APPENDIX A

Establishment of Amery Lakes Protection and Rehabilitation District

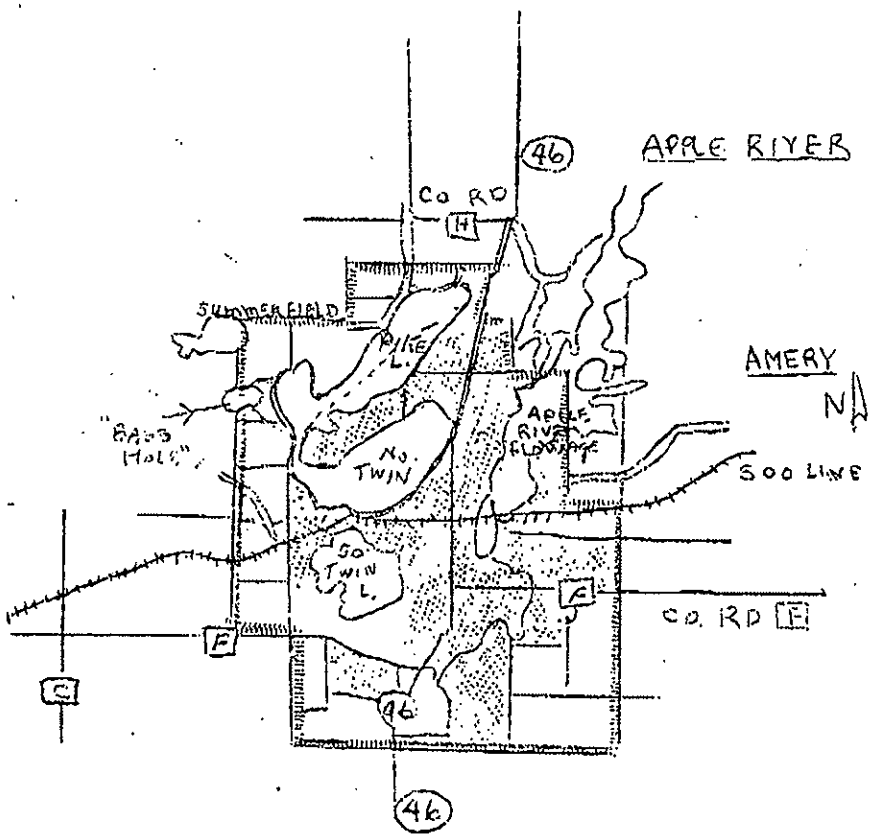
NOTICE OF HEARING ON THE PROPOSED ESTABLISHMENT OF A PUBLIC INLAND LAKE PROTECTION AND REHABILITATION DISTRICT FOR PIKE LAKE, NORTH TWIN LAKE AND SOUTH TWIN LAKE

The Soil & Water Conservation District of the Polk County Board of Supervisors will hold a hearing on Friday, January 27, 1978 at 1:30 P.M. in the auditorium of the Polk County Agriculture Center Building, Balsam Lake, Wisconsin to consider objections, criticisms and suggestions as to the necessity of establishment of a public inland lake protection and rehabilitation district having boundaries as follows:

City of Amery - All property within the city of Amery except the property included in the Apple River Inland Lake Protection and Rehabilitation District.

Town of Lincoln

Gov. Lots 1, 2, 3, 4, 5 - Section 29, T33N, R16W
Gov. Lot 4 - Section 20, T33N, R16W
Part of Gov. Lot 2, Section 21, that is west of 46
SE¼NW¼ of Section 29, T33N, R16W
Gov. Lot 1, Section 21, T33N, R16W
Gov. Lot 2, Section 32, T33N, R16W
SE¼ NW¼ Section 32, T33N, R16W



Respectfully,

E Elroy A. Spangenberg

Elroy Spangenberg
Polk County Clerk

RESOLUTION AND ORDER NO. 18

RESOLUTION AND ORDER ESTABLISHING PUBLIC INLAND LAKE PROTECTION AND REHABILITATION DISTRICT FOR PIKE, NORTH TWIN, AND SOUTH TWIN LAKES

On or about January 6, 1978, a verified petition was filed with the Polk County Clerk requesting establishment of a Public Inland Lake Protection and Rehabilitation District pursuant to Chapter 33 of the Wisconsin Statutes, to be known as the Pike, North Twin, and South Twin Lakes Protection and Rehabilitation District.

