BASS LAKE REHABILITATION DISTRICT

Strategic Plan 2006 – 2010

Bass Lake Rehabilitation District
Strategic Plan
2006-2010

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Executive Summary

Lake Rehabilitation Districts were created in Wisconsin in 1973 to protect environmental values, wildlife, public rights in navigable waters because these were determined to be threatened by the deterioration of public lakes.

Bass Lake Rehabilitation District (BLRD) has a fifteen year history of success. Water level stabilization and other programs have been successfully conducted. Our residents are committed to maintaining and improving the quality/safety of Bass Lake. A lake is a dynamic organism. New threats confront Bass Lake.

Improving or protecting the quality/safety of Bass Lake and maintaining this beautiful lake for our enjoyment and that of succeeding generations will require:

1. District residents committed to the organization's goal/vision
2. Constant vigilance
3. Action to identify threats/causes to lake/water quality and safety
4. Programs to check those discovered threats/causes

BASS LAKE REHABILITATION DISTRICT VISION/GOAL

Bass Lake Rehabilitation District is a proactive force to improve and protect the environmental quality of Bass Lake and its immediate watershed and assure its use for recreational purposes for this and future generations while maintaining its designation as an "outstanding resource water". It's focus will be to monitor environmental conditions, diagnose threats and deficiencies, and conduct programs to eliminate threats, correct deficiencies and make desired lake quality improvements. BLRD residents will become model stewards of this precious resource.

There are five critical elements to BLRD's Strategic Plan

1. Consistent and regular lake quality monitoring using Carlson Trophic State Index (TSI) to provide scientific data upon which to determine water quality trends. This data will be public and available on demand through the district's website.
2. Setting District TSI goals and gaining resident support for achieving those goals.
3. Continuing education of lake residents to encourage the adoption of "best practices" on each resident's property so all residents are model environmental/safety custodians of the lake.
4. District programs to improve water quality and lake safety.
5. Work with other units of government to coordinate efforts, capture available funding and share resources.

Failure to take smaller actions now to protect the quality/safety of Bass Lake, will ultimately confront residents with much more serious and costly problems tomorrow. We have the ability and tools, now…**Let's make it happen**. All residents will be the winners.

History and Purpose of Lake Rehabilitation Districts

Lake Rehabilitation Districts were created in Wisconsin in 1973 to protect environmental values, wildlife, and public rights in navigable waters because these were determined to be threatened by the deterioration of public lakes. The state determined it had a positive public duty, as trustee of waters, to take affirmative steps to protect and enhance navigable inland waters and protect environmental values.

The primary goal of the enabling statute, Chapter 33, "shall be to improve or protect the quality of public lakes". The districts created under Chapter 33 are formed for "undertaking a program of lake protection and rehabilitation of a lake or parts thereof…."

History of Bass Lake Rehabilitation District (BLRD)

BLRD was formed in 1988? The primary concern at the time was wildly fluctuating water level with a strong trend of higher levels causing flooding of properties near the lake which forced property owners to raise, move or remove structures. The District gave the lake residents a "municipal" mechanism to analyze the problem and develop proposed solutions. It also was a means to fund capital programs. Ultimately it recommend installing a pumping facility to create an upper limit on the lake water level. That pumping facility was installed in fall of 1996. It operated through that fall and winter. It is estimated that pumping reduced the lake level about eighteen inches. Since that winter, precipitation levels have been such that the water level has been comfortably below the permitted pumping threshold of 888.6 feet above mean sea level. Some maintain the removal of two dams in the Willow River State Park modified the water table and groundwater flows allowing the lake level to drop. Groundwater experts are uncertain about the impact of the damn removals on Bass Lake water levels.

In addition to the water level project BLRD has been involved in several other lake improvement projects:

1. Fencing a pasture to remove cattle from the northwest shore of the lake
2. Instituting High Water speed restrictions to protect lake quality
3. Water safety and boating regulations
    a. Operation of Water patrol
    b. Ordinances to control speed
        i. 8 to 8 Slow-No-Wake
        ii. Speed limits near landing
        iii. Speed limits near shore
    c. Placement of Caution/Danger signs
4. Eurasian milfoil control
5. Review of building permit applications for structures in the district
6. Annual social event

