh, Winnebago County, WI.
Wisconsin Dept. of Natural Resources

Acknowledgements

This management planning effort was truly a team-based project and could not have been completed without the input of the following individuals:

City of Oshkosh

Tom Stephany
Vince Maas
Ray Maurer
Bill Sturm

Wisconsin Dept. of Natural Resources

Charles Fitzgibbon
Mark Sesing
Robin McLennan

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INTRODUCTION

Millers Bay is an approximate 140-acre, shallow bay on the west shore of Lake Winnebago, Winnebago County, Wisconsin (Map 1). The bay is surrounded by Menominee Park (City of Oshkosh) and supports intense recreational use through its two large boat landings, a sailboat mooring area, a sailing school, and numerous dock-mooring sites for transient boaters. Further, the Otter Street Fishing Club sponsors multiple fishing events on and out of the bay, including a summer kids fisheree, a popular team walleye tournament (350+ boats), and an ice fisheree.

Excessive growth of aquatic plants was first noticed in 2002, but truly nuisance levels are not believed to have been reached until 2004. In 2005 and 2006, Schmidt's Aquatic Plant Control was contracted to harvest areas of the bay to alleviate nuisance plant levels and restore navigation. Although the harvesting provided immediate relief, it was short-lived as the plants returned to their pre-harvest levels within nine days during 2006.

The first herbicide treatment was completed on Millers Bay during July 2007. That treatment, along with those completed in 2008, were found to do much in reducing plant biomass and restoring navigation to the southern portion of the bay.

In 2008, the City of Oshkosh, through their Parks Department, initiated the aquatic plant management planning project for Miller's Bay. The results of the planning project's associated studies are contained within this document along the Miller's Bay Aquatic Plant Management Plan.

STAKEHOLDER PARTICIPATION

Planning Meeting

On February 11, 2009, Tim Hoyman and Eddie Heath of Onterra, LLC met with Tom Stephany and Vince Maas of the City of Oshkosh, and Wisconsin Department of Natural Resources (WDNR) staff including, Mark Sesing, Charles Fitzgibbon, and Robin McLennan. A draft of the management plan's report sections were supplied ahead of time for review by the attendees. During the meeting, the Onterra staff presented the results of the aquatic plant surveys and analysis that were completed the preceding summer on Miller's Bay.

The management needs of Miller's Bay were discussed in terms of what could be completed as a part of this project and what could be completed via additional projects. Aquatic plant management planning was discussed extensively along with more comprehensive management options for the bay, such as tree placement for fisheries habitat enhancement and shoreland restoration. Herbicide applications and mechanical harvesting were decided upon as the two most feasible methods of plant control for the bay.

Public Results Meeting

On April 13, 2009, at a regular meeting of the Oshkosh Advisory Parks Board, Tim Hoyman presented the results of the project's studies and the conclusions he and his staff had drawn from those results and from the meeting described above. The presentation and discussion were broadcast on the city's public television station and attended by approximately 30 citizens. The presentation slides and meeting minutes can be found in Appendix A.

Draft Management Plan Review Meeting

During the summer of 2009, Tom Stephany, Parks Director retired and Vince Maas of the Parks Department accepted a position with an area city. On April 12, 2010, Tim Hoyman met with the new Parks Director, Ray Maurer and Bill Sturm, Landscape Operations Manager to discuss the draft management plan that was created during the winter of 2009. The primary topic of discussion was the development of the alternative analysis for the feasible plant control methods brought forth in the draft's Summary and Conclusions Section and the development of a realistic implementation plan. Both of these sections, within this draft, reflect the results of that meeting.

RESULTS & DISCUSSION

Aquatic Plants and the Lake Ecosystem

Although some lake users consider aquatic macrophytes to be "weeds" and a nuisance to the recreational use of the lake, they are actually an essential element in a healthy and functioning lake ecosystem. It is very important that the lake stakeholders understand the importance of lake plants and the many functions they serve in maintaining and protecting a lake ecosystem. With increased understanding and awareness, most lake users will recognize the importance of the aquatic plant community and their potential negative effects on it.

Diverse aquatic vegetation provides habitat and food for many kinds of aquatic life, including fish, insects, amphibians, waterfowl, and even terrestrial wildlife. For instance, wild celery (*Vallisneria americana)* and wild rice (*Zizania aquatica* and *Z. palustris*) both serve as excellent food sources for ducks and geese. Emergent stands of vegetation provide necessary spawning habitat for fish such as northern pike (*Esox lucius*) and yellow perch (*Perca flavescens*). In addition, many of the insects that are eaten by young fish rely heavily on aquatic plants and the *periphyton* attached to them as their primary food source. The plants also provide cover for feeder fish and *zooplankton*, stabilizing the predator-prey relationships within the system. Furthermore, rooted aquatic plants prevent shoreline erosion and the resuspension of sediments and nutrients by absorbing wave energy and locking sediments within their root masses. In areas where plants do not exist, waves can resuspend bottom sediments decreasing water clarity and increasing plant nutrient levels that may lead to algae blooms. Lake plants also produce oxygen through photosynthesis and use nutrients that may otherwise be used by *phytoplankton*, which helps to minimize nuisance algal blooms.

Under certain conditions, a few species may become a problem and require control measures. Excessive plant growth can limit recreational use by deterring navigation, swimming, and fishing activities. It can also lead to changes in fish population structure by providing too much cover for feeder fish resulting in reduced numbers of predator fish and a stunted pan-fish population. *Exotic* plant species, such as Eurasian water milfoil (*Myriophyllum spicatum*) and curly-leaf pondweed (*Potamogeton crispus*) can also upset the delicate balance of a lake ecosystem by out competing *native* plants and reducing *species diversity*. These *invasive* plant species can form dense stands that are a nuisance to humans and provide low-value habitat for fish and other wildlife.

When plant abundance negatively affects the lake ecosystem and limits the use of the resource, plant management and control may be necessary. The management goals should always include the control of invasive species and restoration of native communities through environmentally sensitive and economically feasible methods. No aquatic plant management plan should only contain methods to control plants, they should also contain methods on how to protect and possibly enhance the important plant communities within the lake. Unfortunately, the latter is often neglected and the ecosystem suffers as a result.

Analysis of Aquatic Plant Data

Aquatic plants are an important element in every healthy lake. Changes in lake ecosystems are often first seen in the lake's plant community. Whether these changes are positive, like variable water levels or negative, like increased shoreland development or the introduction of an exotic species, the plant community will respond. Plant communities respond in a variety of ways; there may be a loss of one or more species, certain life forms, such as emergents or floating-leaf communities may disappear from certain areas of the lake, or there may be a shift in plant dominance between species. With periodic monitoring and proper analysis, these changes are detectable and provide critical information for management decisions.

The aquatic plant surveys completed as a part of this project produced a great deal of information about the aquatic vegetation within the bay. These data are analyzed and presented in numerous ways; each is discussed in more detail below.

Primer on Data Analysis & Data Interpretation

Species List

The species list is simply a list of all of the species that were found within the system being studied, both exotic and native. The list also contains the life-form of each plant found, its scientific name, and its coefficient of conservatism. The latter is discussed in more detail below. Changes in this list over time, whether it is differences in total species present, gains and losses of individual species, or changes in life-forms that are present, can be an early indicator of changes in the health of the lake ecosystem.

Ecoregions are areas related by similar climate, physiography, hydrology, vegetation and wildlife potential. Comparing ecosystems in the same ecoregion is sounder than comparing systems within manmade boundaries such as counties, towns, or states.

Frequency of Occurrence

Frequency of occurrence describes how often a certain species is found within a lake. Obviously, all of the plants cannot be counted in a waterbody, so samples are collected from pre-determined areas. In the case of Miller's Bay, plant samples were collected from plots laid out on a grid that covered the entire bay (Map 1). Using the data collected from these plots, an estimate of occurrence of each plant species can be determined. In this section, relative frequency of occurrence is used to describe how often each species occurred relative to the other plants. These values are presented in percentages and if all of the values were added up, they would equal 100%. For example, if water lily had a relative frequency of 0.1 and that value was described as a percentage, it would mean that water lily made up 10% of the population.

In the end, this analysis indicates the species that dominate the plant community within the lake. Shifts in dominant plants over time may indicate disturbances in the ecosystem. For instance, low water levels over several years may increase the occurrence of emergent species while decreasing the occurrence of floating-leaf species. Introductions of invasive exotic species may result in major shifts as they crowd out native plants within the system.

Species Diversity

Species diversity is probably the most misused value in ecology because it is often confused with species richness. Species richness is simply the number of species found within a system or community. Although these values are related, they are far from the same because diversity also takes into account how evenly the species occur within the system. A lake with 25 species may not be more diverse than a lake with 10 if the first lake is highly dominated by one or two species and the second lake has a more even distribution.

A lake with high species diversity is much more stable than a lake with a low diversity. This is analogous to diverse financial portfolio in that a diverse lake plant community can withstand environmental fluctuations much like a diverse portfolio can handle economic fluctuations. For example, a lake with a diverse plant community is much better suited to compete against exotic infestation than a lake with a lower diversity.

Floristic Quality Assessment

Floristic Quality Assessment (FQA) is used to evaluate the closeness of a lake's aquatic plant community to that of an undisturbed, or pristine, lake. The higher the floristic quality, the closer a lake is to an undisturbed system. FQA is an excellent tool for comparing individual lakes and the same lake over time. In this section, the floristic quality of Miller's Bay is compared to lakes in the same ecoregion and in the state (Figure 1).

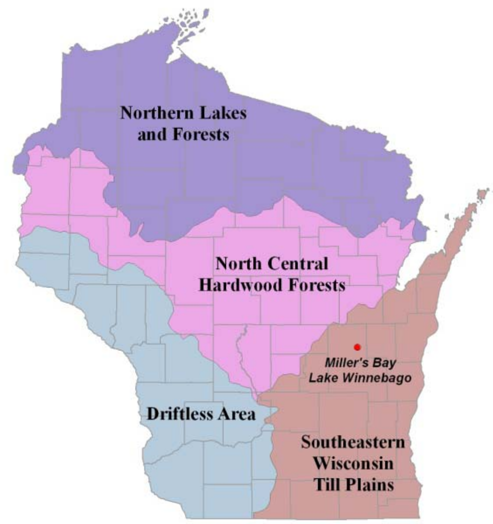

Figure 1. Location of Miller's Bay within the ecoregions of Wisconsin. After Nichols 1999.

The floristic quality of a lake is calculated using its species richness and average species conservatism. As mentioned above, species richness is simply the number of species that occur in the lake, for this analysis, only native species are utilized. Average species conservatism utilizes the coefficient of conservatism values for each of those species in its calculation. A species coefficient of conservatism value indicates that species' likelihood of being found in an undisturbed (pristine) system. The values range from one to ten. Species that are normally found in disturbed systems have lower coefficients, while species frequently found in pristine systems have higher values. For example, cattail, an invasive native species, has a value of 1, while common hard and softstem bulrush have values of 5, and Oakes pondweed, a sensitive and rare species, has a value of 10. On their own, the species richness and average conservatism values for a lake are useful in assessing a lake's plant community; however, the best assessment of the lake's plant community health is determined when the two values are used to calculate the lake's floristic quality (see equation below).

$$\text{FQI} = \text{Average Coefficient of Conservatism (5.4)} * \sqrt{\text{Number of Native Species (16)}}$$
$$\text{FQI} = 21.5$$

2008 Point-intercept Survey Results

In 2008, Onterra completed an aquatic plant survey on Miller's Bay utilizing the point-intercept method as described in "Appendix B" of the Wisconsin Department of Natural Resource (WDNR) document, Aquatic Plant Management in Wisconsin - Draft, (April 2006). The survey identified 19 species of aquatic plants within the bay, including three exotics (Table 1). The three exotics include two submerged species, Eurasian water milfoil and curly-leaf pondweed, and one emergent variety, purple loosestrife.

Table 1. Aquatic plant species located in Miller's Bay during the 2008 point-intercept survey.

Life Form	Scientific Name	Common Name	Coefficient of Conservatism (c)
Emergent	*Iris versicolor*	Northern blue flag	5
	Juncus pelocarpus	Brown-fruited rush	8
	*Lythrum salicaria**	Purple loosestrife	Exotic
FL	*Nymphaea odorata*	White water lily	6
FF	*Lemna minor*	Lesser duckweed	5
	Wolffia sp.	Watermeals	5
	Spirodela polyrrhiza	Greater duckweed	5
Submergent	*Ceratophyllum demersum*	Coontail	3
	Myriophyllum spicatum	Eurasian water milfoil	Exotic
	Najas flexilis	Slender naiad	6
	Elodea canadensis	Common waterweed	3
	Vallisneria americana	Wild celery	6
	Heteranthera dubia	Water stargrass	6
	Elodea nuttallii	Slender waterweed	7
	Potamogeton foliosus	Leafy pondweed	6
	Potamogeton crispus	Curly-leaf pondweed	Exotic
	Potamogeton richardsonii	Clasping-leaf pondweed	5
	Stuckenia pectinata	Sago pondweed	3
	Nitella sp.	Stoneworts	7

FL = Floating Leaf
FF = Free-floating
* = Incidental

As Figure 2 indicates, Miller's Bay is highly dominated by coontail, which makes up nearly 40% of the bay's plant population. Eurasian water milfoil occurs frequently also and makes up just over 18% of the population. The remaining plants in the population occur at frequencies of 10% or less. While Miller's Bay was found to have more native species within it than most lakes in the ecoregion (Figure 3), its species diversity is low (Simpson's Diversity = 0.78) because the lake is dominated by two species, coontail and Eurasian water milfoil. In other words, while the bay has a relatively high species richness, the frequency of each species is unevenly distributed, which leads to a low diversity. As alluded to above, this would be analogous to having 20 stocks in your portfolio with two stocks making up the majority of the holdings. While there are many stocks represented, it is not a diverse portfolio and as a result is at higher risk to major fluctuations as the economy strengthens and weakens.

