Phosphorus Free for Lake Ripley

Community-based social marketing program to use phosphorus-free lawn fertilizer

P-Free for Lake Ripley

May 2007

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FOREWORD

This report is the product of three months of work undertaken by a team of graduate students in the Spring 2007 UW-Madison course entitled Human Behavior and Environmental Problems. The focus of the course is on what contribution social psychology and related disciplines can make toward understanding and helping to solve environmental problems. The course is intended to provide both a theoretical framework and an empirical basis for those university students who will one day be doing environmental planning, environmental education or natural resources management.

Part of the course was conducted as a workshop in which the principles of community-based social marketing (CBSM) were applied to water quality issues within the Lake Ripley Management District located in southeastern Wisconsin. In recent years, CBSM has attracted a lot of interest in Wisconsin among UW-Extension personnel, Wisconsin Department of Natural Resources staff, and representatives of environmental organizations. Many have taken one or more workshops conducted by Douglas McKenzie Mohr, author of *Fostering Sustainable Behavior*. These are individuals who have had the courage to question the status quo of their institutions or organizations and are open to new ideas and approaches to environmental protection.

As with any approach that challenges business-as-usual, many questions have arisen about how to plan and implement a CBSM program. This report documents the process of planning a CBSM program much more thoroughly, and in much more detail, than is usually found in most reports of CBSM projects. The purpose is to give the reader a chance to "look over the shoulder" of a team that has gone through the CBSM planning process from beginning to end.

A major part of CBSM planning is the analysis of perceived barriers and benefits and this is shown in detail in the report. But some material goes well beyond the skeletal process described in *Fostering Sustainable Behavior*. How CBSM differs from other approaches, especially the more traditional educational and informational approaches, is described in this report. Which behavior to select as the target of a CBSM program is another question often raised by those who are trying to understand the process; this report shows the results of an analysis in which several potential target behaviors were evaluated by several different criteria before selecting the target behavior. The students also conducted a Motivation, Opportunity, Ability analysis based on work done by Michael Rothschild. The analysis answers three important questions: (1) is a potential target behavior a good candidate for a CBSM approach?, (2) could the behavior be promoted more easily using educational or informational approaches?, or (3) is the potential target behavior likely to occur only if a regulatory program is enacted?

Yet another analysis not usually performed either in CBSM projects or more traditional informational campaigns, is a Hierarchical Causal Change Analysis. The idea is that if behavior change is going to occur, there must be a set of conditions that is satisfied other than the target audience simply knowing what to do or how to do some pro-environment behavior. The reader should find this analysis to be a very useful tool when launching some new environmental education initiative.

All aspects of planning a CBSM project are described in this report, but some are necessarily incomplete. The class had to accomplish a lot within the standard, yet artificial, university semester time-frame. Thus, while a focus group was conducted, there were fewer participants than one would like to have. Nonetheless, this report describes the process in detail. Similarly, the team prepared a questionnaire as part of the formative research process used in the CBSM process, but there was insufficient time to mail the surveys, get a reasonable return rate, segment the audience, and incorporate the results into the recommendations for tools that would directly address the perceived barriers and benefits of the target behavior. Here again, although the surveys could not be distributed, the survey instrument is included in the report and could be implemented whenever time and resources allow. Finally, there are a few changes to this report that the team would have liked to make before going to press, but time and circumstances precluded these last minute revisions; the end of the semester waits for no one.

The reader will no doubt appreciate both the quantity and quality of the effort that the team has put into this project and this report. Those with an interest in CBSM will benefit substantially from this report. The more that students and professionals in Wisconsin gain hands-on experience with the process of planning a CBSM project, the more likely it is that CBSM will be added to the arsenal of approaches to environmental protection in Wisconsin.

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An Introduction to "P-Free for Lake Ripley"

The objective of this project is to create a program that would increase the water quality of Lake Ripley, a recreational water body in Jefferson County, Wisconsin. Water quality may potentially be enhanced in a variety of ways, but this specific project focuses on reducing the prevalent use of phosphorus-containing fertilizer on property owners' lawns and gardens and increasing usage of phosphorus-free (P-Free) fertilizer. The excess phosphorus in Lake Ripley could potentially lead to frequent algae blooms, reduced fish populations, and a degraded water supply.

P-Free for Lake Ripley is a community-based social marketing (CBSM) project. CBSM projects combine traditional public education programs with behavioral psychology and marketing techniques. CBSM projects contain a specific formula of activities to design a project that will enhance the benefits of a desired behavior while minimizing the barriers to its performance. After initial individual research, class discussions, and interviews with Lake Ripley Management District personnel, the group elected to design a project to make the use of phosphorus-free fertilizer more attractive to lawn caretakers and gardeners, thereby reducing the use of phosphorus-laden fertilizers around Lake Ripley and nutrient loading in the lake. To supplement this research, focus groups were conducted in March 2007. In the focus groups, residents of the community were asked about their fertilizing habits, knowledge of water-quality issues and fertilizer nutrients, barriers to phosphorus-free fertilizer use, and benefits of phosphorus-free fertilizer. Participants for the focus group were reached through phone calls and were randomly selected from a mailing list provided by the Lake Ripley Watershed Management District. To increase the chances of willingness to attend the meeting, listed residents living in the Town of Oakland and Village of Cambridge were targeted. Potential participants were asked a series of qualifying questions, from ownership of their residence and residency status (full or part time) to lawn maintenance and fertilization habits. Residents willing to participate in the focus group were then asked for contact information and given a confirmation phone call one day prior to the focus group meeting.

The focus group met on March 5, 2007 at 6:00 pm in the Oakland Town Hall. The turnout for the focus group consisted of five residents. Despite the relatively small size of the group, it was diverse in several characteristics. There were lakefront owners as well as residents living further away from the lake. The group included users of both fertilizer and "weed and feed" products, which were applied either by residents themselves or a lawn care service. Of the five individuals, four were male, one was female, and all had been residents of the town for at least three years.

During the meeting, ground rules were posted and addressed after introductions were made. The rules were as follows:

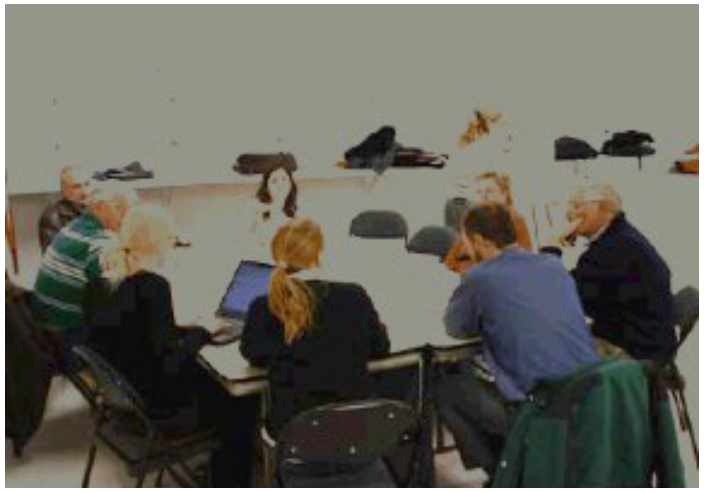
- Turn off your cell phone,
- Be respectful,
- Do not interrupt,
- Be concise,
- Listen to others, and
- Use "I" statements.

The last ground rule made it clear that participants should speak for themselves and from personal experience, rather than making assumptions from what they had heard elsewhere.

The focus group meeting lasted approximately one hour. Forty minutes were devoted to the focus group questions. The following questions were asked:

- What kind of fertilizer do you use?
- What factors go into your decision to buy a particular brand or type of fertilizer? How do the factors affect your purchasing decision?
- Do you think applying fertilizer to your lawn affects the water quality of Lake Ripley? How?
- What are the top three obstacles to you making a change of the fertilizer you currently use to a fertilizer that does not contain phosphorus?
- If you don't currently use zero-phosphorus products, what would get you to think about switching?
- Would you be willing to place a sign in your yard to identify that you use phosphorus-free fertilizer?

Participants were also given a chance to address any issues and questions after the focus group questions were asked and discussed.



Focus group meeting March 2007, Oakland Town Hall

A written survey was created to supplement insights from the focus group. A copy of the survey is included in Appendix C and discussed later in the paper. Considering the information on the barriers and benefits gleaned from the focus groups and research, the next step was to design tools that could be targeted at reducing specific barriers to using P-free fertilizer and increasing the perceived benefits to using P-free fertilizer. Tools selected for this project consist of incentives to encourage phosphorus-free fertilizer use, establishing norms within the

community of phosphorus-free fertilizer use, prompts to remind individuals of this choice, and gaining community members' commitments to action.

The P-Free for Lake Ripley project is intended to be a pilot study that could serve as a model for other CBSM programs in this or other similar areas. Based on the success of the pilot, the program would be adjusted and improved before it was implemented on a large scale. Resting the project on a foundation of meaningful community participation and solid research ensures a well-positioned start of a CBSM campaign that could transform the environmental dynamics of a community.

Origins of CBSM

Community-based social marketing (CBSM) is an effective tool of behavioral change that can be applied in public interest programs that seek to encourage environmentally responsible behavior in everyday activities. Breaking the phrase into its individual components reveals its aims and basic foundations. Community-based implies both a well-defined target audience for a program and a unit effective for observing, encouraging, and providing support for change. Social-marketing identifies the social psychology roots of CBSM. Indeed, CBSM programs build upon models created to explain behavioral choice, motivated action, and other planned behavior.

CBSM recognizes that a great amount of positive environmental change can transpire from human action, but only if humans choose to do so. Often, an individual's attitude towards an environmental issue may be inconsistent with their actual behaviors and actions. For example, a person may believe that air pollution is not good for humans and the environment, yet they do not or cannot choose alternative non-polluting modes of transportation. The links between one's action and their personal sentiment must be strengthened (McKenzie-Mohr 1999). CBSM programs use the psychology behind modern marketing techniques for products and services. However, instead of appealing to 'customers' to make choices that advance self-interest, CBSM influences members of the target population to make choices that benefit their self-interest and greater society.

The number of CBSM programs has grown steadily over the past decade since the publishing of the book *Fostering Sustainable Behavior* by Doug McKenzie-Mohr and William Smith, in addition to previous editions by McKenzie-Mohr. CBSM seems to be gaining popularity as programs designed along its guidelines succeed. As public interest increases, communities are realizing the weaknesses of other types of campaigns—weaknesses that CBSM purports to overcome. Wisconsin has hosted several workshops led by McKenzie-Mohr and interest continues to grow. Research shows, however, that no CBSM-specific project in Wisconsin has so far been fully

planned and executed. Hopefully this project will serve as a learning experience for communities interested in using CBSM to promote environmentally responsible behavior.