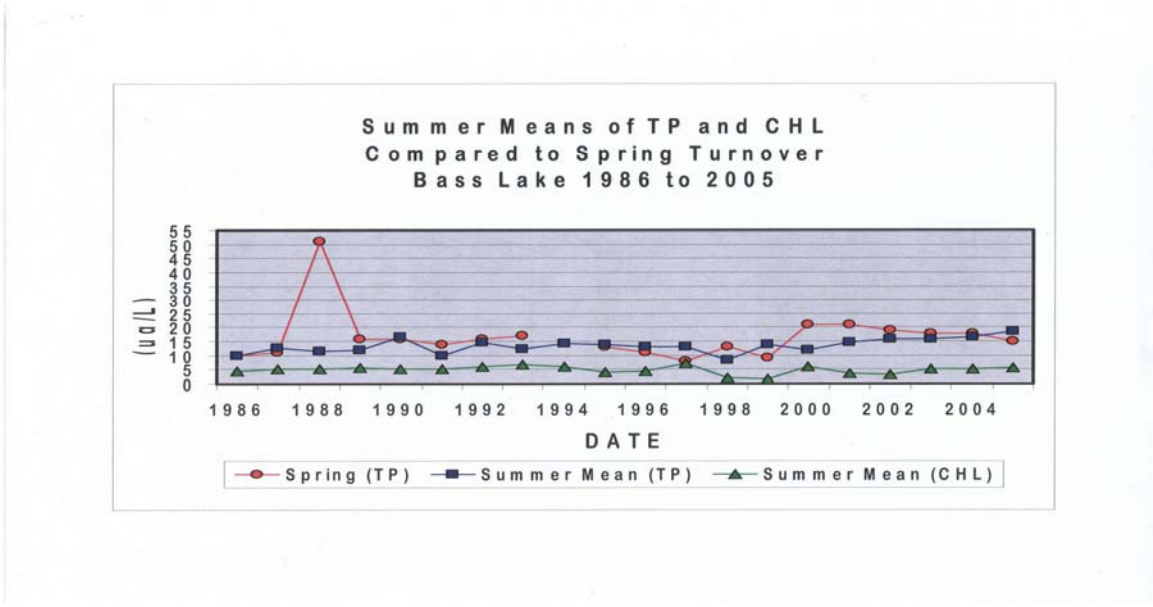
Current Status of Lake
And
Water Quality Trends

Bass Lake is designated as an "outstanding resource water" (ORW) the highest Wisconsin Department of Natural Resources (DNR) designation. Residents and visitors alike have noted its cleanliness over the years. BLRD's primary goal should be to retain this designation.

While the lake level continues to show marked changes both up and down, the exposure to high water flooding is probably under control baring a extreme precipitation event, a series of such events, or a prolonged period of significantly higher precipitation. Lake safety has been monitored and in general safety levels seem to be satisfactory, even though full compliance with district and DNR boating regulations will never be achieved. The attack of Eurasian milfoil seems to have subsided, but Eurasian milfoil remains in the lake. Native weevil populations are credited with attacking this invasive species.

The state of Bass Lake today, is the result of the choices made by its surrounding residents. Since 1994 when Bass Lake entered into the Wisconsin DNR's priority watershed program, there's been a dramatic increase in the awareness, connection and commitment to the lake. Unfortunately, even with all the efforts to date, current trends, while showing some progress in some areas, still show no net change in water quality.

Bass Lake has been part of the DNR's Baseline Trends Monitoring Program since 1986. Data has been collected on water quality, aquatic plants and fisheries. Looking at the water quality trends, it shows it staying constant (see chart below). This is good, but the goal of the watershed project was to decrease nutrient inputs to the lake by at least 30 percent (nutrients being mainly phosphorus and nitrogen). With this type of reduction, water quality conditions would expect to be improved.



What is Phosphorus? A nutrient which has increased in popularity across the media spectrum. What does Phosphorus mean to Bass Lake? Overall, Bass Lake receives 700

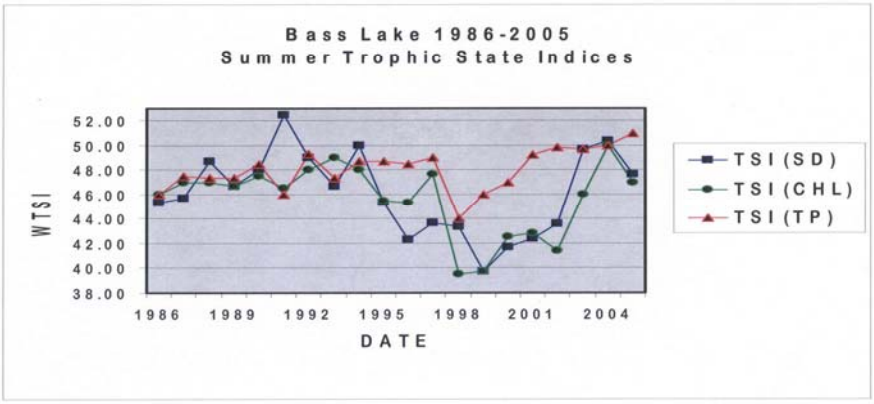
pounds of phosphorus annually. Shoreline erosion contributing 34% of this load, residential development 21%, groundwater 17%, precipitation 14%, uplands 12%, barnyards and gullies the remaining 3%. When phosphorus reaches between 15-20 ug/l you may start seeing enhanced plant growth, algae growth and excessive dissolved oxygen fluctuations.