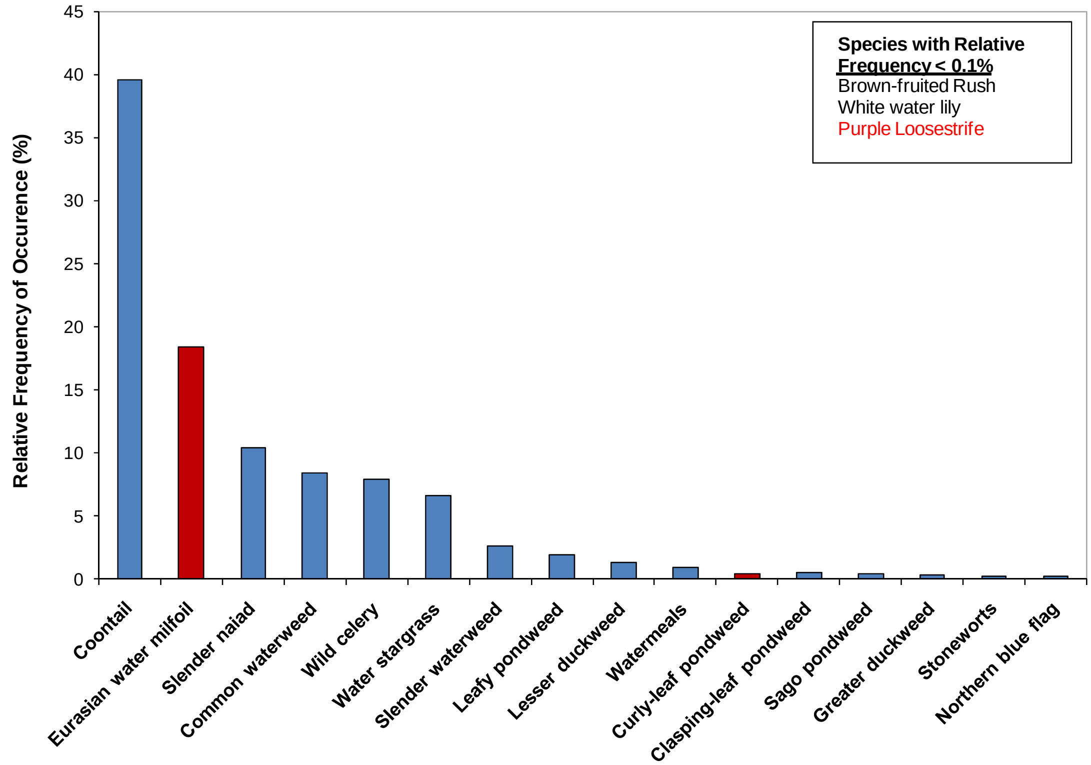

Figure 2. Miller's Bay aquatic plant occurrence analysis of 2008 survey data. Exotic species indicated with red.

Median Value This is the value that roughly half of the data are smaller and half the data are larger. A median is used when a few data are so large or so small that they skew the average value to the point that it would not represent the population as a whole.

As mentioned above, Miller's Bay contains slightly more aquatic species than the state and ecoregion medians. The Miller's Bay average conservatism values are considerably lower than the state and slightly lower than the ecoregion medians (Figure 3). This indicates that many of the species present in the bay are indicative of a disturbed system. Combining the species richness and average conservatism values results in a moderate floristic quality for the bay that is just slightly higher than the ecoregion median and slightly lower than the state median (Figure 3).

The low diversity and moderate floristic quality found in Miller's Bay is indicative of a disturbed system. As described in the introduction, the bay is utilized intensely by recreationist. Much of this use includes powered watercraft. These activities have the potential to negatively impact a lake ecosystem. Many studies have documented the adverse affects of motorboat traffic on aquatic plants (e.g. Murphy and Eaton 1983, Vermaat and de Bruyne 1993, Mumma et al. 1996, Asplund and Cook 1997).

Further, the shoreland development around the bay, primarily in the form of urbanized landscapes and impervious surfaces provides another source of disturbance to the system. Developed shorelines also can greatly impact the health of native plant communities. Radomski and Goeman (2001) found a 66% reduction in quality vegetation coverage on developed shorelines when compared to undeveloped shorelines in Minnesota Lakes. Furthermore, they also found a significant reduction in abundance and size of northern pike (*Esox lucius*), bluegill (*Lepomis macrochirus*), and pumpkinseed (*Lepomis gibbosus*) associated with these developed shorelines.

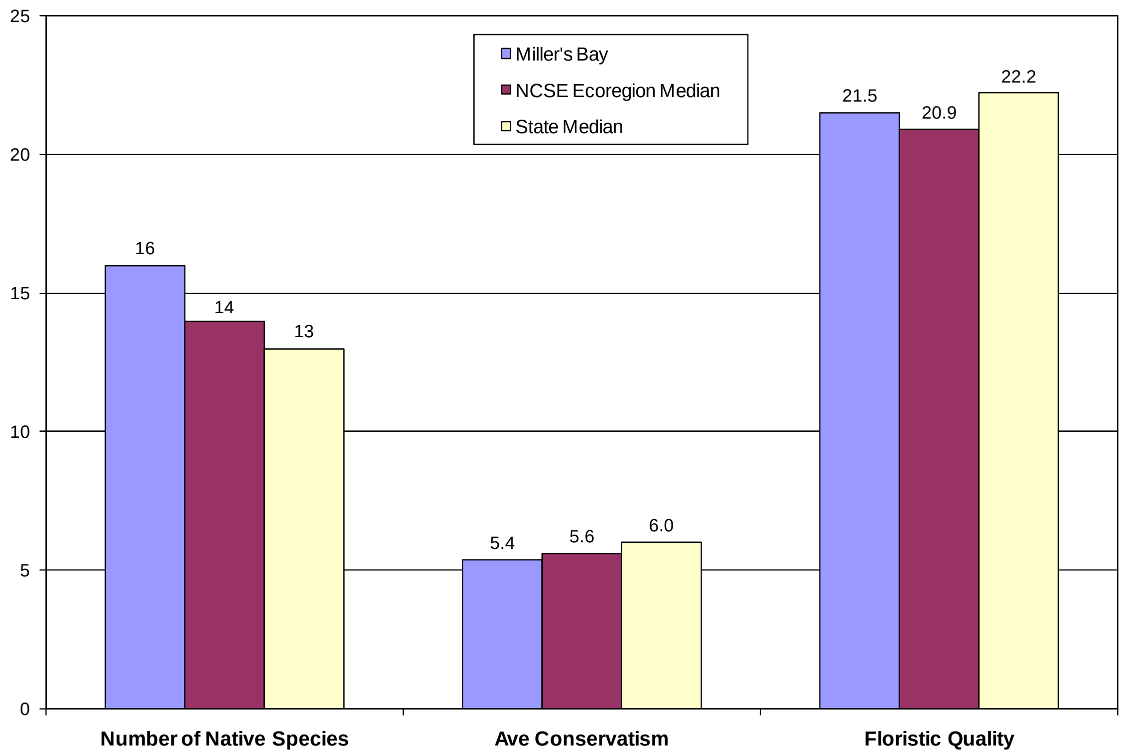

Figure 3. Miller's Bay Floristic Quality Assessment of 2008 survey data. Analysis following Nichols 1999.

Curly-leaf Pondweed

Curly-leaf pondweed is a European exotic first discovered in Wisconsin in the early 1900's that has an unconventional lifecycle giving it a competitive advantage over our native plants. Curly –leaf pondweed begins growing almost immediately after ice-out and by mid or late-June is at peak biomass. While it is growing, each plant produces many turions (asexual reproductive shoots) along its stem. By mid or late July most of the plants have senesce (died-back), leaving the turions in the sediment. The turions lie dormant until fall when they germinate to produce winter foliage, which thrives under the winter snow and ice. It remains in this state until spring foliage is produced almost immediately following ice-out, giving the plant a significant jump on native vegetation. Curly-leaf pondweed can become so abundant that it hampers recreational activities within the lake. Furthermore, its mid-summer die back can cause algal blooms spurred from the nutrients released during the plant's decomposition.

On June 9, 2008, ecologists from Onterra visited Miller's Bay to inspect the area before the herbicide treatment that was scheduled to occur the within the next few days. During that visit, curly-leaf pondweed was noted as being present, but not canopying and very few plants were producing turions. At that time, it was decided that the unusually late ice-out that had occurred statewide delayed the curly-leaf development within the bay and in order assess its true level of infestation, its mapping should be delayed. The curly-leaf pondweed survey was rescheduled to occur in early July believing the plant would be at peak-biomass and lend itself to more accurate mapping based upon density.

Onterra returned to Miller's Bay on July 8, 2008 to complete the curly-leaf pondweed mapping. It was anticipated that the treated areas would not contain a great deal of curly-leaf pondweed, but the remaining areas of the bay would be at full-growth. It was soon discovered that nearly the entire population had senesced. As a result, no mapping of curly-leaf pondweed occurred during the 2008 growing season.

Eurasian Water Milfoil

Eurasian water milfoil is an invasive species, native to Europe, Asia and North Africa, that has spread to most Wisconsin counties (Figure 4). Eurasian water milfoil is unique in that its primary mode of propagation is not by seed. It actually spreads primarily by shoot fragmentation, which has supported its transport between lakes via boats and other equipment. In addition to its propagation method, Eurasian water milfoil has two other competitive advantages over native aquatic plants; 1) it starts growing very early in the spring when water temperatures are too cold for most native plants to grow, and 2) once its stems reach the water surface, it does not stop growing like most native plants, instead it continues to grow along the surface creating a canopy that blocks light from reaching native plants. Eurasian water milfoil can create dense stands and dominate submergent communities, reducing important natural habitat for fish and other wildlife, and impeding recreational activities such as swimming, fishing, and boating.

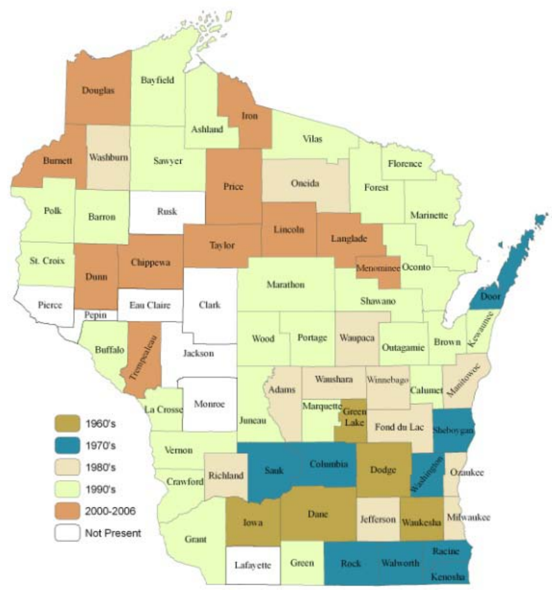

Figure 4. Spread of Eurasian water milfoil within WI counties. WDNR Data 2006 mapped by Onterra.

As discussed above, Eurasian water milfoil is the second most prevalent plant in Miller's Bay and occurs at moderate densities throughout the entire bay (Map 2). In some waterbodies, Eurasian water milfoil creates dense mats as the plant canopies across the water's surface. This was not the case to any great extent during the summer of 2008 within Miller's Bay. Although nuisance plant levels occur throughout much of the bay, hampering navigation, Eurasian water milfoil contributes only a portion to the problem.

Nuisance-level Aquatic Plants

The Miller's Bay aquatic plant community is dominated by coontail, with high frequencies of Eurasian water milfoil, slender naiad, and common waterweed also being found. Of those species, coontail, Eurasian water milfoil, and waterweed raise the most concern because of their tendency to reach nuisance levels in productive systems like Lake Winnebago. Maps 2-4 display the rake fullness ratings of Eurasian water milfoil, coontail, and waterweed (respectively) within Miller's Bay. Eurasian water milfoil is found frequently within nearly the entire bay; however, it is not found in high densities as determined by rake fullness. In fact, Eurasian water milfoil was not found to be matting on the surface to any noticeable level during any of the summer surveys. Coontail, however, is found to occur frequently within the bay and often at high densities. Waterweed, a plant that often reaches nuisance levels, was found to occur somewhat frequently in the southern end of the bay, but not at high densities. Both Eurasian water milfoil and waterweed may be exhibiting lower densities due to the dominance of coontail.