CBSM arose from frustrations with traditional forms of behavior modification appeals attempted by public-interest agencies and government. Information campaigns aim to educate the public, but they assume that once people know about a problem affecting something they care about, they will act to prevent or alleviate the problem. These campaigns may create educated actors, yet do nothing to reinforce links between the actors' attitudes and behaviors. Studies show that in many cases, there is little difference in actual pro-environmental or pro-social behavior between those who have received the educational message and those who have not. Additionally, some traditional models attempt to encourage pro-social or pro-environmental behaviors by appealing solely to economic self-interest. These programs assume that once the population is educated and it is in their economic benefit to act a certain way, they will. Again, this has not always been demonstrated to be the case. None of the non-CBSM behavior-change methods attempt to overcome the predictability of habit, the comfort of performing within the parameters of normative behavior, or the uneasiness of unfamiliarity or risk. CBSM is a tool that overcomes these barriers while also educating people to the benefits of pro-environmental behavior.[1]

Fostering Sustainable Behavior
by Doug McKenzie-Mohr and William Smith

This is not the first project that has attempted to prevent phosphorus from entering waterways. Nationwide, there are many informational campaigns. These campaigns usually stem from governmental agencies, not-for-profit quasi-governmental agencies, or pro-environmental organizations or directories.[2] These campaigns provide lawn caretakers with information about phosphorus and the water cycle, when to fertilize, how phosphorus affects lake and river quality, what brands or types of fertilizer are available in the specific area, how to read the nutrient content of a bag of fertilizer and other similar topics. Information on the Internet is in ample supply, but requires an interested landscaper to find the information and take action based on this information. Pamphlets and flyers are another way this information is distributed, but may easily be ignored or avoided. Two examples of pamphlet advertising are included in Appendix A from the Friends of Waupaca and the UW-Stevens Point Center for Land Use Education. Although the layout and style are different, the message conveyed by both is identical. While one cannot conclude from two pieces of

Normative behavior:

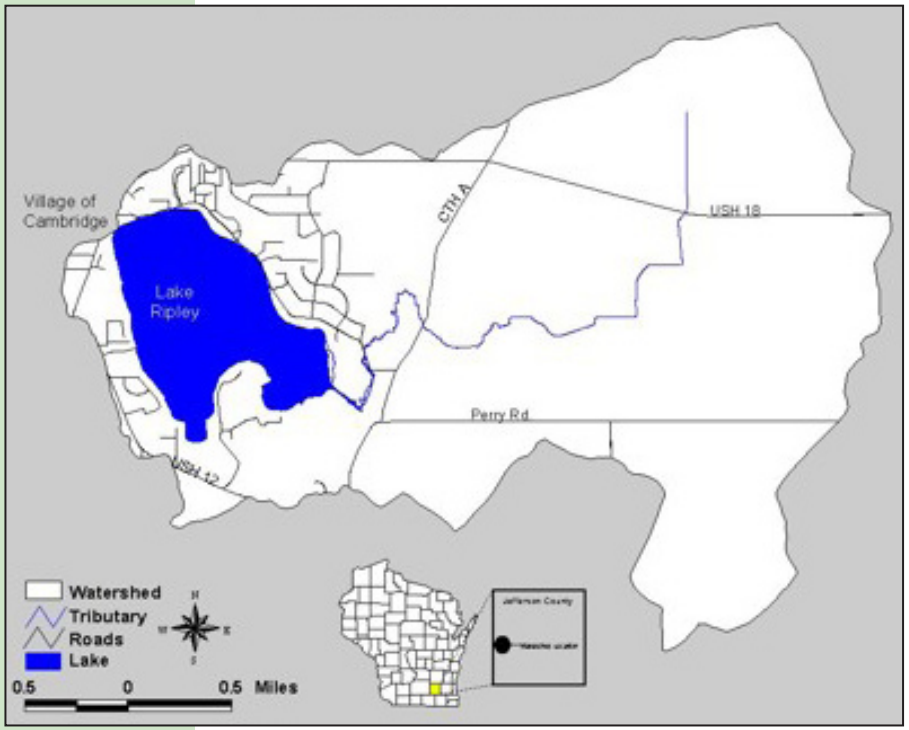
Behavior that is socially acceptable, or what society judges as normal.

[1] McKenzie-Mohr and William Smith, 1999.
[2] Google Search: "phosphorus-free fertilizer" "phosphorus fertilizer ban," April 8, 2007.

zero-P fertilizer educational material that this is the extent of the message Lake Ripley is receiving, it is clear that simple repetition of the message is not changing the public's behavior to a degree that will significantly improve environmental conditions.

Other behavioral change tools are legislative. Counties, states, townships, and incorporated areas across the nation have enacted laws banning or limiting the application or sale of phosphorus-containing fertilizers within their jurisdictions. Dane County, Wisconsin instituted a ban on fertilizers containing phosphorus, excepting application on phosphorus-deficient soils, in 2005.[3] The state of Minnesota phased in a statewide phosphorus fertilizer ban in 2002. By 2005, the application of phosphorus containing fertilizer was banned across the state.[4] When a populace is unresponsive or hostile to educational/informational or marketing campaigns to change behavior, creating a law to regulate the desired action may be necessary. Even then, however, it may be necessary to supplement the law with a program of behavior change that would reduce the costs of enforcement over time. A phosphorus fertilizer ban is being considered in Jefferson County, for which the Lake Ripley Management District is a proponent, but the law is still in the information-gathering stage.[5]

The Lake Ripley Watershed



The Setting

The Lake Ripley Watershed

The Lake Ripley watershed is located in southcentral Wisconsin, in Jefferson County. The watershed lies completely within the town of Oakland and is adjacent to the village of Cambridge. The majority of the village and town are not found with the watershed boundaries. The watershed covers approximately 5,120 acres, eight square miles, and contains 385 acres of wetlands. At the time of this study, 70 percent of the land in the watershed is in agricultural use, 15 percent is in residential use, and the remaining 15 percent of land is undeveloped. A majority of the housing is found directly on, or within close proximity of, the shores of Lake

[3] Dane County Office of Lakes and Watersheds.
[4] Minnesota Department of Agriculture.
[5] Land and water conservation committee minutes, 26 May 2006, 31 Jan 2007

Ripley. As a residential and recreational community, the town and village face increasing development pressure.

Lake Ripley and Changes Over Time

Lake Ripley is a popular destination for boaters and fishermen. Some of the first Evinrude motors were actually tested on the lake around the turn of the century, and the state's current record largemouth bass was caught in Lake Ripley in 1940. A public sewer system was installed around the lake in the mid 1980's, which opened the area up for development.

Due to the popularity of Lake Ripley as a residential community, recreational destination, and vacation spot, in addition to the amount of agricultural lands in the watershed, the lake has undergone increasing amounts of environmental stressors. Many invasive species—including zebra mussels, Eurasian water milfoil, and curly-leaf pondweed—have been introduced to the lake by irresponsible boating practices. A mechanical harvester is now used to mitigate the non-native plants that are choking the lake.

Non-point pollution has contributed to poor water quality by adding nutrients to the lake that cause algae blooms and excessive weed growth. Many of these nutrients originate from excessive or improper fertilizing practices by the agricultural and residential sectors. Residents and tourists have significantly reduced the natural shore-side buffer areas, replacing them with sandy beaches and manicured lawns. Consequently, erosion proliferates and pollution enters the lakes at increasing speed.

The Lake Ripley Management District

The Lake Ripley Management District (LRMD) was formed in 1990 with the purpose of protecting and managing Lake Ripley. The boundaries of the LRMD follow the borders of the Oakland Sanitary District and enclose roughly half of the Lake Ripley watershed.

Seven board members and a full-time Lake manager operate the LRMD. The organization oversees multiple projects with the goal of improving lake quality for environmental health and recreational enjoyment. The majority of operational funding for LRMD comes from the tax levy.

The management district offers 50 percent cost sharing to residents for eligible water-quality improvement projects and oversees a 100-acre natural area called The Lake District Preserve. LRMD also oversees a mechanical weed-harvesting program, a volunteer lake-watch program, litter clean-ups, and the distribution of informational material to area residents.

From 1993 to 2006, Lake Ripley was designated a DNR "priority lake" and received annual grants for operation, including personnel and cost sharing programs. The main

Non-point pollution:

Pollution that does not come from a single, obvious source such as a pipe or gutter. Pollution enters a waterway from diffuse and numerous places often as snowmelt or rainwater running off of land.

Did you know?

Geologic origin: Glacial kettle lake

Lake Type: Drainage (one inlet and one outlet

Surface area: 118 acres

Shoreline area: 1.85 miles

Mean depth: 18 feet

Maximum depth: 44 feet

Percent of lake less than 10 feet deep: 46.30%

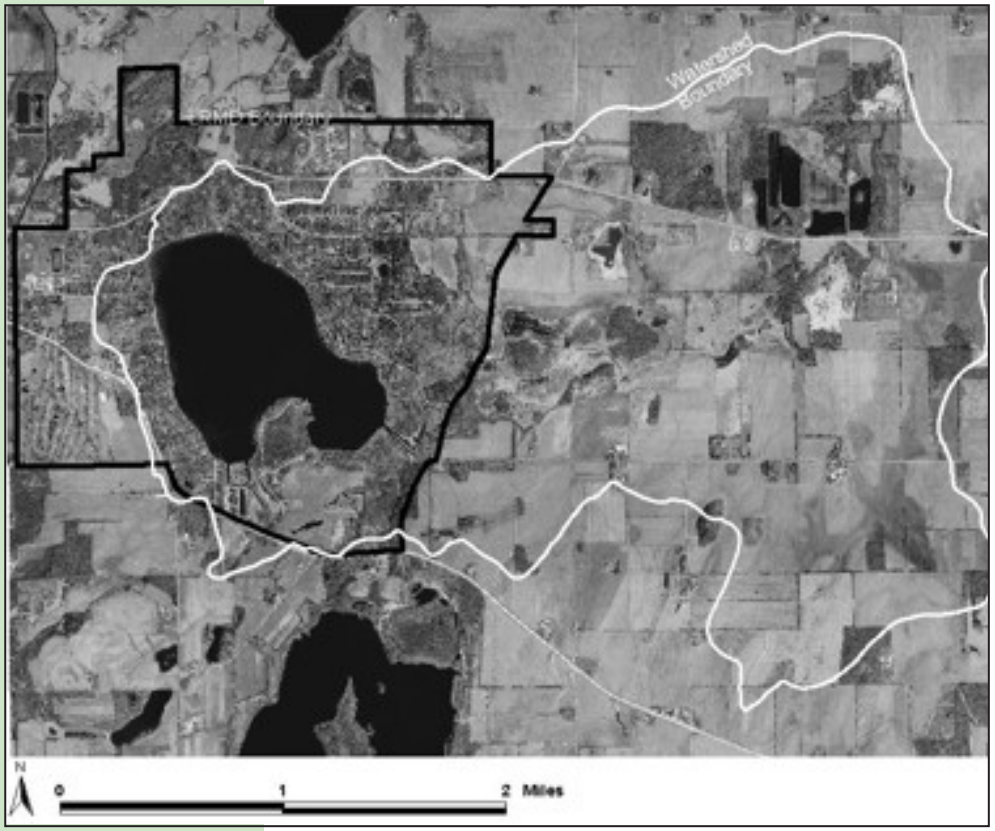
Percent of lake less than 5 feet deep: 34.30%

Total volume: 7,561 acre-feet

Groundwater: 30-45% of lake's water source

Watershed-to-lake area ratio: 12:1

Length of inlet stream: 4.25 miles



Lake Ripley Management District

goals of the Priority Watershed Project, which the LMRD still follow, are

- Reduce phosphorus and sediment inputs by 30 percent and 50 percent, respectively.
- Minimize the effects of eutrophication.
- Prevent further wetland loss and increase wetland acreage in the watershed.
- Preserve undeveloped shore lands as water-quality buffers and wildlife refuges.
- Protect designated sensitive areas that are ecologically significant.
- Promote native aquatic plant communities.
- Protect the fishery and wildlife diversity within the lake and watershed.
- Protect the quality of groundwater resources.

This CBSM pilot study proposed in this report is the result of cooperation between the University of Wisconsin-Madison Department of Urban and Regional Planning and the Lake Ripley Management District. If implemented, we expect that phosphorus inputs into Lake Ripley will be reduced by a measureable amount, thus reducing the rate of eutrophication of the lake.

The Community

The population of the Lake Ripley Management District is made up of seasonal and permanent residents, primarily homeowner occupied. Out of the 915 address points in the Lake Ripley Management District and the boundaries of the watershed, 151 of the residences are situated directly on Lake Ripley waterfront.

The Lake Ripley Management District administered a public-opinion survey to property owners in the Lake Ripley watershed in October 2005 (See Appendix B). Survey results showed the level of care and concern the surrounding community holds for Lake Ripley. In all, 220 households responded out of the 948 households that were sent the survey. Out of the households that replied to the survey, it was found that there are almost an equal number of permanent residences and seasonal residences. Approximately 38 percent of the seasonal

residents claimed that they do plan to eventually make their seasonal home their permanent residence. Survey respondents indicated that the three main reasons they purchased their homes were: natural scenic beauty, water-sport opportunities, and quiet recreation. The top uses of the lake by residents were identified as: swimming, slow motorboat cruising, and fishing—all activities that rely on the environmental health of Lake Ripley.