Bass Lake is currently experiencing areas of dead zones. These are zones where water is depleted of oxygen and is unable to support like. If dead zones continue algal blooms, foul smells, musty-tasting drinking water and damage to the fisheries are only to follow. Once phosphorus reaches these extreme levels, there are treatment options, but not without a cost. The current treatment option available costs around $1000 per acre (Bass Lake is 416 acres) and is not a guaranteed option.

Phosphorus is a nutrient that can easily be managed with a little effort. Here are some examples of what can be done: first, Maintain/re-establish shoreline buffers; second, On-site stormwater management for all home/lands draining to Bass Lake; third, Use of phosphorus free fertilizers; and fourth Encourage no net increase in stormwater runoff from new and redevelopments.

If you would like further information regarding Bass Lake's Water Quality, you may contact the DNR at 715/839-3700 or the St. Croix County Land & Water Conservation Department at 715/684-2874 ext. 3. For information regarding cost-sharing, please contact the Land Conservation Department.

Unfortunately during the past seven years, as the chart below shows, the scientific data collected by the DNR indicates an abrupt, marked and concerning increase in phosphate and chlorophyll and a corresponding reduction in clarity. All three factors are currently far above the desired goal. Reduced clarity was very evident in the summer of 2005. Failure to control these controllable factors will threaten the quality of Bass Lake and its designation as an "outstanding resource water"(ORW). This change has been scientifically documented and is a real threat to Bass Lake giving weight to the need to take action to mitigate and reduce these very real threats to the quality of Bass Lake.



The appendix contains an article about Squaw Lake near Star Prairie in northern St. Croix County. While that watershed is different than Bass Lake's, Squaw lake is a nearby example of what can happen to a lake and how expensive "repairs" might be. One of the issues is phosphorous just like the threat to Bass Lake. One corrective treatment is $1,000 per acre. Bass Lake is 416 acres. That's the amount we spent 10 years ago to deal with high water issues. Why would we want to ignore the current phosphorous and nitrogen issues and place ourselves in a situation facing the huge cost of "repair". A relatively few dollars spent now to reduce nutrient loads will save us big dollars tomorrow.

Improving or protecting the quality/safety of Bass Lake and maintaining this beautiful lake for our enjoyment and that of succeeding generations will require:

1. District residents committed to the organization's goal/vision
2. Constant vigilance
3. Action to identify threats/causes to lake/water quality and safety
4. Programs to combat and correct those discovered threats/causes

BLRD has been proactive since its creation and has been quite successful in dealing with the issues identified. There is no reason it can't continue in that mode. Now is the time to renew our commitment to improve and protect Bass Lake and retain its designation as an "outstanding resource water".

BASS LAKE REHABILITATION DISTRICT VISION/GOAL

BLRD is a proactive force to improve and protect the environmental quality of Bass Lake and its immediate watershed and assure its use for recreational purposes for this and future generations while maintaining its designation as an "outstanding resource Water". It's focus will be to monitor environmental conditions, diagnose threats and deficiencies, and conduct programs to eliminate threats, correct deficiencies and make desired lake quality improvements. BLRD residents will become model stewards of this precious resource.

Lake Rehabilitation Districts were created "for undertaking a program of lake protection and rehabilitation of a lake or parts thereof with in the district". The primary goal is to improve or protect the quality of a public lake. The BLRD's vision /goal is consistent with the statutory purpose of a district.

Focus of Major Improvement and Protection Programs

Protecting a lake is a dynamic goal. A wide variety of constantly changing natural and man-made factors can both positively and negatively impact the quality of a lake. The literature indicates that the major issues/problems are centered around these factors:

1. urbanization
2. curbing pollutants
3. cutting runoff
4. capture and cleanse runoff before it reaches the lake
5. safe public usage practices

Problems most often cited by lake residents, such as excessive plant growth, algae blooms, and murky bottom sediments, are caused by water quality factors that lead to increased lake fertility or productivity. Productivity refers to the amount of plant and animal life that can be produced within the lake. Excess productivity can significantly shorten the life of a lake.

