

AMENDMENT

Aquatic Plant Management Plan, Lake Mendota, Lower Rock River Basin, Dane County Wisconsin

Approved by the Dane County Lakes and Watershed Commission on April 10, 2014 and by the Wisconsin Department of Natural Resources on March 27, 2014

Prepared by Sue Jones, Dane County Office of Lakes and Watersheds, with assistance from Jim Leverance, Darren Marsh, and Pat Sheahan. Mapping by Michelle Richardson, Dane County Land and Water Resources Department, Administration Division.

Plant surveys conducted by James Scharl of Stantec Consulting Services Inc. (2011) for the Dane County Office of Lakes and Watersheds. The Wisconsin Department of Natural Resources provided funding to the Office of Lakes and Watersheds to support this plan amendment.

Introduction

This is an update to the Aquatic Plant Management Plan, Lake Mendota, Lower Rock River Basin, Dane County Wisconsin, published in January 2007 by the Dane County Office of Lakes and Watersheds. The Wisconsin Department of Natural Resources approved the 2007 plan on March 17, 2007 and the Dane County Lakes and Watershed Commission approved the plan on April 12, 2007. Aquatic Plant Management Plans are required under NR 109.04(d), Wisconsin Administrative Code, to guide mechanical harvesting activities and the effective management of aquatic plants in water bodies.

This plan is prepared in support of Dane County's permit for its mechanical aquatic plant harvesting program, operated in accordance with NR 109 Wisconsin Administrative Code. Individuals and groups that propose herbicide treatments of aquatic plants in Dane County waters would need to go through a separate planning and permitting process with the Wisconsin Department of Natural Resources.

Recent Plant Survey Methods and Results

Dane County contracted with Stantec Consulting Services Inc. to conduct the aquatic plant community of Lake Mendota on August 8-9, 2011.

Stantec followed state protocols and used the point intercept method. Refer to the point intercept maps in the 2007 plan for the sampling locations for the Mendota surveys.

Table 1 below indicates species present during the 2011 survey for Lake Mendota, and Figure 1 indicates species richness from 1989-2011 for Lake Mendota.

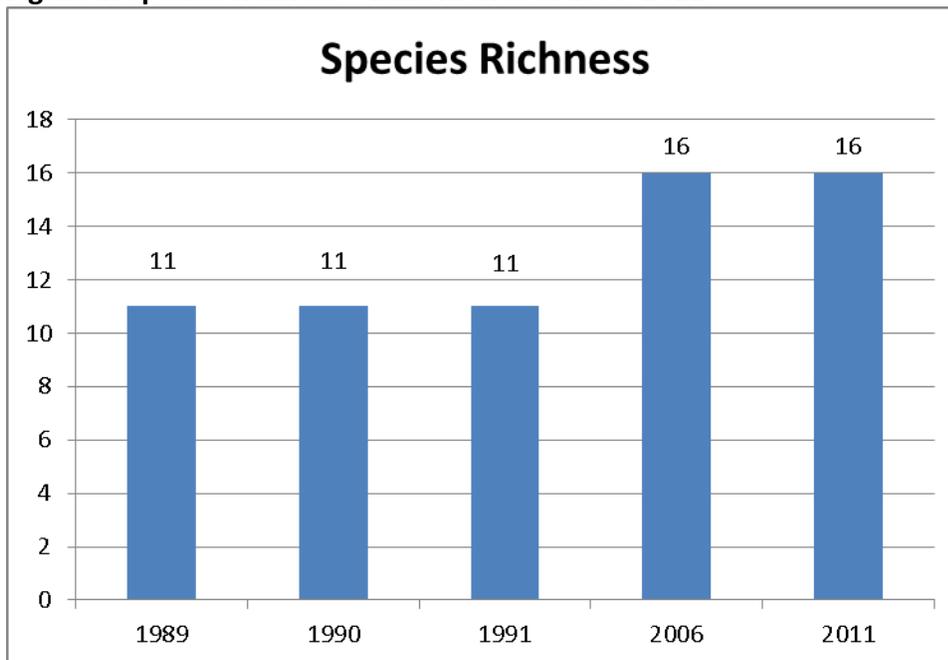
Species richness is a count of the total number of different plant species found in a lake. Generally, the better the water quality the higher the species richness count.

Appendix A includes Lake Mendota plant statistics from the 2011 Stantec survey. Appendix B includes maps of aquatic plant distributions for Lake Mendota in 2011.