The Environmental Problem

Phosphorus is a naturally occurring mineral in rivers and lakes. It naturally enters the aquatic system as phosphate ions from the weathering of rocks and other mineral deposits. This type of phosphate is soluble in water, where it becomes dissolved phosphorus. This nutrient is key for the growth of plankton and aquatic plants. Phosphorus also enters surface water due to human activity. Detergents, sewage/septic material, and fertilizer all contribute to phosphorus levels in lakes. These sources can contribute to an over-abundance of the nutrient, which can accelerate the growth of algae resulting in a negative impact on human health, aquatic life, recreation, and aesthetics.

Lake Ripley North Shore

In the Lake Ripley watershed, conventional commercial fertilizer is one source of excess phosphorus. Developed portions of the watershed utilize roadside swales to carry water runoff directly to the lake or an upstream tributary. Thus, water running off lawns and gardens eventually reaches Lake Ripley. Additionally, overland flow from lawns can directly discharge into the lake. There are two ways that the phosphorus in conventional fertilizers can reach Lake Ripley. First, when fertilizer is initially applied, the phosphorus dissolves readily in water. Therefore, water runoff will collect the soluble phosphorus and carry it to Lake Ripley via the drainage ditches and overland flow. Second, if runoff does not occur shortly after applying the fertilizer, the phosphorus sticks to the soil particles. Eventually, water runoff occurs, which can erode the soil particles containing phosphorus, carrying them with the runoff. The sediment is carried through the drainage ditches to Lake Ripley. Once it reaches the lake the sediment settles to the bottom. Here it becomes benthic sediment where the phosphorus can be released. With a direct path from a resident's lawn to the lake,

Eutrophication:

Excessive nutrient enrichment that causes nuisance algae/weed growth, poor water clarity, and other problems

Benthic:

Relating to the bottom of a lake or other water body

Lake Ripley Ecological Facts

Nutrient that drives algae/ weed growth:
Phosphorous from manure, fertilizers, soil, leaves, pet waste, etc.

Main source of nutrient pollution:
Watershed runoff (83% of total phosphorus load.

Lake trophic status:
Upper-mesotrophic to eutrophic (moderate to high levels of fertility and plant/algae growth)

Alkalinity/hardness:
High in dissolved minerals and calcium bicarbonates

Acidification sensitivity: Low

Winter fish-kill sensitivity:
Very low

Main sport fisheries:
Large-mouth bass, walleye, northern pike, panfish

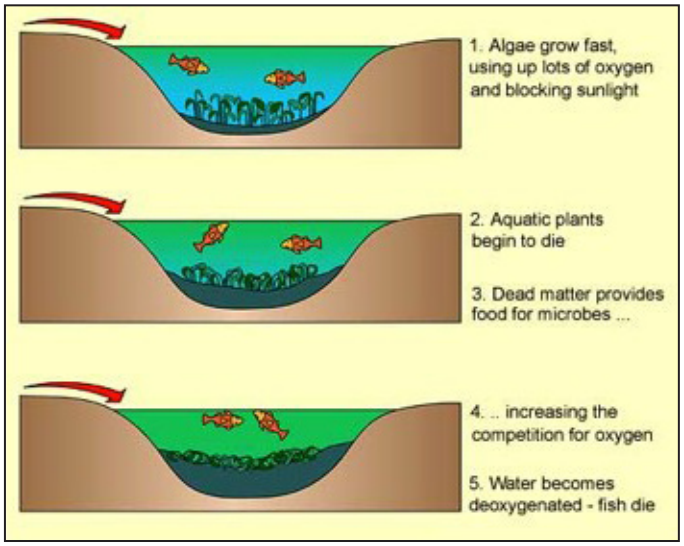
Non-native invasive species:
Eurasian water milfoil, curly-leaf pond weed, purple loosestrife, zebra mussels, and common carp.

phosphorus fertilizer is a contributing source of nutrient loading in this watershed.

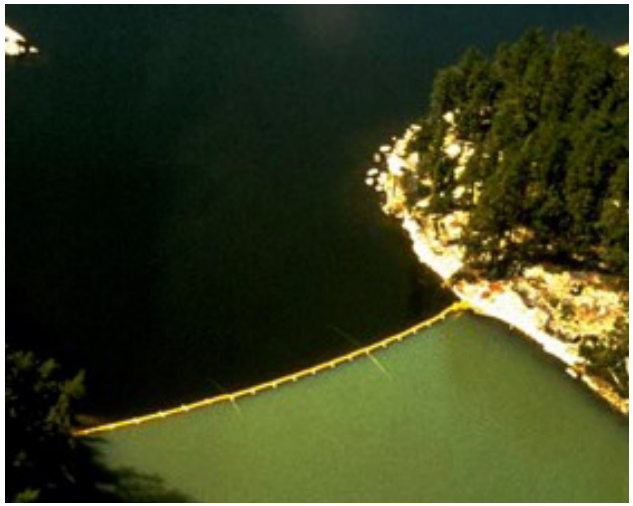
The overloading of phosphorus causes an imbalance in the biological system; more aquatic plants are produced than can be consumed by the ecosystem. The excess vegetation eventually dies, sinks to the bottom of the lake and decomposes. The process of decomposition consumes oxygen, limiting oxygen available to fish and other oxygen dependent aquatic species. In many cases, the increased levels of decomposition consumes all the available oxygen near the bottom of the lake creating a 'dead zone.' This refers to an anoxic zone, where no oxygen-dependent species can survive, and large fish kills can occur. Furthermore, phosphorus stuck to sediment at the bottom of the lake is eventually released, adding to dissolved phosphorus in a lake. According to the Wisconsin Department of Natural Resources, phosphorus is the key nutrient affecting the amount of algal and weed growth in more than 80 percent of Wisconsin lakes.

Phosphorus loading causes more than just ecological problems. Large fish kills can affect lake recreation, particularly fishing. Fishing on a lake that has a 'dead zone' makes the sport more difficult and less

The eutrophication process



This aerial view of the St. Lawrence Great Lakes Basin experiment demonstrates the bright green color of blue-green algae caused by phosphorus added on one side of the curtain.



desirable. Additionally, high levels of phosphorus can lead to hazardous human health conditions. In some cases blue-green algal blooms can produce toxins and pose a threat to humans, domestic pets, farm animals, and wildlife. Not only are algal blooms harmful, they also affect recreation and the aesthetic appeal of a lake. Currently, Lake Ripley does develop a 'dead zone' during the summer months. While there have been no massive fish kills in the lake, algal blooms have become more frequent. If phosphorus loading continues in Lake Ripley, algal blooms could result in fish kills. Limiting conventional commercial fertilizers to phosphorus-free within the watershed can eliminate one source of excess phosphorus.

Target Behavior

The specific behavior this program promotes is the use of phosphorus-free fertilizer on residential lawns, gardens, and other manicured landscapes. This requires that the target audience purchase phosphorus-free fertilizer (P-free) or P-free weed and seed products at a commercial venue in the area. After purchasing the product, the target audience would apply the fertilizer to the manicured portions of their property according to the instructions that accompany the package.

The behavior to "use P-free fertilizer" was chosen from a variety of potential behaviors that may also reduce the effect of phosphorus loading in Lake Ripley. These behaviors include:

- Redirecting downspouts
- Using rain barrels
- Planting shoreline native vegetation buffers
- Reducing fertilizer application rates and frequency
- Using no-till/conservation farming
- Recreating only in non-sensitive areas of the Lake

The above behaviors were compared and contrasted using a list of criteria:

1. Whether new behavior would have a direct beneficial environmental impact on the lake,
2. How large of a magnitude the environmental benefit might be,
3. Whether the behavior occurs once or is repeated over time,

External barrier:

An obstacle that an individual does not control that may prevent them from behaving in a particular way or from acting in a particular way.

4. Potential severe external barriers affecting the target population,
5. Opportunities to use tools provided by the CBSM framework,
6. The potential for incentives,
7. General feasibility of both the success of changing behavior and that change in behavior having a positive environmental impact on the lake, and
8. The ability to monitor the results of the behavior change.

All of the potential behavior changes could be expected to have some degree of direct positive impact on the Lake Ripley watershed, but they vary with respect to magnitude. Because a large proportion of the phosphorus in the lake originates from agricultural fertilizing practices, changing the farming practices to either no-till/conservation or altering fertilizer application practices may have the largest impact on watershed health. No-till/conservation farming was eliminated as an option because there are numerous serious external barriers including new equipment, high risk of crop failure in the initial years, and a large education gap. Altering fertilizer application practices was also eliminated because state legislation already exists to address the issue and there are numerous efforts by other organizations, including UW Extension, that deal with manure and fertilizer application through the Nutrient Management Farmer Education Program. As this program demonstrates, there are numerous behavioral changes that would need to occur to achieve this goal, including soil testing, nutrient-management planning, and crop rotations.

Conservation farming practices include contour farming

Additionally, all of the behavioral changes are repeated behaviors, with the exception of redirecting down spouts. This behavior was not chosen for this reason, and also because the potential impact on water quality and the ability to monitor the behavior change are not apparent. Also, promoting this behavioral change would not require a sufficient array of tools to justify using the CBSM process to promote this behavior; an aggressive education/information program might be enough.

Using rain barrels was eliminated based on the potential magnitude of the impact. While rain barrels may be effective when used properly, many people may not

Home use of rain barrels can collect roof runoff to be used for garden and lawn watering at a later date.

have a use for them, specifically people who do not maintain a garden. Additionally, rain barrels cost money and if not maintained properly they can serve as mosquito habitat. And while precautions can be taken to reduce these threats, they make the behavioral change more complicated, reducing the magnitude of the impact even further. This makes the promotion of rain barrels within the CBSM framework less feasible.

Planting native buffers was also eliminated for similar reasons. The target audience for this behavioral change would be small, limited to those directly on the lake and its inlets. One of the goals of the project is to include lake district and watershed residents. Individuals may experience difficulty in procuring native plants through conventional methods and may not have the knowledge or ability to plant, establish, and maintain the buffers.

The last option considered as a target behavior was to have water-based recreational activities, such as boating, steer clear of sensitive areas. This option was not pursued because the impact of this behavior is not as great relative to the others, enforcement and monitoring can be difficult, and efforts are currently in place to reduce the impact of recreational activities in these areas.

Ultimately, this CBSM program seeks to encourage the urban population of the watershed to change the type of fertilizer they use to a P-free fertilizer. Many of the problems associated with other potential behaviors can be avoided, or are not of concern to this program. For example, it is likely that those who maintain lawns and gardens currently fertilize, thus the decision would be limited to a purchasing and application decision and would not require increased investment in materials and equipment. Additionally, a large portion of the watershed can participate, thus having a potentially significant effect. Promoting this behavioral change creates the opportunity for using a variety of CBSM tools (see Tools for Change section), and can be monitored using a number of methods (see Monitoring and Evaluation section). Thus, it is feasible that behavioral change can occur and can have an impact on water quality.

Before-and-after results of native shoreline buffer planting.

Before

After

Currently, regulations do not exist in Jefferson County that govern non-agricultural fertilizer application. Neighboring Dane County does have a ban in effect and that may make it more politically possible to pass and enforce a regulatory measure in Jefferson County. That said, relative to the remaining options, this behavioral change will have a significant impact on the water quality of Lake Ripley.

Finally, this program does not intend to solve the problem; rather, it is a starting point. Other behaviors will need to change outside of this program to preserve the water quality of Lake Ripley. The largest impact on lake quality would require a change in agricultural practices to either stricter nutrient management or no-till/conservation farming. Still, successful results from this program can facilitate these changes or others like them in the future.

MOA Analysis

MOA is a behavioral theory that posits individual behavior as a product of one's motivation to perform, opportunity to perform, and ability to achieve an outcome. Policy or projects may be designed based on whether a person has the motivation, opportunity, and ability to perform a desired behavior. The combination of one's motivation, opportunity, and ability predicts whether one is prone, unable, or resistant to perform a desired behavior. Depending on one's orientation to perform the behavior policy, educational, legislative, marketing, or social marketing campaigns can be designed and deployed to adjust the behavior. This is best shown in Table 1, where an individual's or the public's orientation towards performing a behavior can be traced to whether they are motivated, have the opportunity, and have the ability to do such an activity.[6]

The focus group was representative of the fertilizer-use habits of fairly well-informed fertilizer users. In choosing a fertilizer for their lawn or garden, participants showed a clear ability to pick a specific type of fertilizer when relating the choice to a personal ethic or when given knowledge about its efficacy and side effects.

