Chapter III

LAKE MANAGEMENT RECOMMENDATIONS AND IMPLEMENTATION

INTRODUCTION

Hooker Lake is a valuable resource to lake residents and visitors, contributes to the economy and quality of living in the local area, and is important asset to the overall hydrology and ecology of the larger Des Plaines River watershed due to its role as a headwater lake. This chapter provides actionable suggestions that help maintain and enhance the health of the Lake and encourage its continued enjoyment. Recommendations provided in this chapter are based upon the data analyses and interpretations provided in Chapter II.

The recommendations made in this chapter cover a wide range of programs and seek to address every aspect that significantly influences the health and recreational use of Hooker Lake. Consequently, it may not be feasible to implement every recommendation immediately. To assist efficient plan implementation, the importance and significance of each recommendation is described lake managers to prioritize plan elements. Nevertheless, all recommendations should eventually be addressed, subject to possible modification based on analysis of data collected in the future (e.g., future aquatic plant surveys and water quality monitoring), project logistics, or changing conditions.

The measures discussed in this chapter are primarily focused on those that can be implemented through collaboration between the Hooker Lake Management District, the Town of Salem, the Village of Paddock Lake and Hooker Lake residents. However, partnerships with WDNR, developers, landowners, and other nearby municipalities are likely very important and necessary to ensure the long-term ecological health of Hooker Lake. Therefore, people engaging in Hooker Lake management efforts are encouraged to continuously seek out projects and partnerships that will aid in implementing the recommendations contained within the plan.

Though the logistics for implementing each recommendation may not be fully described, this chapter does suggest potential projects. It is important to note that these project suggestions do not necessarily constitute recommendations; they are presented to provide the implementing entities with ideas about the type and nature of projects to pursue. In summary, this chapter provides a context for understanding what needs to be done, as well as to help those implementing the plan picture what such efforts may look like and embrace the overall intent.

ISSUE 1: WATER QUALITY

As described in Chapter II, limited water quality data is available for Hooker Lake. The few available data sets suggest that Hooker Lake has historically been a eutrophic (high nutrient level) lake. Even though data sets suggest that the Lake is becoming a less fertile mesotrophic lake, many lake residents continue to express concern about various water-quality-related issues including sources of pollution in the watershed and overly abundant aquatic plant and algal growth. These factors suggest that water quality management is warranted on the Lake.

Management efforts to improve Hooker Lake water quality should focus primarily on the following strategies:

1. **Continue to actively track key water quality parameters.** Water quality monitoring is an important tool that allows the Lake's current condition to be quantified, longer-term changes to be understood, and the factors responsible for change to be identified. Monitoring is a key factor to maintaining and improving Lake health. Therefore, regularly recurring water quality monitoring should be a high priority. To allow comparison with previously collected data and, thereby, allow trends to be identified, sample collection should continue at the site identified as the "deep hole" (i.e., the point above the deepest part of the Lake). Laboratory samples should be collected in early spring shortly after ice out (e.g., early April) and at least once during mid-summer (e.g., late July). Collect field measurements (e.g., water clarity, temperature, and dissolved oxygen) much more frequently. At a minimum, these samples should be analyzed for the following parameters:

    a. Field measurements
        - Water clarity (i.e., Secchi depth in the Lake)
        - Temperature (profiled over the entire water depth range at the deepest portion of the Lake with more frequent readings near the thermocline)
        - Dissolved oxygen (profiled over the entire water depth range at the deepest portion of the Lake with more frequent readings near the thermocline)

    b. Laboratory samples
        - Total phosphorus (near-surface sample with supplemental samples collected near the deepest portions of the Lake)
        - Total nitrogen (near-surface sample)
        - Chlorophyll-*a* (near-surface sample)
        - Chloride (near-surface sample),

    The Clean Lakes Monitoring Network (CLMN) provides training and guidance on monitoring the health of lakes. Volunteers commonly monitor water clarity, temperature, and dissolved oxygen throughout the open water season (preferably every 10 to 14 days) and basic water chemistry (i.e., phosphorus and chlorophyll-*a* concentrations) four times per year (two weeks after ice off and during the last two weeks of June, July, and August).

    Because of their simplicity, utility, and low cost, it is highly recommended that field measurements (water clarity, temperature profiles, oxygen profiles) be taken much more frequently than the minimums described above. Lake conditions can change rapidly and frequently, and more frequent measurements can help lake managers identify and quantify important water quality issues. Supplemental temperature/oxygen profiles collected at other times of the year (e.g., other summer dates, fall, and winter) would be especially helpful to understand lake mixing. Additionally, oxygen profiles should be collected during midsummer in the nighttime hours just before sunrise to help evaluate diurnal oxygen saturation swings.

Laboratory tests quantify the amount of a substance within a sample under a specific condition at a particular moment in time, and are particularly valuable benchmark values. **Field measurements can often serve as reasonable surrogates for common laboratory tests.** For example, water clarity decreases when total suspended solids and/or chlorophyll-*a* concentrations are high, samples with high concentrations of total suspended solids commonly contain more phosphorus, and water with higher specific conductance commonly contains more salt and, therefore, more chloride. Periodically sampling water and running a targeted array of laboratory and field tests not only provides data for individual points in time, but can also allow laboratory/field test results to be compared. Once a relationship is established between laboratory and field values, this relationship can be used as an inexpensive means to estimate the concentrations of key water quality indicators normally quantified using laboratory data. Chloride concentrations should continue to be monitored to quantify the rate concentration increase over time, to gauge the overall impact of cultural influence on the Lake, and to evaluate if chloride concentrations are approaching levels that could damage the Lake's ecosystem.

In addition to the in-lake monitoring, **water quality should continue to be monitored at the six tributary streams (Map 3).** Since there is concern about external phosphorus loading potentially entering the Lake through the tributary streams, stream water quality sampling should be considered a high priority. Samples should be collected to represent a cross section of flow events (i.e. low, medium and high). Notations should be made by the sampler regarding current and recent weather conditions and qualitative description of flow and water quality (e.g., "creek is very high and muddy"), and the exact location, date and time where the sample was collected. Sampling parameters should include the following:

- Stream flow – methods in Appendix K
- Water clarity (transparency tubes, see below)
- Total phosphorus
- Total nitrogen
- Chloride
- Temperature
- Dissolved oxygen

Flow rate information allows the actual mass load of phosphorus contributed from the tributaries and the areas they drain to be estimated and compared. A field method to quantify actual flow in streams is included in Appendix K. The amount of water delivered from each tributary can also be estimated using empirical formulae (e.g., the Rational Method) and models (e.g., TR 55, SWMM). These flow estimates can be combined with water quality information collected in the tributary streams to estimate mass loadings from each stream. The Town of Salem has developed a stormwater management plan. As part of this effort, flows and water quality from various watersheds have been simulated.[1] These data may also be combined with future water quality results generated by the HLMD. Calculating mass loading using modeled flow rates should be considered a high priority. This information can then be used to target priority tributaries, seasons, and events for water quality analyses.

In addition to quantifying flow, general information should be collected regarding weather, stream water quality, and other factors. Creek depths typically make direct clarity measurement impossible; however

[1]*Information regarding the Town of Salem's stormwater management program may be found at the following website:http://www.townofsalem.net/index.asp?SEC=ECC25DEF-D98F-4529-913D-713DF6BAC4D0&Type=B_BASIC. The Village of Paddock Lake may have a similar document.*

transparency tubes (sometimes called turbidity tubes) provide a convenient way to quantify water clarity in shallow water. Transparency tubes are available from several vendors and cost well under $100. Water clarity information is simple and inexpensive to collect and can provide much insight into the day-to-day water quality of tributary streams.

Parameters may be added or deleted or and sampling frequency may be increased or decreased to focus resources on the watersheds identified or suspected to have the greatest impact to the Lake's water quality. For example, Salem Oaks tributary commonly produced samples with the highest concentrations of several pollutants, and could be a priority for future sampling and observation. Depending upon the watershed and sample results, action should be taken to help reduce pollutant loadings. For example, if phosphorus was detected in high concentrations in a tributary draining residential areas, efforts to communicate "best management practices" (BMP's) to homeowners should be reinforced, stormwater management infrastructure inspected, actions to protect and expand wetlands and buffers increased, and other factors considered. Intensified and/or expanded monitoring may help pinpoint source areas for particular attention.

Regular water quality monitoring helps Lake managers promptly identify variations in the Lake's water quality and improves the ability to understand problems and propose solutions. Given the rapidly changing landscape in which the Lake is situated, water quality and the conditions influencing water quality can rapidly change. Regular review and revision of water quality monitoring recommendations should be considered a high priority.

2. **Protect and enhance buffers, wetlands, and floodplains.** Protecting these features helps safeguard areas that already benefit the Lake and requires little to no additional input of money and labor. For this reason, protecting such areas should be considered high priority. **Enhancing these features is often a cost-efficient way of increasing the level of lake protection** and should be considered a medium priority. Efforts should begin by targeting direct residential inflow sources (i.e., the lake shoreline properties) and various sources from properties adjacent to the mapped tributary streams. Efforts may extend to adjacent properties as suitable. Implementation of this recommendation could involve:

    a. Continue to carefully control and limit development in SEWRPC-delineated primary environmental corridors (see Map 23 in Chapter II of this report) to protect existing natural buffers, floodplains, and wetlands systems. This may be accomplished through local zoning.

    b. Continue to enforce zoning standards set forth in Chapter NR115 of the *Wisconsin Administration Code* (Wisconsin's Shoreland Protection Program); i.e., 75 feet minimum setback from the ordinary high water mark along navigable waters in the watershed.[2]

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[2] *The 2015-2017 State Budget (Act 55) changed State Law relative to shoreland zoning. Under Act 55 a shoreland zoning ordinance may not regulate a matter more restrictively than it is regulated by a State shoreland-zoning standard unless the matter is not regulated by a standard in Chapter NR 115, "Wisconsin's Shoreland Protection Program," of the* Wisconsin Administrative Code. *(Examples of unregulated matters may involve wetland setbacks, bluff setbacks, development density, and stormwater standards.) In addition, under Act 55, a local shoreland zoning ordinance may not require establishment or expansion of a vegetative buffer on already developed land and may not establish standards for impervious surfaces unless those standards consider a surface to be impervious if its runoff is treated or is discharged to an internally drained pervious areas. Additional legislation relative to shoreland zoning enacted after the 2015-2017 state budget legislation includes Act 41 which addresses town shoreland zoning authority relative to county authority (effective date: July 3, 2015) and Act 167which codifies and revises current Wisconsin Department of Natural Resources shoreland zoning standards.*

c. Provide information to shoreland property owners and landowners along mapped tributaries. This information should describe the benefits near-shore aquatic and terrestrial buffers provide to the Lake, and help encourage landowners to protect buffers where they still occur; and enhance, restore or create buffers in other favorable areas where none remain. This information could include installation instructions and typical costs. Such programs would be most productive if accompanied by an incentive program that helps share the cost of installation or provides tax incentives.