Currently, coontail is likely causing the most recreational difficulty within the bay, as nearly 50% of rake tows completed during the point-intercept study produced a fullness rating of 2 or 3. The plant lacks true roots, so it can drift on the water's surface and at depth. Most reproduction is through fragmentation, so its population can expand at any time during the growing season.

SUMMARY AND CONCLUSIONS

The aquatic plant studies completed on Miller's Bay during the summer of 2008 verify that the bay supports a dense, low diversity, plant community. The community is indicative of the disturbed area in which it exists. The bay's shorelands are completely developed and with the majority maintained as an urban lawn and the remaining area being paved. Further disturbance is brought about by the large amount of recreational use the bay supports through its expansive boat landing, many mooring areas, and public piers.

Two issues have developed within Miller's Bay that require relatively intense management. First, Miller's Bay contains only low grade terrestrial and aquatic habitat. Second, nuisance plant levels within the bay severely impact recreational use of the area, especially navigation. While both of these issues are definitely related, each requires a different type of management plan to correct or control them.

Nuisance Plant Control

Four alternatives exist for dealing with the nuisance levels of plants that hamper navigation within Miller's Bay; 1) no action, 2) dredging, 3) mechanical harvesting, and 4) herbicides. All four have advantages and disadvantages relating to their cost and effectiveness. With the exception of dredging, all alternatives have been used on the bay.

No Action At the surface, this alternative may seem to be the easiest and the least expensive; however, it is neither because it leads to the public applying negative pressure to the City of Oshkosh, especially the Parks Department, and it ends up costing the city money because of decreased usership. In fact, as result of the increased plant biomass, the city saw a greater than 50% decrease in sailboat mooring rentals from 2006 to 2007. In 2006 and in prior years, all 48 mooring plugs were leased and there was a waiting list for the program. In 2007, even with a significant reduction in price, only 20 plugs were leased for the summer. Therefore, doing nothing to alleviate the nuisance plant levels is not a viable option as it would likely lead to much of the bay being non-navigable and cost the city funds in the form of lost revenue.

Dredging In August 2006, Radtke Contractors was hired by the City of Oshkosh to complete a depth study of the bay with the primary focus being navigability. They concluded that sufficient depth occurred within the bay and that most boaters should not have difficulty navigating through the bay. The contractor also suggested that any navigation issues within the bay were likely brought about by aquatic plants.

Dredging is also incredibly expensive. For example, dredging one acre of lake bottom, three feet deeper (43,560 sq.ft. x 3 ft. = 130,680 cu.ft. = 4840 cu.yd.) at a conservative estimate of $10/cu.yd. removed would equal $48,400. It would be reasonable to assume that at least five acres would need to be dredged; therefore, the dredging costs would exceed $240,000.

Finally, dredging large areas also leaves disturbed sections of open sediment. That disturbed area is prime growing medium for pioneering species such as Eurasian water milfoil and curly-leaf pondweed. In the end, dredging could lead to dense populations of these plants in the areas that were managed to increase navigation.

Mechanical Harvesting As mentioned in the introduction, mechanical harvesting was used to alleviate navigation problems within the bay during the summers of 2005 and 2006. As expected, the harvesting restored navigation immediately, but it was short-lived. This is the case in many waterbodies dominated by coontail and Eurasian water milfoil, because both these plants can sometimes grow inches within a single day. To maintain navigation, repeat harvesting is necessary throughout the summer.

Lake groups facilitate harvesting by operating a harvester they have purchased or by contracting with a harvesting firm. The cost of contracting the harvesting is more expensive then operating the equipment, therefore, if repeat cuts are required throughout the summer it is usually more feasible for a lake group to own and operate their own equipment; that is of course once the group has made the capital investment of purchasing the equipment.

Bill Sturm, Landscape Operations Manager compiled harvesting estimates using both contracted harvesting and purchase, operation, and maintenance of a harvester by the city. The full analysis is contained in Appendix C.

In summary, the capital cost to the city for purchase of an appropriate harvester would be between $114,000 and $121,160. Operating costs for harvesting the two scenarios contained in Map 6 would be approximately $5,726 for the 20.9-acre navigation area and $2,494 for the 9.1-acre habitat enhancement area. If these areas were harvested four times throughout a season, the total costs would be $32, 880 per year. Harvesting of the same areas, four times each season by a contractor would cost approximately $42,400.

As with all aquatic plant management techniques, harvesting has its advantages and disadvantages. Advantages include the removal of plants and associated nutrients from the waterbody, immediate relief of nuisance plants, harvesting is less controversial than chemical use, and specific areas can be treated accurately. Disadvantages include sediment resuspension, fragmentation of plants, high upfront equipment costs, annual maintenance and operating costs, need for repeated treatments within a single year, and no ability to select specific plant species for treatment.

Chemical Herbicides In general, herbicides come in two categories, contact herbicides and systemic herbicides. Contact herbicides are nonselective and work to kill the target plant by causing cellular disruption on exposed stem and leaf structure. In most cases, the entire plant is not killed allowing it to regenerate. Systemic herbicides disrupt a function within the plant causing the entire plant to die. Some systemic herbicides are selective towards particular classifications of plants, such as dicots and monocots.

Advantages of chemical use include; the ability to selectively choose target species with different herbicide choices, dose rate, and treatment timing; and the immediacy and longevity of results. Disadvantages include; unknown ecological risks, the plant biomass is not removed from the waterbody, but instead the plant tissue is left to decay; high per acre cost; and the use of herbicides is often controversial among stakeholders.

During 2008, 13.84 acres of treatment were permitted by the WDNR (Map 5). Over the course of the summer the following treatments were completed:

- June 10
  - All of Site A (10.33 acres).
  - Aquathol K, Cutrine-Ultra, & Reward.
- June 26
  - Southern part of Site A (2.07 acres), All of Site B (0.88 acres), Site C (1.52 acres), and Site D (1.11 acres). Total treatment acreage – 5.58 acres.
  - Aquathol K, Cutrine-Ultra, & Reward.
- July 30
  - Western half of Site A (4.64 acres), Shoreward 2/3 of Site D (0.73 acres), and a 36 by 100 site not contained within original permit but verbally given permission by the WDNR (0.08 acres). Total treatment acreage – 5.45 acres.
  - Aquathol K, Cutrine-Ultra, & Reward.

According to the billing received by the City of Oshkosh and the treatment records, approximately 21.31 acres of treatment were completed over the summer at the cost of $20,577.60. The treatments performed well and cost an approximate average of $965/acre. The chemicals used during the summer of 2008 to kill vascular plants were all non-selective, contact herbicides. While that herbicide mixture worked well, an alternative herbicide does exist that may also perform well.

The systemic herbicide, 2,4-D, is a broadleaf- (dicot) selective herbicide used commonly within Wisconsin to control Eurasian water milfoil. Coontail, the most frequent plant in Miller's Bay is also a broadleaf species susceptible to 2,4-D. Coontail requires higher dose rates of 2,4-D to achieve control as compared to Eurasian water milfoil. Further, when 2,4-D is used to control Eurasian water milfoil, its selectivity towards that plant can be increased if the treatment is completed early in the spring when Eurasian water milfoil is actively growing and our native broadleaf species, including coontail, are not.

Repeat treatments within the same growing season may not be required if 2,4-D is used to control coontail and Eurasian water milfoil. However, with those two dominant plants removed, waterweed, which is not affected by 2,4-D, may exhibit incredible growth rates and cause navigational issues within the bay. A contact herbicide cocktail application similar to that used during 2007 and 2008 may then need to be used to control waterweed.

The City of Oshkosh collected bids from local contractors for herbicide treatments of Miller's Bay for the 2010 season. The applicator most likely to receive the contract, should the city elect to treat during 2010, proposed two treatments of the roughly 14-acre area treated in 2008 (Map 5). The first treatment would target Eurasian water milfoil with 2,4-D during the early spring and the second would target coontail, waterweed, and curly-leaf pondweed with a contact herbicide during the early summer. The total cost of these treatments would be $27,300.

Based upon the information outlined above, the only alternative that is not feasible is the use of dredging because of cost and the ecological impact it would likely have on the bay. Doing nothing is undesirable, because as explained above, the recreational use of the bay is truly impacted to the point that it is nearly unusable by the many people that use it via the boat landing, the mooring plugs, and the transient mooring piers.

The options that appear to be most feasible are the use of herbicides and mechanical harvesting by city staff or by a contractor. Overall, an integrated management strategy combining mechanical harvesting and herbicide control is likely the most realistic.

Enhancing the Habitat Value of Miller's Bay and its Shorelands

While development of a habitat restoration plan was not a part of this project's scope, it must be noted that the condition of the Miller's Bay shoreline is incredibly poor and provides no aesthetic, habitat, or buffering value to the bay. Turf maintenance along the bay's shoreline leads to increased runoff of nutrients, sediments, and other pollutants to Lake Winnebago, while providing appealing loafing grounds to nuisance levels of Canada geese. The area also stands as an incredibly poor example of shoreland maintenance for other riparian property owners – both public and private.

The city's newly drafted Vision Plan recommends native vegetative buffers between all waterways and impervious surfaces outside the downtown area. In addition, the Oshkosh Comprehensive Plan states that the city will work with local units of government and agencies to protect local natural and environmentally sensitive resources such as our water and shoreland (Natural Resource Vision in Comprehensive Plan, p. 172). Restoration of the parklands adjacent to Miller's Bay would bring the area in-line with the city's own vision and resource management plan.

IMPLEMENTATION PLAN

The Implementation Plan outlined below contains a single goal with two actions, one long-term, and one short-term, that would allow the City of Oshkosh to meet that goal. Diligence in facilitating the actions by the city will be imperative to meeting the goal.

Management Goal: Maintain navigability within Miller's Bay for public access to mooring areas, public piers, and Lake Winnebago.

Short-term Management Action: Control nuisance aquatic plant growth with herbicides.
Timeframe: 2010-2013
Facilitator: Oshkosh Parks Department.
Description: As described in the report and the Summary and Conclusions Section, nuisance plants in Miller's Bay include both native and non-native species. Two treatments are recommended for the control of these species:

1. An early spring treatment of Eurasian water milfoil.
2. An early summer treatment of coontail, curly-leaf pondweed, and waterweed.

Likely, a systemic herbicide, such as 2,4-D would be used during the first treatment and a contact herbicide or herbicides would be used during the second treatment.

Action Steps:

1. Contract licensed applicator for guidance on herbicide selection/timing, permit application, and application of herbicides.
2. Obtain herbicide application permit from WDNR.
3. Complete herbicide treatment.
4. Monitor treatment effectiveness and update short-term action as necessary.

Long-term Management Action: Control nuisance aquatic plant growth through integrated management strategy utilizing mechanical harvesting and herbicides, if needed.
Timeframe: 2014 and beyond
Facilitator: Oshkosh Parks Department.
Description: The use of mechanical harvesting for control of nuisance aquatic plants in Miller's Bay is clearly the most ecologically sound method, whether it is completed by city staff or by a contractor. Further, if the habitat enhancement areas (Map 6) are included within the harvesting efforts, there would be an added benefit beyond nuisance plant relief that would include:

- A potential increase in fish size structure as predator fish would have enhanced opportunity to feed on smaller fish within the 20-foot wide fish cruising lanes.
- Increased navigability for boat fishing within the bay.
- Enhanced angling opportunities from shore and the fishing pier.

The cost analysis completed by the Oshkosh Parks Department indicated that the annual cost of completing the habitat enhancement harvesting would be roughly $10,000 if completed by city staff and $12,000 if completed by a contractor. If this type of harvesting is to be completed, the city would seek partnerships to defray these costs from local conservation organizations, fishing clubs and the WDNR.

On an annual basis, the cost of harvesting would be less if completed by city staff; however, that annual cost does not include the substantial cost of the equipment purchase by the city, which would exceed $114,000. To make this capital purchase, the city would rely on state grants to contribute funds to the equipment costs. The most likely source of the funds would be a Wisconsin Waterways Commission Grant.

At this time, it is not known whether or not navigability can be maintained in and around the mooring plugs utilizing a mechanical harvester as the harvester may not be maneuverable around the sailboats that use the plugs. If maintaining control is not possible strictly with the harvester, herbicide use would be warranted within this area.

Action Steps:

1. Contact WDNR to discuss grant opportunities for the purchase of harvesting equipment.
    a. If grants are available, pursue grant for purchase of equipment, purchase equipment, and move onto Step 2. Please note: Completing Step 2 may be a requirement of a grant application.
    b. If grants are not available, move forward to Step 2 with contractor performing harvesting.
2. Obtain mechanical harvesting permit (and herbicide permit if necessary) from WDNR based upon harvest plan indicated in Map 6.
3. Foster partnerships with local conservation organizations and fishing clubs to defray costs of harvesting habitat enhancement areas.
4. Complete harvesting following plan displayed in Map 6.
5. Monitor effectiveness of control efforts and adjust plan as needed.