The gradual increase of lake productivity over time is a natural process called eutrophication, or lake aging. The primary objective of most lake management is to slow down eutrophication by reducing the input of plant nutrients such as phosphorous, and sediments to lakes.

Lake scientists have developed a variety of numerical indexes based on water quality data to express lake productivity on a continuous numerical scale. The widely used Carlson Trophic State Index incorporates water clarity, or transparency, as measured with a Secchi disk; the algal plant pigment chlorophyll a; and total phosphorous as indicators of lake productivity. Long term monitoring of these factors on a consistent and regular basis provides data needed to recognize changes in lake productivity (lake health).

Elements Of BLRD's Strategic Plan

There are five critical elements to BLRD's Strategic Plan

1. Consistent and regular lake quality monitoring using Carlson Trophic Sate Index (TSI) to provide scientific data upon which to determine water quality trends. This data will be public and available on demand through the district's website.
2. Setting District TSI goals and gaining resident support for achieving those goals
3. Continuing education of lake residents to encourage the adoption of "best practices" on each resident's property so all residents are model environmental/safety custodians of the lake.
4. District programs to improve water quality and lake safety
5. Working with other governmental units to coordinate efforts, capture available funding and share resources

Element 1 Lake Quality/Safety Monitoring

Good lake quality data is the basis of a sound lake quality/safety program. BLRD will put in place processes which will assure the regular and consistent collection of appropriate lake data. This will include, but not be limited to, the Carlson Trophic Index. Water elevation and water temperature are likely additional data sets. Research and consultation with WDNR will be important in devising the District's Lake Quality Monitoring Program. This program will identify factors to be monitored, the techniques and processes to be used to collect the data, frequency of collection, and the organization and/or persons to be responsible for conducting the program. Collected data will be readily available for all residents through the District's website. Data will also be routinely be featured in District newsletters and distributed to all interested parties through by e-mail distribution to those requesting the data.

The DNR is currently monitoring at Bass Lake on a limited basis. This data will be baseline data and can become a key part of our program. A DNR document called "Water Resources Monitoring Strategy for Wisconsin" (available at http://www.dnr.wi.us/org/water/monitoring/strategy.htm) describes the "Self Help" monitoring program which could be the basis of BLRD's monitoring initiative. BLRD might begin with semi-monthly measurement of clarity, using a secchi disc, and temperature. In addition on a regular and consistent basis measure dissolved oxygen, total phosphorous and chlorophyll a (TSI). Historic Bass Lake data is available on this website http://dnr.wi.gov/org/water/fhp/lakes/selfhelp/ . DNR has been collecting data since 2000, but probably not the number of observations each year we would like. In the 1980's John Eiring made very regular observations. It appears that BLRD could quite easily establish a regular and consistent monitoring program using volunteers. In addition to the data mentioned above BRLD could begin systematically monitoring aquatic plants including some invasive species such as purple loosestrife, zebra mussels, curly leaf pondweed, and Eurasian milfoil.

Element 2 District TSI and Safety Goals

Shared goals have a powerful motivational impact. Once the factors to be monitored are determined the district will set goals for each factor. It's important that these goals be "shared" goals, in other words that the District's residents are involved in setting the goals through a public process. Once set the District will continually work to gain and continue resident's support for achieving these goals.

Work performed in connection with **"Nonpoint Source Control Plan for the St. Croix County Lakes Cluster Priority Watershed Project", The Wisconsin Nonpoint Source Water Pollution Abatement Program** has already set objectives for Bass Lake. They involve both sediment and phosphorous reduction targets as shown in the two tables below. BLRD could adopt these targets as a preliminary starting point.

Bass Lake Sediment Reduction Objectives

Source	Inventoried Sediment Load (tons)	Percent of Total	Planned Percent Reduction	Planned Sediment Load (tons)
Uplands	18	7	25	14
Gullies	5	2	100	0
Shoreline	242	88	50	121
Rural Residential	9	3		9
Total	**274**	**100**	**48**	**144**

Bass Lake Phosphorus Reduction Objectives

Nonpoint Source	Inventoried Phosphorus Load (lbs)	Percent of Total	Planned Percent Reduction	Planned Phosphorus Load (lbs)
Uplands	83	12	25	62
Gullies	5	<1	100	0
Shoreline	242	34	50	121
Barnyards	14	2	80	3
Residential Development	149	21	50	75
Precipitation	102	14	0	102
Groundwater	118	17	0	118
Total	**713**	**100**	**32**	**480**

