

COMPREHENSIVE ACTION STRATEGY

"We cannot fix our problems with the same thinking we used when we created them."

-- Albert Einstein, Nobel physicist

10-1 GENERAL MANAGEMENT GUIDANCE

This Plan is intended to limit the risk of one person or a vocal minority from steering a lake management decision in the wrong direction. Before satisfying the proverbial squeaky wheel, it is incumbent upon policymakers to acknowledge priority uses and goals for the lake, and to then decide what is in the best interest of the overall lake community. When making management decisions, it is important that they be based on clearly-stated goals that acknowledge lake-use priorities, ecosystem constraints and scientific realities. They should also be made in the context of a long-term vision, with a recognition that information and our level of understanding are always evolving.

Every lake is inherently unique. This explains why lakes can look and behave so differently, and why they may not respond the same to management intervention. There are rarely quick, single-solution fixes for such large and complex systems. Solutions will likely require a multi-faceted approach. Equally significant is that any activity or event can create ripple effects throughout such an interconnected and interdependent ecosystem. Therefore, the potential repercussions of any proposed action will need to be thoroughly investigated prior to implementation. This risk-assessment calculus should also weigh the action against the costs and benefits of taking no action at all. A good rule of thumb is to first protect what you have before attempting to rehabilitate what has been lost. This is because resource protection is almost always more effective and less expensive than rehabilitation.

Experience has shown that effective watershed management is a necessary precursor to effective lake management. Nonetheless, it is not uncommon for significant delays, or lag times, to occur between implemented actions and observable consequences. This is due to the fact that it can take considerable time for lakes to respond to manipulation or intervention, and usually only after a certain threshold of pollution reduction or management action is reached. Management is therefore about understanding and overcoming such thresholds, and focusing on desired outcomes rather than mere process. In other words, patience and persistence are required as cause and effect will not always be close in time and space. Desired outcomes cannot be achieved unless public support, political will and adequate financing are sustained throughout a long-term rehabilitation program.

Ultimately, strategy recommendations for Lake Ripley were selected as long as they met certain basic tests. Many of the following tests were borrowed and modified from a countywide lake-enhancement effort initiated by the Jefferson County Land and Water Conservation Department.¹

1. The recommended action adequately addresses a real problem that is capable of being resolved.
2. The recommended action is applicable to Lake Ripley, and will serve the larger public interest.
3. The problem represents a battle worth fighting, and it is one that no other group is already effectively addressing.
4. The proposed action and desired solution are both achievable in terms of local implementation.
5. The cost, level of effectiveness, and potential side effects of the proposed action are all well understood.
6. Adequate resources are available to fully study and implement the recommended action.

All major findings and recommendations contained within this Plan were presented for public comment at a hearing held on September 26, 2009. No material additions or changes were proposed at this time. The Lake District Board subsequently adopted the Plan by formal resolution on November 21, 2009.

In the end, the success of this Plan will depend on the Lake District's capacity to overcome the barriers to effective management. These can include social barriers (i.e., community norms, under valuing of the resource, loss of a shared long-term vision), political barriers (i.e., entrenched interests and priorities, reluctance to raise necessary capital for management), and technical barriers (i.e., improper data interpretation, misapplied management actions).

10-2 STRATEGY RECOMMENDATIONS

The following strategy recommendations are intended to further the Lake District's goals and objectives as outlined in Chapter 9-5. As a consequence of their implementation, the expected outcome would be a top-quality natural resource that strengthens area property values, provides unique outdoor recreational opportunities for the community, and enhances the overall quality of life of its residents. Complete commentary pertaining to each recommendation is provided in Chapter 10. To attain each goal, any necessary data collection and research should be performed to establish baseline conditions, identify trends, establish measures of success, and decide upon next steps in the planning and implementation process.

Recommended actions include measures aimed at protection and prevention, management control, restoration and rehabilitation, capacity building, and community outreach. Whether they are ongoing or one-time actions, all are designed in an attempt to cost-effectively address

¹ Jefferson County Land & Water Conservation Department. 2003. Shape the Future of Our Lakes: Jefferson County Lake Enhancement Project.

previously identified problems and threats affecting Lake Ripley. Ultimately, successful implementation will depend on interest level, political will, funding availability, workloads, and various other factors.

Note that, in most cases, recommendations pertain to actions that fall directly within the authority and capacity of the Lake District. Problems of significant magnitude and scale, however, are likely to warrant a combination of management approaches, including those that extend beyond the District's immediate control or authority. Approaches could range from simply increasing public awareness, to enacting voluntary incentive programs, to lobbying for mandatory regulation of harmful behaviors and activities.

WATERSHED CONSERVATION

- **Continue the restoration and improvement of the Lake District Preserve.**

The 167-acre Lake District Preserve is identified as an important public resource and restored natural area, and is strategically positioned to protect Lake Ripley's only inlet tributary stream. Management and restoration activities should be pursued at the Preserve that enhance its unique habitats, improve wetland function, protect inlet stream quality, maintain natural scenic beauty, and facilitate reasonable, low-impact public access and outdoor recreational opportunities. See Chapter 7-9 for a list of detailed recommendations relating to the future management and improvement of the Preserve.

- **Provide planning, design, permitting and cost-sharing assistance to targeted landowners for the implementation of eligible Best Management Practices (BMPs).**

Best Management Practices (BMPs) represent tools, devices or strategies that can be employed to control soil erosion, improve habitat value, and/or reduce stormwater runoff volumes or pollutant concentrations. They may involve the restoration of degraded wetlands or lakeshores, rain garden and rain barrel installations, soil erosion-control measures, littoral zone tree-drops, drainage ditch closures, conservation farming practices (i.e., grass-swale waterways, nutrient management planning, no-till planting, strip cropping, contour plowing, buffer strips along waterways, etc.), and the removal or disconnection of water-impervious surfaces.

In selecting and targeting BMPs, priority shall be given to those that most effectively: 1) reduce active soil erosion, 2) provide source control of stormwater runoff, 3) focus on priority, high-loading areas, and 4) protect or enhance critical fish and wildlife habitats. Lake District resources shall be allocated in accordance with approved technical and cost-share standards and procedures. Appendix G contains current copies of the cost-share project scoring sheet, landowner participation guidelines, bidding standards, and contract templates.

Note #1: Considerable resources have already been invested in protecting and repairing eroding shoreline and drainage ditch systems around the lake. In fact, much of what would be considered cost-share-eligible work in these particular areas has been largely completed. Consequently, future efforts should increasingly shift to other identified problem areas, or

else focus on expanding or improving upon already completed BMPS. For residential areas around the lake, future work could involve further attempts to increase the number of functional rain gardens. For agricultural areas, attention could focus more on increasing the use of conservation farming practices, or negotiating additional land-preservation agreements pertaining to mapped critical areas.

Note #2: Given the many benefits associated with aquatic and shoreline vegetative buffers (i.e. increased habitat, runoff filtration, geese control, natural screening of buildings, etc.), consideration should be given to requiring their use as a condition to receiving cost-share assistance for any future shoreline-protection projects. A recent inventory found only a small handful of shoreline areas that remain cost-share eligible and in need of riprap protection.