METHODS

Curly-leaf Pondweed Survey

Surveys of curly-leaf pondweed were completed on Miller's Bay during July 8, 2008 and June 3, 2009 field visits. Visual inspections were completed throughout the lake by completing a meander survey by boat.

Comprehensive Macrophyte Surveys

A comprehensive survey of aquatic macrophytes was conducted on the system to characterize the existing communities within the bay and included inventories of emergent, submergent, and floating-leaved aquatic plants. The point-intercept method as described in "Appendix C" of the Wisconsin Department of Natural Resource document, Aquatic Plant Management in Wisconsin - Draft, (April 20, 2006) was used to complete the studies. Based upon advice from the WDNR, a point spacing of 40-meters resulting 353 points was used during the survey that was completed on August 1, 2008.

Community Mapping

During the species inventory work, the aquatic vegetation community types within Miller's Bay (emergent and floating-leaved vegetation) were mapped using a Trimble GeoXT Global Positioning System (GPS) with sub-meter accuracy. Furthermore, all species found during the point-intercept survey and the community mapping survey were recorded to provide a complete species list for the bay.

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Mumma, M.T., C.E. Cichra, and J.T. Sowards. 1996 Effects of recreation the submersed aquatic plant community of Rainbow River, Florida. Journal of Aquatic Plant Management 34: 53-56.

Murphy, K.J. and J.W. Eaton. 1983 Effects of pleasure-boat traffic on macrophyte growth in canals. Journal of Applied Ecology 20: 713-729.

Nichols, S.A. 1999. Floristic quality assessment of Wisconsin lake plant communities with example applications. Journal of Lake and Reservoir Management 15(2): 133-141

Omernick, J.M. and A.L. Gallant. 1988. Ecoregions of the Upper Midwest states. U.S. Environmental Protection Agency Report EPA/600/3-88/037. Corvallis, OR. 56p.

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Vermatt, J.E., and R.J. de Bruyne. 1993. Factors limiting the distribution of submerged waterplants in the lowland river Vecht (The Netherlands). Freshwater Biology 30: 147-157.

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Onterra LLC
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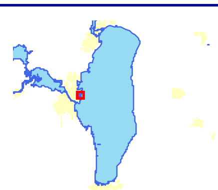
www.onterra-eco.com

Sources:
Orthophotograpy: NAIP, 2005
Map date: January 27, 2008



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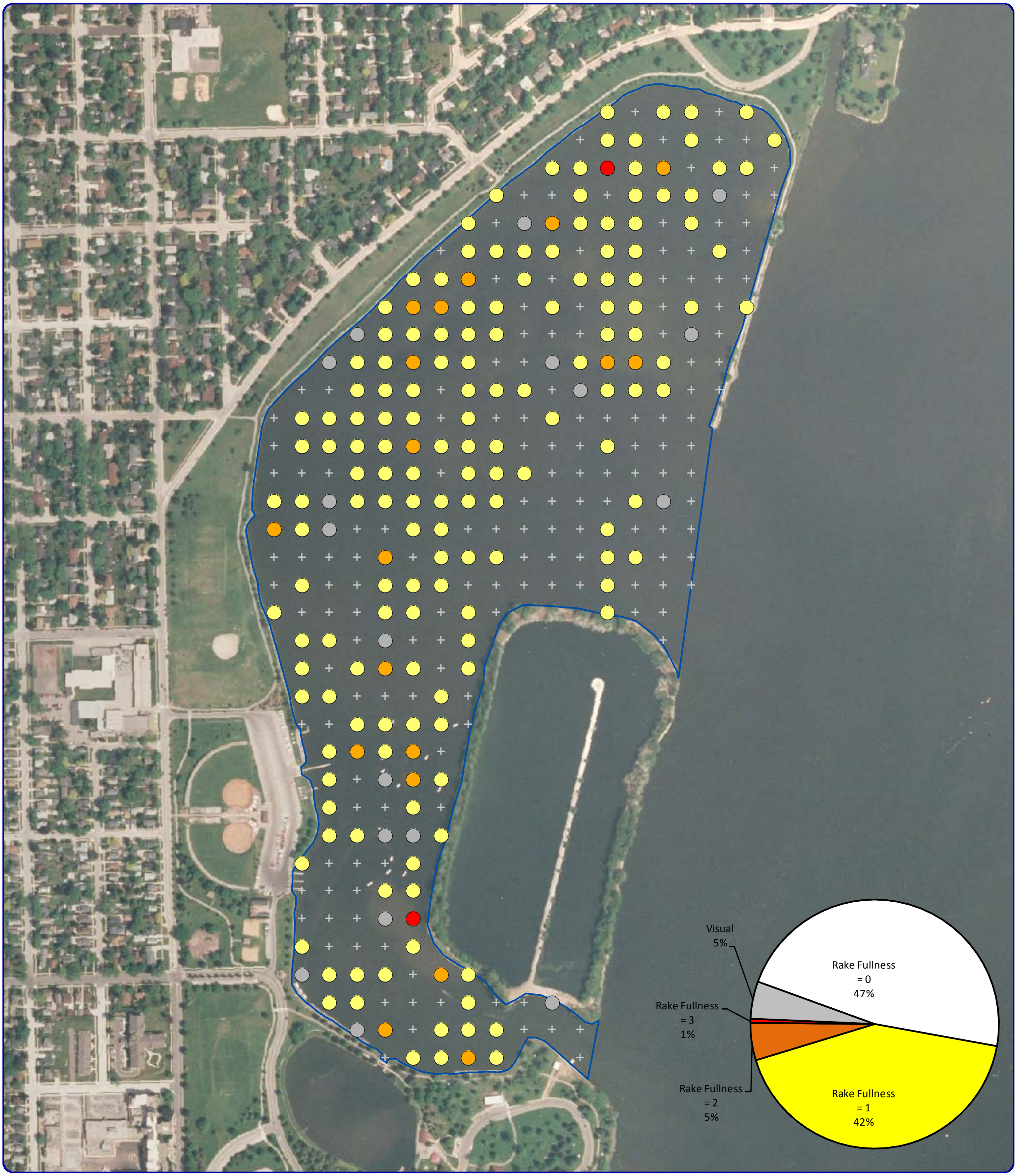
Legend

\# Point-Intercept Plot (40-Meter Spacing)

Millers Bay Project Limits

Map 1
Miller's Bay
Lake Winnebago
Winnebago County, WI
Project Area



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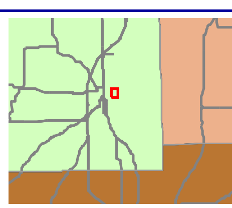
Sources
Roads & Hydro: WDNR
Aquatic Plants: Onterra, 2008
Orthophotography: NAIP, 2005

Map Date: September 23, 2008



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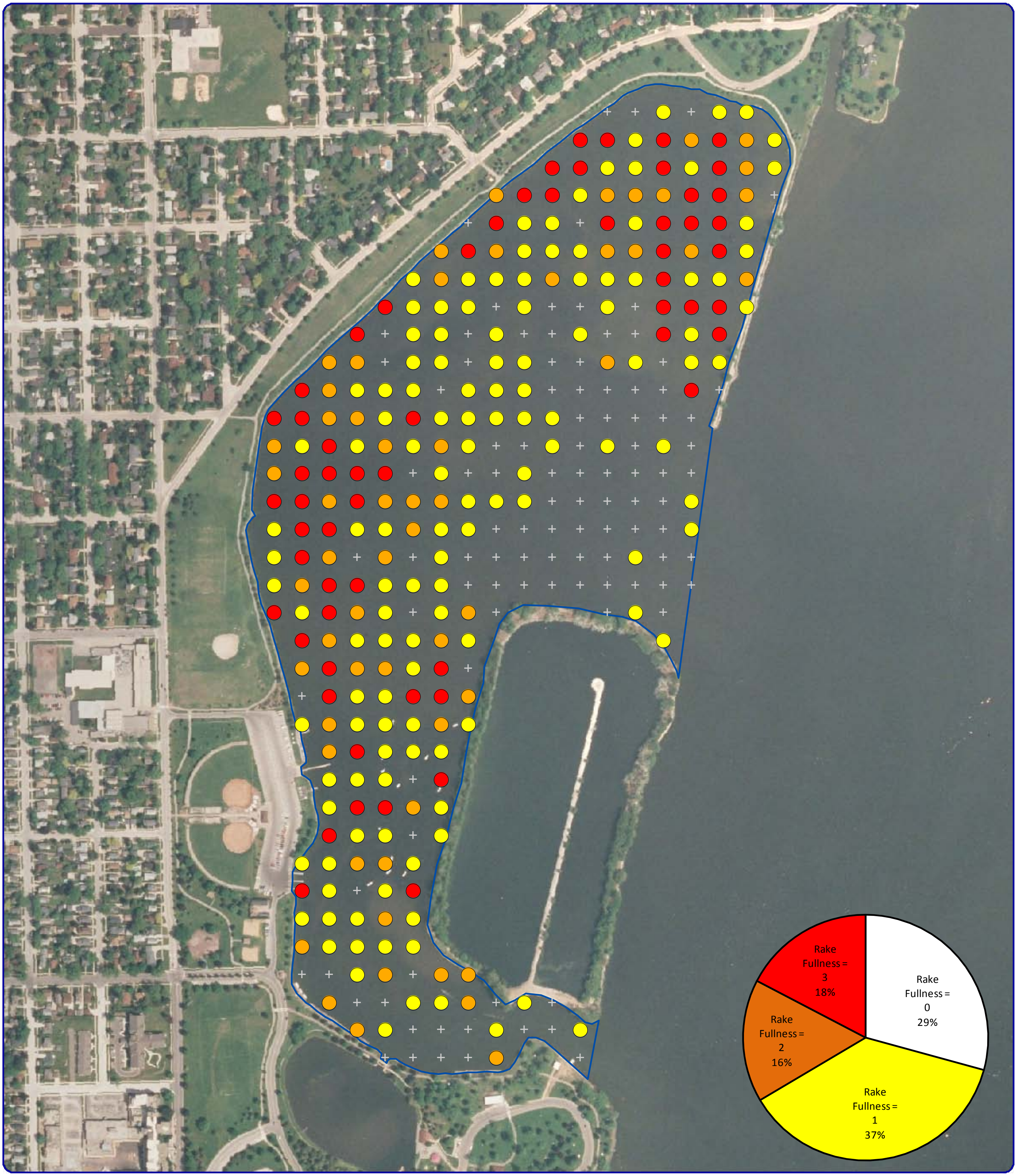
Legend

EWM Locations

- Visual
- Rake Fullness = 1
- Rake Fullness = 2
- Rake Fullness = 3

Map 2
Miller's Bay
Winnebago County, Wisconsin
2008 P-I Survey:
EWM Locations



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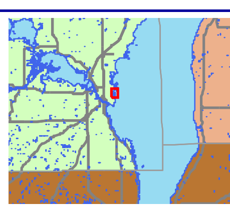
Sources
Roads & Hydro: WDNR
Aquatic Plants: Onterra, 2008
Orthophotography: NAIP, 2005

Map Date: September 23, 2008



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Legend

Coontail Locations

- Rake Fullness = 1
- Rake Fullness = 2
- Rake Fullness = 3

Map 3

Miller's Bay

Winnebago County, Wisconsin

2008 P-I Survey: Coontail Locations

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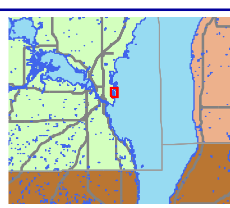
Sources
Roads & Hydro: WDNR
Aquatic Plants: Onterra, 2008
Orthophotography: NAIP, 2005

Map Date: September 23, 2008



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Legend

Common Waterweed Locations

- Rake Fullness = 1
- Rake Fullness = 2
- Rake Fullness = 3

Slender Waterweed Locations

- Rake Fullness = 1

Map 4
Miller's Bay
Winnebago County, Wisconsin
2008 P-I Survey: Waterweed Locations

Site	GIS Acres	Permit Acres
A-08	8.3	10.3
B-08	1.5	0.9
C-08	1.6	1.5
D-08	0.8	1.1
Total	***12.1***	***13.8***

N W E S

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Onterra LLC
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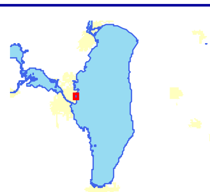
www.onterra-eco.com

Sources:
Orthophotography: NAIP, 2005
Map date: June 9, 2008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Legend

- 2008 Treatment Area
- Millers Bay Project Limits

Map 5
Miller's Bay
Lake Winnebago
Winnebago County, WI

2008 Treatment Areas

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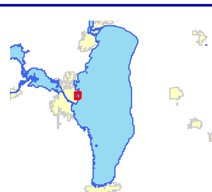
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Legend

Harvest Areas

Navigation Areas/Lanes (~20.9 acres)

Habitat Enhancement Lanes (~9.1 acres)

Millers Bay Project Limits

Map 6

Millers Bay

Lake Winnebago
Winnebago County, WI

Proposed Harvest Plan

Onterra LLC
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www.onterra-eco.com

Sources:
Orthophotography: NAIP, 2005
Map date: April 7, 2009

A

APPENDIX A

Public Participation Materials

Miller's Bay, Lake Winnebago
Aquatic Plant Management Planning Project
Plan Development Meeting
February 11, 2009

Invited Attendees: Tom Stephany, City of Oshkosh
Vince Maas, City of Oshkosh
Rob McLennan, WDNR
Mark Sesing, WDNR
Chuck Fitzgibbon, WDNR
Tim Hoyman, Onterra
Eddie Heath, Onterra

Meeting Intent: Discuss realistic elements and actions to be included within the Miller's Bay Aquatic Plant Management Plan.