Element 3 Continuing Resident Education

It is widely believed that poor environmental decisions made by individuals are the result of inadequate or erroneous information. In other words an informed citizenry will generally make good environmental and safety decisions. Furthermore informed citizens will work with each other to assure that all are being good stewards of the lake. If this does not happen through regular conversation it will happen through “peer pressure”. The ultimate goal is that each resident will adopt the best practice on his/her property for preserving/enhancing the quality/safety of the lake. The district programs will include

- Distribution of materials created by others such as DNR’s and other environmental and safety organizations
- Seminars and presentations at District meetings and neighborhood gatherings
- Demonstration projects conducted in cooperation with residents
- Lakeshore observation/monitoring reports

Element 4 District Programs to Improve Lake Quality and Safety

Responsible individual resident decisions will have a significant impact on lake quality/safety, but there are threats, issues and other factors that supersede individual action; i.e. individual action just won’t be sufficient to reach the desired goal. In these cases the District will develop programs to address these threats, issues and other factors. Examples of such programs might include district anti-invasive species programs, phosphate elimination from households and fertilizers, septic system surveys, development of ordinances, water level control, boating regulation and enforcement(such as “slow-no-wake” and lake patrol), access to state and federal funding for lake improvement programs, and interaction/cooperation with other units of government (County, DNR, PCA, etc.). There are many County and State environmental and lake

protection funding/grant programs. Being pro-active in searching sources and submitting applications for compelling programs will substantially reduce the improvement costs that would be bourn by District residents.

Element 5 Working with other Units of Government

The DNR, St. Croix County and the Towns of St. Joseph and Somerset share an interest in preserving and enhancing the quality of the Bass lake Watershed. DNR developed the Nonpoint Source Pollution Abatement Plan (watershed plan) in 1997. This document can become the foundation for BLRD's focus in the years ahead. A copy of this Plan is attached as an exhibit to BLRD's Strategic Plan. St. Croix County has oversight of shoreland zoning. The County will be updating its Shoreland Zoning Ordinance in the near future. BLRD will want to be a participant in this process. The Towns of St. Joseph are Somerset are involved in all development plans surrounding the Lake. BLRD will be proactively involved with both Towns. A substantial amount of mitigation funds have been committed to St. Croix County and the Town of St. Joseph in connection with the new St. Croix River Crossing Project. It is very likely that Bass Lake Watershed Planning may be a focus of these mitigation funds. BLRD should seek a seat at the table as these funds are distributed to projects. St. Joseph's nearly completed Comprehensive Plan recognizes the importance and vulnerability of the area's groundwater. This document includes goals to enhance monitoring of groundwater, septic systems and agricultural waste management systems. BLRD can partner with the Town in these enhanced monitoring programs. This is just a few of the many opportunities to cooperate with other governmental units.

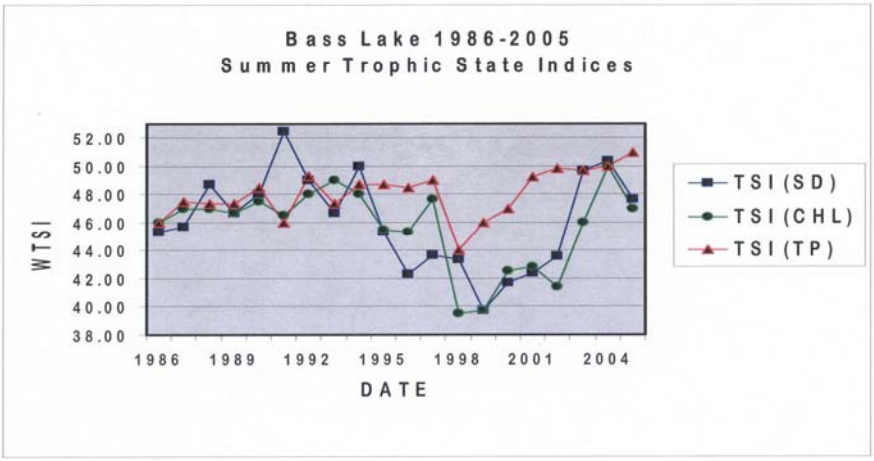
H**ow Would This Be Conducted by BLRD**

District Commissioners have the powers necessary to conduct the kinds of programs and activities mentioned above because the programs are consistent with the purposes of a Lake Rehabilitation District.

Commissioners would be responsible for providing leadership for all activities and programs connected with accomplishing the District's Vision/Goal. A team of Commissioners and volunteers could assume responsibility for the various components of the effort. Each year programs and program actions steps would be developed and budgeted. The Board of Commissioners would review, modify and approve the program actions. The combined costs of the approved programs and action steps would be part of the District's fiscal budget, which would be presented for discussion and approval by the electors at the District's annual meeting. Commissioners would be required to present compelling information about programs with well developed and costed action plans to be assured of elector approval. Once approved or modified by electors, the Commissioners would be responsible for implementing and conducting the programs and activities. There is no question that this effort would require a significant commitment from both the Commissioners and other volunteers.