Note #3: As far as possible ditch closures, future efforts should target channelized and ditched portions of the inlet tributary stream located between the Lake District Preserve and USH 18. All other ditches have either been repaired or plugged.

- **Partner with targeted landowners to protect identified “critical areas” and improve wetland function.**

Critical areas represent unique but threatened habitat features and landscapes that are considered vital to the long-term health and condition of Lake Ripley. These areas are found both within the lake and throughout the watershed. The highest-priority critical areas are those that provide the greatest biophysical benefits or risks to the lake, and those that are most vulnerable to poor land-use management and degradation.

The Lake District is advised to utilize a variety of land-preservation tools to help safeguard critical areas that offer valuable habitat and water quality benefits. Examples include negotiating voluntary land-use agreements, purchasing development rights, adopting environmental deed restrictions, and using fee-simple land acquisitions whenever appropriate. These measures will help ensure that such areas remain protected from future development or harmful land-use activities. Target areas should include wetlands, floodplain stream corridors, large woodlots or groundwater-recharge zones, and steeply sloped, highly erodible lands around the lake.

- **Encourage the planting of native trees throughout the watershed.**

According to *American Rivers*, a mature, urban, forested area can reduce a drainage basin's peak stormwater runoff by 10-20%. Beyond the stormwater benefits, tree cover enhances area aesthetics, moderates air temperatures, reduces energy use, increases property values, and provides food and habitat for wildlife. Native tree planting is an inexpensive, long-term investment that should receive widespread public support. For maximum impact, trees should be located in areas that are best able to receive and absorb runoff. Outreach campaigns, cost-share incentives, and community tree-planting workshops can all be used effectively to increase the amount of trees growing in the watershed.

- **Consider providing free soil tests as a service to both residential and agricultural landowners.**

The misuse of fertilizers can be a source of nutrient pollution to Lake Ripley. For example, even though only 20 ppm of phosphorus is needed to maintain a healthy lawn, most soils in our area are known to have concentrations that far exceed this amount. Storm runoff can easily transport fertilizer product and eroded soil into the lake where it can fuel algal blooms and nuisance weed growth. Despite a 2009 statewide ban on the sale and use of phosphorus lawn fertilizers, compliance rates have not been quantified, nor does the ban apply to phosphorus-based agricultural fertilizers. Soil testing is a relatively inexpensive means of measuring the phosphorus content of area soils. It can also be used to help inform property owners and farm operators on when additional fertilizer inputs are necessary, and when they are not.

LAND-USE POLICY

- **Advocate for policies that reward developers who incorporate green infrastructure and low-impact development (LID) practices.**

Building and development activities within the watershed can permanently alter the landscape and negatively impact downstream water quality. Fortunately, the Town of Oakland's urban service boundary presently confines a majority of these activities to areas west of County Road A, leaving much of the watershed in rural and agricultural land uses. For building activities within the urban service area, LID practices can be used as a means of limiting any negative effects to the lake.

Conservation subdivision planning, reduced building footprints, impervious surface caps, narrower street widths, improved stormwater retention and various other methods should be encouraged or mandated through building and zoning policies. Some practices—such as rain barrels, rain gardens and the disconnection or redirection of roof downspouts—are so inexpensive and universally applied that they could be expected on all new residential sites. However, before advocating for the creation of new incentives and requirements to encourage LID, it is important to make sure the local zoning code allows for these efforts.

- **Advocate for policies at the Town and County levels that limit the amount of road salt applied on area streets.**

Promising salt-reduction strategies exist and should be explored, both as a cost-saving measure and for purposes of long-term environmental protection. These include improved training of equipment operators, better designed salt-dispensing systems, use of sand-salt mixes, monitoring the amount of salt used per land mile, and the use of a long-lasting brine solution as an anti-icing agent applied to roads before an anticipated snow storm. While some of these strategies cost money, the expected payoffs would include improved environmental and public health combined with reductions in road-repair and replacement costs.

- **Advocate for policies at the Town and County levels that call for the use of grass swales, rain gardens and other measures to capture and treat street runoff, as opposed to the creation of curb-and-gutter systems that connect to storm sewer outfalls.**

Connected impervious surfaces, such as traditional curb-and-gutter systems, provide limited opportunity for managing or treating excess storm runoff. Instead, these systems are designed to collect and move water as quickly as possible to a point of discharge—which usually takes the form of a lakeside or streamside storm sewer outfall. The end result is a greater volume, velocity and temperature of overland flow reaching the lake. This concentrated flow is better able to pick up and transport contaminants to the lake and with little to no pretreatment capability. Alternatively, roadways can be designed and pitched so they drain to grass-swale ditches and infiltration basins that are better able to absorb excess runoff.

- **Advocate for the adoption of a Town or County ordinance that would regulate or preclude the development of high-capacity wells where their operation could negatively affect Lake Ripley or its inlet tributary.**

High-capacity wells pump at least 100,000 gallons per day, and have the potential to lower the groundwater table and alter regional lake levels and stream baseflows. Currently, high-capacity wells are weakly regulated by the state, but only if their operation would threaten municipal water supplies or Outstanding Resource Waters. The vast majority of lakes throughout Wisconsin, including Lake Ripley, do not enjoy the necessary legal protections to prevent harmful groundwater withdrawals. A local ordinance could help ensure that proposed projects involving high-capacity wells do not get approved unless it can be shown that their location and pumping rate would not be detrimental to lake health. There are currently no known high-capacity wells in operation near Lake Ripley, except for a high-capacity well that serves the Village of Cambridge.

- **Advocate for the development of multi-modal transportation options around Lake Ripley during street-reconstruction planning.**

The most recent Lake District opinion survey reveals that walking and biking around Lake Ripley is among the most popular of activities enjoyed by local residents. Walking is how many people regularly access and enjoy the lake, and should be facilitated whenever possible. Currently, the lack of a lakeside pedestrian/biking path puts walkers and bikers at risk as they attempt to share the road with vehicular traffic. Supporting any future efforts to develop pedestrian paths around the lake and multi-modal transportation links to downtown Cambridge would help improve safety and reduce automobile dependence throughout the area.

- **Work with the Town of Oakland to explore the possibility of strengthening existing construction site erosion-control rules and enforcement standards.**

Construction site erosion and sedimentation contributes to water quality problems throughout the Lake Ripley watershed. The close proximity of construction sites to ditches, swales, or

other areas draining toward the lake can result in large sediment loads being delivered to the lake or its tributary. In fact, the Wisconsin DNR estimates that the average acre under construction is capable of delivering about 30 tons of soil per year to a lake or stream. This represents a soil erosion rate on a per area basis that can be 10 to 100 times greater than the rate of erosion from agriculture. According to the Nonpoint Source Control Plan for the Lake Ripley Priority Lake Project, construction erosion may have contributed about 450 tons per year of sediment to the lake from 1989-1993, or about 13% of the total estimated sediment load.