   Two examples of programs that could enhance buffers in the watershed include rain gardens in residential areas and Farm Service Agency programs such as the Conservation Reserve Program (CRP) and affiliated Conservation Reserve Enhancement Program (CREP) in agricultural areas. Both of these initiatives use vegetation to slow and filter stormwater runoff. If thoughtfully designed and located, groundwater recharge may also be enhanced. Grants may also be able to be procured for novel initiatives such as cropped buffers, where farmers receive a compensatory payment for growing crops that help filter runoff.

d. Consider a shoreline best management practice and shoreline buffer enhancement program. This program could encourage the development of rain gardens or buffers along the shoreline. Rain gardens can sometimes be combined with buffer strips for additive benefit. WDNR recently introduced a "Healthy Lakes" grant program that could help fund some of these efforts (Appendix L).

e. Consider obtaining conservation easements and purchasing wetlands, floodplains, and uplands in key areas. Buffers can be preserved indefinitely and can their ecological value enhanced to improve their habitat, filtering, and hydrologic functions. An example of such an approach is restoring runoff water storage capacity of the internally drained basins located to the west of the Lake. This would likely entail negotiating an agreement to compensate the owner for loss of agricultural value. Property leases, payments to supplant lost productivity, or property acquisition are examples of agreements that could enable such activities.

3. **Protect buffer, wetland, and floodplain function** by controlling invasive species that threaten ecological value. Additionally, relax human-imposed constraints placed upon watercourses. These efforts should be considered a medium priority. An example invasive species recommendation is to **monitor and control reed canary grass in wetlands and shorelands.** This species, a two- to nine-foot tall grass, spreads and quickly displaces native wetland plants that help treat polluted water before it reaches the Lake and which provide valuable wildlife habitat. Consequently, a visual survey of appropriate watershed and shoreline locations is recommended to determine whether reed canary grass is a problem. If it is found to be an issue, the infestation should be promptly eradicated.[3] Human-imposed constraints commonly manifest themselves as stream reaches that are ditched, aggressively eroding, and debris choked, incised, and or diked. Such reaches should be targeted for naturalization.

4. **Protect remaining woodlands.** Perhaps the largest threat posed to woodlands in Southeastern Wisconsin is the combined problem of diseases and insects that destroy the native tree canopy and invasive plants such as buckthorn (common buckthorn *Rhamnus cathartica* and glossy buckthorn *Frangula alnus*) that inhibit or prevent native tree regeneration. Introduced pests have attacked ash, elm, butternut, and oak species. New pests are on the horizon that target black walnut, beech, and other trees. Existing woodlands should be kept free of invasive plant species and actions can be taken to prepare the woodland for the arrival of pests. For

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[3]*Reed canary grass can be controlled through burning, modifying hydrology (e.g., flooding), tilling, grazing, mulching, shading (with tree and shrub plantins, manual removal, mowing, and/or chemical treatment. These methods are commonly used in appropriate combination. More information can be found at the following website: http://dnr.wi.gov/topic/forestmanagement/documents/pub/FR-428.pdf*

example, increasing the diversity of tree species through careful stand management and or planting can help assure that complete canopy loss does not occur in the future. Actively employing these recommendations should be assigned a medium priority. State programs are available to assist woodland owners with stand management, understand tax implications, and obtain professional forestry advice.[4]

5. **Continue to maintain stormwater detention basins.** This should be considered a high priority, especially given the planned increase in urban land use. Maintenance of stormwater basins includes managing aquatic plants, removing and disposing of flotsam/jetsam, ensuring adequate water depth to settle and store pollutants, and actively and aggressively managing excess sediment. Specifications associated with the design of stormwater detention basins and maintenance requirements ensure that basins are functioning properly.[5] It is important to remember that stormwater detention ponds occasionally require dredging to maintain characteristics that protect the Lake. The frequency of dredging is highly variable and is dependent upon the design of the basin and the characteristics of the contributing watershed. Inspection of basins should be completed by the responsible regulatory entities in a manner consistent with current practices;[6] however, ensuring that owners of these ponds know the importance of meeting these requirements through educational outreach can help ensure continued proper function.

6. **Retrofitting existing and enhancing planned stormwater management infrastructure to benefit water quality** should be considered a high priority. Water quality can benefit by extending detention times, spreading floodwater, and using features such as grassed swales to convey stormwater. Implementing such work requires close coordination with the Town of Salem and the Village of Paddock Lake. Based on the analyses completed as part of this report, the North, Northwest, and West Tributaries are priority areas to consider stormwater management options.

7. **Collect leaves in urbanized areas.** This recommendation should be assigned a high priority. Leaves have been shown to be a very large contributor to total external phosphorus loading to lakes in urban settings. Data from the tributary sampling initiative suggests leaves may be an important contributor to phosphorus loads to Hooker Lake. Avoid stockpiling leaves in the street where they may be crushed and washed into the lake, or burning leaves in shoreline and ditch areas. These situations can create a strong pulse of phosphorus delivered to the Lake by late autumn rains.

8. **Stringent enforcement of construction site erosion control and stormwater management ordinances and creative employment of these practices** should be considered a high priority. Ordinances must be enforced by the responsible regulatory entities in a manner consistent with current practices;[7] however, local

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[4]*The following website provides an overview of WDNR forestry information and programs: http://dnr.wi.gov/topic/ForestLandowners/*

[5]*Technical standards for design and maintenance of wet detention basins and other stormwater management practices can be found at http://dnr.wi.gov/topic/stormwater/standards/postconst_standards.html.*

[6]*Maintenance of stormwater detention basins was also included in the* Town of Salem – Stormwater Management Plan *adopted in March 2010. Consequently, implementation of this recommendation in a manner consistent with that plan should be prioritized by the Town.*

[7]*Enforcement of the construction site erosion control and stormwater management ordinances was also included in the* Town of Salem – Stormwater Management Plan *adopted in March 2010. Consequently, the implementation of this recommendation in a manner consistent with that plan should be prioritized by the Town. It is important to note that the recent merger between the Town of Salem and Village of Silver Lake was approved bythe Wisconsin Department of Administration. These two municipalities will officially become the new "Village of Salem Lakes" in February 2107. It is anticipated that there may be modifications to existing Town ordinances, permitting, and/or enforcement.*

citizens can help by reporting potential violations to the appropriate authorities (see "Issue 11: Implementation").

An excellent opportunity to reduce lake sediment and nutrient loading will become available in the near future. Agricultural land use is forecast to transition to largely residential use. Whereas this may have been perceived as a negative to lake health in the past, stormwater management practices used in urbanizing landscapes can tangibly lessen pollutant loads and positively modulate runoff volumes when compared to existing agricultural land use. Therefore, if carefully and stringently enforced, modern stormwater management practices employed in the soon to be developed watershed areas may reduce the load of pollutants to the Lake and enhance dry weather baseflow. Moreover, future stormwater detention basins can be designed and located to enhance value beyond the requisite pollutant trapping and runoff detention value. If located properly, stormwater basins can provide valuable habitat functions (e.g., if a pond is located adjacent to a natural area). Similarly, stormwater detention basins can be located in areas prone to contribute to groundwater recharge, helping sustain valuable groundwater-derived baseflow to local lakes, streams and wetlands. Bioswales, unlined ditches, and a battery of other "green" stormwater management practices can add to the overall positive effect of modern stormwater management.

9. **Encouraging pollution source reduction efforts along the shorelines (best management practices)** is currently recommended as a high priority due to recent algal blooms. Pollution reduction measures include reducing fertilizer use to the maximum extent practical, ensuring cars are not leaking fluids on driveways, maintaining rain gardens to which runoff can drain, preventing soil erosion, **properly disposing of leaf litter and grass clippings (do not rake onto residential streets of assuring prompt pickup),** and properly storing salts and other chemicals so they do not drain to the Lake. Communicating these best management practices, and engaging in a campaign to encourage their use (e.g., offering to pick up grass clipping and leaves from homeowners) will likely yield a low-cost way to help improve water quality. Based upon the results of this study, these practices may be particularly valuable in the more urbanized areas such as the Salem Oaks, Northwest, and West Tributary watersheds.

10. **Managing in-lake phosphorus sources.** Although Hooker Lake is believed to receive more of its phosphorus loading from external sources, up to a forty percent of the Lake's phosphorus may be contributed by internal loading. More data must be collected and analyzed to determine the relative importance of internal phosphorus loading. Collecting such data is considered a high priority. External loading currently contributes the largest quantities of this important plant nutrient, and all this additional phosphorus is new to the Lake. In-Lake phosphorus contributed by internal loading is "recycled" from that already in the Lake. While it can tangibly increase lake productivity, it is not as significant a factor as external phosphorus loads to the Lake. For this reason, managing external phosphorus loads should be considered a high priority, while managing in-Lake phosphorus loading should be considered a low priority. However, if external loading were significantly decreased and in-Lake phosphorus concentrations remained excessively high, managing internal phosphorus loads should be reassigned a high priority These actions help the Lake achieve less eutrophic conditions, lessen stress on the Lake's fish and aquatic life community, help assure that natural plant-induced phosphorus sequestration processes continue, and sustain a high-quality ecosystem with more long-term resilience. Additional data needs to be collected to more fully evaluate internal loading dynamics, estimate dosing, and/or monitor treatment effectiveness. For example, additional water chemistry profiles and sediment samples from the deep portion of the Lake may need to be collected to better quantify internal loading rates.

    While a large variety of techniques can be used to reduce internal loading of phosphorus, two approaches appear to be the most promising for Hooker Lake. Additional details regarding each are provided below.

    a. **Chemical inactivation using alum.** Alum is used to purify drinking water and has been used for over four decades to improve lake water quality. Although all types of lakes have been treated with alum, lakes that lack significant external sources of phosphorus and owe much of their plant available phos-

phorus to internal loading are most amenable to this approach. Hooker Lake has the future potential to fit both criteria quite well, and may become well suited for alum treatment.

Alum treatments trap water-borne particles which in turn settle to the lake-bottom and form a layer of sediment that does not release phosphorus to overlying lake water under oxygenated or anoxic conditions. Water is much clearer and phosphorus concentrations are markedly lower immediately following an alum treatment. Improved water clarity catalyzes additional synergistic responses that further limit phosphorus concentrations in the Lake. Clearer water allows the plants that naturally produce marl to spread to greater depths, reinforcing the abundance of plant types that promote natural phosphorus sequestration. Lower phosphorus concentrations reduce the concentration of algae in open waters of the Lake, increasing water clarity and decreasing the load of organic matter decomposed in the hypolimnion. Decreased oxygen demand related to reduced algal decomposition allows oxygen concentrations in deeper areas to increase and/or the volume of anoxic water to decrease. Since oxygen deficient water is the catalyst for internal loading, reducing the volume (and hence extent) of anoxic water reduces the Lake's overall internal loading potential.

Care must be taken to achieve proper alum dosing. A dose should create a capping layer thick enough to form a nonreactive barrier above phosphorus bearing sediment. Since alum is acidic, buffering agents are commonly applied with the treatment. According to the WDNR, the cost for an alum treatment averaged less than $500 per acre of lake surface area in 2003 (Appendix M). Assuming average conditions and adjusting for inflation, the WDNR cost data suggests that an alum treatment for Hooker Lake may cost roughly $75,000. Others report significantly higher costs.[8] Most information sources state that benefits from alum treatments can tangibly improve water quality in stratified lakes for decades. Alum treatments on deep stratified lakes such as Hooker Lake typically benefit the Lake for 21 years. Alum treatments have reduced epilimnetic total phosphorus concentrations in some lakes as long as 45 years following treatment.[9]

b. **Hypolimnetic withdrawal and on-shore treatment** involves drawing water from deep areas of the Lake, piping it to a convenient location on the shoreline, and manipulating water chemistry using natural processes and/or induced physical and/or chemical means to cause phosphorus to come out of solution. On-shore treatment may also be employed to treat stormwater before it enters a lake.