There is already opportunity for fertilizer users to use phosphorus-free fertilizers; P-free fertilizer may be purchased from retailers or lawn services. The Lake Ripley watershed is located on the border of Dane County where a phosphorus fertilizer ban is in effect. Several home and garden stores, such as Home Depot, Menards and Ace Hardware, are located nearby in Dane County, meaning that fertilizer bought at these stores would not contain phosphorus. Large chains in Jefferson County, including Menards and Ace Hardware, carry P-free fertilizer as well.

There were both motivated and unmotivated participants in the focus group. None appeared hostile to the idea of switching fertilizers, but many appeared unaware of the benefits and existence of P-free

[6] Rothschild, M.L. 1999.

fertilizer. These uninformed participants seemed neither motivated nor unmotivated to engage in the target behavior; rather, they just seemed unaware that they had an option. All participants reported that education, reminders, and word-of-mouth endorsements would probably encourage them to purchase P-free fertilizer. This seems to illustrate that, in large measure, the focus group participants are motivated to make the fertilizer switch. But for the more apathetic fertilizer users who would not likely come to a focus group meeting, a lack of motivation may be present.

In the context of MOA analysis, it is apparent that fertilizer users who are conscious of their fertilizer choices fall in boxes 1 and 3 in Table 1. For the targeted behavior of switching to P-free fertilizer, they may or may not be motivated, yet definitely possess the opportunity and ability to use P-free fertilizer. CBSM tools will likely aid the adoption of phosphorus-free fertilizer use for motivated users, while regulation, similar to the Dane County phosphorus ban, could be required to solve the situation for unmotivated users. Lawn caretakers and gardeners who use a lawn-care service are not without a choice for their fertilizer; they may request that P-free fertilizer be applied to their landscaping. Evaluating these actors in the MOA context places them in the same categories as those who self-apply fertilizer, leading to the same policy conclusions.

Chain of Causality Analysis

Multiple internal and exterior barriers were uncovered by the focus group. Understanding these barriers led to the construction of the chain of barriers, or chain of causality, which sheds light on the chain of thought that property owners go through when choosing how to fertilize their lawn or garden. Knowing this thought process enables tailoring of the project to reduce these barriers. The concept of the chain of causality was developed by Paul Stern and demonstrates how the barriers develop, preventing the desired pro-environmental action[7].

[7] Stern, 2000.

Table 1. MOA Chart

Motivation		YES		NO	
Opportunity		Yes	No	Yes	No
Ability	Yes	prone education CBSM (1)	unable marketing CBSM (2)	resistant law (3)	resistant marketing law CBSM (4)
	No	unable education marketing CBSM (5)	unable education marketing CBSM (6)	resistant education marketing law (7)	resistant education marketing law (8)

Internal barriers are barriers that take place within the mind of a subject. These could be a lack of knowledge necessary to make a change, or a belief that a change in behavior would produce no noticeable results. External barriers generally present themselves as tangible barriers. In this project, examples of external barriers could be that phosphorus-free fertilizers are unavailable at local stores or that P-free fertilizers may not perform as well as conventional fertilizers.

External Incentives and Constraints

One unanticipated external barrier is that the soil in the Lake Ripley watershed is of poor quality for growing grass. It is mostly made up of sand and clay, and is rather rocky by the standards of the focus group participants. There are questions about how well phosphorus-free fertilizers will perform with less than ideal turf growing conditions. One participant noted that a decrease of root structure would make him reluctant to switch from his current fertilizer. According to another participant, precedent use of P-free fertilizer by a local church or respectable business would help to break down this particular barrier. Additionally, weed control was one of the major motivators for the application of chemicals and conventional commercial fertilizers to participants' lawns. Many use a combination weed killer/fertilizer product on their lawns.

The focus group mentioned that availability and price of phosphorus-free fertilizers were also barriers. Major retail chains, such as Home Depot and Menards, do keep phosphorus-free fertilizers in stock. Due to the phosphorus ban in neighboring Dane County, the availability of phosphorus-free fertilizers has increased in the area. There are also little or no cost differences between phosphorus and non-phosphorus fertilizers.

Values and World Views

It was evident in focus group responses that residents of the Lake Ripley watershed are concerned about the health of Lake Ripley, be it for aesthetic, recreational, or ecology-related motives. Some residents, however, moved to the area for the sole purpose of being closer to their families and do not directly utilize Lake Ripley. Concern for family, animal, and community safety during fertilizer application was also noted in the focus group. The findings suggest that a resident has to be motivated by community and environmental values to make the effort to switch to P-free fertilizers.

Attitudes and Beliefs

Attitudes and beliefs can be large barriers to overcome. Half of the focus group participants felt that their fertilizing activities had no effect on Lake Ripley. If 50 percent of the residents in the watershed believe that their fertilizer habits do not reach or affect Lake Ripley, it will be difficult to convince people to switch to phosphorus-free fertilizers based on these pleas. A few residents in the focus group were concerned about whether or not switching to phosphorus-free fertilizers

would have a noticeable impact on the health of Lake Ripley. These attitudes and beliefs may be some of the hardest aspects to overcome in this CBSM project.

Knowledge

One large internal barrier discovered was the fact that half of the focus group did not think that their fertilizer use had any effect on Lake Ripley. One participant cited a swamp on his property and felt that it would filter out any harmful additives from his lawn. Another participant did not feel that their use of fertilizer use had an effect on Lake Ripley because they did not think that they were in the Lake Ripley watershed. Even though the members in the focus group seemed quite knowledgeable about the types of fertilizers they were putting on their lawns, they knew little about the effects of the phosphorus fertilizer on Lake Ripley. Lastly, when discussing the use of phosphorus-free fertilizers, many questions and concerns were raised about the effectiveness of these 'alternative' fertilizers.

Attention and Commitment

When questioned about the type of fertilizer used on their properties, the focus group participants had no problem remembering the brand name and general make-up of their fertilizer. One member said that they remained faithful to effective products they had used in the past and didn't depend solely on brand names.

If zero-phosphorus fertilizers do work as well as their phosphorus-containing competitors, generally speaking, homeowners will just continue to use what has been successful for them. They suggested that regular distribution of test results of lake health and phosphorus levels could be used as a prompt to remind homeowners that they need to keep up with their commitment to phosphorus-free fertilizers.

Current and Competing Behaviors

A significant component of CBSM is identifying barriers and benefits to the target, current, and competing behaviors. Examining competing behaviors helps narrow down barriers and benefits to changing the behavior. There are four alternative behaviors to using phosphorus-free fertilizers. The first is simply not using fertilizer at all. The second alternative is using fertilizer that contains phosphorus. The third behavior is using weed-and-feed type products that contain phosphorus. The final alternative is the application of fertilizer from a third-party landscape service, without an option to use a phosphorus-free product. Such behaviors are currently being practiced in the Lake Ripley watershed. They were compiled from a focus group of watershed residents who currently fertilize.

During the outreach for focus group participants, many residents discussed their fertilizer application. Residents who did not fertilize were not selected for the focus

group even though non-fertilizing was an important behavior to consider. Not using commercial fertilizer is a current behavior, but not necessarily a competing behavior. Because not fertilizing implies that no phosphorus is being applied to one's lawn or garden, and it is therefore not a behavior contributing to the environmental problem, no attempt to change this behavior will be made.

Applying products that contain phosphorus, however, directly contributes to the environmental problem. This includes fertilizer and weed-and-feed products. According to the focus group, local residents are using both products. Many residents apply fertilizer to their lawn or garden without the knowledge of contents, and others look for fertilizers that are stamped 'environmental.' With one exception, the focus group participants used conventional fertilizers containing phosphorus. This is a traditional fertilizing approach, as P-free fertilizer has only recently become widely distributed. Furthermore, those who fertilize have seen positive results with the traditional approach and have had no incentive to change their current behavior.

Weed-and-feed products are a combination of fertilizer and herbicide intended to facilitate lawn growth and kill weeds. The focus group identified that weed management is a significant portion of lawn and garden care in the area. Results of the focus group also suggested that many residents use a weed-and-feed product for the convenience of one application targeting two goals. Because this behavior includes fertilizing with a product that contains phosphorus, it is currently competing behavior.

The application of conventional fertilizer and/or weed and feed products by lawn-care companies is also a competing behavior because the resident may have less control over the rates or products used. According to the focus group, some local residents use TruGreen Chem Lawn. After speaking with a representative for TruGreen Chem Lawn's southern Wisconsin facilities, it was determined that this company does not use fertilizer that contains phosphorus in this region. Still, knowing that residents do use landscape companies was important information as other companies may only apply phosphorus-free fertilizer upon request of

the resident. Changing this behavior can be targeted at both the corporate and resident level. If provided with incentive to change, residents can request the use of phosphorus-free products, or a company can offer the product up front.

Target audience

This program is designed to target all property owners that live within the Lake Ripley watershed and use conventional purchased fertilizer on their property grounds or who contract out to companies that fertilize their grounds with conventional fertilizer. This group includes male and female adults that live or operate in the watershed year-round or seasonally. This program is not limited to residential property owners, and includes commercial, civic, and religious property owners.

Lake Ripley North Shore

Focus group meeting, March 2007

Barriers and Benefits

The focus group also helped to determine the perceived barriers and benefits of using P-free fertilizers and those of the current and competing behaviors. Using the notes taken during the focus group session, Tables 2 and 3 were created from the residents' perceived barriers to and benefits from using P-free fertilizer versus the competing behaviors. Additionally, other potential barriers and benefits left uncovered in the focus groups are included, based on literature research of past projects, comments, and reports. These barriers and benefits have been footnoted to distinguish them from other barriers and benefits in the tables. For example, all of the focus group participants knew how to read the fertilizer bags to determine nutrient content, but it is possible that an inability to read and understand the labels could be a barrier for many residents.

Table 2: Perceived Barriers

	New Behavior: Use Zero-Phosphorus Fertilizer	Competing Behavior 1: Use Fertilizer Containing Phosphorus	Competing Behavior 2: Use "Weed and Feed" Product Containing Phosphorus Fertilizer	Competing Behavior 3: Use a landscaping company to fertilize
Perceived Barriers	· Unaware that phosphorus-free fertilizer is better for water quality · Lack of precedence · Doesn't use lake or care about fertilizer affecting lake quality and community · House/lawn located in an area that won't affect or show decline in lake quality · More expensive to purchase, or harder to find in stores · Phosphorus-free fertilizer results in poorer lawn quality, underfertilization, and/or thin turf · Soils are of poor quality and require phosphorus · May not be in control of fertilizer choice (use commercial lawn service), or unaware that can request p-free fertilizer from lawn service[a] · Doesn't know how to tell if fertilizer is phosphorus-free if unclearly labeled[a] · Phosphorus containing fertilizers, when properly applied to turf, have not been shown to contribute to phosphorus runoff per se in scientific studies[a] · Most of the P in soils is not available for plant uptake, usually less than 0.01%. Turf needs nitrogen, phosphorus, and potassium in a 4:1:3 ratio[a] · Too costly and complicated to take a soil test and determine correct phosphorus lawn requirements[a]	· Reduced fish and plant population for recreation/scenic appreciation · Lake is not clear, water not healthy to swim in	· Phosphorus content impacts lake quality and clarity · Fish population is affected · Herbicide adds toxins to groundwater in addition to the phosphorus · Inefficient lawn care (The best time of year, usually February, to apply an herbicide to block growth of warm-season weeds isn't the right time to fertilize. Weed-and-feed products often are applied too late to deter weeds and/or too early for the grass to get the fertilizer's benefits)[a]	· More expensive[a] · No control over choices of fertilizer use and application[a] · May have to sign contract and commit longer than desired[a]