Enforcing state and local ordinances can be an effective means of reducing construction site erosion and its adverse water quality impacts. The Town of Oakland has adopted an erosion-control ordinance (Ordinance No. 36) that follows standards set forth in the Wisconsin Department of Commerce's Uniform Dwelling Code (UDC), which applies to one and two family dwellings. However, the UDC does not apply to multi-family dwellings, building repairs, moving of dwellings, or accessory buildings like detached garages, detached decks and farm buildings. Neither does it apply to many small-scale building projects that involve erosion-prone land disturbances. Another problem is that the frequency of inspections and the pursuit of enforcement actions has at times been lax, and can vary depending on the qualifications and availability of the building inspector. Without adequate monitoring and enforcement, construction site erosion will continue to be a significant source of sediment loading to Lake Ripley as corrective actions fail to occur on a timely basis.

- **Ensure that Lake District property annexed by the Village of Cambridge remains a part of and under the taxing authority of the District, and remains subject to shoreland zoning provisions.**

Future property annexations by the Village should not result in a reconfiguration of District taxing boundaries. Properties that were originally designated as being part of the District cannot separate from the District unless permitted as a result of established petitioning procedures, as per Chapter 33 of Wisconsin Statutes. Otherwise, the effect of annexations is to create holes in the District. This process effectively removes benefiting properties from the District while shifting the tax burden to manage the lake to remaining property owners. As the Village annexes land, the land becomes incorporated and is no longer subject to county shoreland zoning rules that apply to unincorporated areas. This presents a potential problem as shoreland zoning rules are meant to protect lakes from harmful building practices.

- **Support the Town of Oakland's comprehensive growth plan (adopted 11-18-08) that places limits on the eastward expansion of the urban service area within the Lake Ripley watershed.**

Every effort should be made to confine future residential growth and development activities to the urban service area. This would help preserve the rural character and agricultural viability of areas lying east of County Road A. Preventing urban sprawl into these rural watershed areas would also limit the extent of water-imperious surfaces, while protecting the types of landscapes that are important for groundwater recharge. It is also important to note that the Town's revised growth plan contains recommendations relating to the protection

of environmental corridors, important natural features, and local water quality. Strict adherence to these planning guidelines will go a long way toward maintaining the condition of Lake Ripley and its watershed.

LAKE-USE POLICY

- **Maintain slow-no-wake and no-motor zoning ordinances in their current form.**

Current no-wake times (7:30 p.m. – 11:00 a.m. daily) and no-wake zoning policies (200 ft. from shore and within portions of both shallow bays) are widely accepted by the public and appear to be achieving their intended objectives. These include an emergency no-wake rule that goes into effect during high-water events. Objectives of no-wake rules include separation of competing lake-use activities, keeping fast-moving traffic away from near-shore swimming areas, providing for quiet enjoyment of the lake, limiting the impact of boat wakes that cause shore erosion, protecting critical habitat areas, and reducing sediment re-suspension and lake-bottom disturbances caused by propeller turbulence. No-wake and other navigational marker buoys should be maintained in their current locations as per Wisconsin DNR permit. Additional buoys may be considered if needed to better demarcate these and other restricted areas. However, it should not be forgotten that an increased number of buoys requires greater installation and removal efforts, and may detract from the natural aesthetics of the lake.

- **Support Town of Oakland's lake-patrol program, and advocate for increased enforcement hours during peak-use boating times.**

The enforcement of local lake rules is important for ensuring high compliance rates and maintaining safe lake use. Seasonal officers hired by the Town of Oakland currently work 35 hours per week during the boating season, and these hours primarily cover weekends. According to Chief Bruce Gondert, an average of one citation is issued for every seven hours of police time on the lake, with most citations related to slow-no-wake violations. Without a consistent law-enforcement presence, lake users become more prone to recreational conflicts and problems associated with repeat offenders. The District's volunteer Lake Watch program can be used to document observed lake-use violations and alert law-enforcement officials to potential problems. It can also help guide the scheduling of lake-patrol hours to reflect changes in observed violation patterns.

- **Discourage policies or actions that would increase motor boat access to the lake.**

It was estimated that recreational carrying capacity is routinely exceeded during Lake Ripley's peak-use periods in terms of boat traffic. In addition, opinion surveys consistently indicate that adequate motor boat access is already available on the lake, and that many lake problems can be linked to traffic congestion.

Expanding the existing boat landing or adding new boat-launch facilities would most likely increase crowding and reduce people's overall enjoyment of the resource. Parking rules at the public boat landing should be strictly enforced to prevent illegal parking, especially

during peak-use periods when boating congestion is more likely to be a problem. Finally, launch fees should be maintained in accordance with Chapter 30.77, Wis. Stats., and may need to be periodically adjusted to stay consistent with rates charged at other area lakes. Revenues collected by the Town of Oakland related to the payment of these fees should be used specifically for the maintenance and improvement of the boat-launching facility.

- **Work with the Town of Oakland in advocating for and instituting an outdoor lighting ordinance, particularly if educational efforts prove ineffective at curbing unnecessary light pollution.**

The natural beauty and aesthetic appeal of a darkened lake after nightfall is becoming increasingly threatened by the growing prevalence of light pollution. Many shoreland property owners and lake users attach great value to the natural appearance and serenity of a lake cloaked in darkness. A nuisance situation can occur when property owners install bright floodlights on piers, boathouses and along the shoreline that project light out over the lake, onto neighboring properties, or into other areas where light is not needed. Excessive lighting also represents a wildlife concern, as certain nocturnal species may become disoriented or behaviorally disrupted by the intrusion of artificial light.

By placing reasonable limitations on the use of such lighting systems, safety and security can be maintained without having to sacrifice this valued aesthetic attribute. Reducing bulb wattage, adjusting the location of lights, avoiding floodlights and pole-mounted lights, and using shades and covers to control the direction of light are all potential strategies that can be used to minimize the unwelcome effects of light pollution. The Town of Koshkonong (Jefferson County, WI) adopted an outdoor lighting ordinance in 2001. Language from this and other similar ordinances can be used as a model if this type of measure is ever considered for the Lake Ripley area.

MANAGEMENT OF LAKE BIOTA

- **Use mechanical harvesting to cut and remove non-native, invasive lake weeds.**

The Lake District should continue to use mechanical harvesting to manage non-native, nuisance weed growth in approved locations. Mechanical harvesting is recommended as an effective method for removing Eurasian watermilfoil canopies, establishing edge habitat for fish, opening boating lanes to improve access to open-water areas, and removing plant biomass that can deplete oxygen levels and release phosphorus if left in the lake to decay. It is also considered a relatively environmentally sound technique for the immediate (albeit temporary) control of milfoil in large, offshore areas. Finally, the District already has a significant investment in the capital equipment and trained staff necessary for carrying out a successful mechanical-harvesting program.

Weed-harvesting activities should be performed in accordance with Wisconsin DNR permit conditions and harvesting guidelines specifically described in Chapter 5-13 and 5-14 of this Plan. Efforts should be focused on Eurasian watermilfoil and curly-leaf pondweed beds

within approved locations. The disturbance of native, mixed-species plant beds should be avoided to maintain water quality protections and desirable fishery habitat.