Discussion Items: Introductions

Onterra's "normal" planning model.

Comments on draft management plan report.

Aspects of Miller's Bay and its shorelands that can and should be addressed within the management plan.

Develop a broad list of plan components (goals and/or actions).

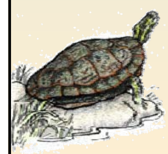
- Two general categories:
  - Aquatic plant management (for recreation).
  - Habitat management (for ecological enhancement).
- Who needs to be involved with particular components?
- How should we proceed with the development of each component?

Presentation Outline

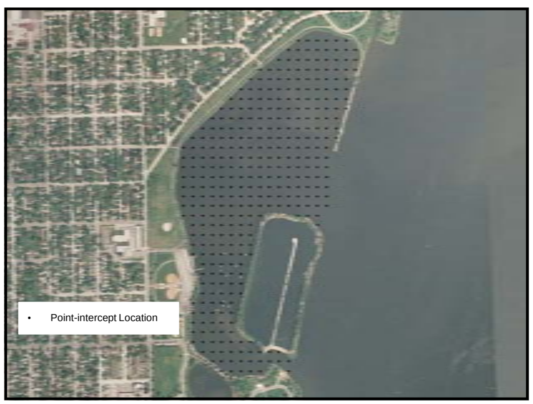
- Current Lake Project Overview
- Study Results
  - Aquatic Plants
- Alternatives and Recommendations
- Next Steps

Current Project

Study and Plan Goals



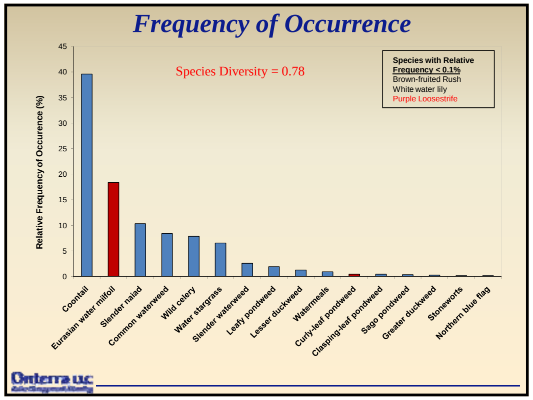
- Collect & Analyze Data
- Construct Long-Term & Useable Plan

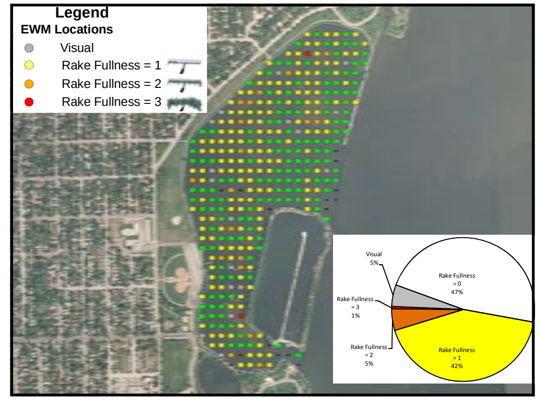


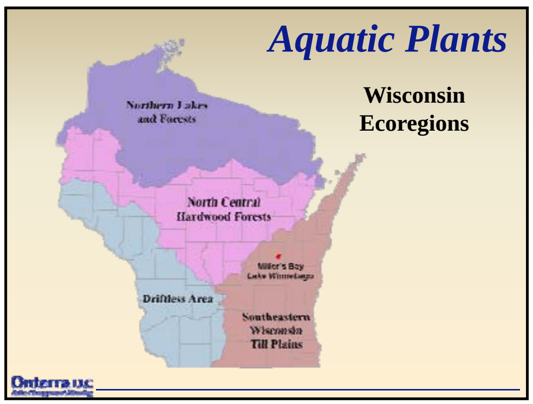
Species List

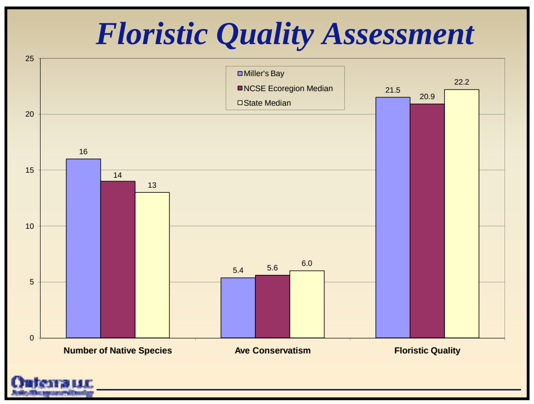
- 16 Native Species
- 3 Non-native Species
  - Eurasian water milfoil
  - Curly-leaf pondweed
  - Purple loosestrife

Life Form	Scientific Name	Common Name	Coefficient of Conservatism (C)
Emergent	[illegible]	[illegible]	[illegible]
	Juncus pelocarpus	Brown-fruited rush	8
	Lythrum salicaria	Purple loosestrife	Exotic
FL	Nymphaea odorata	White water lily	6
FF	Lemna minor	Lesser duckweed	5
	Wolffia sp.	Watermeals	[illegible]
	Spirodela polyrhiza	Greater duckweed	5
Submergent	Ceratophyllum demersum	Coontail	3
	Myriophyllum spicatum	Eurasian water milfoil	Exotic
	Najas flexilis	Slender naiad	6
	Elodea canadensis	Common waterweed	3
	Vallisneria americana	Wild celery	[illegible]
	Heteranthera dubia	Water stargrass	6
	[illegible]	Slender waternymph	7
	Potamogeton foliosus	Leafy pondweed	6
	Potamogeton crispus	Curly-leaf pondweed	Exotic
	Potamogeton richardsonii	Clasping-leaf pondweed	5
	Stuckenia pectinata	Sago pondweed	3
	Nitella sp.	Stoneworts	7









Conclusions

- Aquatic plant community is indicative of a disturbed system
  - Comprised of plants that can reach nuisance levels
  - Provides limited habitat for some fish species
- To maintain recreation within bay, control efforts will be required
  - Many control alternatives exist
  - An integrated approach will likely work the best

Alternatives Analysis

- **No Action**
  - No cost to implement
  - Reduced recreational use will occur
    - Sailboat mooring rentals decreased by 50% from 2006 to 2007
    - Immeasurable economic impact if landing and park were not used
- **Dredging (sediment removal, lake deepening)**
  - Removal of sediments to deepen area and open navigation
  - Very high cost
    - Example: Remove 3 feet of sediment from a 1-acre area
      - 130,680 cu.ft. = 4,840 cu.yd.
      - At a conservative estimate of $10/cu.yd. = $48,400
      - 5 acres would exceed $240,000
  - Disturbed sediment area open to exotic infestation
  - Radtke Contractors dredging study (2006)
    - Found bay to have sufficient depth for navigation
    - Abundance of plants were responsible for navigation issues

Alternatives Analysis

- **Herbicides (chemical treatment)**
  - Two primary categories:
    - Systemic (kills whole plant)
    - Contact (browns exposed foliage)
  - Approved for use in aquatic environment by EPA
  - Appropriate in many situations
    - Use against exotic plant species
    - Use to maintain navigation
  - Costs vary by chemical and use
    - 2008 Treatments
      - Worked well to control nuisance plant levels
      - Total acres treated: 21.3
      - Total cost: $20,577.60 ($966/acre)

2008 Herbicide Treatment

- Permitted 13.84 acres of treatment:
  - For "nuisance caused by algae and submersed water plants"
  - To "reduce nuisance algae accumulation, maintain navigational channel for common use, maintain private access for boating, and maintain private access for fishing"
  - Target Plants: Eurasian water milfoil, coontail, elodea, curly-leaf pondweed, and Pithophora (horse-hair algae)
  - Chemicals Used: Cutrine-Ultra, Reward, and Aquathol K
    - June 10 – 10.33 Acres
    - June 26 – 5.58 Acres
    - July 30 – 5.45 Acres

Site	Permit Acres
A-08	10.3
B-08	0.9
C-08	1.5
D-08	1.1
Total	*13.8*

Alternatives Analysis

- **Mechanical Harvesting**
  - Cutting and removing of aquatic plants though mechanical means
  - Fragmentation can lead to spread of Eurasian water milfoil within lake
    - Not an issue in lakes where plant is highly established such as Miller's Bay
  - Can be used to maintain navigation and in some cases enhance habitat
  - Costs
    - Contracted: $165/hr
    - Local District: $136/hr
    - City of Oshkosh: $115/hr
      - 30 acres at 0.65 acres/hour
        - Navigation (20.9 acres): $3,700/cutting
        - Habitat (9.1 acres): $1,600/cutting
        - Total: $5,300/cutting
        - Annual (3 cuttings): $15,900

Recommendations

- **No Action**
  - Loss of recreational use and economic benefits too great
- **Dredging**
  - Not a sediment or depth issue
  - It is a nuisance plant issue
- **Herbicides - Integrated as needed**
  - Worked well within bay during 2008
  - Costs are high for acreage treated
  - Little habitat benefit to outweigh environmental risks
- **Mechanical Harvesting - Primary Control Alternative**
  - Start-up costs are high and grants are competitive
  - City could recoup some costs by contracting out their equipment and operator
  - Lower costs overall
  - Can also enhance habitat within bay

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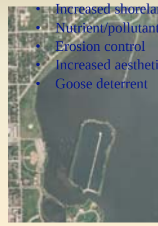
Recommendations

- **Shoreland Habitat Restoration**
  - Benefits
    - Increased shoreland habitat
    - Nutrient/pollutant buffer
    - Erosion control
    - Increased aesthetics
    - Goose deterrent



Onterra LLC

ADVISORY PARK BOARD
MINUTES
APRIL 13, 2009

Present: Bill Gogolewski, Kay Hansen, Mark Philipp, Colin Walsh
Excused: Ted Bowen, Dennis McHugh, Jim Michelson, Allan Siiman, Terry Wohler
Staff: Thomas Stephany, Director of Parks; Vince Maas, Parks Operations Manager; Bill Sturm, Landscape Operations Manager/City Forester; Steve Dobish Lakeshore Golf Course General Manager; Trish Wendorf, Recording Secretary

CALL TO ORDER & ROLL CALL

Chairman Gogolewski called the meeting to order at 6:00 P.M. A quorum was determined not to be present.

APPROVAL OF MINUTES

Since there was not a quorum, the minutes of January 12, 2009, could not be approved. The January 12, 2009 minutes will be brought back before the Board at their May 11, 2009 meeting for approval.

PARK BUSINESS

1) Miller's Bay Aquatic Plant Study Report

Mr. Stephany gave a brief overview of the weed (aquatic problems) situation in Miller's Bay and attempts that have been made to rectify the weed problems. He stressed that this meeting is for informational purposes and discussion only and that no Board action would be taken at this time. He introduced Tim Hoyman, an aquatic ecologist who owns Onterra, LLC from DePere, Wisconsin, who was commissioned to conduct a study of Miller's Bay, and also Paul Leisten, an aquatic biologist from Aquatic Biologists Inc., from Fond du Lac, who has previously treated Miller's Bay.

Mr. Hoyman gave a PowerPoint™ presentation (said printed version of the presentation on file at the City Parks office and made a part of these minutes) of the Miller's Bay Aquatic Plant Management Planning Project. He stated his goal is to help the Board decide what to do with the weed situation and to develop an implementation plan. He explained how his crews did a point intercept survey to collect plants in the Bay and then determined what species were collected to analyze the alternatives and give their recommendations for treatment. Mr. Hoyman noted that the coontail was the most commonly found plant, along with Eurasian water milfoil, which contribute greatly, but are not the primary reasons for the weed problems. He stated that Onterra does not do the chemical treatments, they just do the studies.

Mr. Phillips inquired as to which plants/weeds were the "stinky" ones?

Mr. Hoyman stated that the dying algae are what start to stink.

Mr. Phillips inquired if Mr. Hoyman knew of other bays that were suffering similar problems?

Mr. Hoyman stated there are several bays in Wisconsin that have similar issues/situations.

Mr. Phillips inquired if covering the bottom of the bay would help deter the weed problem.

Mr. Hoyman stated it is too large of an area to cover plus the sediment on the bottom would have to be removed – dilution and maintenance would be difficult. He noted that covering the area would stop recreational uses as well.

Chairman Gogolewski inquired if the weeds could be treated every other year and not on a yearly basis?

Mr. Hoyman stated, in his opinion, he would say "no" because of the way the plants are currently being treated.