[a]-not discussed during focus group, but included based on literature research

Table 3: Perceived Benefits

	New Behavior: Use Zero-Phosphorus Fertilizer	Competing Behavior 1: Use Fertilizer Containing Phosphorus	Competing Behavior 2: Use "Weed and Feed" Product Containing Phosphorus Fertilizer	Competing Behavior 3: Use a landscaping company to fertilize
Perceived Benefits	· Better water quality, less toxins · Lake clarity improved for scenic appreciation · Healthier, larger fish population for fishing · Using same fertilizer as recommended by a well respected friend/ neighbor[a]	· Better, greener lawn · Costs less · More choices to choose from in price, brand name, quantity, etc. · More readily available for purchase · More convenient to buy (don't have to look at package formula) · Using same fertilizer as recommended by a well respected friend/neighbor[a] · Good turf, which prevents phosphorus from getting into the lake, requires phosphorus fertilizer[a]	· More concerned about killing weeds than fertilizing lawn so this takes care of both · Less physical work applying separate herbicide and fertilizer on lawn[a] · Saves time, less applications of different products=more time to do other things[a] · Easy solution to lawncare, only other things to remember to do are water and mow lawn[a] · Saves money to buy one product instead of two[a] · Using same product as recommended by a well respected friend/neighbor[a]	· Using same lawn company as recommended by a well respected friend/neighbor · No physical work involved, hands stay clean[a] · Saves time in lawn maintenance[a] · Saves from effort required for good lawn maintenance[a] · Increased chances of good lawn (compared to owner maintenance) [a] · No excess fertilizer bags to deal with[a] · Use of lawn care company signifies affluence[a]

[a]-not discussed during focus s group, but included based on literature research

Several perceived barriers were recorded during the focus group meeting. Half of the focus group indicated that they did not think their fertilizer use had any effect on Lake Ripley. Another internal barrier observed was that not everyone in the focus group had a strong tie to the lake, while lakeside residents indicated a heightened sensitivity to lake-quality impacts compared to the other residents who did not have a view of the lake from their home. Some of the other barriers mentioned involved possible ineffectiveness of phosphorous-free fertilizers, price, and availability of phosphorus-free fertilizers. As previously discussed, another barrier is the fact that the soil in the Lake Ripley watershed is of poor quality and may require fertilizers with phosphorus to grow a lawn. Some of the perceived benefits included scenic appreciation of the lake and the use of the lake for recreational purposes.

An obvious competing behavior to P-free fertilizer would be using fertilizer containing phosphorus. The focus group added a variation of this behavior, creating a new competing behavior of using weed control with fertilizer in it to control weed growth. And in many cases, weed control was the primary motivator for the application of the product. Many use a combination weed killer/fertilizer product on their lawns because it's an easy, one-step process to lawn care. These weed-and-feed products are available with or without phosphorus-added fertilizer. The final competing behavior is the use of a landscaping company to maintain resident's lawn.

Survey Instrument

The focus group is a crucial component to identifying the barrier and benefits of using phosphorus-free fertilizer. Only one focus group was conducted; thus, there is a large segment of the community that was not represented in the focus group. To gain greater understanding of the barriers and benefits, the program will distribute, collect, and analyze a questionnaire in the community at large. There will be questions regarding their fertilizer practices and their perception of the effects of fertilizer use on the water quality of Lake Ripley. The questionnaire is divided into the following sections:

- Fertilizer use and current practices
- Perceptions of Lake Ripley water quality
- Barriers to using phosphorus-free fertilizer
- Benefits of using phosphorus-free fertilizer
- Influences of others on fertilizer use
- Tell us about yourself…

The survey instrument can be found in Appendix C.

Proposed Tools for change

CBSM offers a variety of tools that can effectively get individuals to change their behavior to the more environmentally responsible option. These include communication, making commitments, establishing norms, prompts, and incentives. To effectively utilize these tools, CBSM project managers must first examine the perceived barriers and benefits of the target behavior, using P-free fertilizer, and then select one or more tools that can overcome the barrier or enhance the benefit (McKenzie-Mohr 1999). Once tools have been selected, it is important to use and apply them effectively.

Appendix D, a checklist for the effectiveness of the selected tools, can help to ensure successful implementation and accomplish the desired target behavior.
Based on preliminary analysis of the barriers and benefits identified up to this point, the CBSM tools below were developed for the P-free for Lake Ripley project. It is important to note that the list of tools could be expanded or reduced after the community survey is analyzed for other barriers and benefits and should be reexamined to determine which tools would be the most effective with the new information.

The tools are divided into five categories: commitments, prompts, norms, communications, and incentives. Tables 4 through 8 include a description of the above tools, how to use them effectively, and the corresponding barriers and benefits.

Table 4: Recommended Commitment Tools

CBSM Tool Description and Use	Checklist for Effective Use	Perceived Barriers/Benefits Targeted By Tool
Commitment A: Residents and local organizations will take a written pledge to use phosphorus-free fertilizer. These include churches, schools, other large lawn area owners, and lawn care service companies in the Watershed Management District. The LRMD website will have a page explaining the project, a call for environmentally conscious commitments, and a place to pledge online. The number of pledges received will be tracked via a "climbing thermometer" to be posted online and in the LRMD newsletter (also see *Norm A*).	• Emphasize written over verbal commitment • Ask for public, group commitment • Consider cost-effective ways to obtain commitments • Use existing points of contact to obtain commitments • Help people view themselves as environmentally concerned • Do not use coercion	• May not be in control of fertilizer choice (use commercial lawn service) or unaware that can request p-free fertilizer from lawn service[a] • Lack of precedence • Using same fertilizer as recommended by a well respected friend/neighbor[a]

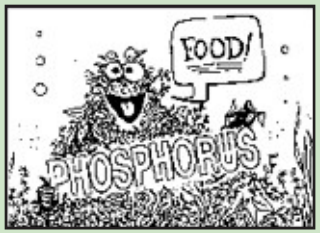
[a]-not discussed during focus group, but included based on literature research

Table 5: Recommended Prompt Tools

CBSM Tool Description and Use	Checklist for Effective Use	Perceived Barriers/Benefits Targeted by Tool
Prompt A: Post signs in the fertilizer aisle of gardening stores next to phosphorus-free fertilizers, which would serve as a reminder and indicator for residents to "Buy P-free Here!" (see Appendix E) over other conventional fertilizer types. The prompt will be noticeable and include the project catch phrase; it will also attempt to make a connection between phosphorus fertilizer use and decreased water quality.	• Make prompt noticeable and self-explanatory • Should be presented as close in time and space as possible to target behavior	• Unaware that phosphorus-free fertilizer is better for water quality • Harder to find in stores • Doesn't know how to tell if fertilizer is phosphorus-free if unclearly labeled[a] • Phosphorus-containing fertilizers, when properly applied to turf, have not been shown to contribute to phosphorus runoff per se in scientific studies[a] • Lake clarity improved for scenic appreciation • Healthier, larger fish population for fishing

Table 6: Recommended Norm Tools

CBSM Tool Description and Use	Checklist for Effective Use	Perceived Barriers/Benefits Targeted by Tool
Norm A: Track pledges via a large and colorful "climbing thermometer" to be published regularly with updates, both online and in the local newsletter. Names of local organizations who have pledged could also be published in the local newsletter to set a precedence that residents may want to follow. To be effective, this norm can be started immediately prior to the lawn fertilization season.	• Norms should be noticeable • Norms should be made explicit at the time the targeted behavior is to occur • Use norms to encourage people to engage in positive behaviors rather than to avoid environmentally harmful actions	• Lack of precedence • Doesn't use lake or care about fertilizer affecting lake quality and community • House/lawn located in an area that won't affect lake quality or show decline in lake quality • Using same fertilizer as recommended by a well respected friend/neighbor[a]
Norm B: Small, brightly colored yard signs (see Appendix E) which can be distributed at the point of purchase of P-free fertilizers, with the help of participating stores. Another option for distribution is to have them available during the pledging phase. This norm will be effective in making the invisible action of using P-free fertilizers more visible.	• Norms should be noticeable • Norms should be made explicit at the time the targeted behavior is to occur • Use norms to encourage people to engage in positive behaviors rather than to avoid environmentally harmful actions	• Lack of precedence • Doesn't use lake or care about fertilizer affecting lake quality and community • House/lawn located in an area that won't affect lake quality or show decline in lake quality • Using same fertilizer as recommended by a well respected friend/neighbor[a]



Each CBSM tool varies by purpose and use. Public commitments increase the chances of performing a preferred behavior by creating a link between the behavior and a pro-environmental attitude (Gardner and Stern 2002). Similarly, norms change attitudes based on public perception, i.e. the idea that one should act in an appropriate or socially acceptable manner (Gardner and Stern 2002). Incentives augment motivation, while prompts do not change attitudes or increase motivation but serve as reminders (McKenzie-Mohr 1999). When a CBSM tool is used in combination with another tool, the strengths of each tool are enhanced, and the chances of an effective CBSM strategy are increased (McKenzie-Mohr 1999).

In Table 9, the perceived barriers of the proposed behavior are organized by the group of tools used to alleviate them, with a brief discussion of the value of combining the tools for each barrier.

The use of CBSM tools, no matter how strategic, would remove individual barriers to a preferred behavior, but not external barriers beyond the control of the individual. It is important to identify and address any existing, significant external barriers to the preferred behavior. For a successful community-based social marketing campaign, external barriers should be examined realistically and eliminated if possible (McKenzie-Mohr 1999).

Monitoring and Evaluation

To gauge the success of the P-free for Lake Ripley CBSM pilot project, monitoring needs to take place. This is a step that is often overlooked in typical environmental education campaigns. Monitoring will provide insight into the effectiveness of this project that can be used for other CBSM projects focusing on phosphorus-free fertilizer in small watersheds. It can also provide cost-effective insight through the assessment of the pilot, thus allowing for adjustments before full implementation. For this project, monitoring for both the short- and long-term effects is proposed. Short-term monitoring would be implemented at the start of the program and provide immediate results to be used as a baseline against later comparisons. Long-term monitoring will also begin at the start of the program; however, results cannot be used to assess environmental impact for several years. Both monitoring efforts are expected to continue for the duration of the project.

Two strategies have been developed to monitor program success in the short term. First, work with the Cambridge Ace Hardware, the closest to Lake Ripley, to track the quantity of phosphorus-free fertilizer bags sold to the target audience. Gardening stores well beyond the watershed may be excluded because they may have a large amount of phosphorus-free customers

Table 7: Recommended Communication Tools

CBSM Tool Description and Use	Checklist for Effective Use	Perceived Barriers/Benefits Targeted by Tool
Communication A: An informative poster, brochure, or article showing a clear map of the areas within the watershed affecting lake quality (see Appendix E). This piece of communication will include a brief, clear explanation of how water quality is negatively impacted when residents use phosphorus-containing fertilizers on their property, emphasizing on things that the residents lose when phosphorus levels increase. The Watershed Management District's name will be included on the communication, in collaboration with the University of Wisconsin-Madison, to create a sense of credibility. The communication will be delivered during the commitment stage, when community members are working to obtain pledges in person. This literature can also be made available at stores that sell fertilizer, and would include contact information for questions and feedback.	• Make sure message is vivid, personal, concrete, and clear • Make it easy to remember what to do • Know the attitudes and beliefs of your intended audience • Have your message delivered by an individual or organization that is credible to audience • Frame message to show audience what they are losing by not acting • If using a threatening message, couple it with specific suggestions for action • Use personal contact to deliver the message where possible • Provide feedback at both individual and community levels	• Unaware that phosphorus-free fertilizer is better for water quality • Doesn't use lake or care about fertilizer affecting lake quality and community • House/lawn located in an area that won't affect lake quality or show decline in lake quality • Phosphorus-containing fertilizers, when properly applied to turf, have not been shown to contribute to phosphorus runoff per se in scientific studies[a]
Communication B: A poster or article showing price comparisons between phosphorus-free fertilizer and phosphorus-filled fertilizer (see Appendix E). The same article or poster will also show local locations where residents can purchase the phosphorus-free fertilizer. The Watershed Management District's name will be included on the communication, in collaboration with the University of Wisconsin-Madison, to create a sense of credibility.	• Make sure message is vivid, personal, concrete, and clear • Make it easy to remember what to do • Know the attitudes and beliefs of your intended audience • Have your message delivered by an individual or organization that is credible to audience	• More expensive to purchase • Harder to find in stores