- **Implement strategies that promote a diverse and thriving native plant community—both on shore and throughout the lake’s littoral zone—to protect water quality and enhance fishery habitat.**

Efforts should focus on selectively controlling non-native weed beds while minimizing disturbances to native and mixed-species plant communities. Control efforts should be targeted in a priority-driven manner that: 1) recognizes the root causes of nuisance weed growth; 2) preserves important ecological values of the larger plant community; 3) facilitates reasonable public access and navigation within high-traffic boating lanes; and 4) balances the needs of competing recreational uses.

The District should implement plant-control programs and policies that support at least moderate amounts of vegetative cover (minimum 15-20% aerial cover). Native plant growth should be sufficient to protect water quality while providing habitat for indigenous fish and wildlife species, including rare, threatened or endangered resources. Encouraging and assisting lakefront property owners in planting aquatic emergent vegetation along their own shorelines would help advance this objective. Alternatively, excessive, non-native weed growth can be managed through mechanical harvesting so it does not unnecessarily restrict predator-prey dynamics, cause fish stunting, and contribute to excessive respiration and dissolved oxygen depletion during non-daylight hours.

- **Explore the feasibility of using spot herbicide treatments or hand pulling to more aggressively control curly-leaf pondweed in East Bay.**

A relatively isolated colony of the non-native, invasive curly-leaf pondweed has been documented in East Bay, and was observed during the most recent (2009) harvesting season. Early and aggressive control of this weed bed may help slow its spread throughout the rest of the lake. However, because it is located within a Critical Habitat Area, it may not be possible to obtain the permit approvals needed to apply herbicides. Using SCUBA divers to hand pull small weed beds may be equally effective while reducing impacts to non-target species.

Herbicides are not advocated as a lake-wide control method due to non-target toxicity concerns, as well as problems associated with the resulting decomposing plant biomass. Considerable caution is warranted given the location of these weed beds in relation to a Critical Habitat Area.

- **Support walleye stocking, carp-control efforts, and a thriving native aquatic plant community as “biomanipulation” tools that can positively influence water quality.**

Reducing external nutrient loading is the key to long-term improvements in water quality. However, this alone is unpredictable as a restoration tool because of the effects of internal loading (recycling of phosphorus from the lake bottom). Biomanipulation can be used to improve water clarity by altering communities of aquatic organisms such as plants, algae,

zooplankton and fish. Aquatic plants provide the basis for a clear-water trophic cascade since they promote predatory (piscivorous) fish populations, create shelter for zooplankton, compete to some degree with algae, and limit sediment re-suspension. Sediment re-suspension (which can be caused by carp) is a source of both algae-producing nutrients and turbidity. Experiments have shown that sediment re-suspension increases the rate of phosphorus release by up to 20-30 times greater than what can be expected from undisturbed sediment.

Since natural reproduction of walleye in Lake Ripley is minimal, the walleye-stocking program sponsored by the Wisconsin DNR should be continued to maintain a viable population. Walleyes have become a popular sport fish that can help keep panfish (planktivore) populations in check, and without displacing or negatively impacting other game fishes.

- **Protect designated Sensitive Areas, now called Critical Habitat Areas, by ensuring adequate enforcement of the Town of Oakland’s pier and boating ordinances that affect these locations, and by advocating for additional protections if deemed necessary.**

Critical Habitat Areas represent ecologically significant areas found in and around Lake Ripley. They are deemed important for sustaining native flora and fauna, and for preserving overall lake health. These areas were found to contain high-quality wetland and aquatic plant communities and other critical habitat features. Placing reasonable limitations on shoreline alterations, new pier development, and motorboat traffic within these specific locations will ensure that these unique natural assets are not unnecessarily damaged or destroyed.

Critical Habitat Areas on Lake Ripley were originally mapped in the early-1990s, and were then subsequently incorporated into a Town of Oakland pier ordinance. A copy of the map that was created for purposes of the ordinance is included in Appendix D. In 2008, the Wisconsin DNR partnered with the Lake District to re-evaluate and re-map these areas based on a thorough assessment of current conditions. Although still considered to be in draft form, the present status of this updated map can be found in Chapter 5-7.

- **Partner with Wisconsin DNR to complete a re-evaluation and re-mapping of Lake Ripley’s Critical Habitat Areas, a process that was started in 2008.**

Aquatic plant communities and general shoreline conditions are in a constant state of flux, and their status has undoubtedly changed since Critical Habitat Areas (formerly called “Sensitive Areas) were first mapped in the early-1990s. Recognizing this fact, fieldwork was conducted by the Wisconsin DNR and Lake District during the summer of 2008 to identify and re-map critical habitat features in Lake Ripley. A draft report was subsequently prepared in 2009.² This process should be completed so that a final report can be issued by DNR and made available for public comment. In the event that any boundaries are materially adjusted,

² Graham, Susan and Johnson, A. 2009. Critical Habitat Study Report, Lake Ripley, Jefferson County, Wisconsin (DRAFT). Wisconsin Department of Natural Resources.

related boating and pier-development ordinances should be revisited to ensure that they continue to adequately protect these important areas.

- **Work with Wisconsin DNR in revisiting bag and size limits for bass, northern pike and walleye to ensure that current fish-harvest policies are meeting their objectives.**

Bass, northern pike and walleye are arguably the most popular and sought after game fish on Lake Ripley. Aside from their obvious recreational value, they also represent important top predators that play a vital role in maintaining optimal lake health through their food-web interactions. Their feeding habits not only help curtail the overpopulation and stunting of panfish in the lake, but also effectively keep carp numbers in check. Fewer carp and panfish translates into improved water quality as a result of reduced sediment disturbance (also called “bioturbation”) and less grazing on algae-consuming zooplankton. To sustain these food-web interactions, it is necessary that the resource not be subject to overharvesting. Promoting catch-and-release and setting appropriate bag and size limits are effective ways of maintaining a proper balance between these top predators and their forage base.

- **Investigate the feasibility and potential effectiveness of installing a carp barrier in the outlet stream channel.**

Lake Ripley is hydraulically connected to Koshkonong Creek and the Rock River through its outlet channel. Consequently, carp have the ability to migrate back and forth between Lake Ripley and these larger drainage systems, particularly during high-water events. So far, Wisconsin DNR fish surveys show relatively small and stable populations of carp in Lake Ripley. To reduce carp recruitment in the lake, however, a carp gate or similar barrier may be helpful in limiting migration runs during the spring spawning season.

This action would impact a navigable waterway and therefore require a Chapter 30 permit. The potential effectiveness of such barriers, and especially during high-water events, would have to be explored prior to permitting and implementation. Any investigation should examine the degree to which carp migrate back and forth through the outlet. Wisconsin DNR fisheries biologists would be in the best position to carry out this type of investigation.

In addition, it should also be noted that hosting community carp harvests can be used as a fun activity to help raise awareness while removing some carp from the lake. Such “carp-a-thons” have previously been organized by the Lake District, with most fish taken by bow after nightfall. Although these events are unlikely to make a significant dent in the lake’s carp population, they involve little cost and can be used in combination with other efforts. Lake Ripley is not considered to be a good candidate for commercial harvesting due to low carp numbers in relation to lake size.