Mr. Leisten stated he is limited to only using contact herbicides.

Mike Nigl, 1021 School Avenue, stated he is a Miller's Bay patron, and inquired if the primary objective of the weed control is strictly for navigational purposes only? He stated the number of boats in the Miller's Bay program has drastically reduced. He suggested relocating the mooring area to the south end of the bay and just chemically treat that particular area to alleviate some costs.

Mr. Hoyman stated he has held discussions with the DNR, and their department is willing to allow the same chemical treatments to the bay as were used last year.

Bob Plummer, 5251 Ivy Lane, inquired as to what agency had jurisdiction over Miller's Bay? Who owns the water and Miller's Bay? He is of the opinion that any monies expended for this study/remedy should be taken from Winnebago County taxes.

Mr. Stephany stated the City Parks Department takes care of Miller's Bay because it is a program (Miller's Bay Mooring Program) that is operated by the City. He also stated that nothing for this study/remedy has been paid for by or through taxes.

Chairman Gogolewski stated Miller's Bay affects not just sailboat navigation, but motorized boats' navigation as well.

Dave Fenrich, 19 W 14th Avenue (former City Parks Department employee) stated he had worked for the Parks Department for over 33 years and as part of his park duties, he was required to apply the herbicide treatments to Miller's Bay. He stated the bay had been dredged by the water filtration plant area approximately 25 years ago. He gave a brief description of the way the Montello (Buffalo Lake) area staff cut the weeds with weed harvesters. He stated he would prefer that Miller's Bay be chemically treated as he did not feel it would be harmful to the fish (weed harvesting tends to also affect the fish population).

Mr. Philipp stated he was shocked about the amount of fish that were "caught up" with the weed harvester.

Michael Lizotte, Ph.D., 229 Hickory Lane, stated he is the Winnebago Lakes Council President, and stated that the submitted report of Onterra LLC (said report on file at the City Parks Department and made a part of these minutes) is excellent. He stated he would prefer to see weed harvesting done at Miller's Bay since it is a cheaper route. Dr. Lizotte stated the amount of fish being pulled out by the weed harvester is not in excess. He inquired as to how many days after the weeds were harvested, did they return?

Mr. Stephany stated the weeds started to grow back almost immediately and after nine (9) days, they were significant.

Mike Nigl, 1021 School Avenue, stated that the cuttings that he observed were not significant and didn't accomplish much. The cuttings also made it harder for the boats to maneuver because the weed harvester left behind a lot of debris. He is of the opinion that chemical treatments would be more effective.

Mr. Stephany explained the DNR regulations relative to weed harvesting and noted they were only able to cut one-half of the depth area.

Mr. Philipp inquired if it was possible to get rid of the coontail with a chemical application, how long before they would grow back (navigation area)?

Mr. Hoyman stated there are too many variables – type of strain of coontail, dependent upon winds, etc., so that question becomes unanswerable.

Mr. Stephany expressed concern with the chemical treatment and inquired if there have been any negative impacts with communities utilizing chemical treatments?

Mr. Hoyman stated that is difficult to answer because there are different types of chemicals being used by different communities. If chemical 2,4-D is used correctly, there should be no negative impacts.

Mr. Leisten stated chemical 2,4-D has been used since the 1940's and is the most widely used and researched chemical out, and there should be no ill-effects if applied properly.

Dr. Lizotte encouraged the Board to have the park staff apply for State funded grants and suggested that the academic and government get together to partner for a study of the chemicals for long or short term effects.

Andrew (?), 333 Saratoga Avenue, stated he is in favor of a weed harvester for the Miller's Bay weed problem.

Mr. Maas stated he has been and is continuing to do research for the pricing of a weed harvester and noted that a trailer for the harvester would also have to be purchased. He noted that he would also attempt to apply for grant dollars to help with the cost of the harvester and trailer.

Mr. Stephany inquired who would operate the harvester? How will staff maintain it? How will it be hauled? These are all questions that need to be researched as well.

2) Introduction of 2010-2014 Capital Improvement Projects (CIP)

Mr. Stephany stated he will get copies of this Board meeting video tape to the Board members not present at this meeting so they are aware of the dialogue/discussion. He will also get a list of proposed CIP projects to all of the Board members so that they can view and prioritize them and get the results back to Ms. Wendorf so she can get the Board members' selections prioritized for the next Board meeting.

Chairman Gogolewski questioned the project at Menominee Park – construct an asphalt trail from the lake-side trail to connect to the central toilet building and amusement rides * * * also repair areas of the roads within the parks – for a cost of $40,000.

Mr. Maas stated there are some areas where it would be cutting and patching areas – poor areas, not the entire roadway.

CITIZEN'S STATEMENTS

There were no citizen statements.

PARK DIRECTOR/STAFF REPORTS

Mr. Stephany stated that the first event at the Leach Amphitheater is a half marathon scheduled for April 18th.

Mr. Dobish stated the Lakeshore Municipal Golf Course has been open for the best part of two weeks and so far, so good. He also stated that he will be bringing a request to grant an easement for transmission lines on Highway 21 before the Board at their next regularly scheduled meeting (May 11th). The easement needs Park Board approval and then approvals from the Plan Commission and City Council. It is a standard easement requested by American Transmission Company (ATC) for planting trees, construction, etc.

Mr. Maas stated that since it is now spring, crews are getting ready to cut grass, as well as their regular spring duties.

Mr. Sturm stated his forestry crews have a lot on their plate and are continuing their regular duties for a typical season.

ADJOURNMENT

There being no other business,

> ***Motion by Philipp for adjournment; seconded by Hansen. Motion carried 4-0. The meeting adjourned at 8:35 P.M.***

Respectfully submitted,

Trish Wendorf

Trish Wendorf
Recording Secretary

B

APPENDIX B

2008 Aquatic Plant Survey Data

Sample Point	Latitude (Decimal Degrees)	Longitude (Decimal Degrees)	Depth (ft)	Sediment type (M=muck, S=Sand, R=Rock)	Rope (R); Pole (P); Visual (V)	Myriophyllum spicatum	Potamogeton crispus	Ceratophyllum demersum	Elodea canadensis	Elodea nuttallii	Heteranthera dubia	Iris versicolor	Juncus pelocarpus	Lemna minor	Najas flexilis	Nitella species	Nymphaea odorata	Potamogeton pusillus	Potamogeton richardsonii	Spirodella polyrrhiza	Stuckenia pectinata	Vallisneria americana	Wolffia species
1	44.032190	-88.520477	5	M	P			3															
2	44.031830	-88.520486	6	M	P			2															
3	44.031470	-88.520495	6	M	P			2															
4	44.031110	-88.520504	6	M	P	1		3															
5	44.030750	-88.520513	5	M	P	2		1															
6	44.030390	-88.520522	6	M	P			1	1	1													
7	44.030030	-88.520531	5	M	P			1															
8	44.030364	-88.518526	7	R	P	1		2							1								
9	44.029670	-88.520540	5	M	P			3						1									1
10	44.032544	-88.519969	4	M	P	1		3															
11	44.032184	-88.519978	4	M	P	1		3															
12	44.031824	-88.519987	4	M	P			1															
13	44.031464	-88.519996	7	M	P	1		3															
14	44.031104	-88.520005	4	M	P	1		3															
15	44.030744	-88.520014	6	M	P			3			1												
16	44.030384	-88.520023	6	M	P	1		3															
17	44.030024	-88.520032	7	M	P			2															
18	44.029664	-88.520041	6	M	P	1		1															
19	44.029304	-88.520050	6	M	P	1		3															
20	44.028944	-88.520059	5	M	P	1		2															
21	44.028584	-88.520068	4	M	P				1						1								
22	44.028224	-88.520076	4	M	P	1		1						1			1						1
23	44.026424	-88.520121	4	M	P			1	1													1	
24	44.026063	-88.520130	4	M	P			3	1					1									1
25	44.025703	-88.520139	4	M	P	1		1	1														
26	44.025343	-88.520148	4	M	P	V		2	1														
27	44.024983	-88.520157	4	M	P	V			3														
28	44.032897	-88.519461	4	M	P			2															
29	44.032537	-88.519470	5	M	P	1		2															
30	44.032177	-88.519479	4	R	P	1		2															
31	44.031817	-88.519488	4	M	P			3															
32	44.031457	-88.519497	7	M	P	V		3															
33	44.031097	-88.519506	6	M	P	V		2															
34	44.030737	-88.519515	6	M	P			3															
35	44.030377	-88.519524	7	M	P			2							1								
36	44.030017	-88.519533	5	M	P			3															

Sample Point	Latitude (Decimal Degrees)	Longitude (Decimal Degrees)	Depth (ft)	Sediment type (M=muck, S=Sand, R=Rock)	Rope (R); Pole (P); Visual (V)	Myriophyllum spicatum	Potamogeton crispus	Ceratophyllum demersum	Elodea canadensis	Elodea nuttallii	Heteranthera dubia	Iris versicolor	Juncus pelocarpus	Lemna minor	Najas flexilis	Nitella species	Nymphaea odorata	Potamogeton pusillus	Potamogeton richardsonii	Spirodella polyrrhiza	Stuckenia pectinata	Vallisneria americana	Wolffia species
37	44.029657	-88.519542	6	M	P	1		3	1		1				1								
38	44.029297	-88.519551	12	M	P			2															
39	44.028937	-88.519560	5	M	P	1		3	1		1												
40	44.028577	-88.519569	6	M	P			3	1	1													
41	44.028217	-88.519577	5	M	P	1		2	1														
42	44.027857	-88.519586	5	M	P	1		2	1						1								
43	44.027497	-88.519595	3	M	P	1		1														1	
44	44.027137	-88.519604	4	M	P	1		1	1				1							1			1
45	44.026777	-88.519613	4	M	P			3	1														
46	44.026417	-88.519622	4	M	P			1		1													
47	44.026057	-88.519631	4	M	P			1	2														
48	44.025697	-88.519640	4	M	P			1	1					1						1			
49	44.025337	-88.519649	4	M	P	1		1															
50	44.024977	-88.519658	4	M	P	1																	
51	44.024617	-88.519667	5	M	P	V		2															
52	44.033251	-88.518953	5	M	P	1		3															
53	44.032891	-88.518962	4	M	P	1		2															
54	44.032531	-88.518971	5	M	P	1		1															
55	44.032171	-88.518980	4	R	P	1		2														1	
56	44.031811	-88.518989	6	M	P	1		1			1										1		
57	44.031451	-88.518998	4	M	P	1		3															
58	44.031091	-88.519007	6	M	P			3			1												
59	44.030731	-88.519016	4	M	P			1															
60	44.030371	-88.519025	7	R	P																		
61	44.028931	-88.519061	7	M	P			2							1								
62	44.030011	-88.519034	6	M	P			3															
63	44.029651	-88.519043	7	M	P	1		2	1														
64	44.029291	-88.519052	5	M	P			1	2	1													
65	44.028571	-88.519070	5	M	P	1		1	2	1													
66	44.028211	-88.519079	6	M	P	2		1		1													
67	44.027851	-88.519087	4	M	P			3	1														
68	44.027491	-88.519096	4	M	P			1	1						1								
69	44.027131	-88.519105	5	M	P	1		3															
70	44.026771	-88.519114	4	M	P			1	1	1					1								
71	44.026411	-88.519123	4	M	P			2	1														
72	44.026051	-88.519132	4	M	P				1						1								

Sample Point	Latitude (Decimal Degrees)	Longitude (Decimal Degrees)	Depth (ft)	Sediment type (M=muck, S=Sand, R=Rock)	Rope (R); Pole (P); Visual (V)	Myriophyllum spicatum	Potamogeton crispus	Ceratophyllum demersum	Elodea canadensis	Elodea nuttallii	Heteranthera dubia	Iris versicolor	Juncus pelocarpus	Lemna minor	Najas flexilis	Nitella species	Nymphaea odorata	Potamogeton pusillus	Potamogeton richardsonii	Spirodella polyrrhiza	Stuckenia pectinata	Vallisneria americana	Wolffia species
73	44.025691	-88.519141	4	M	P			1	1						1								
74	44.025331	-88.519150	4	M	P	1		1															
75	44.024971	-88.519159	4	M	P	1		1															
76	44.024610	-88.519168	5	M	P	V	V								1								
77	44.024250	-88.519177	5	M	P	1		2															
78	44.033604	-88.518445	4	M	P	1		3															
79	44.033244	-88.518454	4	R	P	1					1												
80	44.032884	-88.518463	4	R	P	1					1											1	
81	44.032524	-88.518472	5	M	P	1		1	1														
82	44.032164	-88.518481	4	R	P	1		1	1														
83	44.031804	-88.518490	6	M	P	1		2							1						1		
84	44.031444	-88.518499	5	M	P	1		3			1												
85	44.031084	-88.518508	4	M	P			2															
86	44.030724	-88.518517	5	M	P	2		1															
87	44.030004	-88.518535	4	M	P	1		1							1								
88	44.029644	-88.518544	4	M	P	1		1															
89	44.029284	-88.518553	4	M	P	V		1	1														
90	44.028924	-88.518562	5	M	P	2		2	1														
91	44.028564	-88.518571	5	M	P			1						1	1								
92	44.028204	-88.518580	5	M	P	1		1	1														
93	44.027844	-88.518588	5	M	P	1		1															
94	44.027484	-88.518597	4	M	P	V		1	1														
95	44.027124	-88.518606	4	M	P			3		1													
96	44.026764	-88.518615	5	M	P	V		1															
97	44.026404	-88.518624	5	M	P			2	2														
98	44.026044	-88.518633	4	M	P	1		1	1						1								
99	44.025684	-88.518642	4	M	P	V		2	1														
100	44.025324	-88.518651	4	M	P			1	1														
101	44.024964	-88.518660	4	M	P	1		2							1								
102	44.024604	-88.518669	4	M	P										1								
103	44.024244	-88.518678	5	M	P	2		1							1								
104	44.023884	-88.518687	sherman																				
105	44.033958	-88.517937	4	R	P	1		1														1	
106	44.033598	-88.517946	5	M	P	2		1											1				
107	44.033238	-88.517955	4	M	P	1		1	1														
108	44.032878	-88.517964	3	M	P	2		1														1	