A hearing was held on January 27, 1978, pursuant to Section 33.26 of the Wisconsin Statutes, with the following Committee presiding: Mr. Earl Paulson, Chairman, George Vollert and Roland Marschall.

FINDINGS OF FACT

Based on the report of the Committee holding the hearing in the matter, this Board finds:

1. That the Petition filed on or about January 6, 1978, was signed by at least 51% of the landowners in the proposed district.
2. That the Public Inland Lake Protection and Rehabilitation District is necessary and will promote the public health, comfort, convenience, necessity or public welfare.
3. That the property included in the district will be benefited by the establishment thereof.
4. That formation of a district will not cause or contribute to long range environmental pollution as defined by Wisconsin Statute Section 144.30(9).

ORDER

IT IS, THEREFORE, ORDERED THAT:

1. Pursuant to Wisconsin Statutes Section 33.24 and 33.26, the Polk County Board of Supervisors does hereby establish a Public Inland Lake Protection Rehabilitation District to include the area within the following boundaries:

   All property within the City of Amery except the property included in the Apple River Inland Lake Protection and Rehabilitation District; and the following property in the Town of Lincoln:
   Gov. Lots 1, 2, 3, 4, 5 - Section 29, T33N, R16W
   Gov. Lot 4 - Section 20, T33N, R16W
   Part of Gov. Lot 2, Section 21, that is west of 46
   SE1/4NW1/4 of Section 29, T33N, R16W
   Gov. Lot 1, Section 21, T33N, R16W
   Gov. Lot 2, Section 32, T33N, R16W

2. The District shall be a body corporate to the extent provided by Chapter 33 of the Wisconsin Statutes, and shall be known as the Pike, North Twin, and South Twin Lakes Protection and Rehabilitation District.

DATED this 27th day of January, 1978.

Submitted at the request of the Zoning Committee

R.H. Rasmussen

Approved as to form by Robert H. Rasmussen
Polk County District Attorney

CITY COUNCIL RESOLUTION PETITIONING COUNTY BOARD
TO CREATE A LAKE DISTRICT PARTIALLY WITHIN THE CITY LIMITS

CITY OF AMERY COUNCIL

RESOLUTION TO PETITION COUNTY BOARD TO ESTABLISH A PUBLIC INLAND LAKE PROTECTION AND REHABILITATION DISTRICT	))))	Resolution No. _____

FINDINGS AND CONCLUSIONS

The City Council makes the following findings:

1. That the establishment of a public inland lake protection and rehabilitation district is necessary to define the present and anticipated problems of Pike Lake, North Twin Lake and South Twin Lake and to identify their causes and to implement various remedial measures to deal with the problems and to undertake activities such as protection of the fishery, maintenance of appropriate lake levels, control of aquatic weeds and reduction of sedimentation.
2. Thatn establishment of the district will promote the public health, comfort, convenience, necessity or public welfare.
3. That the lands proposed for inclusion within the district will be benefited.
4. That the number of landowners whose names appear on the assessment roll prepared for purposes of real property taxation within that portion of the city included in the proposed district is 738.

RESOLUTION

IT IS, THEREFORE, RESOLVED THAT:

Pursuant to Section 33.25, Wisconsin Statutes, the city council hereby petitions the Polk County Board of Supervisors to establish a public inland lake protection and rehabilitation district, and directs the mayor to sign an appropriate petition for all 738 property owners within the following boundaries.

Gov. Lots 1, 2, 3, 4, 5 - Sec. 29, T33N, R16W
Gov. Lot 4 - Section 20, T33N, R16W
Part of Gov. Lot 2 - Section 21, that is West of 46
SE¼, NW¼ of Section 29, T33N, R17
Gov. Lot 2 - Sec. 32, T33N, R16W
Lot 1 - Sec. 21, T33N, R16W
And all property within the city of Amery limits except the property included in the Apple River Inland Lake Protection & Rehabilitation District.

Dated this 31st day of January, 1978.