Water can be treated in several ways after it is drawn from a lake, stream, or storm sewer, and several treatment processes can be combined for the desired result. The treatment process can rely on common municipal/industrial treatment practices, often employing prefabricated treatment system components. Alternatively, nature-like processes can be promoted in purpose built treatment cells to enhance water quality. Such treatment cells may take the appearance of ponds or wetlands. Examples of treatment processes that could benefit Hooker Lake include:

- **Aeration.** The simplest form of on-shore treatment is aeration. Air is pumped through water, increasing water oxygen concentration. The oxygenated water is then returned to deeper portions of the lake. This helps reduce the volume of anoxic water, reducing the areal extent of sediment/water conditions prone to release phosphorus to the water column, and thereby decreasing the amount of

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[8]*Bassett Creek Watershed Management Commission, "Twin Lake Phosphorus Internal Loading Investigation", March, 2011.*

[9]*Huser, Brian, Sara Egemose, Harvey Harper, Michael Hupfer, Henning Jensen, Keith. M. Pilgrim, Kasper Reitzel, Emil Yydin, and Martyn Futter,* Longevity and effectiveness of aluminum addition to reduce phosphorus release and restore lake quality, *Water Research, in press.*

phosphorus released to the lake from bottom sediment. Aeration may produce phosphorus-bearing precipitates that can be captured on shore before the treated water is returned to the Lake (see below).

- **Dissolved phosphorus removal.** Dissolved phosphorus can be removed from the lake water by introducing certain compounds that combine with phosphorus forming a solid precipitate that is than collected and removed. Iron, alum, and lime can all be used to precipitate dissolved phosphorus under various pH and dissolved oxygen conditions. Since the treated water is in a controlled environment, water chemistry can be manipulated to allow any of these compounds to precipitate phosphorus.

- **Clarification.** Particles are removed from water by allowing the water to remain motionless for a period of time, by active filtration, or by centrifugal action. All of these clarification processes can be enhanced using flocculants such as alum.

- **Nature-like processes.** Water is allowed to flow, detained, and handled in ways that help remove pollutants. An example includes pumping deep lake water to a closed basin occupied by a manmade pond or wetland. Water is then aerated, comes in contact with plant material, filters through the underlying substrate, and is returned to the Lake or a tributary of the Lake through a diffuse path (e.g., created wetlands) or through the shallow groundwater system. This type of system would need to be built upon non-wetland soil areas. Significant open upland soil areas with good potential for such a treatment are found within a half mile of Hooker Lake.

  On-shore treatment is currently used to improve water quality in many other lakes. For example, an active treatment system operating on Crystal Lake (a 79 acre, 35 foot deep lake in the Minneapolis metropolitan area) removed 200 pounds of phosphorus from stormwater and water drawn from the hypolimnion during its first full season of operation. This system is composed of a large vessel, operates between May and November, and can treat over one million gallons of water per day. This treatment volume equals about one-third of the Lake's entire volume over the period of operation.[10] Another community chose to polish wastewater to remove phosphorus using constructed wetlands and a carefully engineered groundwater recharge area to supplement flow in a high quality river.

  The prevailing water elevation and lake outlet flow rate influences the method chosen to withdraw water. If the rate of withdrawal could be expected to exceed the lake outlet's discharge rate, the treated water should normally be returned to the lake to reduce the potential for lowered lake levels. In this case, lake water can be actively pumped to an area topographically higher than the lake, treated, and be allowed to return to the lake directly (via tributaries) or indirectly (via shallow groundwater). If lake elevations and outlet flow are moderate to high, water can be drawn from deep portions of the lake with little or no active pumping under favorable topographic conditions. Flashboards or gates can be used to prolong the period of time such a system could operate without reducing lake levels from normal elevation ranges. Water is treated prior to discharge.

  The cost of on-shore treatment varies widely and depends upon the type and intensity of treatment desired. Custom-built on-shore treatment plants require significant capital investment to construct and continual input of labor, services, and consumable supplies over long periods of time. For example, the large system installed on Crystal Lake, Minnesota to resolve severe stormwater quality issues (see preceding paragraph) cost over one million dollars to build and $90,000 per year to operate. Equipment may sometimes be leased and delivered onto a site as a prefabricated package

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[10]*Dullinger, Danielle, "Robbinsdale working to clean up Crystal Lake", StarTribune, March 11, 2014,http://www.startribune.com/robbinsdale-working-to-clean-up-crystal-lake/249536501/*

plant. In such a case, the risk of long-term commitment is reduced. Furthermore, smaller plants operating over extended periods of time can incrementally reduce the amount of phosphorus in a lake that does not suffer from ongoing heavy external loads. The cost of nature-like systems depends upon desired location and treatment capacity. In the right setting, little special investment may be needed aside from pumps, piping, and ongoing utility costs.

Implementation of these recommendations will significantly contribute to tracking and improving the water quality within Hooker Lake. However, since there is currently insufficient data to determine the level of need for these programs, **water quality management recommendations should be re-evaluated** and likely assigned a medium priority after additional water quality data become available (e.g., in three to five years) and trends are evaluated. This will help quantify how much water quality management effort should be undertaken as well as clarify the relative importance of internal loading to the Lake's overall phosphorus budget, and, relatedly, the need for in-lake phosphorus treatment.

ISSUE 2: WATER QUANTITY

Lake residents have expressed concern regarding several issues related to water quantity. Some of these issues focus on particular concerns (e.g., drainage from the the STH 83 area) while others are applicable to all portions of the watershed (e.g., maintaining groundwater supplies). As mentioned in the Chapter 2, maintaining water levels and flushing rates can be crucial to the health of the Lake. Slowing runoff and increasing baseflow are key principals to reduce extreme lake elevation fluctuation and maintain water quality. Consequently, the following recommendations are made to address monitoring and water quantity measurements:

1. **Lake elevation monitoring should be continued as a part of the regular CLMN data collection using the staff gauge already present in the Lake.** The reference point elevation must be related to a known datum to allow comparison to data collected in the past and the future. This is considered a medium priority. Continued monitoring is necessary, so that any issues can be detected early and a long-term Lake level record is obtained. Automated lake level systems are available and may be useful to link to public websites. Real time data may be useful to better enforce boating ordinances.

2. **Quantify the volume of water delivered to the Lake from the various subwatersheds.** At a minimum, stream flow should be quantified when water quality samples are collected, and is given a high priority. Additional measurements should be made to help quantify flow during fair weather, periods of heavy runoff, and dry weather. Runoff estimates can be made using empirical formulae or models. Additional measurements and modeling require substantial amounts of labor and/or cost. The HLMD should check with the Town of Salem and the Village of Paddock Lake to determine if these municipalities have collected useful flow and water quality data and/or have refined their runoff models (high priority).

3. **Upgrade or construct stormwater detention and treatment infrastructure to help reduce the quantity of sediment, nutrients and pollutants entering the lake, reduce peak flows in tributary streams, and reduce stream channel erosion.**This should be considered a high priority If properly designed and positioned, these practices can also reduce the volume of runoff and meaningfully contribute to groundwater recharge. Practices include detention/retention basins, swales, two-stage ditches, and on-line storage areas. Such practices are generally most practical and effective if dispersed in headwater areas. Such practices may be valuable to reduce water flow rates and sediment/pollutant loads in the western tributary area specifically mentioned by Lake residents, but are applicable throughout the Lake's watershed. Specific actions targeted at the western watershed area include the following:

    a. Investigate drainage from internally drained area at the extreme northwest corner of the Lake's watershed. Determine if water quantity and/or quality has been influence by recent ditching. Consider

working with the land owner to improve the situation. Enhance water holding capacity, infiltration, and duration of ponded water in internally drained basins.

b. Upgrade the existing stormwater detention basin to improve water quality treatment performance. The current design was primarily intended to reduce flow rates, not improve water quality.

c. Identify opportunities for supplemental stormwater detention/retention basins. Most opportunities likely exist west of STH 83. Prioritize locations within the three identified watersheds immediately west of Hooker Lake that are not fitted with any stormwater quantity/quality infrastructure.

d. Naturalize conveyance channels. Encourage the use of swales as opposed to curb and gutter, piped, or paved channels. Incorporate or reconnect floodplains to slow water and decrease stream power.

e. Encourage application of best management practices, buffers, and lot-scale stormwater management. Examples include buffers along water course corridors in rural areas and rain gardens in urban areas.

4. **Developing a comprehensive water budget (and potentially a delineation of the area contributing groundwater to the Lake) should be considered** a medium priority if water levels change. A water budget will help better determine where groundwater supplied to Hooker Lake is coming from, and can help target management efforts to maintain or increase groundwater discharge. Additionally, if the water budget determines that groundwater flow is a significant contributor to the Lake, a delineation of the area contributing groundwater can be used to determine what areas need to be protected to ensure an adequate groundwater supply.

5. **Implementing measures to promote infiltration in near-shore residential areas** is a medium priority. Implementation of this recommendation could involve:

   a. Improve infiltration of rainfall and snowmelt through installation of innovative BMPs associated with low-impact development, including rain garden projects (see Figure 44).[11] (Some of these projects can be partially funded through the WDNR "Healthy Lakes" initiative.); and

   b. Retrofit current urban development (e.g., disconnect downspouts, install permeable pavement). This can be encouraged through educational outreach and by providing resources to lakeshore property owners.

6. **Reducing the impacts of future urban development** is a high priority. This recommendation can be implemented by:

   a. Enforce the infiltration recommendations in the current Town of Salem Stormwater Management Plan, which sets infiltration requirement criteria;[12]

   b. Protect high groundwater recharge potential areas. Consider local and more regional flow systems. Consider purchasing land or obtaining conservation easements on agricultural and other open lands with high groundwater recharge potential; and

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[11] *Rain gardens are depressed basins that maintain native plants and help water infiltrate into the ground rather than entering the Lake through surface runoff. Rain gardens can help reduce the amount of erosion and unfiltered pollution entering the Lake and can stabilize baseflow to the Lake.*

[12] *R.A. Smith National Inc.,* Town of Salem - Stormwater Management Plant, *p. 2-8. This recommendation can be found at: http://www.townofsalem.net/vertical/sites/%7BFD43A93D-1DA7-4F52-8644-C09DA66C3401%7D/uploads/%7B9CAD9918-E8E5-4552-8FB9-EA052415CF0B%7D.PDF.*

c. Promote consideration of groundwater conditions when designing new developments. This could include encouraging developers to incorporate infiltration in site designs and local government consideration of groundwater recharge as an integral part of development proposals.[13]

7. **Continue to protect wetlands and uplands by enforcing County zoning ordinance** as discussed in the "Issue 2: Water Quality" section of this chapter. This is a medium priority.

As with the other recommendations made in this chapter, future changes in Lake elevation or outflow will spur the need to reevaluate the above recommendations. Plan reevaluation should be assigned a medium priority.