Table 8: Recommended Incentive Tools

CBSM Tool Description and Use	Checklist for Effective Use	Perceived Barriers/Benefits Targeted by Tool
Incentive A: Hold a contest for the best (registered) P-free lawn. Winners' names will be published in newsletters with pictures, and winners could receive either a small prize or a yard sign/plaque displaying the award. The contest could become an annual event in which residents could anticipate and work towards. The incentive will be permanent because it is a social, non-monetary award, and if the contest were popular enough, neighbors will monitor the type of fertilizer used in yards with the P-free yard signs (a good indication of entry into the contest).	• Consider the size of the incentive—large enough to be taken seriously • Consider non-monetary incentives • Closely pair the incentive and behavior • Make the incentive visible • Be cautious about removing incentives • Prepare for people's attempts to avoid disincentives	• More expensive to purchase or harder to find in stores • Phosphorus-free fertilizer results in poorer lawn quality • Most of the P in soils is not available for plant uptake, usually less than 0.01%. Turf needs nitrogen, phosphorus, and potassium in a 4:1:3 ratio[a]
Incentive B: Hold a drawing for free bags of fertilizer. Entries into the drawings will occur with each purchase of a P-free bag, or return of empty P-free to a participating store. The amount of winners and free bags of fertilizer will be dependent upon the budget of the project and potential producer donations. To increase visibility, winners' names will be published on the website and in the newsletter.	• Consider the size of the incentive—large enough to be taken seriously • Closely pair the incentive and behavior • Make the incentive visible • Prepare for people's attempts to avoid disincentives	• More expensive to purchase or harder to find in stores

[a]-not discussed during focus group, but included based on literature research

Table 9: Connecting Tools and Values

Perceived Barriers to New Behavior:	Proposed Tools:	Value of Combining Tools:
Unaware that phosphorus-free fertilizer is better for water quality	*Prompt A, Prompt B, Communication A*	Through the use of the communication tool, a clear link should be established between phosphorus-filled fertilizers and degraded water quality before, during, and after the purchase of fertilizers. However, by adding in the prompts, a reminder of the link will be located at the nearest time to the chosen behavior—either at the place of purchase with *Prompt A*, or at the place of use with *Prompt B*.
Lack of precedence	*Commitment A, Norm A, Norm B, Norm C*	By combining these tools, a precedence will be set in a variety of visible, influential places, including churches and schools (*Commitment A*), as well as through friends and neighbors (*Norms A-C*).
Doesn't use lake or care about fertilizer affecting lake quality and community	*Norm A, Norm B, Norm C, Communication A*	Through the use of *Norms A-C*, a feeling of community will be established as well as an environmentally conscious norm. The inclusion of *Communication A* will further strengthen the connection between lake quality and the community.
House/lawn located in an area that won't affect lake quality or show decline in lake quality	*Norm A, Norm B, Norm C, Communication A*	Through the use *Communication A* along with the other proposed tools, strong environmental norms will be established in the community, reinforced with an environmental message.
More expensive to purchase or harder to find in stores	*Prompt A, Communication B, Incentive A or Incentive B*	*Prompt A* will help users find the phosphorus-free fertilizers in stores. *Communication B* will clarify the price differences between phosphorus-free and phosphorus-filled fertilizers prior to the purchase, and without any research on the part of the resident. Used in combination with either *Incentive A* or *Incentive B*, the P-free fertilizers should come out the same, if not slightly less expensive, than fertilizers with phosphorus.
Phosphorus-free fertilizer results in poorer lawn quality	*Norm C, Incentive A*	In order for the norm to work, the perceived barrier must be locally targeted by a credited source, such as a trusted neighbor. In addition to the norm, *Incentive A* will then reinforce the idea community-wide that phosphorus-free lawns can look healthy and green.
Soils are of poor quality and require phosphorus	*Communication C*	n/a

from neighboring communities. This monitoring strategy requires strong cooperation with the hardware store because product quantities will need to be tallied by the store at the time of purchase. This strategy will allow the effectiveness of many tools to be evaluated, particularly commitments and in-store educational material. To further assess the impacts of the stores, a simple point-of-purchase survey at the hardware store and/or a survey of lake residents could also be conducted. Additionally, feedback from the target audience would be solicited.

Second, to monitor the actual application of the product, LRMD can visually observe the number of yard signs promoting the use of phosphorus-free fertilizer. This is a visual cue signifying the use of the product and can easily be tracked. To track this tool, a driving route through the watershed can be established to note the addresses of residents with a yard sign. This monitoring should be done twice during the growing season to estimate the number of residents using P-free fertilizer. Additionally, recording home addresses helps identify the number of new residents using the product each

year and those residents who may no longer be promoting the product. This also helps evaluate the reception of the yard signs and possible establishment of social norms. Due to the possibility that not all P-free users will use the yard sign, this monitoring strategy cannot be used alone to evaluate the success of the program. It is intended to complement the other monitoring efforts.

The long-term monitoring strategy focuses on the actual phosphorus loading into Lake Ripley. Since there are other ecological influences that may affect seasonal phosphorus levels in the lake, testing actual concentrations may not depict the positive influence from using P-free fertilizer. In this case, computer modeling is suggested. Since the hydrology of the system is known, the flow paths from lawns to the lake can be simulated. By knowing the number of residents using P-free fertilizer through commitments or lawn signs, the volume of water running off these lawns can be quantified. Using modeling software and baseline conditions, the phosphorus concentrations in the lake can be estimated. This estimate would be exclusive from other ecological factors that would influence field conditions. This strategy is intended to model the increased benefits over several years as more residents use P-free fertilizer.

Both the long- and short-term strategies should be completed as a whole. Each strategy evaluates different portions of the pilot project's success; furthermore, when paired, other results can be deducted. For instance, one may expect to see a correlation between the bags of phosphorus-free fertilizer sold each year and lower simulated phosphorus concentrations in the lake. Because of the ongoing monitoring, a correlation could be detected between a behavior change and specific CBSM strategies. A comparison with a group from another lake should be conducted to attribute the monitoring results to the program and not other factors.

Conclusion

Excess phosphorus in Lake Ripley has severe negative environmental implications. Through a program utilizing Community Based Social Marketing, non-point phosphorus pollution originating from lawn fertilizers could be greatly minimized. To be successful, the program must make use of an intimate knowledge of the residents of the Lake Ripley watershed and the geographic limitations of the area. The tools were designed to target specific benefits and barriers that were observed in the Lake Ripley watershed. Other communities looking to apply CBSM to a similar problem may likely find different benefits and barriers and subsequent tools as they work towards implementation.

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Appendix A

3 Simple Steps to Create a Lawn That's Healthy for Kids, Pets, Wildlife and Water Quality

This time of year many folks are making plans for their lawn. Maybe you're planning a trip to the store to get lawn supplies. Or a call to a lawn care company that promises a lush, green carpet in your yard. Before you take action, consider the following.

One lawn is only a small piece of land, but when you add up all the lawns across the country they cover an area the size of the State of Ohio. How we manage our lawns affects the health of our children, pets, wildlife and water quality. Here are three simple steps for creating a lawn that's healthy for all.

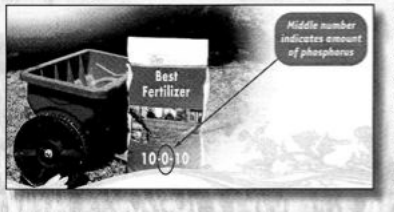
Step 1: Avoid pesticide use

Avoid using pesticides because they are dangerous for children, pets and other wildlife. In addition, these harmful chemicals can be tracked into the house or leach into the groundwater. Pesticides include insecticides, fungicides, herbicides and are in weed and feed products.

For more information, contact: Lynn Markham
Land Use Specialist
Center for Land Use Education
University of Wisconsin - Stevens Point
800 Reserve Street
Stevens Point, Wisconsin 54481
Phone (715) 346-3879 - Fax (715) 346-4038
email - Lynn.Markham@uwsp.edu
Center for Land Use Education

Step 2: Choose zero-phosphorus fertilizer

Before you fertilize, test your soil and see what it really needs. If you must fertilize, avoid fertilizers that contain phosphorus. Remember, it's phosphorous that accelerates algae growth in our lakes and rivers. Whether you live next to water or not, the runoff from your lawn can make its way to the groundwater or local lake or stream. Consider this – one pound of phosphorous in runoff can result in 500 pounds of algae growth! If you follow the instructions on a bag of fertilizer containing phosphorus, you may be adding over 50 pounds of phosphorus to a half-acre lot each year. The middle number on a fertilizer bag indicates the amount of phosphorus it contains.



Step 3: Consider downsizing your lawn

Only mow where you go. If the only time a person walks on a particular piece of lawn is when you mow it, why bother? Mow areas that you use: under hammocks, picnic tables, play areas and the like. Golf course-type lawns are missing many of the benefits that more interesting yards can provide. By planting more trees and shrubs, wildflowers and tall grasses you provide fun play areas for kids as well as nesting spots and food for songbirds, butterflies and other wildlife. In addition, a smaller lawn takes less time to mow, uses less gas and provides more time for rest and relaxation.

Caring for children, pets, birds, drinking water, lakes and streams begins in our own backyards.

Sources:

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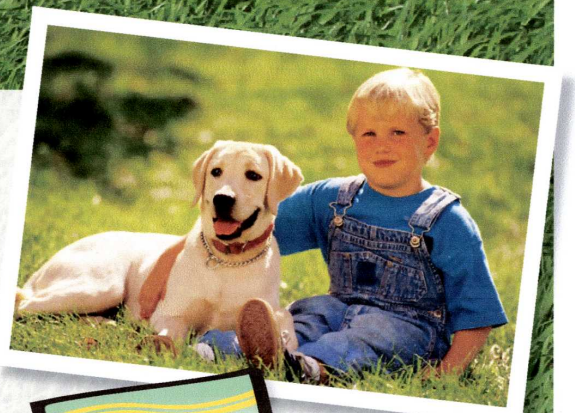
Pollution Prevention Fact Sheet: Landscaping and Lawn Care by Center for Watershed Protection, www.stormwatercenter.net/Pollution_Prevention_Factsheets/LandscapingandLawnCare.htm
Protecting Your Waterfront Investment: 10 Simple Shoreland Stewardship Practices by Center for Land Use Education, www.uwsp.edu/cnr/landcenter/Publications/waterfront.pdf

It's Time To Start Thinking About Your Lawn Again!



This year, make your lawn healthy for

Kids, Pets & Wildlife

Step 1

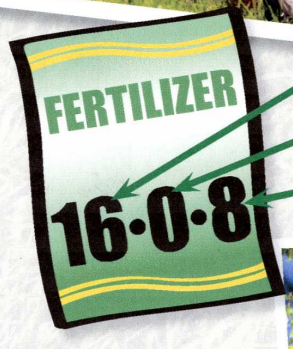
Avoid use of pesticide that can be tracked into your house.

- Insecticides, fungicides, herbicides and weed-and-feed products all contain pesticides.

Step 2

Choose zero-phosphorus fertilizer.

- Whether you live next to water or not, the runoff from your lawn can make its way to the groundwater or local lake or river.
- Before you fertilize, test your soil to see what it really needs. If you must fertilize, avoid fertilizers that contain phosphorus. It's phosphorus that accelerates algae growth in our lakes and rivers. Consider this – one pound of phosphorus in runoff can result in 500 pounds of algae growth.
- If you follow the instructions on a bag of fertilizer containing phosphorus, you may be adding over 50 pounds of phosphorus to a half-acre lot each year.
- The middle number on a fertilizer bag indicates the amount of phosphorus it contains.



Step 3

Downsize your lawn. Mow only where you go.

- Planting trees and shrubs, wildflowers and tall grasses will provide great play areas for kids as well as food and safety for birds, butterflies and other wildlife.