Conclusion and Call To Action

Living on a lake that is recognized as an "Outstanding Resource Water" is the ultimate goal. The gradual increase of lake productivity over time is a natural process called eutrophication, or lake aging. The primary objective of most lake management is to slow down eutrophication by reducing the input of plant nutrients such as phosphorous, and sediments to lakes. Failure to take smaller actions now to protect the quality/safety of Bass Lake, will ultimately confront residents with much more serious and costly problems tomorrow. We have the ability and tools…Let's make it happen. All residents will be the winners. The Chart below clearly shows that action now is warranted.



Appendix 1

SQUAW LAKE HISTORY:

Squaw Lake-107 acres is located in Star Prairie Township, St. Croix County, Wisconsin, in the St. Croix River Basin. Squaw Lake is listed on the Wisconsin Department of Natural Resources' (WDNR) 1998 303(d) List of Impaired Waters. The Lake is nutrient (phosphorus (P)) impaired as a result of agriculture, internal loading and local land use, is listed as a *medium priority* water and external load sources are nonpoint source (NPS) dominated. The *designated use* for Squaw Lake is defined as a full recreation, warm water sport fishery water.

Water quality in Squaw Lake is generally poor to very poor, falling in the eutrophic to hypereutrophic category. Summer lake phosphorus levels have been about 270 ug/l in recent years. Mats of filamentous algae frequently cover a large portion of the lake bottom and summer algal blooms result in foul odors and an unsightly build-up of algae biomass on the shoreline. In addition, trophic conditions in the lake limit rooting depth for emergent vegetation used by the resident fish populations. As a result, these impairments impact the recreational/aesthetic value of the lake and stress sport fish populations. Squaw Lake is not currently meeting applicable narrative *water quality criterion* as defined in NR 102.04 (1); Wis. Admin. Code:

In September 2000, the U.S. Fish and Wildlife Service acquired 215 acres of land at the north end of Squaw Lake. This acquisition is now known as the "Prairie Flats North Waterfowl Production Area" (WPA). St. Croix County received a Targeted Runoff Management Grant, and with the assistance of multiple partners, including the FWS and Ducks Unlimited, completed construction of two wetland restoration areas in the fall of 2003. These restorations on the WPA allow temporary storage and infiltration of a portion of spring runoff to reduce phosphorus loading to Squaw Lake. (*overall project costs: $462,810*)

The Squaw Lake District intends to complete an alum treatment of Squaw Lake when an adequate level of annual phosphorus loading to Squaw Lake has been achieved to make an alum treatment cost effective. This current treatment option will cost around $1000 per acre (Squaw Lake 107 acres) and is not guaranteed to work and/or may take more than one treatment.

Appendix 2

Bass Lake Section from "Nonpoint Source Control Plan for the St. Croix County Lakes Cluster Priority Watershed Project"

The Wisconsin Nonpoint Source Water Pollution Abatement Program

Plan approved
April 1997

This Plan Was Cooperatively Prepared By:

The Wisconsin Department of Natural Resources
Wisconsin Department of Agriculture, Trade and Consumer Protection,
St. Croix County Land Conservation Department
and
Polk County Land Conservation Department

Publication WT-496-97

Bass Lake Inventory Results and Objectives

Nonpoint Source Pollutants
Bass Lake receives just over 700 pounds of phosphorus annually. Shoreline erosion contributes an estimated 242 pounds, or 34% of this load. Current very high water levels are a major contributing factor, and this source is expected to diminish when water levels fall. Residential development in the watershed is the second largest source, contributing an estimated 149 pounds, or 21% of the phosphorus load. An estimated 274 tons of sediment reach Bass Lake, with 242 tons, or 88% coming from shoreline erosion. Tables 2-8 and 2-9 summarize the inventoried sediment and nutrient loads and pollutant load reduction objectives.