- **Assist targeted landowners in securing federal permits for the purpose of implementing egg-oiling efforts if necessary to control nuisance, non-migrating geese populations.**

Giant Canada geese introduce bacteria and phosphorus to the lake in the form of goose droppings, although the actual amount relative to other sources has not been quantified.

Many of these geese no longer migrate and can quickly become a nuisance on the lake in larger numbers. Geese are also known to congregate as large flocks within certain areas, causing damage to shorelines and potentially displacing other wildlife. However, they are a protected species under the Federal Migratory Bird Act. In order to manage their numbers, it may be necessary to locate concentrated nesting areas and work with private landowners to engage in permitted egg-oiling efforts.

Egg oiling is considered a humane way of destroying the viability of a developing egg. When performed on a consistent basis, geese will usually leave in search of other more productive nesting areas. In addition to egg oiling, other geese-control strategies could include the creation of shoreline vegetative buffers, encouraging increased hunting in the area, using trained herding dogs or other harassment techniques, discouraging hand feeding, and limiting access to frequented foraging and nesting grounds. Each has its advantages and disadvantages in terms of effectiveness and degree of public acceptance.

Before pursuing any geese-control program, the Lake District will want to determine whether the magnitude of the problem warrants the necessary resources. Goose counts should be periodically performed to estimate population size and long-term trends, especially by monitoring known nesting and foraging sites around the lake. This type of monitoring would be helpful in determining whether current numbers are considered excessive.

PUBLIC EDUCATION AND OUTREACH

- **Explore using additional incentive programs and community-based social marketing strategies to increase landowner participation rates relating to the implementation of watershed Best Management Practices (BMPs).**

Water quality improvements are largely dependent on the voluntary implementation of BMPs and informed behavior change by landowners throughout the watershed. Consequently, the Lake District should investigate the feasibility of increasing the availability of cost-share grants, instituting special tax rebates (see Burnett County case study), offering green-development bonuses, hosting stewardship-recognition awards and events, or providing similar incentives to further motivate desired behavior changes.

Also, most resource managers agree that without incentives, and unless required by regulation, landowners adopt new BMPs or behavior changes they perceive as being in their best interest. Social-marketing techniques should therefore be incorporated into existing outreach programs to better achieve required behavioral responses. Social capacity building goes beyond making individuals aware of a problem by ensuring that they have the knowledge, skills, ability and motivation to make meaningful behavior changes. Social-marketing programs that were developed for Lake Ripley relating to rain gardens and fertilizer use may be used as models.³ If successful, these models should be expanded to other behaviors through the use of pilot projects.

³ Cipiti, M., P. Heiberger, N. Hunt, J. Keeley, B. Panke and E. Sievers. 2007. Rain Gardens for Lake Ripley Watershed: How a Community-based Social Marketing Program Can Promote Rain Gardens. Human Behavior and Environmental Problems course report, University of Wisconsin-Madison.

In terms of project evaluation, “social indicators” can be used to fill the gap between BMP installation and documentable water-quality improvements. The logic behind social indicators is that water quality problems have accumulated over many decades and may well take decades to amend. Rather than measuring progress solely through changes in environmental indicators (like coliform bacteria counts, phosphorus concentrations, water clarity, etc.), or administrative indicators that say little about actual impact (like materials developed, meetings conducted, funds expended, etc.), social indicators provide information about people’s behaviors and the factors that influence them. Changes in these factors often precede water quality changes. Confirming that awareness and attitudes are changing and behaviors are being adopted in the watershed is one way to demonstrate progress toward water quality goals.⁴

- **Utilize multiple forms of media and social-marketing techniques to enhance the public’s ability to understand, evaluate and advocate for actions and policies that protect the lake.**

The Lake District should focus on communicating “value,” “threats,” and “consequences of action or inaction” when conducting public outreach. It should also point out the connection between management investments and the enhancement of recreational opportunities and property values. The *Ripples* newsletter—which is consistently identified in opinion surveys as the preferred means of obtaining news about the lake—is recommended to serve as the primary mechanism for information sharing.

Outreach efforts should be tailored according to the target audience the District is attempting to inform or influence. Topics of interest might include the purpose and status of ongoing management activities, an explanation of local lake rules and shoreland zoning policies, landowner cost sharing, invasive species prevention, home yard-care tips, and easy ways of staying informed and involved—among many others. Evaluation measures and procedures should be built into any outreach program to gauge its effectiveness. In addition to *Ripples*, other outreach tools should continue to include the following:

- Lake District website (www.lakeripley.org)
- Lake Ripley E-bulletins to disseminate time-sensitive announcements
- “Welcome Wagon” mailings to new landowners
- Public hearings on proposed policy changes
- Televised Lake District Board meetings
- Visits with homeowner associations
- Articles in The Cambridge News
- Educational programming on Cable TV 98
- Community-service projects

Fogarty, E., J. Huston, R. Maskin, B. Van Belleghem and S. Vang. 2007. Phosphorus Free for Lake Ripley: A Community-based Social Marketing Program to Use Phosphorus-free Lawn Fertilizer. Human Behavior and Environmental Problems course report, University of Wisconsin-Madison.

⁴ Genskow, Ken, Linda Prokopy, and Rebecca Power. Fall 2008. Using Social Data in NPS Management. *LakeLine*. North American Lake Management Society.

- Informational workshops and seminars
- Signage and flyers (i.e. at public access points, Lake District Preserve, major street intersections near watershed boundaries)
- High-visibility demonstration projects for new BMPs
- Personal communications with landowners (i.e. phone calls, letters, site visits, etc.)
- Homeowner guides on various topics
- Public lake/watershed tours

Finally, inviting Town Board members on pontoon boat tours is an excellent way of increasing the awareness of local decision makers and building political support for coordinated management action.

- **Organize paid or volunteer watercraft inspectors to educate boaters about aquatic invasive species at boat launches.**

Aquatic invasive species such as Eurasian watermilfoil and zebra mussels have already infested Lake Ripley. These and many other invasive species continue to spread inland from places like the Great Lakes, primarily as a result of transient recreational boat traffic. While it is currently illegal in Wisconsin to transport boating equipment with any attached plants or other organisms, additional policing and boater education is warranted to complement existing outreach programs. One or more boat inspectors can be stationed at the public boat landing and marina on busy summer weekends to help increase awareness and curb the threat of future introductions. However, note that past attempts to solicit and train a sufficient number of volunteers was met with limited success. It may therefore be necessary to compensate workers or offer other incentives to sustain a viable program.

- **Maintain high-visibility informational signage at the public boat landing and other access locations.**

At a minimum, boat-landing signage should contain lake maps and information that clearly inform the public about local lake ordinances, launch rules, documented aquatic invasive species, and preventative steps for controlling the spread of AIS. The placement of additional signs identifying the boundaries of the Lake Ripley watershed should also be considered. These types of signs can be used to increase public awareness about the geographic extent of the watershed, as well as the connection between land use and water quality. Existing signs that were developed as part of the Lake Ripley Priority Lake Project are currently located at the public boat landing and at the intersection of Park and Ripley Roads. Major street intersections near the boundaries of the watershed, particularly along County Highway A, offer other potential sign locations.