Figure 44

EXAMPLE OF A RAIN GARDEN

NOTE: Further details are provided on Natural Resources Conservation Service and Wisconsin Department of Natural Resources Websites at: http://www.nrcs.usda.gov/Omtermet/FSE_PLANTMATERIALS/publications/ndpmctn7278.pdf; and http://dnr.wi.gov/topic/Stormwater/raingarden/.

Source: U.S. Department of Agriculture, Natural Resources Conservation Service.

ISSUE 3: LAKE OUTLET DAM

As discussed in Chapter II, the dam that currently regulates the level and outflow of water from Hooker Lake is privately owned and was reconstructed in 2002. The owner of the dam permits HLMD personnel to periodically visit the dam to clear debris. Several recommendations are associated with the dam.

1. **The HLMD should continue to regularly monitor the spillway and downstream road crossing culvert for debris. Debris should be cleared to prevent it from restricting water outflow and unintended lake elevation changes.** This should be considered a high priority.

2. The **HLMD or another public entity should consider acquiring the dam.** This will help assure adequate maintenance and access to potential funding sources. This should be considered a medium priority, but may need to be elevated to high priority, if action is needed to correct dam deficiencies.

3. Complaints of flooding have occurred since the dam was reconstructed in 2002. **Available information suggests that the spillway capacity of the new dam may be less than the old dam and the spillway elevation is now about 10 inches higher than permitted.** This could create higher lake water levels during heavy runoff periods than would have occurred before reconstruction of the dam. As the regulatory agency for dam safety in the State, WDNR should evaluate the situation regarding the spillway capacity and take appropriate action. This should be considered a high priority. Depending on how the spillway issue is resolved, consideration may need to be given to revising the floodplain model and the floodplain maps for Hooker Lake.

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[13]*Some Wisconsin communities have promulgated groundwater protection ordinances that require consideration of development's effect on groundwater supplies and surface-water/groundwater interactions. For example, the Village of Richfield in Washington County has passed such an ordinance. More information on the Richfield ordinance may be found at the following website: http://www.richfieldwi.gov/DocumentCenter/View/651*

4. Records now available suggest that the dam may not comply with regulatory agency standards. For example, **the dam's spillway may not be able to pass a sufficient amount of water to comply with WDNR regulation,** and could theoretically be unstable at high flow. The status of the dam should be reviewed, and action should be taken to correct deficiencies. This should be considered a high priority.

5. In conjunction with water elevation monitoring, **a rating curve should be developed relating water elevation with Lake outflow.** This may help with applications to apply aquatic chemicals and is useful to determine the Lake's water budget. This should be considered a low priority.

ISSUE 4: AQUATIC PLANT GROWTH

As discussed in Chapter 2, Hooker Lake historically contained a fairly diverse aquatic plant community capable of supporting a warm water fishery as well as a wide range of recreational uses. However, the 2014 survey (see Appendix F for distribution maps) also reveals three major reasons why revising the aquatic plant management activities and establishing a plan consistent with Lake conditions should be considered a high priority. These reasons include 1) high volumes of plants and algae that deter recreational use; 2) existence of invasive EWM, which could potentially threaten the long-term stability of the native aquatic plant community; and, 3) a potentially fragile and declining native plant community as evidenced by the relatively low numbers of native pondweeds in the Lake and the decline in plant species from 2008 to 2014.

This section describes a comprehensive aquatic plant management plan based on the preliminary recommendations provided in Chapter II. The recommendations presented below form the nucleus of an aquatic plant management plan for Hooker Lake and attempt to balance three major goals:

1. Promote that the current recreational use of the Lake (e.g., swimming, boating, and fishing) be maintained to the greatest extent practical,
2. Protect the native aquatic plant community, and
3. Effectively control invasive plants, especially EWM populations.

The conceptual plan described below relies upon common, State-approved, aquatic plant management alternatives listed in Chapter 2 including manual, biological, physical, chemical, and mechanical plant control measures.

Plant Management Recommendations

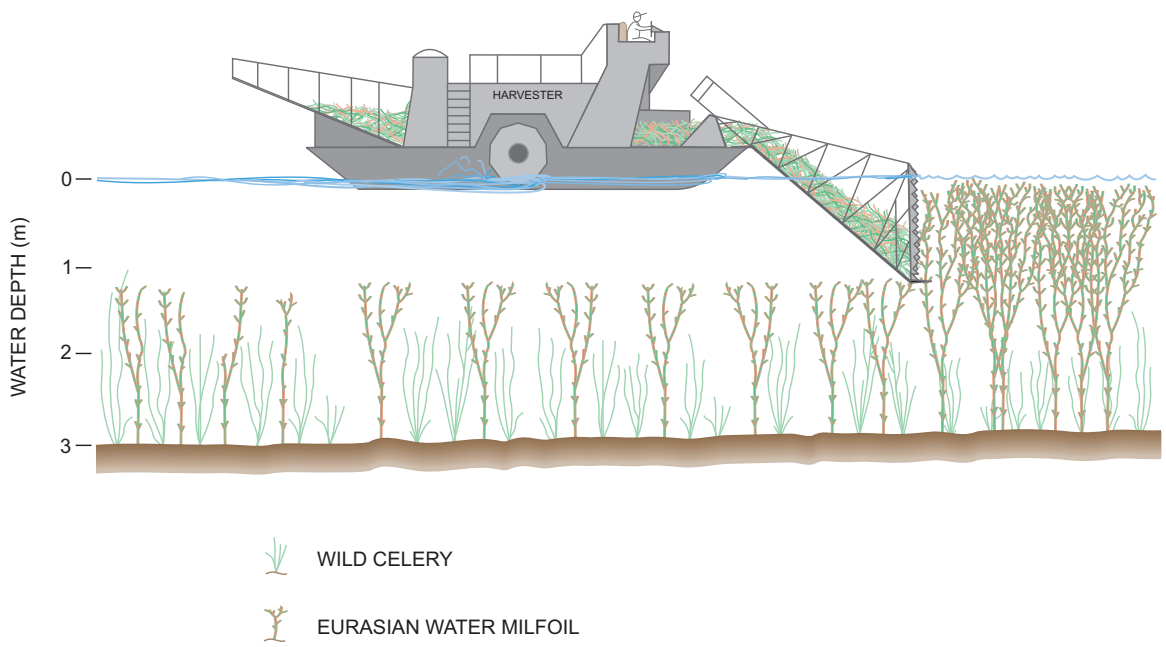
The most effective plans for managing nuisance and invasive aquatic plants combine several methods and techniques. A "silver bullet" single-focus strategy rarely produces the most efficient or best result. Therefore, to enhance access to Hooker Lake while maintaining Lake health, three aquatic plant management techniques are recommended under this plan, as described below:

1. **Create navigation lanes in high-traffic/critical access nearshore areas.** This should be considered a high priority. As can be seen on Map 24, *navigation lanes* are recommended for the portion of the Lake shoreline bordered by residential properties. Priority access lanes should be provided at the three public access sites, some of which also serve adjacent residential areas. To avoid further loss to the native aquatic plant community, plant harvesting is the preferred method to establish and maintain navigation lanes. Harvesting, as opposed to simple cutting, requires that several details be specified to ensure continued recreational use of the Lake and the health of the native plant community. These details include:

    a. **Leave at least one foot of uncut plant material rooted to the Lake bottom while harvesting.** This should be considered a high priority and is done to avoid agitating lake-bottom sediment and helps ensure native plants communities are maintained. Disturbing lake-bottom sediment can uproot native plants and promote colonization of new areas by EWM. Leaving one foot of uncut plant material is gen-

Figure 45

PLANT CANOPY REMOVAL OR "TOP CUTTING" WITH AN AQUATIC PLANT HARVESTER



NOTE: Selective cutting or seasonal harvesting can be done by aquatic plant harvesters. Removing the canopy of Eurasian water milfoil may allow native species to reemerge.

Source: U.S. Department of Natural Resources and SEWRPC..

erally easy to accomplish when water depths are three feet or greater. However, when water depths are less than three feet, special care should be employed. Consequently, all areas less than three feet deep are designated as "shallow-cut only" areas. This means that, in these areas, only the "top cut" technique (see Figure 45) should be used. Harvesting should not occur where the harvester is unable to leave one foot of plant material. Instead, raking and hand-pulling should be used in these areas. Likely areas for raking and hand-pulling are depicted in Map 24.

b. It should be a high priority to **inspect all cut plants for any live animals and immediately return such animals to the Lake.** Some animals get entangled in plants and caught in the harvester, particularly when cutting larger plant mats. Consequently, cut plants must be carefully examined to avoid inadvertent harvest of fish, crustaceans, amphibians, turtles, and other animals.

c. **Harvesting should not occur in the early spring** (high priority) to prevent disturbing spawning fish.

d. **All harvester operators must undergo WDNR training to help assure adherence to harvesting permit specifications and limitations** (high priority). Training should be provided by the regional WDNR aquatic invasive species coordinator and should cover, at a minimum 1) "deep-cut" versus "shallow-cut" techniques and when to employ each according to this plan; 2) review of the plan, associated permit, and review of the need to restrict cutting in shallow areas; and 3) plant identification to encourage conservation of native plant communities. Additionally, the training should ensure that all harvester personnel are aware that they must record their work for inclusion in permit-required annual harvesting reports.

e. Harvesting can fragment plants. Plant fragments may float in the Lake and accumulate on shorelines, creating aesthetic and recreational use problems. Harvesting can also help spread undesirable plants as some plants can reproduce themselves from fragments. **A harvesting program should include a**

Map 24

AQUATIC PLANT MANAGEMENT PLAN MAP FOR HOOKER LAKE: 2016

DATE OF PHOTOGRAPHY: APRIL 2010

AQUATIC PLANT MANAGEMENT AREAS

- HAND-PULL OR RAKE
- NAVIGATION LANES [a]
- SENSITIVE AREAS
- PUBLIC BOAT LAUNCHES
- —25'— WATER DEPTH CONTOUR IN FEET

GRAPHIC SCALE
0 300 600 FEET

[a] *NAVIGATION LANES ARE NOT DRAWN TO SCALE.*
[a] *Navigation lanes are drawn to scale.*

Source: U.S. Department of Natural Resources and SEWRPC.

comprehensive plant pickup program that all residents can use (high priority). This helps assure that harvesting activities do not become a nuisance for lake residents. A plant pickup program typically includes residents raking plants and placing them on their pier for weekly pickup. This may be combined with a regular effort by harvester operators to pick up cut plant fragments. Efforts should be as collaborative as practical.