By: City of Amery Council, Amery, Wisconsin

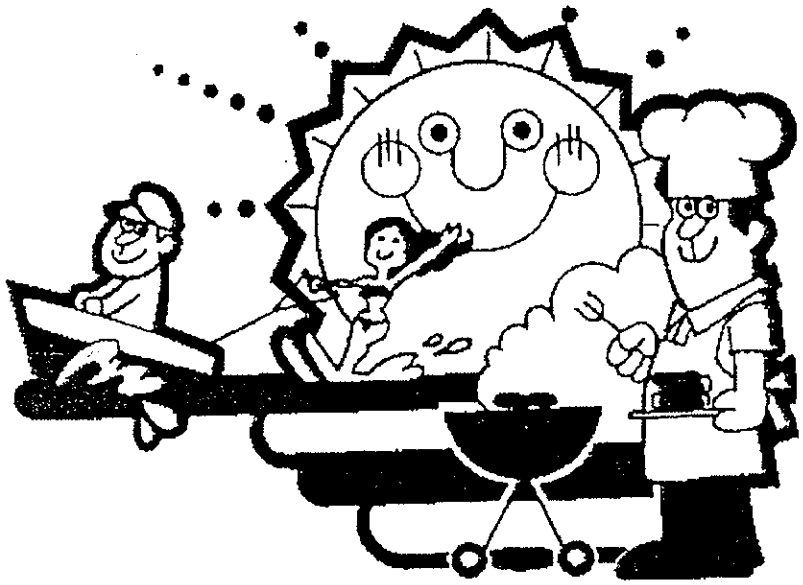
City of Amery Ralph Muckelson City Adm

APPENDIX B

Amery Lakes District – Lake Management Feasibility Study

AMERY LAKES DISTRICT

1991 - 1992
LAKES MANAGEMENT STUDY



PREPARED BY

AMERY LAKES DISTRICT

INTRODUCTION

In 1991 the Amery Lakes District in cooperation with the City of Amery applied for grant money to undertake a lakes study of the three lakes lying within the Amery Lakes District. The grant was approved and we received a grant totaling $18,938.52 which is a 75% share of the estimated cost of the project.

The study included topographical mapping of the Amery Lakes watershed which will be used for present projects as well as for planning in future development in and around Amery. They will be extremely helpfull in spotting target areas where potential runoff in developing areas could be a problem for the Amery lakes.

We will also be taking water samples in the lakes to compare to the samples taken in 1980 and to help us in understanding and spotting problem areas to the lakes. Our sampling was testing for Nitrogens and Phosphorus and an explanation of those readings is contained later in this booklet.

Aerial photographs were taken of the Amery area and the topographical maps have been made. Copies of the map are on display at Amery City Hall. They are continuing to upgrade the maps, and they should be a usefull tool for Amery for years to come.

We feel it is important to review the data collected in the 1980 study. For that reason the colored pages following this cover letter are reprints of the pages from the 1980 study. We have omitted the charts and graphs in an effort to keep costs of printing down.

Drainage Basin

The combined area draining to the Amery Lakes is 1,182 acres. Figure 1 represents the direct drainage boundary about each lake. Table 1 lists each lake and its physical characteristics.

TABLE 1. Physical Characteristics of the Amery Lakes.

Pike Lake (Figure 2)	
Watershed Area (A_d)	764 acres
Lake Area (A)	159 acres
Lake Volume (V)	2,140 acre-feet
Mean Depth (V/A)	13.5 feet
Maximum Depth	33 feet
Hydraulic Residence Time	3 years
North Twin Lake (Figure 3)	
Watershed Area (A_d)	1,061 acres
Lake Area (A)	135 acres
Lake Volume (V)	1,422 acre-feet
Mean Depth (V/A)	10.5 feet
Maximum Depth	27 feet
Hydraulic Residence Time	1 year
South Twin Lake (Figure 4)	
Watershed Area (A_d)	1,182 acres
Lake Area (A)	74 acres
Lake Volume (V)	360 acre-feet
Mean Depth (V/A)	4.9 feet
Maximum Depth	9 feet
Hydraulic Residence Time	0.25 years

The hydraulic residence times were estimated from a series of 8 instantaneous flow measurements made at the outlet of North Twin Lake and 12 instantaneous flow measurements made at the outlet of South Twin Lake. In addition to the instantaneous surface water flows, the groundwater contribution was estimated from a series of observation wells installed about each lake. The direction of groundwater flow is illustrated in Figure 5.

TABLE 2. Total Phosphorus Loading to the Amery Lakes.