- **Ensure that the public is made aware of strategies or approaches to problems that the Lake District considers impractical, ill advised, of questionable impact, or beyond the District's charge and authority.**

Identifying sound management strategies is as important as understanding why competing strategies may have been discounted. Potential solutions to different problems are always

being proposed and investigated. Some perceived solutions may initially enjoy considerable public support, making it all the more challenging to temper public expectations and avoid getting sidetracked by ill-conceived management approaches. The following are just a few examples covering a range of different topics:

Drainage and flood relief: Most land-drainage and flood-control activities (i.e. drainage ditching, stream dredging, water diversions, etc.) fall outside of the Lake District's core mission, and even its legal authority. One exception would be the restoration of wetlands or the protection of groundwater recharge areas in which flood relief is a secondary benefit. Nonetheless, flood-control proposals can be common during unusually wet years when high water and widespread flooding increases the risk of property damage. While the Lake District may be able to offer guidance or connect property owners with the proper authorities, it is not legally or institutionally positioned to address such concerns.

Lake-level manipulation: Installing an outlet control structure as a means of moderating lake levels is regularly proposed, and has been the subject of prior investigations (see 10-17-05 Lake District meeting minutes). Unfortunately, a dam or similar structure would be of limited use in retaining water during severe drought conditions given the elevation of the outlet relative to the expected lake surface elevation. The use of such a structure to facilitate the release of floodwaters has its own set of challenges. For one, a Lake Ripley floodplain study showed that peak discharges at the outlet are substantially lower than the rate of inflow through the inlet. The study further showed that Park Road is the primary hydraulic control on Lake Ripley flood levels, and not the location of the existing outlet dam. Another complication is the relatively flat gradient of the outlet stream combined with the location of nearby homes in and around the floodplain. This situation makes increasing discharge volumes through the outlet problematic at best. Other concerns involve landowner-permission and permitting requirements, potential ecological and water quality impacts, cost, maintenance liability, and a low probability of significantly alleviating flooding problems. Instead, it is recommended that flood-reduction strategies be based on protecting and restoring wetland areas, reducing or infiltrating storm runoff, and keeping homes and other buildings out of the floodplain. If permitted repairs or improvements to the existing dam are ever contemplated, consideration could be given to a fixed-crest weir design that would be less prone to illegal manipulation.

Fish cribs: While seemingly beneficial as a habitat improvement, fish cribs can create more problems than they solve by concentrating game fish, focusing angling pressure, and increasing harvest rates. They also serve as a poor substitute for natural habitat features such as aquatic plant beds and downed timber along the shoreline margin.

Algicides and Herbicides: The use of chemicals to control nuisance weed and algal growth can contribute to a number of adverse side effects. Their long-term, environmental and public-health effects are often unknown, and it may be difficult if not impossible to minimize impacts to non-targeted species. In addition, these types of treatments fail to address the underlying cause of the problem, and can create entirely new problems as plant and algal material is left in the lake to decay. These problems may include dissolved oxygen depletion and the release of phosphorus that contribute to water quality impairments. However, limited

herbicide use may be appropriate to prevent a lake-wide weed infestation, especially if a new weed is discovered to occupy only a small, discrete area.

Bans Based on Engine Size or Watercraft Type: Banning the use of watercraft by type, size or horsepower is routinely proposed as a means of correcting certain problems, particularly those that stem from aggressive motor boating behavior. However, such bans pose serious legal questions, and have been considered an arbitrary and unwarranted restriction of public rights in previous court rulings. These rulings were based chiefly on the Equal Protection clause of the U.S. Constitution and Wisconsin's Public Trust Doctrine. Unless it can be reasonably established that a certain watercraft or engine type, by nature of its design, is the cause of a particular problem, an outright ban may not be legally feasible. Bans may be construed as unfair or arbitrary, especially when such limits are not based on a scientifically defensible rationale. The Wisconsin DNR takes the position that ordinances regulating horsepower are overly restrictive and cannot be justified because they do not account for the fact that larger horsepower motors can be operated within established speed limits. Other control measures, such as slow-no-wake zoning, are likely to be more effective and will be perceived as being more equitable.

EVALUATION AND ANALYSIS

- **Use computer modeling to identify realistic sediment/phosphorus-reduction targets on a watershed and subwatershed basis.**

Computer models have been used for Lake Ripley in the past to try to quantify pollutant loading, estimate probable lake response, and establish reduction targets. Re-running these watershed-loading and lake-response models may be appropriate following major land-use change or the implementation of large-scale BMPs. Modeling output can and has been used to readjust goals and management efforts, thereby maintaining focus on the key watershed areas and land-use activities that contribute to larger problems.

Note: While the Wisconsin Lake Management Suite (WiLMS) model was used for the purpose of this planning effort, re-running WINHUSLE other models could help derive a better understanding of site-specific sources and quantities of sediment and phosphorus loads to the lake. This, in turn, would aid in the targeting of BMPs.

- **Estimate the extent and sources of in-lake phosphorus recycling by developing more refined phosphorus and hydrologic budgets for the lake.**

The effectiveness of external (or watershed-based) nutrient loading reductions may be limited due to in-lake phosphorus recycling. Current evidence suggests that while phosphorus recycling is occurring in Lake Ripley, it does not appear to be a significant problem in proportion to other sources. However, further study may be warranted to better quantify all sources of phosphorus loading, especially if long-term water clarity goals cannot be attained through the implementation of watershed practices alone. A phosphorus budget can also be used to estimate relative phosphorus loadings from geese droppings, or from the lake's only tributary. In 1993, monitoring of the inlet stream revealed consistently poor

water quality and high phosphorus concentrations. This monitoring regimen could be repeated to assess the inlet's current condition.

Note: If deep-water phosphorus recycling is shown to be significant, the addition of aluminum sulfate (alum) could be considered as a possible management technique. Alum treatments are used to lower a lake's phosphorus content by producing a non-toxic, aluminum hydroxide "floc" that settles to the bottom and prevents the mobilization of phosphorus during anoxic conditions. Case studies suggest an average effectiveness timeframe of 7-10 years, but earlier cost estimates for Lake Ripley ranged from \$150,000-200,000. Other *potentially* applicable options include hypolimnetic aeration or hypolimnetic withdrawal. The former attempts to oxygenate the hypolimnion during summer stratification, while the latter attempts to remove nutrient-rich, hypolimnetic water before it mixes with the entire water column by altering the depth at which water leaves the lake.

- **Assist the Wisconsin DNR and other permitting authorities to ensure a thorough and comprehensive permit evaluation of any future dredging proposals related to Lake Ripley's inlet channel or Vasby's Ditch.**

A group of property owners is currently pursuing the necessary permits and financing to re-dredge portions of the inlet channel, primarily to facilitate private motorboat access to the main water body. Given the potential scale, cost and range of impacts associated with such a large-scale dredging operation, the Lake District will need to ensure that the permit-review process is conducted in a complete and thorough manner. In particular, the District should review any proposed plans to verify that all water quality and ecological concerns are adequately addressed as a condition of approval. These concerns include ensuring that the proposed project will not adversely affect the lake or adjoining wetlands, which are mapped as designated "sensitive areas."