2. **Hand-pulling and/or raking for nuisance plant growth, including EWM, in the near-shore areas** should be considered a medium priority. A permit is not required for these activities for individual landowers employing this practice on a 30-foot width of their own shoreline (including the recreational use area such as a pier) that does not exceed a 100-foot distance into the Lake, as long as all the resulting plant materials are removed from the Lake. It is also recommended that, prior to the "hand-pulling" season, an educational campaign be promoted to assure that shoreline residents know the value of native plants, the relationship between algae and plants (i.e., fewer rooted plants is commonly related to more algae), the basics of plant identification, and the specifics about the actions they are allowed to legally take to "clean up" their shorelines.[14]

3. **Chemical treatment** has historically been the primary method used to manage aquatic plant in Hooker Lake. Recently, a **whole-lake chemical treatment strategy** has been suggested to manage EWM. The WDNR considers such treatments on a lake-by-lake basis, but, given the significant decrease in aquatic plant species diversity, the WDNR is unlikely to support a whole-lake chemical treatment at this time. Therefore, chemical treatment is given a low priority. **If the HLMD believes chemical treatment is needed in the future, it will need to contact the proposed chemical applicator to collect information needed to seriously consider this option.** The information that would need to be collected includes:

   a) A list of proposed alternatives for chemicals and or admixtures

   b) Target concentrations and treatment methodologies

   c) Probable cost and schedule

   d) The anticipated longevity of the treatment

   The WDNR considers the following elements when reviewing a whole-lake permit application:

   - Lake volume. The entire lake volume needs to be calculated. The volume of the epilimnion layer[15] needs to be broken out because the amount of chemical applied is based on the volume of water in the epilimnion alone.

   - Water temperature profile. Whole-lake treatments are most effective and typically required to be implemented in spring as soon as possible after the Lake stratifies. Lake temperature profiles should be monitored to ensure the whole lake is fully stratified. The temperature of the epilimnion needs to be monitored to ensure the minimum temperature requirements specified by use of directions of the chosen chemicals are met.

   - Target plant density and the thresholds for applying a whole lake treatment. A typical threshold is average Eurasian and hybrid water milfoil rake fullness rating of between two and three at a minimum of 35 percent of vegetated sampling sites, based on a recent comprehensive point-intercept aquatic plant survey;

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[14]*SEWRPC and WDNR staff could help review this document.*

[15]*When completely stratified, the epilimnion layer is the top layer of the lake that is warmer and less dense. The chemicals will mix throughout that layer but are unable to break through the thermocline layer, which acts as a barrier.*

- Native Plants. The type and abundance of native plant populations and their sensitivity to chemical treatments.
- Distribution. Are native plant communities more monotypic or are they intermixed with EWM and natives.

A whole-lake treatment may need to be followed later in the year by harvesting or chemical treatments to maintain navigation lanes.

Care must be exercised to carefully choose herbicides that at least somewhat selectively control EWM, hybrid water milfoil (HWM), and curly-leaf pondweed to prevent unintentional loss of native aquatic species. A **WDNR permit and WDNR staff supervision are required to implement this alternative.** Additionally, lakeshore property owners need to be informed of the chemical treatment and permit conditions before applying chemicals. **Residual chemicals concentrations should be monitored** after application is complete. Generally, chemical residue monitoring is undertaken as a standard component of whole-lake treatments to determine if applied chemicals are well dispersed throughout the Lake.

A further complication of the whole lake treatment scenario is the presence of **HWM,** which has been found in Hooker Lake. **Properly adjusting the treatment dosage can be a difficult task.** Too high a dosage can significantly damage the native plant population while too low a dosage could actually promote evolution of herbicide resistance HWM by killing the susceptible plants but leaving the heartier strains to propagate into an infestation that would be increasingly difficult to control with chemicals. Furthermore, accurate dosage relies on precise and current lake bathymetry, confirmed HWM identification (possibly through DNA analysis), and may require multiple samples of HWM be collected from the Lake and tolerance tested (through a process known as "challenge testing") to accurately determine the plant's susceptibility to various chemical mixes.

Map 24 locates elements of the proposed aquatic plant management plan and helps aquatic plant managers implement aquatic plant management plan recommendations. Nevertheless, aquatic plant management must react to what is actually occurring at the time of treatment. Consequently, this aquatic plant management plan must be reevaluated every three to five years (before the end of the five-year permitting cycle). Reevaluation is assigned a high priority. This effort should include a comprehensive point-intercept aquatic plant survey, a summary of aquatic plant management activities actually completed during the subject period, and an evaluation of plant community dynamics. This will help lake managers quantify and judge the effectiveness of the aquatic plant management plan described in this report and make appropriate adjustments.

Native Plant Community and Invasive Species Recommendations

1. Protect native aquatic plants to the highest degree feasible through careful application of aquatic plant management and water quality recommendations (high priority). Hooker Lake's native plant community has been declining. Native plants provide wildlife habitat. **Muskgrass growth is particularly beneficial as it stimulates marl formation and phosphorous sequestration.**

2. Invasive species compromise the health and resilience of native plant and wildlife communities and are commonly a nuisance to lake recreation. Consequently, active invasive species management is recommended and is given high priority. **The most problematic invasive species currently in or around Hooker Lake are EWM, HWM, curly leaf pondweed and potentially reed canary grass.** All of these may be treated through manual or chemical methods. Mechanical and chemical aquatic plant control methods should follow best management practices to avoid spreading invasive plants and lower the stress imposed by invasive species on the native plant community.

3. Avoid disrupting bottom sediment or leaving large areas of bottom sediment devoid of vegetation to lower the risk of nonnative species recolonization (high priority). Invasive species tend to thrive under disturbed bottom conditions. EWM in particular thrives in such areas.

4. EWM, HWM, and curly leaf pondweed grow early in the season, earlier than many native aquatic plants. Executing control methods as early as practical in the spring can help minimize damage to native aquatic plant communities (high priority). Even though chemical treatment is not recommended at the present time, early spring chemical applications are more effective due to colder water temperatures, a condition enhancing the herbicidal effect and reducing the concentrations needed for effective treatment. Early spring chemical treatment also helps reduce human exposure through lower human contact with lake water when water temperatures are still cold. Lastly, early season eradication of curly leaf pondweed helps lower production of turions (a dormant plant propagule) that is the dominant preproduction method for this plant.

5. Introduction of new invasive species is a constant threat. **Preventing introduction and establishment of new invasive species** is crucial to maintaining healthy lakes. Starry stonewort – Figure 46, though not discussed in Chapter II, is a recently discovered invasive species posing a distinct risk to the Lake. To help decrease the chance of introduction, the following recommendations are given high priority:

    a. **Continue to educate residents and Lake users as to how they can help prevent invasive species from entering their lake** (Appendix N) and which species to look for, as new threats are continuously evolving;

    b. The HLMD should consider **enrolling in the Clean Boats Clean Waters program** (a State program targeting invasive species prevention) to proactively encourage lake users to clean boats and equipment before launching and using them in the Lake.[16] This will help lower the probability of invasive species entering Hooker Lake;

    c. Since boat launches are likely entry point for alien species, **boat launch sites should be targeted for focused aquatic plant control**; and

    d. If a new alien species infestation is found in the Lake, **efforts to eradicate the new species should immediately be evaluated and, if possible, be employed to help prevent establishment.** The WDNR offers funding that can aid early eradication efforts, particularly as it pertains to aquatic plants (Table 27). Therefore, citizen monitoring for new invasive species is recommended. The Wisconsin Citizen Lake Monitoring Network (CLMN) provides training to help local citizens engage in these efforts.

6. Chemical treatment has been the primary method of aquatic plant management in Hooker Lake. However, the spot treatment protocols used to date have shown to be largely ineffective. In fact, **the WDNR no longer recommends spot treatment as a viable method of aquatic plant management,** especially to address EWM. Therefore chemical treatment is assigned a low priority.

7. Given the loss of species diversity that has occurred in the Lake, at least some of which may be related to the use of aquatic herbicides, **the HLMD should consider aquatic plant harvesting to keep navigation lanes clear of vegetation (high priority).** Aquatic plant harvesters are used at many other lakes in the area, and several models are available. Harvesting can be completed by a contract service provider, or the HLMD can purchase and operate a harvester.

Map 24 is provided to help future aquatic plant managers implement the aquatic plant management plan recommendations. However, aquatic plant management must consider and react to what is actually occurring in the Lake at the time of treatment. Consequently, **this aquatic plant management plan should be reevaluated in three to five years** (at the end of the five-year permitting cycle). Periodic plan review and re-evaluation is assigned a high priority. This effort should include a comprehensive aquatic plant survey and an evaluation of the the relative effectiveness

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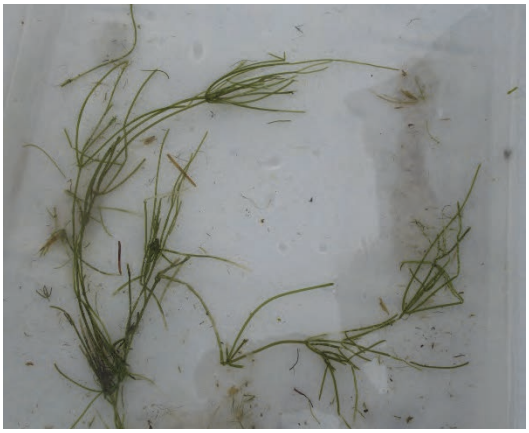
[16]*Further information about Clean Boats Clean Waters can be found on the WDNR website at: http://dnr.wi.gov/lakes/cbcw/.*

Figure 46

AQUATIC INVASIVE SPECIES WATCHLIST



STARRY STONEWORT
(*Nitellopsis obtuse L.)*

- Distinctive star-shaped bulbils

- Side branches arranged in whorls or 4-6 branchlets; more robust than other members of family

Source: Paul Skawinski, Skawinski, P.M. (2014). Aquatic Plants of the Upper Midwest: A Photographic Field Guide to Our Underwater Forests. *Wausau, Wisconsin, USA: Self-Published., Wisconsin Department of Natural Resources, Vic Ramey, University of Florida, Minnesota Sea Grant, Ohio Sea Grant, and SEWRPC.*

of recent aquatic plant management activities. This will help lake managers evaluate the continued suitability of the aquatic plant management measures described in this report and make appropriate changes to the plan.

ISSUE 5: CYANOBACTERIA AND FLOATING ALGAE

Algal blooms have become a concern in Hooker Lake in recent years. Preventing excessive algal growth should be considered a medium to high priority. Four recommendations address this concern:

1. **Maintain and improve water quality** by implementing recommendations provided in the "Issue 1: Water Quality" section of this chapter. Initial efforts should be focused on reducing external phosphorus loading. Address internal phosphorus loading if excessive external loading is controlled water quality and algal blooms persist.

2. **Maintain a healthy aquatic plant community** (to compete with algal growth) by implementing recommendations provided in the "Issue 4: Aquatic Plant Growth" section of this chapter (high priority).

3. **Algae in the Lake should be monitored.** This effort should focus on monitoring chlorophyll-*a* (high priority), as was described in the water quality monitoring recommendation above. When large amounts of suspended algae grow, this monitoring could also include collecting and identifying algae to check whether a toxic strains are present (medium priority).

4. **Residents should be warned to not enter the water in the event of an excessive algal bloom.** This should be considered a high priority if algal blooms contain toxic strains. Therefore, a method to quickly communicate water conditions adverse to body contact should be developed.

Implementing the above recommendations will help assure that algae growth does not preclude or greatly inhibit Lake use.