Table 2-8. Bass Lake Sediment Reduction Objectives

Source	Inventoried Sediment Load (tons)	Percent of Total	Planned Percent Reduction	Planned Sediment Load (tons)
Uplands	18	7	25	14
Gullies	5	2	100	0
Shoreline	242	88	50	121
Rural Residential	9	3		9
Total	**274**	**100**	**48**	**144**

Table 2-9. Bass Lake Phosphorus Reduction Objectives

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Uplands	83	12	25	62
Gullies	5	<1	100	0
Shoreline	242	34	50	121
Barnyards	14	2	80	3
Residential Development	149	21	50	75
Precipitation	102	14	0	102
Groundwater	118	17	0	118
Total	**713**	**100**	**32**	**480**

Current in lake summer phosphorus concentration is estimated to be 18 ug/l, and would be reduced to about 12 ug/l with a 32% reduction in phosphorus load. A detailed description of modeling methods and in lake phosphorus concentration as a measure of water quality can be found in the Appraisal Report for this watershed project (DNR, 1996).

Bass Lake Rural Nonpoint Pollution Sources and Eligibility Criteria

Upland Sediment and Phosphorus

Agricultural practices are a fairly small source of sediments and nutrients to Bass Lake. Upland sediment sources were evaluated using the WINHUSLE model on the direct drainage areas to the lake. (The WINHUSLE model is a sediment transfer model based on the Universal Soil Loss Equation). An estimated 13 tons of soil per year are delivered to the lake from croplands. An additional 10 tons/year are delivered from farmsteads, pastures and gullies. These sources account for 9 percent of the sediment delivered to surface waters.

A 25 percent reduction in sediment from eroding fields is targeted for agricultural lands. The erosion rate and sediment delivery rate in the watershed is quite low, with nearly all fields already meeting the tolerable (T) soil loss objective. The average sediment delivery rate for the watershed is less than 0.1 ton/acre/year. *All uplands delivering greater than .01 ton/acres/year are eligible.*

To be classified as critical, fields must be in the direct drainage area of Bass Lake, and be contributing greater than 0.3 ton/acre/year of sediment. There are 6 fields, including approximately 45 acres identified as critical at this time. Critical sites will be required to reduce their annual load below the critical level. Landowners wishing to voluntarily participate in the Priority Watershed Project may sign a cost share agreement to apply practices to reduce the sediment loss to the target amount.

Barnyard Runoff

Runoff carrying a variety of pollutants from barnyards and other confined livestock areas is overall a small source of pollutants in Bass Lake. However, where barnyards or confined

livestock areas drain directly to the lake, they may have locally significant impacts. Three barnyards are a source of 14 pounds of phosphorus per year. *Barnyards contributing more than 10 pounds of phosphorus annually and with direct drainage to surface water will be designated critical.* There are currently no critical site barnyards. If a barnyard is determined to be critical, animal lot relocation may be an eligible practice.

All barnyard sites are eligible for low cost practices to control runoff. These practices include clean water diversions and roof gutters. The objective for barnyard runoff control is to reduce phosphorus loading to the lake by 80 percent, and should be achievable with installation of these low-cost practices.

Keeping horses is often a popular activity in areas of low density residential development. Although this is not very common yet in the Bass Lake watershed, it is a often a high intensity land use with potential adverse impacts to the lake, and should be monitored as future development occurs.

Nutrient and Pest Management

All cropland in the Bass Lake Watershed will be eligible for cost sharing for development of a nutrient and pest management plan. Approximately 5 farms (912 acres) are eligible. Manure spreading runoff and management of nutrients are addressed through Natural Resource Conservation Service (NRCS) Nutrient Management Standard 590. Pest management is addressed through NRCS Pest Management Standard 595. Nutrient and pest management plans will be developed by private consultants. Landowners will be eligible to participate for up to three years and will be responsible for paying 50 percent of the consulting fees. A soil conservation plan is necessary for development of a nutrient management plan. LCD staff will prepare soil conservation plans and materials for the nutrient and pest management plan. LCD staff will also review the nutrient and pest management plans.

Nutrient and pest management activities will result in pollutant load reductions. For this reason, fertilizer application rates must be tracked and reported. Professional services contracts developed for nutrient and pest management consulting must include a provision for reporting the required information to the LCD. Records should be kept showing progress towards reducing the use of fertilizer and pesticides.

In addition to eligibility and promotion of nutrient management planning on all cropland, the plans will encourage limiting the application of manure to meet plant needs for phosphorus wherever possible. Manure stacks or leaking manure storage structures will be targeted for abandonment or relocation to a suitable site.

In order to reduce spring runoff to the lake, no manure will be spread in channels or places of concentrated flow. These places are designated critical sites for manure spreading. Channels and places of concentrated flow will be identified by reviewing sites for evidence or history of crops impacted by inundation, crop flattening by water flow, and indication of intermittent waterways in the USDA/NRCS Soil Survey of St. Croix County. There are no identified critical sites at this time.