FRIENDS OF WAUPACA Mirror Shadow LAKES

To learn more about Friends of Waupaca Mirror/Shadow Lakes contact Sandy Testin at:

Phone: 715-258-7510
E-mail: testrath@charter.net

Appendix B

2005 Lake Ripley Opinion Survey Results

Distribution: Questionnaires were sent on 10/06/05 to the mailing addresses of all property owners located within the boundaries of the Lake Ripley Management District and/or Lake Ripley watershed

Number of households receiving a survey: 948
Number responding: 220
Response rate: 23%

---

1. What type of property do you own? Check all that apply.

45%: Single-family home (Seasonal residence)
49%: Single-family home (Permanent residence)
6%: Vacant/Undeveloped
1%: Agricultural
3%: Rental property
1%: Condominium
1%: Business/Commercial

2. Approximately how far from the lake is your property located?

40%: On the water
47%: 1/4 mile
7%: 1/2 mile
2%: 3/4 mile
4%: 1 or more miles

3. How long have you owned property near Lake Ripley?

28%: 0-5 years
18%: 6-10 years
11%: 11-15 years
9%: 16-20 years
34%: 20+ years

4. If you are a seasonal or part-time resident, please answer the following questions.

A) On average, how many days per month do you use your home?
11%: 0-3 days
15%: 4-6 days
24%: 7-9 days
20%: 10-12 days
30%: 12+ days

B) Do you have plans to make this home your permanent residence?
38%: Yes
62%: No

5. What about Lake Ripley contributed to your decision to buy property near Lake Ripley? List the letters of your top three choices.

(1st choices = 3 points, 2nd choices = 2 points, 3rd choices = 1 point)
91 pts: Lake not a consideration
54 pts: Size/depth
34 pts: Level of use
130 pts: Water clarity
11 pts: Weed/algae conditions
20 pts: Public accessibility
62 pts: Fishery
31 pts: Level of development
240 pts: Natural scenic beauty (1st)
26 pts: Lake-bottom condition
170 pts: Water-sport opportunities (2nd)
142 pts: Quiet recreation (3rd)
38 pts: Regional center of activity

6. If you boat on Lake Ripley, please answer the following questions.

A) What types of watercraft do you use? Check all that apply.

30%: Row/paddle boat
8%: Sailboat
11%: Jet Ski
11%: <30HP fishing boat
12%: >30HP fishing boat
27%: Speed boat
36%: Pontoon boat

B) How do you access the lake? Check all that apply.

31%: Public boat landing
15%: Marina
49%: Private lakefront access

C) Do you use your boat on other waters besides Lake Ripley?

22%: Yes
78%: No

D) If you answered "Yes" above, are you aware of how to inspect, identify and clean your boating equipment of invasive species (i.e., zebra mussels, Eurasian milfoil, etc.)?

91%: Yes
9%: No/not sure

7. If you are an angler, please answer the following questions.

A) Which types of fish do you prefer to try to catch on Lake Ripley? Rank 1-5, with 5 being least important. (Rank 1 = 5 points, rank 2 = 4 points,… rank 5 = 1 point)

403 pts: Largemouth Bass (1st)
314 pts: Walleye (3rd)
197 pts: Northern pike
331 pts: Bluegill/Sunfish (2nd)
144 pts: Yellow perch
35 pts: Other

B) Compared to other lakes, how is the fishing on Lake Ripley in terms of fish sizes and numbers?

7%: Excellent
35%: Good
47%: Fair
11%: Poor

C) How often do you practice "catch-and-release"?

56%: Always
39%: Sometimes
5%: Never

8. How do you feel about the current availability of public access on Lake Ripley?

24%: Too much
66%: Sufficient
10%: Not enough

9. Overall, how would you describe Lake Ripley's water clarity?

67%: Clear
26%: Cloudy
7%: Murky
0%: Pea soup

10. Overall, how would you describe Lake Ripley's aquatic plant growth? Please explain why you feel this way.

6%: Too sparse
69%: Acceptable
25%: Overly abundant

11. What activities do you or members of your household most enjoy while on Lake Ripley? List letters of your top three choices. (1st choices = 3 points, 2nd choices = 2 points, 3rd choices = 1 point)

32 pts: Don't use the lake
191 pts: Slow, motorboat cruising (2nd)
40 pts: Speed boating
178 pts: Fishing (3rd)
41 pts: Jet skiing

137 pts: Water skiing/tubing
270 pts: Swimming (1st)
5 pts: Diving/snorkeling
42 pts: Paddling
119 pts: Enjoying natural scenery
15 pts: Sailing/wind surfing
95 pts: Enjoying quiet solitude
27 pts: Spotting wildlife
8 pts: Snowmobiling
6 pts: Cross-country skiing
14 pts: Other

12. How crowded do you generally feel when on the lake?

WEEKENDS:
6%: Not crowded
16%: Slightly crowded
44%: Moderately crowded
34%: Extremely crowded
WEEKDAYS:
71%: Not crowded
19%: Slightly crowded
8%: Moderately crowded
2%: Extremely crowded

13. How do you feel about rule enforcement on Lake Ripley?

16%: Not sufficient
64%: Adequate
20%: Overly aggressive

14. What lake qualities are of greatest importance to you? Rank as follows: 2 = very important, 1 = moderately important, 0 = little or no importance

268 pts: Minimal boat traffic (6th)
246 pts: Fish/wildlife refuges (7th)
272 pts: Few to no problem weeds (4th)
162 pts: Big fish (13th)
223 pts: Abundant fish (10th)
294 pts: Natural scenic areas (2nd)
244 pts: Rule compliance/enforcement (8th)
269 pts: Quiet solitude (5th)
362 pts: Clear water (1st)
205 pts: Unique and diverse aquatic life (11th)
190 pts: Ease of navigation (12th)
289 pts: Safe beaches (3rd)
243 pts: Minimal shore development (9th)
126 pts: Public access opportunities (14th)
14 pts: Other (15th)

15. Do any of the following routinely impair your ability to enjoy Lake Ripley? Check all that apply.

14%: Poor water clarity (7th – tie)
19%: High or low water levels (5th – tie)
31%: Aquatic "weed" growth (2nd)
10%: Small fish sizes (9th)
14%: Low fish numbers (7th – tie)
40%: Overcrowding (1st)
22%: Algae (4th – tie)
5%: Insufficient public access (12th)
19%: Boating conflicts (5th – tie)
7%: Lack of fish/wildlife habitat (11th)
15%: Rule violations (6th)
22%: Noise (4th – tie)
9%: Burdensome lake-use policies (10th)
12%: Litter (8th – tie)
14%: Shore development (7th – tie)
12%: Pollutant-level concerns (8th – tie)
25%: Canada geese (3rd)
14%: Other (7th – tie)

16. What do you feel are the biggest threats to Lake Ripley's future? List the letters of your top three choices. (1st choices = 3 points, 2nd choices = 2 points, 3rd choices = 1 point)

183 pts: Misuse of lawn/garden/farm chemicals (3rd)
208 pts: Invasive species (1st)
18 pts: Groundwater pumping
105 pts: Soil erosion and polluted runoff
171 pts: Boating pressure
18 pts: Fishing pressure
200 pts: Development pressure (2nd)
49 pts: Fluctuating water levels
38 pts: Poor farming practices
28 pts: Uninformed public officials
47 pts: Uninformed citizenry
58 pts: Habitat destruction
61 pts: Misguided management priorities
13 pts: Other

17. Do you feel that you are kept reasonably informed of important matters regarding Lake Ripley?

90%: Yes
10%: No

18. How do you obtain, or would prefer to obtain, your Lake Ripley-related news and information? Check all that apply.

20%: Watch or attend meetings
90%: The Ripples newsletter
42%: Local news articles
18%: Website
1%: Library archives
29%: Friends/neighbors
5%: Other

19. Which of the following topics would you like to learn more about? Check all that apply.

13%: Rain gardens (11th – tie)
23%: Lake-friendly lawn care (5th – tie)
10%: Conservation easements (12th – tie)
19%: Aquatic plant management (7th)
16%: Fisheries management (9th)
26%: Invasive species I.D./control (3rd)
27%: General lake ecology (2nd)
18%: Shoreline vegetative buffers (8th)
25%: Shoreline erosion control (4th – tie)
10%: Construction site erosion control (12th – tie)
9%: Conservation farming practices (13th – tie)
8%: Drainage ditch repair (14th)
29%: Lake rules (1st)
20%: Wetland restoration (6th)
13%: Nutrient/pesticide management planning (11th – tie)
5%: Composting (15th)
14%: Polluted runoff (10th)
9%: Water conservation (13th – tie)
23%: Shoreland zoning rules (5th – tie)
25%: Lake Ripley trivia (4th – tie)
3%: Other (16th)

20. What do you think is the most positive aspect of Lake Ripley? Please explain.

Top responses (descending order): Water quality; natural beauty; peacefulness

21. What do you think is the most negative aspect of Lake Ripley? Please explain.

Top responses (descending order): Overcrowding; jet skis; overdevelopment

22. What actions would you like to see taken to better protect and manage Lake Ripley?

Top responses (descending order): Boating restrictions (numbers/sizes/horsepower/speed); better lake-access controls; continued management efforts

23. Do you have any concerns or questions that were not addressed as part of this survey?

Overwhelming majority indicated “no” or made no comment

Appendix C

Dear Property Owner,

The Lake Ripley Management District is collaborating with you on a project to improve the water quality of Lake Ripley. In March 2007, we held focus groups to discuss fertilizer use for lawn and garden care and maintenance. Now we invite you to complete this survey to help us gain a broader understanding of the community's opinions. **The following survey is for people who fertilize their lawn and/or garden. If you do not fertilize your lawn or garden, please recycle this survey, and encourage your neighbors to complete it.**

The main purpose of this survey is to understand community perceptions of fertilizer use and its effects on water quality. The survey covers these major topic areas:

1. Fertilizer use and current practices
2. Perceptions of Lake Ripley water quality
3. Disadvantages of using phosphorus-free fertilizer
4. Advantages of using phosphorus-free fertilizer
5. Influences of others on fertilizer use
6. Tell us about yourself…

This survey should take approximately 15 minutes to complete. Please return this completed survey in the enclosed envelope or return it to the Town of Oakland Town Hall by (return date). If you have any questions, please contact Paul Dearlove at (608) 423-4537. We appreciate your participation and contribution to ensuring a healthy Lake Ripley.

Thank You!

Paul Dearlove
Lake Ripley Management District

Fertilizer Use and Current Practices
Please circle whether the following statements apply to you. If you select yes, please specify when prompted.

1. I know the brand of my fertilizer	No	Yes, this brand:_____
2. I read the instructions printed on the fertilizer bag	No	Yes
3. I know which fertilizer I am going to buy before I purchase it	No	Yes
4. I use Weed and Feed.	No	Yes
5. I use a landscaping service.	No	Yes, this service:_____
6. I have used this fertilizer repeatedly over the last few years	No	Yes
7. I fertilize my lawn in the Spring	No	Yes
8. I fertilize my lawn in the Fall	No	Yes
9. I know whether my fertilizer contains phosphorus	No	Yes
10. I use phosphorus-free fertilizer	No	Yes
11. I am aware of phosphorus-free fertilizer	No	Yes
12. I would be willing to use phosphorus-free fertilizer	No	Yes

For questions 13 and 14 please choose all the responses that apply to you.

13. From whom do you get your advice about choosing a fertilizer?

- ○ Family
- ○ Friend (in community)
- ○ Hardware Store
- ○ Lawn and Garden Store/Nursery
- ○ Friends (outside community)
- ○ Media (specify)_____
- ○ Landscaping Service
- ○ Other (specify) _____

14. Where do you purchase your fertilizer?

- ○ Menards
- ○ Home Depot
- ○ Ace Hardware
- ○ Landscaping Service
- ○ Other, please specify _____

Lake Ripley Water Quality

Please indicate whether you agree or disagree with the following statements about Lake Ripley and your property.

	Strongly Agree	Agree	Don't Know	Disagree	Strongly Disagree
15. Lake Ripley has water quality problems.	☐	☐	☐	☐	☐
16. Water running off my property contains phosphorus from my fertilizer	☐	☐	☐	☐	☐
17. Water running off my property enters Lake Ripley	☐	☐	☐	☐	☐
18. Phosphorus in the runoff from my yard degrades the quality of Lake Ripley	☐	☐	☐	☐	☐

Disadvantages of Using Phosphorus-free Fertilizer

Please mark how the following factors affect you ability to use phosphorus-free fertilizer.