ISSUE 6: RECREATIONAL USE AND FACILITIES

Hooker Lake is popular with boaters who live on the Lake and who trailer watercraft to the Lake. **The Village of Paddock Lake operates a public boat launch that meets the requirements necessary for the Lake to receive public funding.** Although little work is needed at the present time, maintaining this public boat launch should be

Table 27

EXAMPLE WDNR GRANT PROGRAMS SUPPORTING LAKE MANAGEMENT ACTIVITIES

Category	Program	Grant Program	Maximum Grant Award	Minimum Financial Match	Application Due Date	Examples of Potentially Eligible Issues
Water	Surface Water Grants	Aquatic Invasive Species (AIS) Prevention and Control	Education, Prevention, and Planning Projects: **$150,000**	25%	December 10	Issue 4
			Established Population Control Projects: **$200,000**	25%	February 1	
			Early Detection and Response Projects: **$20,000**	25%	Year-Round	
			Research and Development: annual funding limit: **$500,000**	25%	Year-Round	
			Maintenance and Containment: **permit fee reimbursement**	25%	Year-Round	
		Lake Classification and Ordinance Development	**$50,000**	25%	December 10	Issues 1, 2, 6, 7
		Lake Protection	**$200,000**	25%	February 1	All
		Lake Management Planning: Large and Small Scale	Small-Scale: **$3,000**	33%	December 10	
			Large Scale: **$25,000**	33%	December 10	
	Citizen-Based Monitoring Partnership Program		**$4,999**		Spring	Issues 1, 2
	Targeted Runoff Management	- -	Small-Scale: **$150,000**	30%	April 15	Issues 1, 4, 5
			Large-Scale: **$1,000,000**	30%	April 15	
	Urban Nonpoint Source & Stormwater Management	- -	Design/construction: **$150,000**	50%	April 15	
			Property Acquisition: **$50,000**	50%	April 15	
Conservation & Wildlife	Knowles-Nelson Stewardship Program	Acquisition of Development Rights		- -	May 1	Issues 1, 2, 4, 5, 6, 7
		Natural Areas		- -	February 1, August 1	
		Sport Fish Restoration	- -	50%	February 1	Issue 8
		Streambank Protection		- -	February 1, August 1	Issues 1, 2, 3, 4, 7
Boating	Boat Enforcement Patrol	- -	Up to **75% reimbursement**	None	Various	Issue 6
	Recreational Boating Facilities	- -	Up to **$100,000 per state**	50%	- -	
Recreation	Knowles-Nelson Stewardship Program	Acquisition and Development of Local Parks	- -	- -	- - May 1	Issues 7, 8
		Habitat Area	- -	- -	February 1, August 1	
		Urban Green Space	- -	- -	- - May 1	

NOTE: More information regarding these example grant programs may be found online at the following address: http://dnr.wi.gov/aid/grants.html. Additional federal, state, and local grant opportunities are available.

Source: Wisconsin Department of Natural Resources and SEWRPC.

considered a high priority. This could include elements that help reduce the chance of spreading invasive species such as deploying trained volunteers to inspect boats and distribute literature during high-use periods. The two Town of Salem boat launch sites should also be managed to help reduce the chance of spreading invasive species.

Boat counts suggest that Hooker Lake is subjected to boat densities at the upper end or slightly exceeding desirable levels during high-use periods. Excessive boat density decreases the ability of the Lake to safely, sustainably, and satisfactorily support a wide range of activities. This means that **the potential for use conflicts, safety concerns, and environmental degradation is slightly higher than desirable on Hooker Lake during weekends and holidays.** To help avoid such problems, existing boating regulations should be reviewed for compatibility with current conditions and expectations and the ordinances should be conscientiously enforced. Given the variability of boating density, this recommendation should be considered a low priority for week days, but a high priority for weekends and holidays.

Demand for power boating on Hooker is on the verge of exceeding desirable capacity during peak-use periods. Common economic theory suggests that demand can be reduced if cost increase. Cost can include the price paid to launch a boat or other factors such as convenience. Certain changes can be made that both benefit the long-term health of the Lake and may place negative pressure on demand. These changes include the following:

- Review water-based recreation ordinances and modify as necessary. Stringently enforce the regulations, especially during holidays and weekends. Consider a water patrol. Grants are available to assist with revision and development of ordinances and with water patrols.
- Increase the current base boat launch fees from $7.00 to $8.00 as allowed by State law.
- Consider surcharges, particularly on weekends and holidays, such as the following:
  - Twenty per cent surcharge for toilet facilities. Potentially also apply to weekday rates to enhance revenue available for weekend/holiday launch attendants.
  - Large boat surcharges on weekends. An attendant would need to be on site for effective application.
  - Have an attendant on duty during all summer weekends and holidays. The attendant's primary duty would be to implement Clean Boats/Clean Waters watercraft inspections (Appendix N) and distribute literature to help lake users understand invasive species issues. A surcharge of 20 per cent may be charged when an attendant is on duty, and the attendant can also be responsible for launch surcharges for large boats.

Increasing launch fees is assigned an overall medium priority, the implementation of which is dictated by the needs and perceptions of Lake users. Nevertheless, an attendant trained in Clean Boats/Clean Waters inspection protocol should be considered even if no increase in launch fees is desired. Such an inspector can help reduce the probability of the spread of invasive species into the Lake and other lakes, and should be considered a high priority.

ISSUE 7: SHORELINE MAINTENANCE

Shoreline maintenance is assigned medium to high priority due to the results of the shoreline assessment conducted in 2014, which reveal areas of erosion, unprotected banks, a large portion of unbuffered shoreline, and failing shoreline protection. The major recommendations related to shoreline maintenance are:

1. **Encourage repair or removal of failing "hard" shoreline structures.** This should be considered a high priority and could be done by educating private landowners and donation-based cost-share programs. Removal may require technical expertise; consequently, it is also recommended that WDNR and shoreline restoration experts be consulted and integrated into the process.
2. **Educate residents and shoreline property owners on the importance of buffers and appropriate shoreline protection measures** consistent with lake use and guidelines presented in the Healthy Lakes Initiative Plan. This should be considered a high priority.

3. **Encourage installation of "soft" or "natural" shoreline protection** (e.g., bio-logs, buffers, native shoreline plantings, and native aquatic plantings) **whenever appropriate. Focus on areas where little to no shoreline protection exists or where erosion is currently taking place.** Natural shoreline protection has the additional benefit of deterring nuisance geese from congregating along shorelines. This action should be considered a medium priority. Should these shoreline protections take the form of shoreline buffers (as recommended in the "Issue 1: Water Quality" section of this chapter), funding would be available from WDNR through the "Healthy Lakes Initiative" that can be used for these types of projects.

4. **Ensure enforcement of shoreline setbacks/shoreland zoning** as discussed in the "Issue 2: Water Quality" section (high priority).

Implementing programs that encourage stable and ecologically friendly shorelines will greatly contribute to the health of the Lake in terms of wildlife populations, sedimentation, and water quality. To track success, **it is also recommended that shoreline restoration goals be established and that a new shoreline assessment be completed after a shoreline restoration program has been implemented** (medium priority). This will help document progress and may be useful in future reports and/or grant applications.

ISSUE 8: FISH AND WILDLIFE

Wildlife is reliant on Lake health. The presence of wildlife increases recreational use and enjoyment of the Lake and the functionality of the Lake as an ecosystem. To enhance wildlife within the Hooker Lake watershed, the following recommendations are made:

1. **Continue current fish stocking practices.** Stocking of northern pike may improve the largemouth bass population and community structure. This should be considered a medium priority. Stocking helps assure that the fishery is maintained while efforts to better support natural fish propagation are developed and implemented.

2. **Current fishing practices**[17] **and ordinances should continue to be enforced** because the current fishery appears to be healthy. This requires no direct change, and would therefore be a medium priority, unless current fishery characteristics or recreational uses tangibly change.

3. **Identify and remove fish passage barriers on streams.** Even ephemeral streams (streams which dry up seasonally) provide fish passage to spawning and nursery grounds. All four streams with mapped connections to the Lake run through wetlands, which are critical feeding, breeding, and spawning habitat for many fish species including northern pike. Fish passage barriers are often categorized by scale. Small scale barriers include debris jams, sediment and railroad ballast accumulations, and overgrowth of invasive plants. Such barriers are commonly not recognized as problems, but can significantly effect fishery vitality. Large scale barriers include dams and culverts that are perched, too narrow, or too long. These barriers vary greatly in their ease of removal. Best management practices include prioritization of barrier removal along a single stream, with highest habitat benefits and highest ease of removal given the highest rank for remediation. Ozaukee County's Fish Passage Program is highly developed and is a good information resource.[18] Removing fish passage barriers should be considered a medium priority. Fish passage projects often require frequent communication and active collaboration with private land owners, municipalities, and highway departments.

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[17]*Should residents be interested in reducing carp populations, catching and removing carp and catching and releasing northern pike would be advantageous.*

[18]*See website at http://www.co.ozaukee.wi.us/619/Fish-Passage*

4. **Improve aquatic habitat in the Lake by maintaining or installing large woody debris and/or vegetative buffers along the Lake's edge.** The Lake's shorelines have been sanitized through traditional landscaping practices, a situation that reduces habitat value for aquatic organisms. Implementing this recommendation could take the form of educational or incentive-based programs to encourage riparian landowners to install "fish sticks"[19] (see Figure 47), to leave fallen trees in the water, and to develop buffer systems along the shoreline. This should be considered a medium priority. WDNR grant money is available through the "Healthy Lakes" program on a competitive basis for implementing "fish sticks" projects. Installing buffers will provide the added benefits of deterring geese populations from congregating on shoreline properties and promoting better water quality.

Figure 47

EXAMPLES OF COMPLETED "FISH STICKS" PROJECTS

Source: Wisconsin Department of Natural Resources.

5. **Encourage adoption of best management practices to improve wildlife populations.** This should be a medium priority, although this should increase to a higher priority if wildlife populations decline. The acceptance and employment of best management practices can be fostered through voluntary, educational, or incentive-based programs for properties adjacent to the shoreline, and by directly implementing these practices on public and protected lands. Special interest non-governmental organizations ("NGOs", e.g., Pheasants Forever, Ducks Unlimited, Trout Unlimited, etc.) exist to foster habitat improvement projects, some of which collaborate with land owners to install beneficial projects. The HLMD should actively communicate and collaborate with NGOs. If this recommendation is implemented, a complete list of best management practices and relevant NGOs should be compiled and provided to landowners.

6. **Ensure proper implementation of the aquatic plant management plan** described earlier in this chapter (see "Issue 4: Aquatic Plant Growth" section) specifically as it relates to avoiding inadvertent damage to native species (high priority).

7. **Preserve and expand wetland and terrestrial wildlife habitat, while making efforts to ensure connectivity between such areas (high priority).** This could be achieved by implementing of the buffer and wetland protection recommendations provided in the "Issue 1: Water Quality" section of this chapter.

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[19]*Natural shorelines generally have hundreds of fallen trees per mile along the shoreline. "Fish sticks" is a term coined for engineered installation of woody debris (logs) along lake shorelines to mimic these natural conditions. Generally these projects involve anchoring logs into the shore so that the log is oriented perpendicular to the shoreline. See "Healthy Lakes Initiative" in Appendix L.*

8. **Follow WDNR guidelines for protecting WDNR-designated Sensitive Areas.** This should be a high priority endeavor. The WDNR established two Sensitive Areas on Hooker Lake reflecting the particularly valuable habitat they provide and the number and importance of plant and animal species depending on these areas for survival. The WDNR established guidelines regarding a number of issues that impact these areas including regulation of recreational traffic, permissible types of aquatic plant management, and the types of shoreline protection.