Table 1. Species present during 2011 aquatic plant survey – Lake Mendota

Genus	Species	Common Name	Category
<i>Algae</i>	<i>sp.</i>	Filamentous algae	Submersed
<i>Ceratophyllum</i>	<i>demersum</i>	Coontail	Submersed
<i>Chara</i>	<i>sp.</i>	Muskgrass	Submersed
<i>Elodea</i>	<i>canadensis</i>	Common waterweed	Submersed
<i>Heteranthera</i>	<i>dubia</i>	Water star-grass	Submersed
<i>Lemna</i>	<i>minor</i>	Small duckweed	Free floating
<i>Myriophyllum</i>	<i>spicatum</i>	Eurasian watermilfoil	Submersed - Invasive
<i>Najas</i>	<i>flexilis</i>	Bushy pondweed	Submersed
<i>Nelumbo</i>	<i>lutea</i>	American lotus	Emergent
<i>Nymphaea</i>	<i>odorata</i>	White water lily	Floating-leaf
<i>Potamogeton</i>	<i>illinoensis</i>	Illinois pondweed	Submersed
<i>Potamogeton</i>	<i>richardsonii</i>	Clasping-leaf pondweed	Submersed
<i>Potamogeton</i>	<i>zosteriformis</i>	Flat-stem pondweed	Submersed
<i>Vallisneria</i>	<i>americana</i>	Wild celery	Submersed
<i>Wolffia</i>	<i>columbiana</i>	Common watermeal	Free floating
<i>Zannichellia</i>	<i>palustris</i>	Horned pondweed	Submersed

Figure 1. Species richness – Lake Mendota 1989-2011



Discussion of historical plant community changes

Definition of terms used in this section

Statistical and limnological terms (e.g. Floristic Quality Index, Coefficient of Conservatism) used in this section are more fully described in the 2007 aquatic plant management plan for Lake Mendota. Please refer to that plan for additional background.

Maximum depth of plant growth is the deepest depth at which plants were found in the lake. This is a function of water clarity. The clearer the water, the better the light penetration and presumably the deeper plants are able to grow. Not all plants grow in deep water some may prefer the shallower parts of the lake, but with clearer water the opportunity to grow deeper is available. Oligotrophic lakes (very clear water lakes) will have some plants growing in waters deeper than 20 feet. Hypereutrophic lakes (the opposite of oligotrophic) are characterized by excessive algal blooms and turbid poor water quality and clarity. Rooted plants are few, and restricted to either unusual weather conditions or very shallow water where light can penetrate. Plant diversity is usually restricted to species that can tolerate poor water clarities.

Frequency of occurrence is calculated by taking the total number of times a species is sampled divided by the total number of points at which depth was less than or equal to the maximum depth of plant growth.

The photic zone is the area where light penetrates enough to support plant growth.

The Floristic Quality Index (FQI) is a metric that evaluates the closeness of the flora in a lake to that of an undisturbed condition. The higher a FQI value, the closer that plant community is to an undisturbed ecosystem. Just for reference, compare a lake's numbers to the statewide average (24) or ecoregion average (20)(lakes also within the Southeast Glacial Plains ecoregion - see map here http://dnr.wi.gov/topic/landscapes/documents/StateMaps/Map_S1_Els.pdf), calculated from a subset of approximately 250 lakes across Wisconsin.

Coefficients of conservatism (C) range from 0 to 10 and represent an estimated probability that a plant is likely to occur in a landscape relatively unaltered from what is believed to be a pre-settlement condition (see the end of Table 3 in Appendix A). The lower numbers indicate more of a disturbed ecosystem, while the higher numbers indicate a community more like one that would have been found before human settlement.

Lake Mendota

Between 1989 and 1991, the aquatic plant community remained consistent on Lake Mendota. However, in 2006 an increase in community diversity and makeup was observed and remained consistent to the 2011 survey.