Sample Point	Latitude (Decimal Degrees)	Longitude (Decimal Degrees)	Depth (ft)	Sediment type (M=muck, S=Sand, R=Rock)	Rope (R); Pole (P); Visual (V)	Myriophyllum spicatum	Potamogeton crispus	Ceratophyllum demersum	Elodea canadensis	Elodea nuttallii	Heteranthera dubia	Iris versicolor	Juncus pelocarpus	Lemna minor	Najas flexilis	Nitella species	Nymphaea odorata	Potamogeton pusillus	Potamogeton richardsonii	Spirodella polyrrhiza	Stuckenia pectinata	Vallisneria americana	Wolffia species
109	44.032518	-88.517973	4	M	P	1		1	1	1	1												
110	44.032158	-88.517982	5	M	P	1		3														1	
111	44.031798	-88.517991	6	M	P	2		1			1											1	
112	44.031438	-88.518000	4	R	P	1			1									1					
113	44.031078	-88.518009	6	M	P	1		2															
114	44.030718	-88.518018	4	M	P	1		2														1	
115	44.030358	-88.518027	6	R	P	NV																	
116	44.029998	-88.518036	5	R	P	1		1	1		1				1								
117	44.029638	-88.518045	4	M	P	1			1		1				1								
118	44.029278	-88.518054	4	M	P			1	1					1									1
119	44.028918	-88.518063	5	M	P	1		1	1														
120	44.028558	-88.518072	5	M	P			3	1	1				1	1								1
121	44.028198	-88.518081	4	M	P	1		1															
122	44.027838	-88.518090	5	M	P	2		1															
123	44.027478	-88.518098	4	M	P	2																	
124	44.027118	-88.518107	4	M	P	1		2			1												
125	44.026758	-88.518116	5	M	P	V				1													
126	44.026398	-88.518125	5	M	P	1		1															
127	44.026038	-88.518134	4	M	P	1		3															
128	44.025678	-88.518143	5	M	P	3		1							1								
129	44.025318	-88.518152	3	M	P	1		1	1														
130	44.024958	-88.518161	5	M	P										1								
131	44.024598	-88.518170	4	M	P			1			1							1					
132	44.024238	-88.518179	5	M	P	NV																	
133	44.023878	-88.518188	4	M	P	1																	
134	44.034312	-88.517429	4	R	P			2															
135	44.033952	-88.517438	4	R	P	1		2															
136	44.033592	-88.517447	4	R	P	2		1		1	1												
137	44.033232	-88.517456	6	M	P	1		1			1				1								
138	44.032871	-88.517465	3	R	P	1		1		1												1	
139	44.032511	-88.517474	5	R	P						1				1								
140	44.032151	-88.517483	8	M	P			1										1	1			1	
141	44.031791	-88.517492	6	R	P	1		2			1	1			1								
142	44.031431	-88.517501	4	R	P			1	1													1	
143	44.031071	-88.517510	5	M	P	1		2			1												1
144	44.030711	-88.517519	4	M	P	1		1							1								

Sample Point	Latitude (Decimal Degrees)	Longitude (Decimal Degrees)	Depth (ft)	Sediment type (M=muck, S=Sand, R=Rock)	Rope (R); Pole (P); Visual (V)	Myriophyllum spicatum	Potamogeton crispus	Ceratophyllum demersum	Elodea canadensis	Elodea nuttallii	Heteranthera dubia	Iris versicolor	Juncus pelocarpus	Lemna minor	Najas flexilis	Nitella species	Nymphaea odorata	Potamogeton pusillus	Potamogeton richardsonii	Spirodella polyrrhiza	Stuckenia pectinata	Vallisneria americana	Wolffia species
145	44.030351	-88.517528	6	M	P	1		1		1	1				1								
146	44.029991	-88.517537	4	M	P	1		1			1				1								
147	44.029631	-88.517546	5	M	P			1	1		1												
148	44.029271	-88.517555	6	M	P			2	1					1									1
149	44.028911	-88.517564	5	M	P			3														1	1
150	44.028551	-88.517573	5	M	P	1		3															
151	44.028191	-88.517582	4	M	P	1		2															
152	44.027831	-88.517591	5	M	P			1															
153	44.027471	-88.517600	4	M	P	1		3															
154	44.027111	-88.517608	5	M	P			1	1														
155	44.026751	-88.517617	5	M	P	1		1															
156	44.024951	-88.517662	4	M	P	2		2	1														
157	44.024591	-88.517671	4	M	P			1							1								
158	44.024231	-88.517680	5	M	P	1			1						1								
159	44.023871	-88.517689	4	M	P	1																	
160	44.034665	-88.516921	4	R	P	1																	
161	44.034305	-88.516930	4	M	P	1		3															
162	44.033945	-88.516939	4	R	P	2		1			1												
163	44.033585	-88.516948	4	R	P	1		1							1								
164	44.033225	-88.516957	6	R	P	1					1				1								
165	44.032865	-88.516966	3	R	P	1																1	
166	44.032505	-88.516975	5	R	P	1		1			1				1							1	
167	44.032145	-88.516984	5	M	P	1		1											1			1	
168	44.031785	-88.516993	5	R	P	1		1										1					
169	44.031425	-88.517002	5	R	P	1					1				1							1	
170	44.031065	-88.517011	9	R	P	1		1										1				1	
171	44.030705	-88.517020	6	M	P			1			1											1	
172	44.030345	-88.517029	5	M	P	1									1								
173	44.029985	-88.517038	8	M	P				1		1				1								
174	44.029625	-88.517047	5	M	P	1		2	1	1					1								
175	44.029265	-88.517056	5	M	P	1		1	1														
176	44.028905	-88.517065	6	M	P	1								1									
177	44.028545	-88.517074	6	M	P			2	1														
178	44.028185	-88.517083	4	M	P			1															
179	44.024945	-88.517163	6	M	P	1		2	1									1		1		1	
180	44.024585	-88.517172	6	M	P	1		2			1				1								

Sample Point	Latitude (Decimal Degrees)	Longitude (Decimal Degrees)	Depth (ft)	Sediment type (M=muck, S=Sand, R=Rock)	Rope (R); Pole (P); Visual (V)	Myriophyllum spicatum	Potamogeton crispus	Ceratophyllum demersum	Elodea canadensis	Elodea nuttallii	Heteranthera dubia	Iris versicolor	Juncus pelocarpus	Lemna minor	Najas flexilis	Nitella species	Nymphaea odorata	Potamogeton pusillus	Potamogeton richardsonii	Spirodella polyrrhiza	Stuckenia pectinata	Vallisneria americana	Wolffia species
181	44.024225	-88.517181	6	M	P	1			1														
182	44.023865	-88.517190	6	M	P	2			1						1								
183	44.035019	-88.516413	3	R	P	1		2														1	
184	44.034659	-88.516422	4	S	P			3	1														
185	44.034299	-88.516431	4	R	P	1		2															
186	44.033939	-88.516440	4	S	P			1	1													2	
187	44.033579	-88.516449	4	R	P	1					1				1							1	
188	44.033219	-88.516458	5	M	P	1		1		1	1												
189	44.032859	-88.516467	5	R	P			1			1				1							1	
190	44.032499	-88.516476	5	M	P	1		1	1												1		
191	44.032139	-88.516485	6	R	P			1							1			1					
192	44.031778	-88.516494	6	M	P	1												1					
193	44.031418	-88.516503	6	M	P	1					1				1			1					
194	44.031058	-88.516512	8	R	P	1		1			1												
195	44.030698	-88.516521	5	R	P						1												
196	44.030338	-88.516530	5	R	P	1			1		1				1								
197	44.029978	-88.516539	9	M	P				1									1					
198	44.029618	-88.516548	4	M	P																		
199	44.024578	-88.516673	8	M	P	NV																	
200	44.024218	-88.516682	5	M	P	1		1	1														
201	44.023858	-88.516691	4	M	P	1		2	1													1	
202	44.035012	-88.515914	4	R	P			3						1									
203	44.034652	-88.515923	4	S	P	V		1															
204	44.034292	-88.515932	4	R	P	1		1														1	
205	44.033932	-88.515941	4	M	P	1		1						1								1	
206	44.033572	-88.515950	4	R	P			1			1											1	
207	44.033212	-88.515959	6	M	P				1									1					
208	44.032852	-88.515968	5	R	P			1							1							2	
209	44.032492	-88.515977	5	R	P	1		1		1					1							1	
210	44.032132	-88.515986	5	R	P			1		1					1								
211	44.031772	-88.515995	5	M	P										1			1					
212	44.031412	-88.516004	6	M	P	1		1														1	
213	44.031052	-88.516013	9	R	P			1	1		1				1								
214	44.030692	-88.516022	7	M	P										2							1	
215	44.030332	-88.516031	4	M	P																	1	
216	44.029972	-88.516040	3	M	P										1							1	

Sample Point	Latitude (Decimal Degrees)	Longitude (Decimal Degrees)	Depth (ft)	Sediment type (M=muck, S=Sand, R=Rock)	Rope (R); Pole (P); Visual (V)	Myriophyllum spicatum	Potamogeton crispus	Ceratophyllum demersum	Elodea canadensis	Elodea nuttallii	Heteranthera dubia	Iris versicolor	Juncus pelocarpus	Lemna minor	Najas flexilis	Nitella species	Nymphaea odorata	Potamogeton pusillus	Potamogeton richardsonii	Spirodella polyrrhiza	Stuckenia pectinata	Vallisneria americana	Wolffia species
217	44.024572	-88.516174	8	R	P			1	1														
218	44.024212	-88.516183	8	M	P	NV																	
219	44.035366	-88.515406	5	S	P	1		3															
220	44.035006	-88.515415	5	M	P			3	1													1	
221	44.034646	-88.515424	4	S	P	2		1														1	
222	44.034286	-88.515433	4	R	P	1		1														1	
223	44.033926	-88.515442	4	M	P			2														1	
224	44.033566	-88.515451	4	R	P	1													1			1	
225	44.033206	-88.515460	5	M	P										1							1	
226	44.032846	-88.515469	6	M	P	V					1				1								
227	44.032486	-88.515478	6	R	P					1					1								
228	44.032126	-88.515487	6	M	P	1		1							1							1	
229	44.031766	-88.515496	6	R	P			1			1				1								
230	44.031405	-88.515505	4	R	P										1			1					
231	44.031045	-88.515514	5	R	P										3								
232	44.030685	-88.515523	4	R	P				1									1				1	
233	44.030325	-88.515532	4	M	P										1	2							
234	44.029965	-88.515541	10	R	P				1						1							1	
235	44.024565	-88.515675	4	R	P	V					1				1								
236	44.024205	-88.515684	8	R	P	NV																	
237	44.035719	-88.514898	4	S	P		1	3															
238	44.035359	-88.514907	4	S	P	1		3															
239	44.034999	-88.514916	3	S	P	1		1															
240	44.034639	-88.514925	3	S	P	1																	
241	44.034279	-88.514934	4	R	P			1			1											1	
242	44.033919	-88.514943	5	M	P	1		1														1	
243	44.033559	-88.514952	5	R	P																	2	
244	44.033199	-88.514961	5	M	P			1			1											1	
245	44.032839	-88.514970	6	R	P	1					1				1								
246	44.032479	-88.514979	6	M	P	V									1							1	
247	44.032119	-88.514988	4	R	P										1								
248	44.031759	-88.514997	6	R	P						1				2								
249	44.031399	-88.515006	4	M	P				1	1					1							1	
250	44.031039	-88.515015	8	R	P										3							1	
251	44.030679	-88.515024	7	R	P						1				2							1	
252	44.030319	-88.515033	5	M	P																	1	