9. In general, keeping track of fish and wildlife populations will help Lake managers detect change. Consequently, **continued monitoring of fish populations and periodic recording of the types of animals found on the Lake and within its watershed is also recommended** as a medium priority.

ISSUE 9: IMPLEMENTATION

The methods to implement the plan vary with recommendation type. For example, several important recommendations relate to enforcing of current ordinances (e.g., shoreline setbacks, zoning, construction site erosion control, and boating). Public agencies often have limited resources available to monitor compliance and effect enforcement. Consequently, the following recommendations are aimed at local citizens and management groups and are made to enhance the ability of the responsible entities to monitor compliance and enforce regulations.

1. **Maintain active, open relationships with the County, municipal zoning administrators, directors of public works/ city engineers, as well as law enforcement officers.** This helps build solid working relationships with the responsible entities and facilitates efficient communication whenever needed (high priority).

2. **Keep actively abreast of activities within the watershed** (e.g., construction, filling, erosion) that appear to be affecting the Lake, **maintain good records (e.g., notes, photographs),** and judiciously notify relevant regulatory entities as appropriate (medium priority).

3. **Educate watershed residents about relevant ordinances and update ordinances as necessary to face evolving use problems and threats.** This will help ensure that residents know why these rules are important, that permits are required for almost all construction within the watershed, and that such permits offer opportunities to regulate activities that could harm the Lake (high priority).

In addition to regulatory enforcement, a number of voluntary and/or incentive-based programs should be considered. These require proactive efforts to protect and manage the Lake. A number of factors hinder the ability of local citizens and management groups to effectively execute lake management projects. Consequently, the following actions are suggested to enable tangible action:

1. **Encourage key players to attend meetings, conferences, and/or training programs to build their lake management knowledge** which will enhance institutional capacity (medium priority). Some examples of capacity-building events are the Wisconsin Lakes Conference (which targets local lake managers) and the "Lake Leaders" training program (which teaches the basics of lake management and provides ongoing resources to lake managers). Both are hosted by the University of Wisconsin - Extension. Additionally, courses, workshops, on-line training, regional summits, and general meetings can also be used for this purpose. Attendance at these events should include follow-up documents/meetings so that the lessons learned can be shared with the larger lake group.

2. **Continue to ensure inclusivity and transparency with respect to all Lake management activities.** If stakeholders do not fully understand the aims and goals of a project, or if they do not trust the process, excess energy can be devoted to conflict, a result that benefits no one. For this reason, this element is assigned

high priority. These efforts should be implemented through public meetings and consensus building so that conflicts can be discussed, addressed and mitigated prior to implementing projects.

3. **Foster and monitor management efforts to communicate actions and achievements to future lake managers.** Institutional knowledge is a powerful tool that should be preserved whenever possible. Actions associated with this are sometimes imbedded in organization bylaws (e.g., minutes) and are therefore assigned medium priority. Open communication helps increase the capacity of lake management entities. This may take the form of annual meetings, website, newsletters, emails, reports and any number of other means that help compile and report action, plans, successes, and lessons learned. These records should be kept for future generations.

4. **Apply for grants when available** to support implementation of programs recommended under this plan (high priority). Table 27 provides a sample of WDNR grant opportunities that can potentially be used to implement plan recommendations. **The HLMD should be aware that other local, State, and Federal agencies likely have grant opportunities that could assist with plan implementation.**

5. **Integrate lake users and residents in future management efforts** (medium priority). The aim of this effort is to add to the donor and volunteer base working toward improving the Lake. Private donations and volunteer time can be used as cost match for some grants.

Additionally, as discussed in Chapter 2, a major recommendation that should be considered a high priority is the **creation of an action plan/schedule which highlights goals, accomplishment, timelines, logistical needs, and responsible parties.** This document will help assure that plan recommendations are implemented in a timely, comprehensive, transparent, and effective manner. Additionally, an action plan can help ensure that all responsible parties are held accountable for their portions of the plan's implementation.

As a final note, a major recommendation to promote implementation of this plan is **education of lake residents, users, and governing bodies** regarding the content of this plan. A campaign to communicate relevant information should therefore be given a high priority.

SUMMARY AND CONCLUSIONS

Hooker Lake is a valuable and cherished natural resource. Those charged with the responsibility of protecting it need to consider not only the Lake's current conditions, but also its condition in the near and far future. Therefore, this plan has been developed, and is intended to be implemented, to address the needs of both the present and the future. Managing any issue or set of issues requires vision and the ability to see the lake system and stakeholder needs as a whole.

The future is expected to bring many changes to Hooker Lake's watershed. Projections suggest that the agriculture-dominated watershed of today is expected to give way to a watershed dominated by urban residential land use in the next two decades. **It is critical that proactive measures be executed that lay groundwork for effectively dealing with and benefiting from future change.** Excellent working relationships with appropriate local, county and state entities need to be nurtured right now to help protect critical features and areas in the watershed during development, to initiate actions (such as residential street leaf litter pickup and disposal), and to instill attitudes among current and future residents that will foster cooperation and coordination of effort on many levels.

To aid in the implementation of the plan recommendations, Table 28 highlights recommendations, as well as their priority level. Additionally, Maps 25 and 26, in combination with the aquatic plant management recommendation map (Map 24), identify where these recommendations should be implemented. These maps will provide current and future Hooker Lake managers with a visual representation of where to target management efforts.

Table 28

SUMMARY OF RECOMMENDATIONS FOR HOOKER LAKE: 2016

Number	Description	Suggested Priority Level
ISSUE 1: WATER QUALITY		
1	Actively track key water quality parameters for the long term. Frequently collect field measurements by taking readings with hand-held instruments, with full-depth profiles of temperature and dissolved oxygen concentrations. Actively participate in the Clean Lakes Monitoring Network programs.	HIGH
2	Track water quality and flow in tributary streams over a range of runoff conditions.	HIGH
3	Promote actions and enforce rules that that protect, preserve, and/or enhance shoreline buffers, environmental corridors, wetlands, water detention features, and floodplains, especially those near or adjacent to the Lake and tributary streams. Examples include application of best management practices, infrastructure construction, landowner education, and direct acquisition or acquiring easements on key parcels of real estate.	HIGH
4	Maintain ecological integrity and function of buffers, environmental corridors, wetlands, woodlands, stream corridors, and floodplains by controlling invasive species and relaxing human-imposed constraints.	MEDIUM
5	Monitor and maintain existing stormwater detention basins. Consider enhancing and supplementing stormwater detention infrastructure in highly developed watersheds, such located to the north and west of the Lake.	HIGH
6	Promptly collect leaves in urbanized watersheds.	HIGH
8	Stringently and thoughtfully enforce construction site erosion control and stormwater ordinances. Engage Lake users in monitoring violations. Remember that land-use conversion is an opportunity to reduce pollution loads to the Lake.	HIGH
10	Promote pollution source reduction practices, especially on riparian parcels.	HIGH
11	Manage in-Lake phosphorus sources.	LOW
12	Reevaluate the recommendations of this plan in three to five years, particularly if new data indicates unacceptable water quality or trends.	MEDIUM
ISSUE 2: WATER QUANTITY		
1	Regularly measure and record Lake water surface elevation.	MEDIUM
2	Quantify tributary stream flow volumes through direct measurement of flows under various weather and runoff conditions.	HIGH
3	Enhance stormwater detention and treatment. Opportunities to both create and restore detention and treatment exist in the watershed.	HIGH
4	Quantify groundwater contributions to the Lake and protect groundwater recharge areas.	MEDIUM
5	Implement measures that help protect the Lake's groundwater supply. For example, promote infiltration in near-shore residential areas through land management practices, protect areas of high groundwater potential, promote groundwater recharge in new developments, and avoid overdrafting groundwater supplies.	MEDIUM
6	Reduce impacts of future urban development.	HIGH
7	Continue to protect wetlands and uplands through enforcement of County zoning ordinances.	MEDIUM
8	Periodically re-evaluate plan recommendations.	MEDIUM
ISSUE 3: LAKE OUTLET DAM		
1	Keep the spillway/dam clear of debris through regular inspections, especially after significant rainfall events.	HIGH
2	Consider acquisition of the Bryzek Dam by HLMD or another public entity.	HIGH
3	Evaluate current status of Bryzek Dam spillway controversy and actively promote actions that help correct regulatory and/or physical deficiencies.	HIGH
4	Develop a rating curve relating water elevation with Lake outflow.	LOW

Table 28 (continued)

Number	Description	Suggested Priority Level
ISSUE 4: AQUATIC PLANT GROWTH		
1	Manage aquatic plant growth to favor recovery of desirable native plants and maintain or enhance navigation.	HIGH
2	Actively control aquatic invasive species such as Eurasian and hybrid water milfoil, curly leaf pondweed, and reed canary grass. Early spring control has the least potential to harm native plants.	HIGH
3	Create navigation lanes in high traffic, critical nearshore areas using plant harvesting. Implement a comprehensive and consistent plant pickup program.	HIGH
4	Hand pull or rake nuisance vegetation, especially invasive plant species, in nearshore areas.	MEDIUM
5	Avoid disrupting bottom sediment as part of plant management. Avoid indiscriminate spot application of aquatic herbicides.	HIGH
6	Focus efforts on prevention of new nonnative species: Educate residents; join Clean Boats Clean Waters program; target launch sites for aquatic plant management; citizen monitoring and immediate notification of WDNR if new species observed	HIGH
7	Reevaluate the aquatic plant management plan in three to five years, conducting a new complete point-intercept aquatic plant survey.	HIGH
8	Focus efforts on prevention of new nonnative species: Educate residents; join Clean Boats Clean Waters program; target launch sites for aquatic plant management; encourage citizen monitoring and immediate notification of WDNR if new species observed	HIGH
9	Implement “Issue 1: Water Quality” recommendations to reduce conditions that encourage nuisance aquatic plant growth.	HIGH
ISSUE 5: CYANOBACTERIA AND FLOATING ALGAE		
1	Maintain or improve water quality (implement the actions listed under Issue 1: Water Quality). This action reduces the overall abundance or free-floating plants and algae.	HIGH
2	Maintain or enhance native aquatic plant community (implement the actions listed under Issue 4: Aquatic Plant Growth). This action suppresses algal growth by increasing competition for water-borne nutrients.	HIGH
3	Monitor algal population.	HIGH
4	Monitor for toxic algae during algal blooms.	MEDIUM
5	Educate Lake users about the hazards of toxic algae and develop a warning program if algal blooms and/or toxic strains are identified.	HIGH
ISSUE 6: RECREATIONAL USE AND FACILITIES		
1	Maintain the public boat launch.	HIGH
2	Review and conscientiously enforce existing boating regulations. Review ordinances to ensure compatibility with current conditions and expectations on weekends, holidays, and weekdays.	HIGH for weekends and holidays, LOW for weekdays
3	Consider increasing launch fees.	MEDIUM
4	Establish a Clean Boats/Clean Waters cleaning station and education/inspection program	HIGH
ISSUE 7: SHORELINE MAINTENANCE		
1	Repair or remove failing shoreline structures and replace with natural materials.	HIGH
2	Educate shoreline property owners on the importance of buffers and appropriate shoreline protection measures consistent with lake use guidelines presented in the Healthy Lakes Initiative plan.	HIGH
3	Install “natural” or “soft” infrastructure whenever artificial shoreline protection is desired or needed.	MEDIUM
4	Develop shoreline restoration goals with a follow-up survey to monitor progress.	MEDIUM
5	Enforce ordinances to ensure proper building setbacks and mitigation measures.	HIGH