Manure Storage

Eligibility for a grant for manure storage practices will be based on the development of a preliminary Nutrient Management Plan, developed in accordance with NRCS standard 590. This means that the storage facility is needed to manage manure during periods of snow-covered, frozen and saturated conditions in order to protect water quality. The nutrient management plan

must also demonstrate that proper utilization of the manure can be achieved following adoption of the intended storage practice.

Options for manure storage may include, but are not limited to: properly sited, unconfined manure stacks (in accordance with Std. 312); the construction of a short term storage facility (capacity for 30 to 100 days manure production in accordance with Std. 313); the construction of a long term storage facility (capacity for up to 210 days production in accordance with Std. 313 or 425); a reduction in the number of animals; the rental of additional lands; or haul or broker manure to a neighboring farm that can use the manure in accordance with a nutrient management plan.

The eligibility for storage facilities will be based on the least cost system that can 1) meet the requirements of the nutrient management plan and 2) allow the watershed to meet its goals of overall reduction of nutrients reaching the lake from winterspread manure. Cost share funding of manure storage through the federal Environmental Quality Incentive Program (EQIP) may be an option that should be investigated to enhance incentives for installation of storage facilities. More detailed discussion of the EQIP program can be found in the Integrated Resources Management Chapter.

The impact of winterspreading of manure are substantial for Squaw and Baldwin Pine Lakes, and will be discussed in more detail in the Squaw Lake rural nonpoint source discussion.

Shoreline Erosion

Shoreline erosion on Bass Lake is a major source of sediments and nutrients. Extremely high water levels have contributed to this problem. A shoreline erosion inventory was done during the summer of 1996. The inventory showed 242 tons of sediment from shoreline erosion. Of the 37 contributing sites, five sites lost more than 10 tons annually to the lake.

Critical area sites for shoreline erosion are those with severe erosion, defined as having greater than 10 tons/year eroding or a lateral recession rate of 1 foot per year or more. Sites are not considered critical if there is no human use impact causing the erosion, and/or there is no cost effective means of correcting the problem. Eligible sites are those with mild and moderate erosion. *Eligible sites are defined as having 1 to 10 tons/year eroding.* Currently 13 sites are identified as critical. Fluctuating water levels may change the status of these and other sites. Exceedingly high water levels in the last several years have aggravated shoreline erosion, and to some extent, when water levels recede, eroding sites may correct themselves. Therefore, the emphasis will be on lower cost practices such as bioengineering and establishment of vegetation to establish shorelines resilient to fluctuating water levels.

Gully Erosion

Gully erosion has been determined to not be a significant problem throughout this watershed, therefore, a complete field inventory of gully erosion has not been done. One severely eroding gully was identified during inventory. Gullies identified during implementation will be evaluated to determine if they are significant sediment sources and eligible for cost sharing. *Actively eroding gullies eroding 1 ton or more per year are eligible. A gully that delivers 10 ton or more of sediment directly to surface water may be designated as critical.* Gullies are not considered critical if there is no human use impact causing the erosion, and/or there is no cost effective means of correcting the problem.

Rural Residential Nonpoint Sources
Bass Lake currently has approximately 370 acres of low to medium density residential development on land that drains directly or indirectly via swales or ditches to the lake. Inventory and modeling using the Source Loading and Management Model (SLAMM) estimated a loading rate of 0.4 lbs/acre/year. Residential development is estimated to contribute 149 lbs of phosphorus to the lake annually.

The Bass Lake watershed, like much of western St. Croix County, is experiencing rapid rural residential growth. The West Central Wisconsin Regional Planning Commission population projections show an anticipated 18 to 20% per decade growth rate over the next two decades.

There are an estimated additional 250 acres of land that could be converted to residential development in areas that drain directly or indirectly via swales to the lake. The potential future phosphorus load to the lake from all residential development if these lands are developed is 250 lbs, or a 68 % increase over the existing residential load of 149 lbs. With low cost best management practices applied to existing, and potential new development, the total phosphorus load from maximum residential development could be kept at about 125 lbs.

Practices to accomplish this include diversion of clean runoff from rooftops and other hard surfaces to grass swales and other infiltration areas, low herbicide and low phosphorus fertilizer yard care practices, and other low cost yard care practices. Most of this will be accomplished by information and education efforts. Other low cost efforts such as down spout extenders and landscaping for infiltration may be cost sharable as residential retrofits, or structural urban BMPs, to solve runoff problems from existing development. *Eligibility will be determined on an individual basis by project staff.*
For riparian property owners, Shoreline Habitat Restoration for Developed Areas will be available as an interim BMP. *Landowners with existing shoreline vegetation that can be improved to provide better habitat diversity will be eligible, as described in the guidelines for this BMP (see Appendix B).*