Sample Point	Latitude (Decimal Degrees)	Longitude (Decimal Degrees)	Depth (ft)	Sediment type (M=muck, S=Sand, R=Rock)	Rope (R); Pole (P); Visual (V)	Myriophyllum spicatum	Potamogeton crispus	Ceratophyllum demersum	Elodea canadensis	Elodea nuttallii	Heteranthera dubia	Iris versicolor	Juncus pelocarpus	Lemna minor	Najas flexilis	Nitella species	Nymphaea odorata	Potamogeton pusillus	Potamogeton richardsonii	Spirodella polyrrhiza	Stuckenia pectinata	Vallisneria americana	Wolffia species
253	44.024199	-88.515186	4	R	P			1	1		1				1			1					
254	44.023839	-88.515195	8	R	P	NV																	
255	44.036073	-88.514390	9	R	P	NV																	
256	44.035713	-88.514399	5	S	P	1		3															
257	44.035353	-88.514408	4	S	P	1		1															
258	44.034993	-88.514417	4	M	P	3		2															
259	44.034633	-88.514426	3	M	P			3															
260	44.034273	-88.514435	3	S	P	1		2			1				1				1			1	
261	44.033913	-88.514444	4	R	P	1		1			1											1	
262	44.033553	-88.514453	5	M	P	1		1														1	
263	44.033193	-88.514462	4	R	P	1																2	
264	44.032833	-88.514471	5	M	P	1		2	1	1					1								
265	44.032473	-88.514480	6	R	P	2					1												
266	44.032113	-88.514489	6	M	P	1					1				1								
267	44.031753	-88.514498	5	R	P			1			1				1							1	
268	44.031393	-88.514507	6	R	P	1					1				2							1	
269	44.031033	-88.514516	4	R	P													1				2	
270	44.030672	-88.514525	5	R	P										1							1	
271	44.030312	-88.514534	5	R	P	1									1			1				1	
272	44.029952	-88.514543	7	R	P	1			1						2								
273	44.029592	-88.514552	5	M	P	1				1	1												
274	44.036066	-88.513891	6	M	P	1					1				1								
275	44.035706	-88.513900	5	S	P			1															
276	44.035346	-88.513909	4	S	P	1	1	1															
277	44.034986	-88.513918	4	M	P	1		2						1									
278	44.034626	-88.513927	5	M	P	1		1						1									
279	44.034266	-88.513936	5	S	P	1		2														1	
280	44.033906	-88.513945	4	S	P	1		1		1	1											1	
281	44.033546	-88.513954	5	M	P	1			1		1												
282	44.033186	-88.513963	5	R	P	1				1					1								
283	44.032826	-88.513972	6	R	P	1		1	1						1								
284	44.032466	-88.513981	6	R	P	2																	
285	44.032106	-88.513990	6	M	P	1					1				1								
286	44.031746	-88.513999	5	R	P										1							2	
287	44.031386	-88.514008	6	G	P				1		1							1				1	
288	44.031026	-88.514017	6	R	P						1				1							1	

Sample Point	Latitude (Decimal Degrees)	Longitude (Decimal Degrees)	Depth (ft)	Sediment type (M=muck, S=Sand, R=Rock)	Rope (R); Pole (P); Visual (V)	Myriophyllum spicatum	Potamogeton crispus	Ceratophyllum demersum	Elodea canadensis	Elodea nuttallii	Heteranthera dubia	Iris versicolor	Juncus pelocarpus	Lemna minor	Najas flexilis	Nitella species	Nymphaea odorata	Potamogeton pusillus	Potamogeton richardsonii	Spirodella polyrrhiza	Stuckenia pectinata	Vallisneria americana	Wolffia species
289	44.030666	-88.514026	5	R	P	1									2								
290	44.030306	-88.514035	6	R	P			1		1	1				1								
291	44.029946	-88.514044	7	R	P	1									1								
292	44.029586	-88.514053	6	M	P			1							1								
293	44.036060	-88.513392	8	R	P			1							1			1					
294	44.035700	-88.513401	5	R	P	1	1	3															
295	44.035340	-88.513410	5	M	P			3															
296	44.034980	-88.513419	4	M	P	2		2															
297	44.034620	-88.513428	4	M	P	1		3															
298	44.034260	-88.513437	5	S	P			3	1														
299	44.033900	-88.513446	6	M	P			3															
300	44.033540	-88.513455	4	M	P			3	1														
301	44.033180	-88.513464	4	R	P			3															
302	44.032820	-88.513473	3	R	P				1		1				1							1	
303	44.032460	-88.513482	6	R	P	1				1	1				1								
304	44.032100	-88.513491	6	M	P	1									1			1				1	
305	44.031740	-88.513500	6	R	P			1			1				1								
306	44.031380	-88.513509	7	M	P						1												
307	44.031020	-88.513518	8	R	P										1								
308	44.030660	-88.513527	8	R	P	V					1				1								
309	44.030299	-88.513536	9	M	P				1						1								
310	44.029939	-88.513545	9	M	P	NV																	
311	44.029579	-88.513554	10	R	P	NV																	
312	44.029219	-88.513563	6	R	P			1							1								
313	44.036053	-88.512893	8	R	P	NV																	
314	44.035693	-88.512902	5	R	P	1	V	2															
315	44.035333	-88.512911	5	M	P	1	1	1															
316	44.034973	-88.512920	5	M	P		1	3															
317	44.034613	-88.512929	44	R	P	1		3															
318	44.034253	-88.512938	4	S	P	1		2															
319	44.033893	-88.512947	5	R	P			1			1												
320	44.033533	-88.512956	5	M	P			3															
321	44.033173	-88.512965	4	M	P	1		1															
322	44.032813	-88.512974	5	M	P	V		1														1	
323	44.032453	-88.512983	6	R	P			3														1	
324	44.032093	-88.512992	6	M	P										1			1				2	

Sample Point	Latitude (Decimal Degrees)	Longitude (Decimal Degrees)	Depth (ft)	Sediment type (M=muck, S=Sand, R=Rock)	Rope (R); Pole (P); Visual (V)	Myriophyllum spicatum	Potamogeton crispus	Ceratophyllum demersum	Elodea canadensis	Elodea nuttallii	Heteranthera dubia	Iris versicolor	Juncus pelocarpus	Lemna minor	Najas flexilis	Nitella species	Nymphaea odorata	Potamogeton pusillus	Potamogeton richardsonii	Spirodella polyrrhiza	Stuckenia pectinata	Vallisneria americana	Wolffia species
325	44.031733	-88.513001	8	R	P	NV																	
326	44.031373	-88.513010	9	M	P																		
327	44.031013	-88.513019	9	M	P	NV		1															
328	44.030653	-88.513028	10	M	P			1															
329	44.030293	-88.513037	10	M	P	NV																	
330	44.029933	-88.513046	9	R	P	NV																	
331	44.036047	-88.512394	9	R	P			1							2								
332	44.035687	-88.512403	3	R	P			3															
333	44.035327	-88.512412	5	M	P			3						1									
334	44.034967	-88.512421	4	S	P	1		3															
335	44.034607	-88.512430	5	R	P	V		3															
336	44.034247	-88.512439	5	S	P			3															
337	44.033887	-88.512448	5	R	P	1		1	1														
338	44.033527	-88.512457	4	M	P			3															
339	44.033167	-88.512466	4	M	P			3															
340	44.032807	-88.512475	5	M	P			1															
341	44.032447	-88.512484	6	M	P				1		1				1							1	
342	44.036040	-88.511895	7	M	P			1							1								
343	44.035680	-88.511904	3	R	P	1		2		1													
344	44.035320	-88.511913	5	M	P			2															
345	44.034960	-88.511922	4	M	P	1		2	1														
346	44.034600	-88.511931	6	S	P			1														2	
347	44.034240	-88.511940	5	R	P			1													1	1	
348	44.033880	-88.511949	5	R	P			2															
349	44.033520	-88.511958	4	M	P			1			1												
350	44.035674	-88.511404	4	M	P	1		1															
351	44.035314	-88.511414	3	R	P	1		1			1												
352	44.029959	-88.515042	3	M	P					1												2	1
353	44.034954	-88.511423	6	S	P				1		1						V					1	

C

APPENDIX C

Miller’s Bay Aquatic Plant Management/Treatment Cost Comparison

Compiled by City of Oshkosh Parks Department

MILLER'S BAY AQUATIC PLANT MANAGEMENT
TREATMENT COST COMPARISON

The following cost comparison is based on data derived from the April 2009 Onterra (DRAFT) report and the treatment and/or plant harvest recommendations based on mapped acreage estimates that include navigational areas/lanes and habitat enhancement lanes. Cost data is based on 2009 equipment purchase and operating costs as well as 2010 chemical treatment costs. All treatment and harvest activities are subject to the permitting requirements of WI DNR.

The proposed 2010 Harvest Plan includes navigation areas/lanes approximately 20.9 acres and habitat enhancement lanes approximately 9.1 acres.

HARVESTER COSTS TO OWN AND OPERATE

Several aquatic plant harvester equipment vendors have been contacted for pricing of new equipment with the following estimate appropriate to our project. This item would be a capital purchase and then an annual operating budget cost if we choose to perform the ongoing work each season with city staff.

H5130 Harvester	$59,940	
w/options	$22,247 (extended package)	$5,814 (basic package)
SC-130 Shore Conveyor	$19,320	
w/ options	$4,796 (extended package)	$4,076 (basic package)
T-130 Trailer	$11,015	
Options	$3,842	
Total Equipment Cost	**$121,160** (All equipment w/extended packages)	
Or	**$114,007** (All equipment w/basic option packages)	

AVERAGE COST OF HARVESTER OPERATION BY CITY STAFF

Includes wages, benefits, operating supplies and fuel at an average of $330 per acre assuming a 0.5 acre per hour production estimate while on the lake. This cost is based on a similar WI community's actual staff and supplies cost for a program of similar scale. Included in this estimate is an additional 20% for mechanic and other staff necessary for the operation. The City of Oshkosh currently does not have sufficient staffing levels to operate a harvester.
Cost for navigation area and lanes (20.9 Ac.) = $6,897 each cutting event
Cost for habitat enhancement areas (9.1 Ac.) = $3,003 each cutting event
Estimated Total Cost of harvest each event = $9,900
Depending on conditions, approximately four (4) cutting events per year will be required (minimum**) = $39,600**

AVERAGE COST OF HARVESTER OPERATION BY CONTRACTOR

2010 rates based at $165 per hour on the lake with harvesting machine, shore elevator, dump truck and on-board guidance system plus $700 set up and mobilization charge per visit.
Operating rate of 0.5 Ac. Per hour on the lake with cost equal to $330/acre plus set up and mobilization each visit ($700).
Cost for navigation area and lanes each visit (20.9 Ac.)(41.8 hrs.) = $6,897+700 = $7,597
Cost for habitat enhancement areas (9.1 Ac.)(18.2 hrs.) = $3,003 (assumes part of navigational lane visit)
Estimated Total Cost (with set up and mobilization) of harvest each visit by contractor = $10,600
Depending on conditions, approximately four (4) visits per year will be required **= $42,400**

CHEMICAL CONTROL OF AQUATIC NATIVE AND INVASIVE SPECIES

(2010 rates) Two treatment events have been recommended specifically in the same areas treated in 2008 to include an early to mid-May application for control of the Eurasian Water Milfoil (non-native) and a later treatment of the same areas for Curly Leaf Pondweed and Coontail. The area to be treated is approximately fourteen (14) acres and addresses boat launch areas, sailboat mooring area and existing docking facilities. The sailboat mooring area is approximately 10.3 acres and would not be possible to harvest with mechanical equipment with mooring plugs in place.

CHEMICAL TREATMENT COST BASED ON ACREAGE TREATED IN 2008

2008 Permitted Treatment Area=13.8 Acres

Estimated treatment cost for 2008 areas (approximately 14 acres) = $27,300 (2010 estimate)

Historical Information for 2008 indicates that 13.84 acres of treatment were permitted by the DNR (see map #8). The following treatments were done over the course of the summer:

-June 10, All of Site A (10.33 acres)
-June 26, Southern part of Site A (2.07 acres), All of Site B (0.88 acres), Site C (1.52 acres) and Site D (1.11 acres). Total treatment acreage=5.58 acres.

-July 30, Western half of Site A (4.64 acres), Shoreward 2/3 of Site D (0.73 acres), and a 36’ by 100’ site not contained within the original permit but verbally authorized by the WDNR (0.08 acres). Total treatment acreage = 5.45 acres.

-According to the billing received by the City of Oshkosh and the treatment records, approximately 21.31 acres of treatment were completed over the summer at the cost of $20,577.60. The treatments performed well and cost an approximate average of $965/acre.

SUMMARY OF CHEMICAL TREATMENT AND/OR HARVEST COSTS
2010 ESTIMATES

CONTRACTOR HARVEST 30 ACRES (based on 4 cutting events**) = $42,400**

CITY STAFF HARVEST 30 ACRES (plus cost of harvester purchase above**) = $39,600**

CONTRACTOR HARVEST 13.8 ACRES (may not be able to perform more than one event at plugs, estimate based on 4 cuttings**) = $21,016**

CITY STAFF HARVEST 13.8 ACRES (may not be able to perform more than one cutting event at plugs, estimate based on 4 cuttings**) = $18,216**

CHEMICAL TREATMENT 13.8 ACRES (not to exceed price subject to current conditions**) = $27,300**