The aquatic plant community of Lake Mendota was surveyed on August 8-9, 2011. Earlier surveys indicated 11 total species to a maximum depth of 13 feet. These surveys were

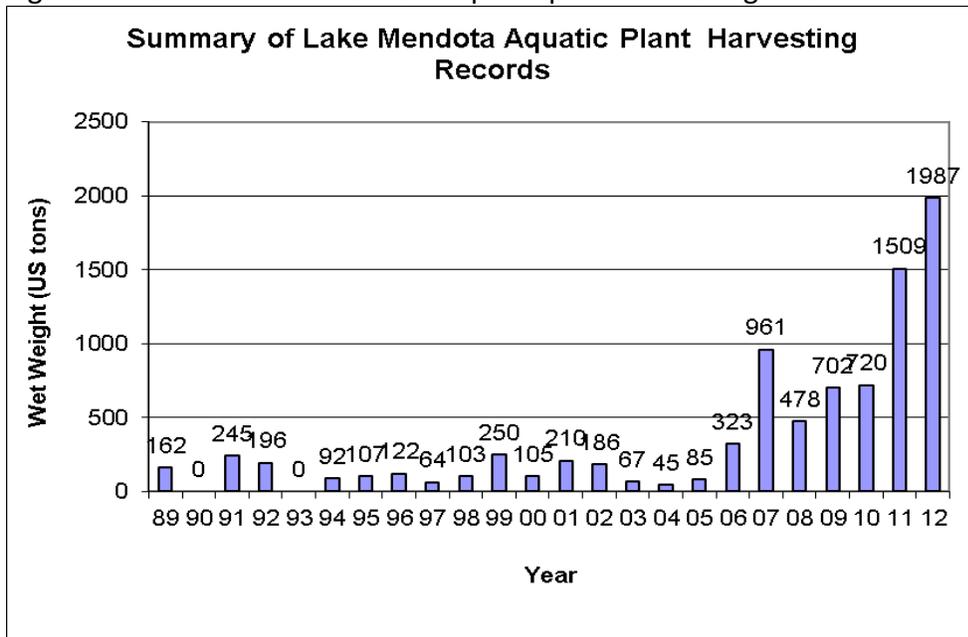
dominated by coontail, Eurasian watermilfoil (EWM), and sago pondweed. A survey in 2006 showed an increased plant depth to 16 feet and diversity to 16 total species. Coontail and EWM remained dominant while common waterweed increased by 38%. The 2011 survey showed similar, overall community statistics mirroring the species richness and maximum depth of plants found in 2006. However, the most prevalent species found is now wild celery, while coontail and EWM are still abundant within the lake. Over these sampling periods, the FQI and average coefficient of conservatism (C) both increased. From 1989-1991, the FQI and average C were stable at 15 and 5, respectively. In 2006, these rose to 19.14 and 5.31 and then rose in again after the 2011 survey to 20.58 and 5.5. These values can be used to gauge the health of the lake and potentially show an increasingly healthy aquatic plant community on the lake.

Using the two most recent surveys, 16 species were identified during both surveys. Though maximum depth remained the same at 16 feet, the amount of photic zone inhabited by plants decreased from 67.04% to 51.36%. Wild celery saw the biggest increase in abundance from 9.0% relative frequency to 29.6% while EWM also increased. Bushy pondweed, Illinois pondweed, and common watermeal are new species found during the 2011 survey while curly-leaf pondweed (invasive species), leafy pondweed, and sago pondweed were not found in 2011 but were found in 2006. While these species were likely present during each survey, due to the relatively low frequency of occurrence and the dynamic nature of aquatic ecosystems their abundance may have changed slightly between the two surveys. Given this, the presence or absence of these species should not be a cause for concern, but should be monitored on future surveys.

Recent Chemical and Harvesting Aquatic Plant Management Records

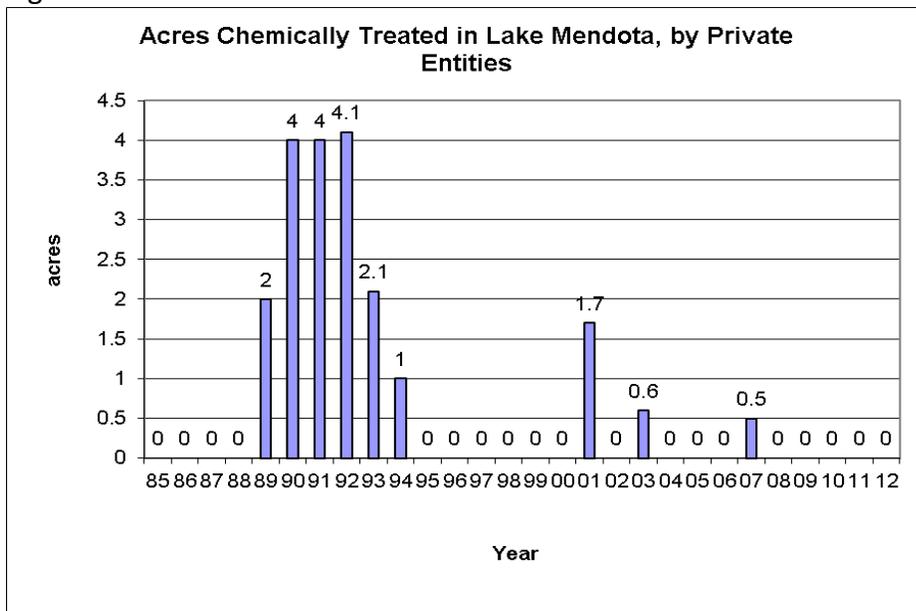
Figure 2 summarizes Dane County's mechanical harvesting operations in Lake Mendota since 1989. Figure 3 indicates chemical treatments of aquatic plants by private entities.