Table 28 (continued)

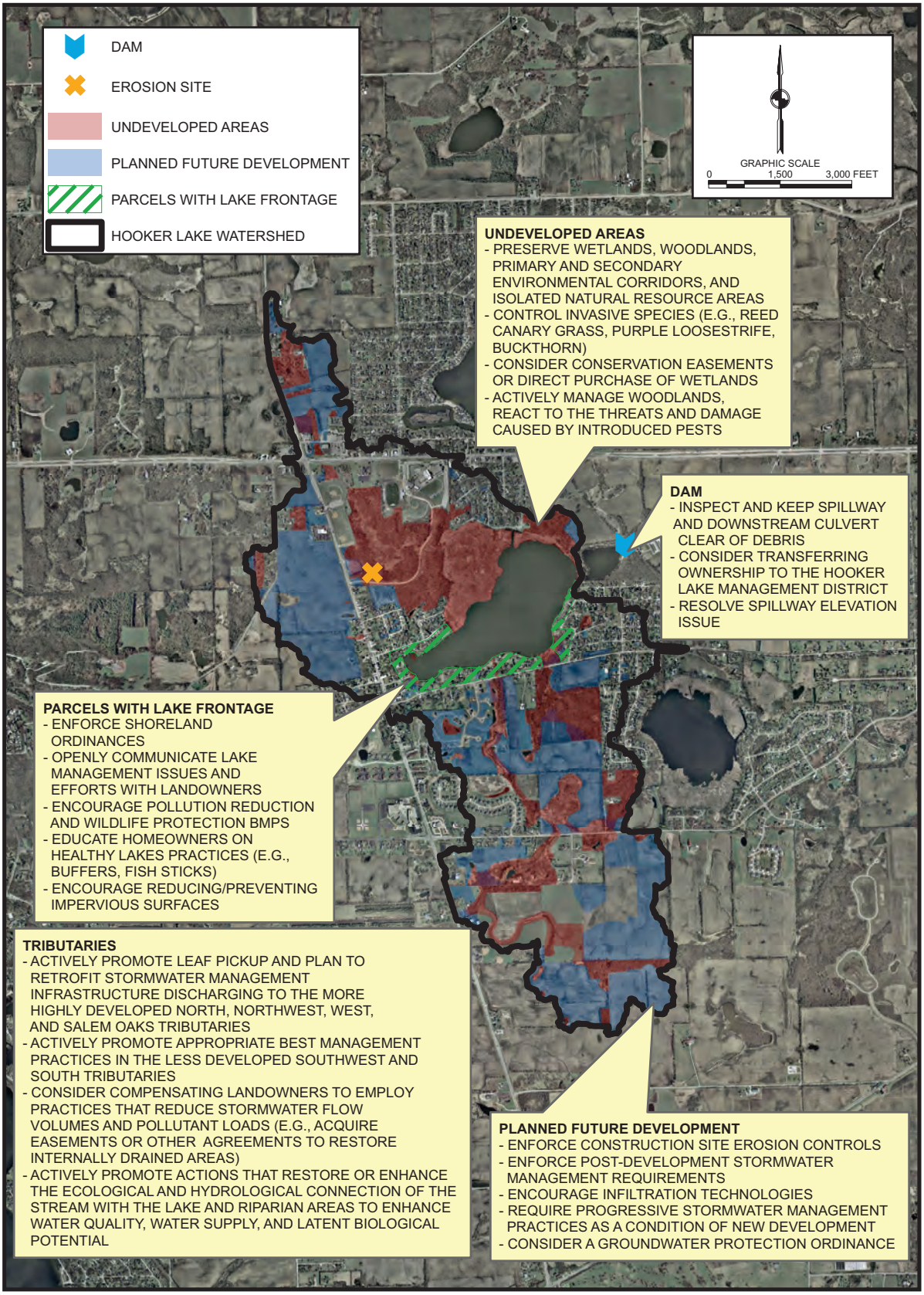
Number	Description	Suggested Priority Level
	ISSUE 8: FISH AND WILDLIFE	
1	Continue fish stocking.	MEDIUM
2	Maintain current fishing practices and regulations.	MEDIUM
3	Identify and remove fish passage barriers on streams.	MEDIUM
4	Introduce woody debris (e.g., “fish sticks” or fallen trees) into the Lake’s shallow nearshore area and encourage vegetative buffers on the shorelines.	MEDIUM
5	Implement recommendations listed under Issue 4: Aquatic Plant Growth and Issue I: Water Quality to help assure a healthy foundation of aquatic plants to support fish and wildlife populations.	HIGH
6	Periodically monitor fish and wildlife populations.	MEDIUM
7	Communicate and encourage implementation of wildlife best management practices along shoreline and in other valuable habitat areas.	MEDIUM
8	Follow guidelines set by WDNR to protect WDNR Sensitive Areas: “Slow no-wake,” restrictions on mechanical and chemical treatment of aquatic plants, use of “soft” techniques for protecting shoreline in Sensitive Area #2	HIGH
	ISSUE 9: IMPLEMENTATION	
1	Foster open relationships with potential project partners and collaborators	HIGH
2	Establish a written action plan that identifies action items, timelines, responsible parties, and potential funding sources.	HIGH
3	Actively remain abreast of changes and activities in the watershed. Communicate this information to other Lake users, regulators, and others interested in the health of the Lake.	MEDIUM
4	Educate watershed residents about relevant ordinances and update ordinances as necessary to face evolving use problems and threats.	HIGH
5	Encourage key players to attend meetings, conferences, and/or training programs to build their lake management knowledge.	MEDIUM
6	Continue to ensure inclusivity and transparency with respect to all Lake management activities.	HIGH
7	Foster and monitor management efforts to communicate actions and achievements to future Lake managers,	MEDIUM
8	Apply for grants.	HIGH
9	Encourage participation of Lake users and residents in management efforts to acquire a wider volunteer base. Record donated resources and Volunteer time.	MEDIUM
10	Actively monitor management efforts and their effects to develop and communicate lessons learned.	MEDIUM
11	Actively share this plan.	HIGH

Source: SEWRPC.

As stated in the introduction, this chapter is intended to stimulate ideas and action. The recommendations should, therefore, provide a starting point for addressing the issues that have been identified in Hooker Lake and its watershed. **Successful implementation of the plan requires vigilance, cooperation, diligence, and enthusiasm from local management groups, State and regional agencies, counties, municipalities, and lake residents.** The recommended measures will help provide the water quality and habitat protection necessary to maintain and establish conditions in the watershed suitable for retaining and improving the natural beauty, ecological value and ambience of Hooker Lake and its ecosystems. This in turns helps guarantee the enjoyment of the Lake by its human population today and in the future.

Map 25

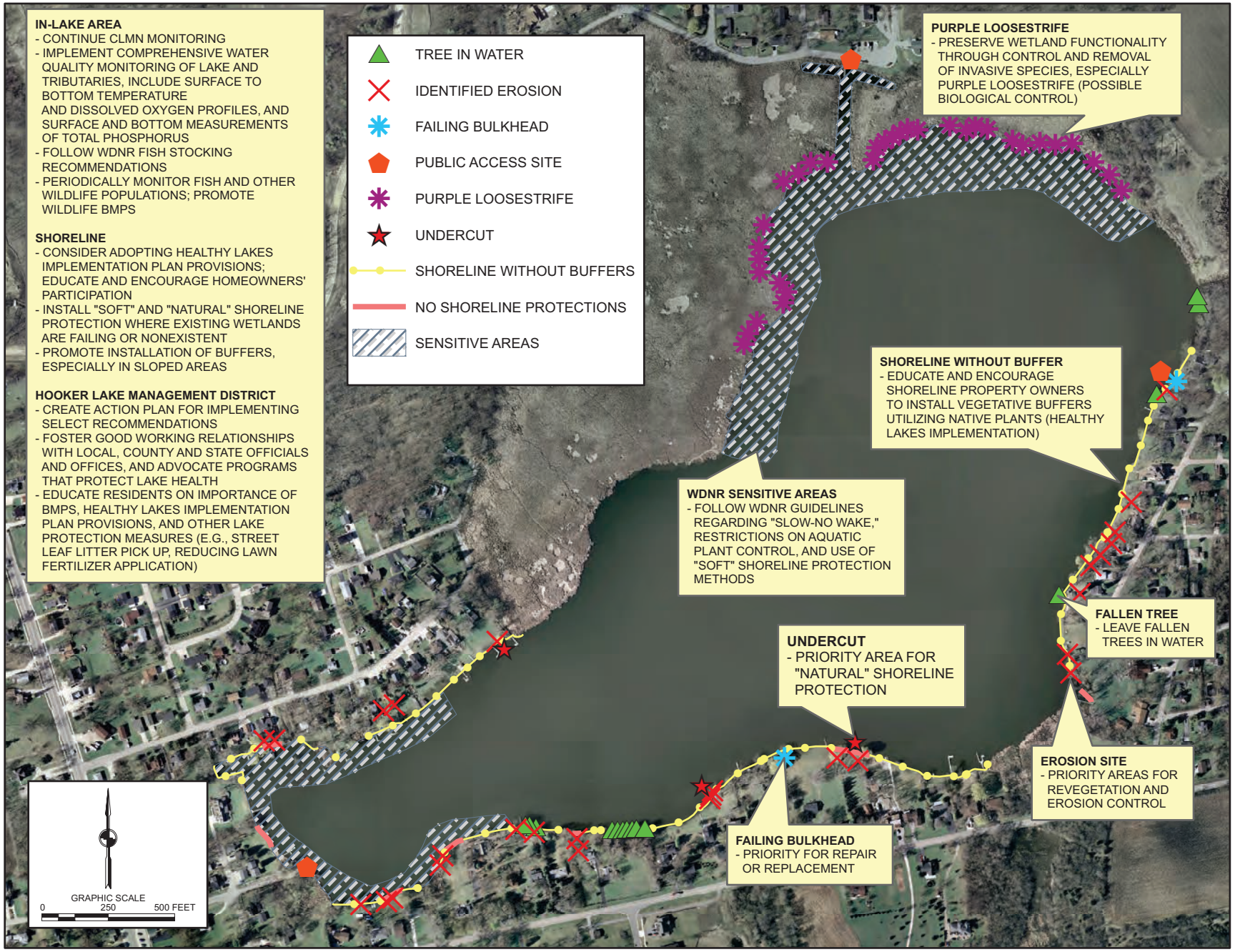
SELECTED RECOMMENDATIONS FOR THE HOOKER LAKE WATERSHED: 2016



Source: SEWRPC.

Map 26

IN-LAKE, SHORELINE, AND INSTITUTIONAL RECOMMENDATIONS FOR HOOKER LAKE: 2016



Source: SEWRPC.