If it can be shown that dredging would achieve a beneficial objective in terms of the larger public interest, the Lake District may wish to consider supporting its implementation by providing cost sharing or technical assistance. However, before any funds are allocated, benefits should be clearly demonstrated and should significantly outweigh any potential negative impacts. The clearest benefit would go to the off-lake homeowners who would see improved motorboat access to the main water body. However, this would not constitute a public-access benefit, as the channel does not connect to a public boat landing. Any increased boating activity would result from boats accessing dredged portions of the channel from the main water body.

Depending on scope of work, public-interest benefits could *potentially* include: (1) enhanced sediment-detention capability through increased pooling and particulate settling; (2) removal of channel sediment that may prove to be a significant source of phosphorus loading --- assuming any high-phosphorus-content sediment is contained within the upper 1-1.5 feet of a sediment core, and that phosphorus release can be demonstrated to occur in significant quantities; (3) increased availability of open-water, pelagic fish habitat; and/or (4) post-dredging remediation that incorporates significant shoreland-habitat enhancements.

Alternatively, potential negative impacts could include: (1) increased turbidity and sediment-phosphorus release; (2) re-suspension of buried contaminants (if present); (3) loss of wetland-trapping function and habitat value from the re-establishment of an incised channel; (4) removal of beneficial aquatic/wetland plants and benthic organisms; (5) increased bank instability due to an artificial channel geomorphology; (6) disruption or permanent damage to Critical Habitat Areas; and (7) the need to repeat dredging at a recurrence frequency dependent on sediment-infilling rates. Finally, channelized streams tend to have more uniform flow velocities and substrates that are unsuitable for many forms of aquatic life. Each of these issues would also be pertinent to Vasby's Ditch, and would warrant serious scrutiny during permit review.

CAPACITY BUILDING

- **Encourage board members and staff to attend continuing education seminars, conferences and workshops.**

Attending lakes conferences, workshops and training seminars is a valuable way to network with other lake organizations and agency professionals. It is also a means of staying up to date on lake-related legislation, scientific research, new grant opportunities, and successful case studies relating to the design and implementation of management strategies. In-house training programs should also be explored. These efforts can be used to serve both new and experienced Board members, and could be modeled after successful programs sponsored by the Wisconsin Lake Leaders Institute. Potential educational topics could cover everything from lake district and open meetings law, to the science behind ongoing lake and watershed management efforts.

- **Utilize Board committees, citizen task forces, volunteer groups and student internships to increase the capacity of Lake District programs.**

Lake District programs are limited by budget, staffing and time constraints. To expand the reach and effectiveness of District efforts, it may be possible to delegate certain activities to self-directed volunteers or interns. The Friends of the Preserve, Lake Watch volunteers, project interns, citizen advisory committees, and volunteer lake monitors are examples of groups and individuals who have donated their time and skills in the past.

- **Seek out grant opportunities and diverse partnerships to advance Lake District initiatives.**

For every one dollar collected in taxes over the years to support lake-management work, over two dollars has been raised through various grants and in-kind donations. Local, state and federal grants have tremendously expanded the Lake District's operational capacity over the years. The same can be said of the strong professional relationships that are maintained with Town of Oakland, Jefferson County, Wisconsin DNR, U.S. Fish & Wildlife Service, University of Wisconsin, U.W.-Extension, Wisconsin Association of Lakes, and various other entities. Continued effort should be made to seek outside sources of funding, and to build new and diverse partnerships that advance mutual objectives.

The Jefferson County Land and Water Conservation Department, in particular, offers a cost-sharing program that is similar to the Lake District’s program. For certain eligible projects, financial assistance can be coordinated to reduce the amount of the District’s and/or landowner’s cost-share match. While grants come from many sources, the Wisconsin DNR implements a number of funding programs that have been successfully utilized in the past. These grants have been used to finance efforts such as scientific research, lake-management planning, land and capital equipment acquisitions, lake-access improvements, and a number of watershed Best Management Practices (BMPs). Table 38 provides an abbreviated summary of the more relevant grant programs that could benefit the District in the future.

Table 1: Grants available from the Wisconsin Department of Natural Resources

Grant	Awards	Application Deadline
Aquatic Invasive Species	50% up to \$10,000 or \$75,000 depending on project	February 1 and August 1
Lake Management Planning	75% up to \$10,000 for large-scale planning efforts	February 1 and August 1
	75% up to \$3,000 for small-scale planning efforts	
Lake Protection	75% up to \$100,000 or \$200,000 depending on project	May 1
Recreational Boating Facilities	50-90% depending on project	Ongoing; awards made up to four times per year
River Protection – Planning	75% up to \$10,000	May 1
River Protection – Management	75% up to \$50,000	May 1
Targeted Runoff Management	70% up to \$150,000	April 15
Urban Nonpoint Source and Stormwater Grants	50% up to \$150,000 for construction and \$50,000 for land acquisition or easements	April 15

LONG-TERM MONITORING

- **Maintain an updated inventory of completed projects and targeted properties that remain eligible for approved BMPs.**

The condition of previously implemented BMPs should undergo performance inspections at least every couple years. As for future projects, priority should be given to properties with a demonstrated need for corrective action, and those directly affecting or located in close proximity to the lake, major drainage routes, or identified critical areas such as wetlands. Inventoried properties and parcel-ownership records should be updated on a regular basis so outreach programs can be tailored to maximize landowner-participation rates. The availability of an interactive, web-based watershed map showing completed projects by type and location could help draw attention to cost-share efforts and promote further BMP investments.

- **Monitor changes in land-use conditions to identify potential problem areas and better target BMPs.**

Water quality and lake health are greatly impacted by changes in watershed land cover and land use. Therefore, watershed activities and their affect on soil erosion and pollutant delivery should be closely monitored. This includes monitoring shoreline development activities, especially those that could impact Critical Habitat Areas. Active construction sites, agricultural cropping practices, livestock operations, shoreline/ditch conditions (i.e., type and amount of bank cover, evidence of erosion, structural improvements, etc.), and any significant landscape alterations should all be the focus of continued monitoring efforts. These efforts should involve regularly videotaping the shoreline and maintaining a photographic record of BMPs and Critical Habitat Areas.

- **Support the continuation of long-term trends monitoring on Lake Ripley by the Wisconsin DNR, including regular monitoring of water quality, fisheries and aquatic plant conditions.**

Monitoring is an important part of watershed management that measures changes in watershed conditions and water quality. Identifying trends through long-term monitoring is critical to good lake planning and decision-making. It confirms progress toward stated goals, and reveals problems that require attention. Long-term trends monitoring has so far produced a wealth of information pertaining to Lake Ripley's past and present condition. This information has proved invaluable for assessing lake health, diagnosing problems, evaluating management programs, and distinguishing between real and perceived changes. Effective planning relies on the availability of this type of baseline data, and it provides the basis for informed management action.