Figure 2. Historical Lake Mendota aquatic plant harvesting records



Please note that, starting in 2006, Dane County changed the way it records total harvested plant weight. In the 2007 plan for Lake Mendota, one truck load of harvested plants was equated with one ton. Beginning in 2006, Dane County uses a formula to more precisely estimate the wet weight of one truck load, expressed in U.S. tons. What may seem to be a dramatic increase in harvested plant amounts compared to 2005 and earlier is likely mostly due to this change in estimating harvested weights.

Figure 3. Historical Lake Mendota chemical treatment records



Public input opportunities

Dane County Land and Water Resources Department staff held a public information and input meeting on March 20, 2013, at the Middleton City Hall, with approximately five area residents present. The focus of the meeting was lakes Mendota and Monona; Fish, Indian and Crystal Lakes; Tenney, Warner and Vilas Lagoons. Attendees represented the Yahara Lakes Association and Lake Mendota and Monona residents who enjoy these lakes for recreation and aesthetics.

At this meeting, Dane County and DNR staff presented current plant data from Lake Mendota (the maps found in Appendix B), following an overview of the ecological importance of aquatic plants and the current harvesting operation. Dane County staff invited comments on suggested revisions to the plan goals, recommendations, and harvesting operations.

No specific suggestions were made about updating the 2011 plan's goals and recommendations.

Public comments were also solicited via email, press release, and the danewaters.com website. No direct emails or correspondence was received regarding Lake Mendota.

A draft plan amendment was posted on the www.danewaters.com website in spring 2013, and comments requested via email and other direct outreach to parties interested in this waterbody. No comments were received on the draft plan amendment for Lake Mendota. The final draft plan amendment was posted for comment in spring 2014, and no comments were received.

Aquatic Plant Management in Dane County

The overall goal of Dane County's mechanical harvesting program is to cut and harvest Eurasian watermilfoil and other invasives to help provide for reasonable use of the lakes for boating, fishing and swimming, while preserving the health and balance of the lake ecosystem. During periods of high water, harvesting of plants in the Yahara River between lakes Waubesa and Kegonsa becomes the highest priority.

Aquatic plant growth varies from lake to lake and year to year. Dane County employs a Plant Scout to evaluate plant growth conditions and recommend appropriate harvesting in response, within the limits of the plan harvesting priority areas and DNR permit. In times of heavy plant growth, local residents often advocate for additional harvesting in their areas, harvesting longer into the season (into the fall), or dedicating a harvester for a particular waterbody. County managers need to balance staff and harvesting equipment resources and priorities with needs and ecological conditions countywide. Local groups or individuals always have the option of contracting with the county for additional harvesting and special event harvesting, within the boundaries of the permit. Additional information about contract harvesting is available here: www.countyofdane.com/lwrp/parks/aquatic_plant_harvesting2.aspx#garden.

Dane County, Wisconsin Department of Natural Resources, and the U.S. Army Corps of Engineers completed a research project in 2013 that evaluated the response of selective early-season herbicide application and cutting of aquatic plants on Turville Bay, the southwest area of Lake Monona, on Eurasian watermilfoil (EWM, an invasive aquatic exotic plant) and on native plant communities. The complete project report and a summary fact sheet are available at www.danewaters.com.

Eurasian watermilfoil begins growing early in the year, and creates a dense growth canopy which shades out native plant species. Cooperating scientists and managers wondered if controlling EWM early in the season would give an advantage to native plants. The research project found that both herbicide and harvested early-season treatment resulted in significant decreases in EWM. Mechanical harvesting produced more variable results, but better protected native coontail plants. The herbicide treatment resulted in longer control of EWM than mechanical harvesting.