	Prevents Use	No effect	Makes Use Easier
19. Cost of phosphorus-free fertilizer	☐	☐	☐
20. Availability of phosphorus-free fertilizer	☐	☐	☐
21. Potential results	☐	☐	☐
22. Soil quality after use	☐	☐	☐
23. Landscaping service use	☐	☐	☐
24. My level of knowledge about phosphorus-free fertilizer	☐	☐	☐
25. Other, please specify _____	☐	☐	☐

Advantages of Using Phosphorus-free Fertilizer

Please indicate if you would consider the following conditions to be positive, negative, or neutral outcomes of using phosphorus-free fertilizer.

	Positive	Negative	Neutral
26. Better water quality	☐	☐	☐
27. Lake clarity	☐	☐	☐
28. Healthier fish population	☐	☐	☐
29. Using same fertilizer as my peers	☐	☐	☐
30. Other, please specify _____	☐	☐	☐

Influences of others on my fertilizer use

Please indicate the importance of the following peoples' opinions on your fertilizer use.

	Positive	Negative	Neutral
31. Family	☐	☐	☐
32. Neighbors	☐	☐	☐
33. Community leaders	☐	☐	☐
34. My religious community	☐	☐	☐
35. Lake Ripley Management District	☐	☐	☐
36. Other, please specify _____	☐	☐	☐

37. Do you own or rent your home?

Tell Us About Yourself…

○ Own

38. Is this your year-round residence?

○ Yes

39. Is your home on the shore of Lake Ripley?

- ○ Yes
- ○ No ⑧ What is the approximate distance between your house and Lake Ripley?_____

40. What is your age?

- ○ Under 18
- ○ 18-24
- ○ 25-35
- ○ 36-45
- ○ 46-55
- ○ 56-65
- ○ Over 65

Appendix D

Checklist for the Effectiveness of Selected Tools

Commitment

- Emphasize written over verbal commitment
- Ask for public commitments
- Seek groups' commitment
- Actively involve the person
- Consider cost-effective ways to obtain commitments
- Use existing points of contact to obtain commitments
- Help people view themselves as environmental concerned
- Don't use coercion

Prompts

- Make the prompt noticeable
- Prompts should be self-explanatory – explain simply what the person is to do
- Should be presented as close in time and space as possible to the target behavior
- Use prompts to encourage people to engage in positive behaviors rather than to avoid environmentally harmful actions

Norms

- The norms should be noticeable
- The norm should be made explicit at the time the targeted behavior is to occur
- Use norms to encourage people to engage in positive behaviors rather than to avoid environmentally harmful actions

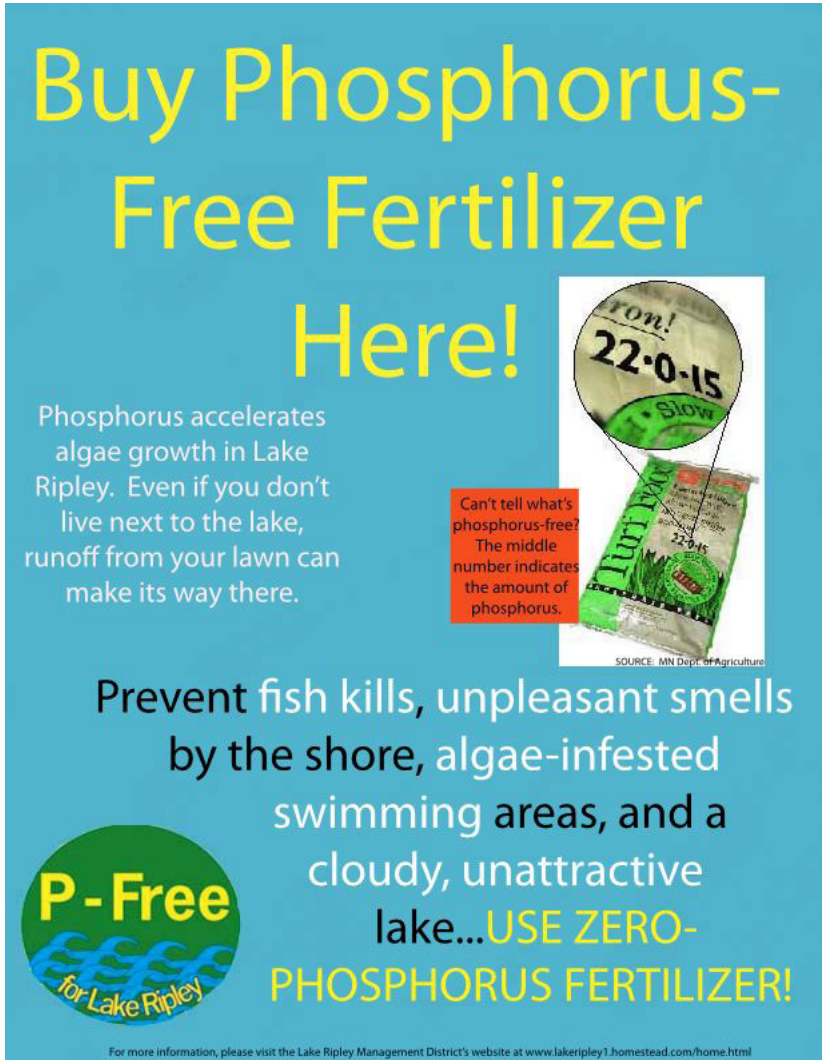
Communication

- Make sure the message is vivid, personal and concrete
- Know the attitudes and beliefs of your intended audience
- Have your message delivered by an individual or organization that is credible with the audience you are trying to reach.
- Frame your message to indicate what the individual is losing by not acting rather that what he or she is saving by acting
- If you use a threatening message, be sure to couple it with specific suggestions for action the individual can take
- Depending on the knowledge of your audience about a particular issue, use either a one-sided or two-sided message
- Make your communication, especially instructions for a desired behavior, clear and specific
- Make it easy for people to remember what to do, and how and when to do it
- Integrate personal or community goals into the delivery of your program
- Model the activities you would like people to engage in
- Make sure that your program enhances social diffusion by increasing the likelihood that people will discuss their new activity with others
- Where possible, use personal contact to deliver your message
- Provide feedback at both the individual and community levels about the impact of the sustainable behaviors

Incentives

- Create effective incentives
- Consider the size of the incentive-large enough to be taken seriously
- Consider non-monetary incentives and disincentives
- Closely pair the incentive and the behavior
- Reward positive behavior
- Make the incentive visible
- Be cautious about removing incentives
- Prepare for peoples attempts to avoid disincentives

Appendix E1


Buy Phosphorus-Free Fertilizer Here!
Phosphorus accelerates algae growth in Lake Ripley. Even if you don't live next to the lake, runoff from your lawn can make its way there.
Can't tell what's phosphorus-free? The middle number indicates the amount of phosphorus.
22-0-15
Slow
SOURCE: MN Dept. of Agriculture
Prevent fish kills, unpleasant smells by the shore, algae-infested swimming areas, and a cloudy, unattractive lake...USE ZERO-PHOSPHORUS FERTILIZER!
P-Free
for Lake Ripley
For more information, please visit the Lake Ripley Management District's website at www.lakeripley1.homestead.com/home.html

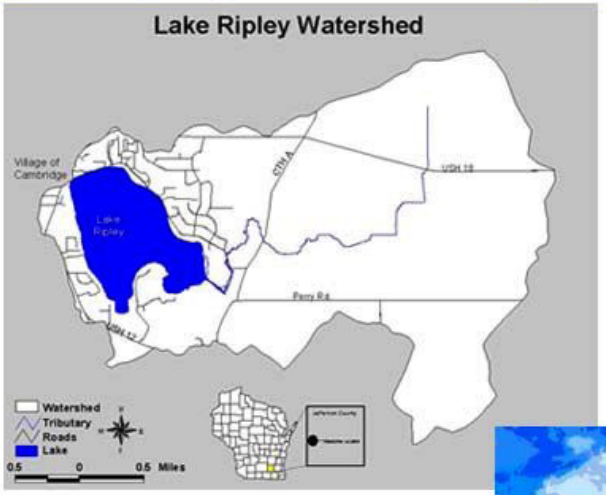
Appendix E2

P - Free

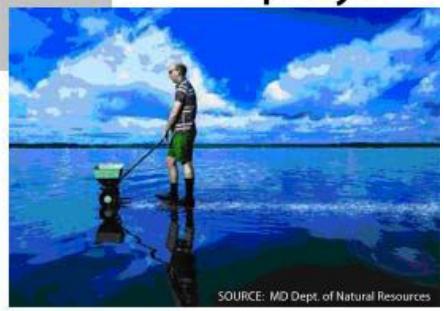
for Lake Ripley

Appendix E3

If you use phosphorus fertilizer at any location on this map...



...you may as well be doing this to Lake Ripley:



Too much phosphorus in Lake Ripley=

-Reduced fish populations
-Algae-infested swimming areas
-Unpleasant odors by the lake shore, and
-Green, murky lake waters.

How does this happen with fertilizer?

Runoff from your lawn can carry unused phosphorus to the lake through drainage ditches. The excess phosphorus increases growth of algae in the lake. After the algae die, the decomposition creates odors and decreased oxygen levels, resulting in large fish kills.

P-Free for Lake Ripley

For more information, please visit the Lake Ripley Management District's website at www.lakeripley1.homestead.com/home.html. This information was created by the Lake Ripley Management District in collaboration with University of Wisconsin-Madison students.

Appendix E4

Make a BIG Difference by Paying a LITTLE Difference!

Phosphorus-Free Products	Phosphorus-Filled Products	Price Difference:
Ace® Green Turf Crabgrass Preventer & Lawn Fertilizer, 15 lbs. $17.49	Ace® Green Turf Crabgrass Preventer & Lawn Fertilizer, 15 lbs. $15.99	$1.50
Ace® Green Turf Weed & Feed, 16 lbs. $12.49	Ace® Green Turf Weed & Feed, 16 lbs. $10.99	$1.50
Ace® Super Green Turf Fall Feed/Winterizer, 15 lbs. $9.99	Ace® Super Green Turf Fall Feed/Winterizer, 15 lbs. $9.99	NONE!

SOURCE: MN Dept. of Agriculture

P-Free for Lake Ripley

You can buy your phosphorus free fertilizer at the Cambridge Ace Hardware store at 200 Commerce Avenue, Cambridge, WI.

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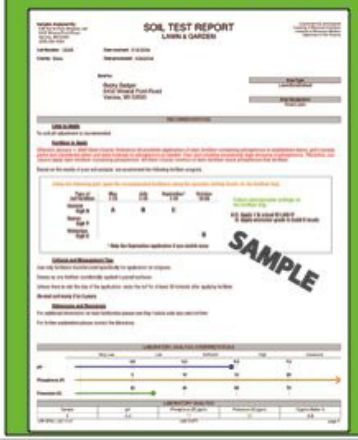
Appendix E5

Get the Dirt about What's in Your Dirt!

Knowing what is in your soil can help you choose the right fertilizer for your lawn or garden.

Much of the Soil in the Lake Ripley watershed already contains ample phosphorus. If you fertilize your lawn or garden, you could be adding unneccessary amounts of phosphorus that can travel from your turf to Lake Ripley's surf, impacting water quality. Phosphorus free fertilizer is readily availale, but some gardeners and lawn caretakers may feel they need phorphorus for a healthy lawn. The Lake Ripley Mangement District advises property owners in the area, even those not directly on the water, to test their soil before using fertilizer containing phosphorus.

Getting a soil test is easy. The UW-Madison Soil and Plant Analysis Lab offers a simple $15 test that will provide you with a report detailing the nutrient content of your soil and whether you really need to add phosphorus fertilizer to your lawn or garden.
Visit this website: http://uwlab.soils.wisc.edu/madison/
or contact the Lab at (608) 262-4364 for more information.



P-Free for Lake Ripley

Be P-Free for Lake Ripley!