- **Monitor water quality conditions by tracking a range of parameters and biotic indicators in accordance with recommended monitoring schedules (see Table 39).**

Good water quality provides the basis for supporting all aquatic life in the lake, and is consistently cited as the most valued lake attribute by area property owners. There are many measures of water quality that can and should be used to track changes over time. Typical monitoring parameters taken over the deepest point in the lake include water clarity, chlorophyll-*a* concentrations (a measure of algae growth), total phosphorus concentrations (limiting nutrient that drives algae growth), and temperature/dissolved oxygen profiles. *E. coli* bacteria levels—which may indicate the presence of dangerous pathogens that can affect public health—are currently tracked on a weekly basis at the Ripley Park Beach by Jefferson County Health Department officials. Groundwater quality is also important to monitor, particularly to determine the extent of Atrazine and nitrate contamination caused by the widespread land application of fertilizers and herbicides. Finally, a number of biotic indicators (i.e., fish, plants and macroinvertebrates) can be used to evaluate water quality conditions.

Note #1: Concentrations of nutrients and other contaminants change as water moves through the watershed. Therefore, trends can be observed not only by long-term monitoring at a single point, but also by monitoring many points along a flow path.

Note #2: Adequate monitoring equipment is needed to maintain an effective lake-monitoring program. Equipment needs include a current meter for measuring stream flow, a temperature-dissolved oxygen probe, and a new staff gage for tracking changes in lake levels. Grants may be available to help defray costs.

- **Support annual electrofishing inventory and occasional fyke-net surveys by Wisconsin DNR fisheries biologists.**

Fishery surveys are important for tracking fish recruitment (number of fish surviving to a certain size or age each year) and overall fishery health. The potential causes of variability should be evaluated, including weather during the spawning period, availability and quality of nursery cover, condition of the forage base, water quality changes, and harvest pressure. Data obtained from regular fishery inventories can be used to monitor the long-term health of different fish populations. Data can also be used to help identify a variety of lake-related problems. In many cases, changes in a lake's fishery can affect or be affected by changes in water quality and habitat availability through food-web manipulations. A database should continue to be maintained at the District office with updated fishery information.

The Lake District should continue tracking the status of the lake chubsucker (*Erimyzon sucetta*), a Wisconsin Species of Special Concern. In addition, continued monitoring is recommended for the pugnose shiner (*Notropis anogenus*) and least darter (*Etheostoma microperca*), two Wisconsin Threatened Species that appear to have disappeared from the lake. The banded killifish (*Fundulus diaphanous*) is another rare and sensitive species that appears to have disappeared from the lake. Rediscovery of these species using effective capture methods could be an early indicator of water quality improvements or successful habitat recovery.

- **Conduct aquatic plant inventories at least every 4-5 years to evaluate changes in the plant community.**

Different aquatic plants have different tolerance levels of environmental disturbance and degradation, making them excellent biotic indicators. A stable, diverse and thriving native aquatic plant community is a sign of good lake health. Alternatively, too much or too little plant growth is a sign of trouble, particularly when the plant community is dominated by only a few pollution-tolerant species. Plant inventories are used to track changes in the aquatic plant community over time. They are also used to monitor harvesting impacts on species diversity, distribution and densities within management zones.

- **Monitor lake use to track long-term changes in boating behavior and recreational-use patterns.**

Lake Ripley is a popular but finite recreational resource. Space and other natural limitations somewhat control the types and intensity of lake activities. Boating ordinances and other lake-use policies also place limitations on these activities. Despite these limiting factors, a 2003 recreational boating study estimated that the lake’s carrying capacity is regularly exceeded during peak-use periods. Lake-use patterns should be monitored each year to draw attention to potential problems related to crowding, and to better quantify long-term trends. Lake Watch volunteers may be used to document rule violations and conduct on-lake boat counts. In addition, annual counts of piers, boatlifts, rafts and parked boats should continue in order to track changes in the riparian boat fleet and related structures. This can be further documented through video documentation of the shoreline every 2-3 years. Finally, public opinion surveys that may be conducted in the future should include questions pertaining to lake use.

- **Survey the opinions of property owners and lake users at least every several years.**

Comprehensive opinion surveys and targeted questionnaires are used to gauge public perceptions and attitudes on any number of issues related to the lake and its management. These efforts should be conducted at least every several years. It is important to assess the public’s awareness and understanding of key management challenges, identify emerging concerns, and be able to re-evaluate community priorities. Examples of past opinion surveys can be found in Appendix F.

- **Synthesize and evaluate all available monitoring data at regular intervals to re-evaluate trends and diagnose emerging problems.**

Continued data collection and information gathering is of critical importance to effective planning, problem diagnosis and strategy evaluation. Table 39 offers an overview of the suggested monitoring schedule for Lake Ripley.

Table 2: Suggested Monitoring Schedule for Lake Ripley

Parameter or Information Type	April/May	June	July	August	September	October	Remarks
Secchi clarity	X	X	X	X	X	X	Every 10-14 days
Total phosphorus	X	X	X	X			2 depths: 1 ft. below surface, and 2 ft. above lake bottom
Chlorophyll- <i>a</i>		X	X	X			Lake surface; early and late season measurements optional
Temperature/dissolved oxygen profiles	X	X	X	X	X		October measurement optional

Complete water chemistry	X					Spring turnover
Lake water levels	X	X	X	X		Every 10-14 days and during flood events from known elevation at W9073 Ripley Rd. (838.93' at top of steel plate on seawall 10' from west property line)
E. coli bacteria		X	X	X		Weekly sampling at Lake Ripley Park beach by Jefferson County Health Department
Condition of inlet tributary stream	X	X	X	X		Flow, dissolved oxygen, phosphorus and ammonia as needed to evaluate changes since 1993
Fish community					X	Electrofishing surveys performed annually by Wisconsin DNR
Macroinvertebrates		X				Collected from inlet and outlet streams to evaluate biotic indices
Aquatic plants			X			Macrophyte surveys performed at least every 4-5 years
Zebra mussels		X	X	X		Plate-sampler monitoring as appropriate to track trends
Phytoplankton (algae) and zooplankton	X	X	X	X		Optional; identify species and general abundance
On-lake boating	X	X	X	X	X	On-lake, active boat counts taken randomly as volunteer time permits
Piers, boatlifts, swim rafts and parked watercraft			X			Counts of individual piers, boatlifts, rafts, and moored or beached watercraft (by type)
Videotaping of shore conditions			X			At least every 2 years
Groundwater contaminants						Area wells should be re-tested for chlorides, nitrates and triazine to identify land-use concerns that affect groundwater quality
Property owner opinion surveys						Every 4-6 years, or as needed for outreach development and program-evaluation purposes
Cost-shared BMPs						Inspect every 2 years or as needed; maintain information on location, ownership, BMP type, completion date, cost, and estimated impact

- **Update management-planning findings and recommendations as needed.**

This plan is intended to be continually updated, especially as new and applicable scientific research, technologies, case studies and management guidance become available.

Consequently, the need to refine goals and objectives should be anticipated as management

strategies are implemented and resource conditions change over the course of time. Any significant amendments or updates to the Plan shall be documented on a continual basis, preferably through an electronic-tracking system. Special document inserts or stickers can then be distributed to prior Plan recipients when deemed appropriate. At a minimum, recipients of this Plan shall include the Lake District Board, Town of Oakland Board, Jefferson County Land and Water Conservation Department, Wisconsin DNR, and Cambridge Library.