One outcome of this research is that Dane County staff may identify small areas in larger lake systems for early-season mechanical harvesting to provide nuisance control of EWM, as resources and priorities permit.

Dane County holds annual training sessions for new and returning harvester operators before the harvesting season begins. In that training, permanent and seasonal staff receive instruction on many topics including aquatic invasive species prevention protocols, plant identification, and communications. The Lakes Management Supervisor directs the day-to-day operations of the staff, guided by the Parks Director who is informed of plant conditions and harvesting needs by the Plant Scout. Particular concerns with a water body; deep versus shallow harvesting; collection of plant fragments from harvesters, plant senescence, and boat propellers etc. are all addressed in the supervision.

Working closely with the Wisconsin Department of Natural Resources, the Dane County Land and Water Resources Department has developed harvesting priority maps that are included in many of the aquatic plant management plans and referred to in DNR harvesting permits issued to Dane County. Not every area that is identified for potential harvesting on the map will be harvested in any given harvesting season if there is little to no plant growth, because attention to higher priority areas does not permit it, or due to budget constraints. Harvester operators are instructed not to cut and remove plants outside of harvesting priority areas identified on these maps, unless authorized by their Supervisor in consultation with the Wisconsin Department of Natural Resources.

Harvesting machines are designed to collect and remove plant fragments. Dane County also helps clean up plant materials at beaches and other public access points, even when the plant material is not associated with harvesting operations.

Limits of the equipment, staff, and budget mean that plant harvesting for aesthetics, collection of wind-blown plant fragments due to boat propeller action, and the removal of plants that release from the sediment and float free in the fall cannot generally be accomplished. However,

program managers do their best to accommodate requests for collection of naturally-occurring windblown and boat motor chopped plant fragments near shorelines, as time and budget permit. The Dane County Lake Management Operations Manual provides instructions to harvesting machine operators about plant fragment collection.

There is a common misperception that excessive external nutrients carried into lakes in runoff from the watershed causes macrophyte (large aquatic plant) problems. In fact, external nutrient loading usually produces algal blooms that shade and reduce macrophyte biomass. Attempts to control biomass by controlling nutrients in the water column are unproductive, according to G. Dennis Cooke and others in the third edition of *Restoration and Management of Lakes and Reservoirs* (2005). This is because rooted macrophytes, such as the nuisance Eurasian watermilfoil, usually get their phosphorus and nitrogen directly from sediments. In the short-term, reduced phosphorus in the water column resulting from watershed controls may actually result in more macrophyte growth, because clearer water permits more light penetration that fosters plant growth.

It could take many years to reduce the historical nutrient additions to lake sediments especially in agricultural areas. Much important work is underway in the Yahara River watershed to reduce watershed phosphorus loadings. Long-term, scientists and managers hope that community efforts can reduce sediment phosphorus, thereby more directly affecting plant growth.

Recommended management

Dane County staff have reviewed the plant survey data and public input, and recommend the updated management elements found in this section.

Lake Mendota Goals

Because Eurasian watermilfoil has dominated the littoral zone for several decades, the goals for managing Lake Mendota aquatic plants are to: (1) improve recreational access in the lake, (2) protect areas of unique natural value and historical significance, and (3) restore documented losses and declines of high value species [NR 107.08(4)] in the lake including large-leaf pondweed (*Potamogeton amplifolius*), Illinois pondweed (*Potamogeton illinoensis*), clasping-leaf pondweed (*Potamogeton richardsonii*), horned pondweed (*Zannichelia palustris*), wild celery (*Vallisneria Americana*), sago pondweed (*Struckenia pectinatus*), bulrush (*Scirpus*), and wild rice (*Zizania*). Other important native plants that have declined in Lake Mendota and also require protection include flat-stem pondweed (*P. zosteriformis*) yellow water lily (*Nuphar*), white water lily (*Nymphaea tuberosa*), American lotus (*Nelumbo lutea*), *Chara*, slender naiad (*Najas flexilis*), leafy pondweed (*Potamogeton foliosus*), and water stargrass (*Heteranthera dubia*).

These overarching aquatic plant management goals are coupled with the more specific goals of Dane County's mechanical harvesting program: to cut and harvest Eurasian watermilfoil and

other invasives to help provide for reasonable use of the lakes for boating, fishing and swimming, while preserving the health and balance of the lake ecosystem.

Lake Mendota Recommendations

1. Conduct large-scale mechanical harvesting in areas where Eurasian watermilfoil inhibits boating access and recreation. Avoid designated or proposed Critical Habitat Areas under Wisconsin Administrative Codes. (Designation of Critical Habitat Areas is a DNR decision.)
2. Consider options for reducing motorboat impacts to floating-leaf plants (American lotus and white water lily) in University Bay and Governor's Island sheltered coves.
3. Consider expanding floating-leaf plant beds and introducing high value species (historically found in the lake) within proposed Critical Habitat Areas, University Bay and Governor's Island sheltered coves.
4. The Dane County Plant Scout should document occurrences of high value native plants in regular scouting reports, including shoreline reference and GPS location. Dane County staff should make an annual summary report of these occurrences available to the public.
5. Dane County mechanical harvesting crews should continue to take steps to prevent the spread of exotic invaders across Dane County lakes and streams. These steps include removing any visible plants, mud, debris, water, fish or animals from the machinery and thoroughly washing the equipment.

Proposed Critical Habitat Areas

Wisconsin DNR's website describes the importance of the DNR's designation of Critical Habitat Areas as follows: "Every waterbody has critical habitat - those areas that are most important to the overall health of the aquatic plants and animals. Remarkably, eighty percent of the plants and animals on the state's endangered and threatened species list spend all or part of their life cycle within the near shore zone. As many as ninety percent of the living things in lakes and rivers are found along the shallow margins and shores. Wisconsin law mandates special protections for these critical habitats. Critical Habitat Designation is a program that recognizes those areas and maps them so that everyone knows which areas are most vulnerable to impacts from human activity. A critical habitat designation assists waterfront owners by identifying these areas up front, so they can design their waterfront projects to protect habitat and ensure the long-term health of the lake they where they live."

Lake Mendota

Dane County staff recommend two additions to the Critical Habitat Areas designated in the 2007 Aquatic Plant Management Plan (called "sensitive areas" in the 2007 plan). They are: 1) an area north of the beach at Governor Nelson State Park, and 2) an area of shoreline between the Yahara River and Sixmile Creek.

Similar to Lake Monona, the undeveloped shoreline and off-shore reef areas on the lake already designated should continue to be designated into the future. Areas of emergent and floating-leaf vegetation are similar to those found in 2007 and should continue to be protected. Figure 4 indicates proposed amended Critical Habitat Area map for Lake Mendota.

Figure 4. Proposed Critical Habitat Areas for Lake Mendota



Harvesting Priorities

Dane County holds annual training sessions for new and returning harvester operators before the harvesting season begins. In that training, permanent and seasonal staff receive instruction on many topics including aquatic invasive species prevention protocols, plant identification, and communications. The Lakes Management Supervisor directs the day-to-day operations of the staff, guided by the Parks Director who is informed of plant conditions and needs by the Plant Scout. Particular concerns with a water body, deep v. shallow harvesting, collection of plant fragments from harvesters, plant senescences, boat propellers etc. are all addressed in the supervision.

The harvesting priorities map for Lake Mendota (Figure 5) shows areas that may be harvested. Additional background on harvesting priorities is found in the Lake Management Operations Manual and posted on the Office of Lakes and Watersheds website (www.danewaters.com). Annual training and daily supervision of harvester operators reinforce that plants should be harvested only from these planned areas, unless a variance from the plan has been approved

by Wisconsin DNR. Actual effort is dictated based on plant conditions, as evaluated and reported by Dane County’s Plant Scout.

Changes to harvesting priorities proposed from the 2011 plan:

- Extends a “recreation and navigational and beach access” cut area directly east into deeper water from the Governor Nelson State Park boat landing
- Indicates an “undeveloped shoreline” no-cut area north of Governor Nelson beach
- Designates the Yahara estuary (the northern area where the Yahara River flows into Mendota) down to Governor’s Island (west of Warner Bay) as an “undeveloped shoreline” no-cut area
- Adds a “recreation and navigational and beach access” cut area in the area locally called the “Six Pack” (referring to the six navigational buoys), west of the Mendota Mental Health Institute
- Expands the “recreation and navigational and beach access” in Warner Bay
- Adds a “recreation and navigational and beach access” cut area at the UW Madison Hooper mooring field
- Extends the “undeveloped shoreline” no-cut area around Frautschi Point on the UW Madison campus, west of Picnic Point

Figure 5. Lake Mendota harvesting priorities