LAKE/SOURCE	LBS/YR	KG/YR	PERCENT
PIKE LAKE			
Urban	39	(17.6)	13
Woodlands	15	(7.0)	5
Agricultural	64	(29.1)	22
Atmospheric to lake	45	(20.5)	15
Atmospheric to lake via wetlands	9	(3.9)	3
Septic systems about lake	21	(9.4)	7
Septic systems from trailer park	13	(6.0)	4
Groundwater	88	(40)	30
TOTAL	294	(133.5)	99
NORTH TWIN LAKE			
Urban	395	(179.4)	73
Woodlands	2	(0.9)	--
Atmospheric to lake	38	(17.4)	7
Atmospheric to lake via wetlands	5	(2.4)	1
Pike Lake	65	(29.5)	12
Apple River	5	(2.4)	1
Groundwater	31	(14.0)	6
TOTAL	541	246	100

LAKE/SOURCE	LBS/YR	KG/YR	PERCENT
SOUTH TWIN LAKE			
Urban	65	(29.6)	35
Woodland	3	(1.4)	2
Atmospheric to lake	21	(9.5)	11
Atmospheric to lake via wetlands	1	(0.6)	--
North Twin Lake	77	(35)	41
Septic systems	8	(3.7)	4
Groundwater	12	(5.3)	6
TOTAL	187	85.1	99

Water quality

The total phosphorus loadings to each lake from the watershed and their respective water quality characteristics will be considered individually.

1. Pike Lake

Agriculture is the most significant land use in the Pike Lake watershed, contributing 20% of the annual phosphorus budget. However, much of the agricultural runoff is from the east side of Highway 47 and the impact to the lake is lessened considerably owing to the existence of wetlands. In general, the phosphorus loading to Pike Lake appears to be reasonable and suggests that the water quality of the lake should be acceptable to the lake users. The trophic position for Pike Lake is illustrated in Figure 8. The model used in this illustration does not, however, account for rooted aquatic plants and is limited to relationships between the free floating microscopic plants (algae), water transparency, and nutrient concentrations within the open water area of the lake. The rooted aquatic plants cover approximately 100 acres of the 159 acre lake and interfere somewhat with recreational usage. A lake map showing the location of the major plant species is presented in Figure 9. During the summer, the plants are growing to a maximum depth of approximately 20 feet. A species list is presented in Table 3.

These plants also contribute phosphorus loading to the lake through an internal recycling process. A certain amount of phosphorus taken from the lake sediments by the rooted aquatic plants during their seasonal growth can be recycled back into the lake upon death of the plants. Figure 10 illustrates the seasonal patterns of whole lake weighted average total phosphorus for Pike Lake and also the weighted average for just the surface to 7.5 foot depth. The increases in the phosphorus concentration in the lake during May, June and July are a result of a combination of events: (1) The lake thermally stratified beginning in May and the bottom waters became anoxic, without oxygen, (Figure 11). As a result of anoxic conditions in the bottom waters, phosphorus was released from the sediments and this resulted in an increase in the total amount of phosphorus in the lake; (2) There were several major rain events during the month of June that may have resulted in phosphorus influx from the watershed via surface runoff (Figure 10), and (3) Between the two dates of the macrophyte surveys, June 30 and August 14, there was a decrease in certain plant species, e.g. Potamogeton pectinatus, and elimination of others, e.g. Potamogeton richardsonii. A portion of the phosphorus within the dead plant tissue was probably recycled to the lake.

The algal growth patterns in Pike Lake for the summer of 1980 are illustrated in Figure 12. The dominant algae during the months of July, August, September and October were in the blue-green classification. In general, the blue-green algae create more of a nuisance problem because they have gas vacuoles that allow the algal cells to be positioned anywhere in the water column. During periods of low water transparency, these algae can physiologically adjust their gas vacuoles to float near the surface, thereby creating a scum-like appearance.

During the summer months when blue-green algae were dominant, their total biomass (weight) in the lake was not overly large. Algae biomass is measured by determining the amount of plant pigment chlorophyll. If the amount of chlorophyll present is 10-20 milligrams per cubic meter of water (mg/m^3) or greater, a green color is usually evident. The only time that the algal biomass became a concern was during the months of late September and October when the genus Oscillatoria became dominant. The physiological requirements of Oscillatoria are generally associated with cooler water temperatures and its dominance in the surface water during the fall months is common.

2. North Twin Lake

The largest single external source of phosphorus loading to North Twin Lake is urban runoff, contributing 73% of the annual phosphorus budget (Table 2). This assumes that the Apple River is not allowed to be diverted into North Twin Lake except for short periods. The percent contribution from the river would be increased if the diversion were to be of any duration. For example, if the diversion were allowed to proceed at a modest flow of 2 cubic feet per second (cfs) for 3 months during the summer, its percent contribution would change from 1% to 8%. If the diversion would be at 2 cfs for 8 months, the contribution would change to 20% of the total budget.

The trophic position for North Twin Lake suggests that, relative to other lakes, the annual phosphorus loading rate should create some problems with

nuisance algae growth (Figure 13). This was confirmed by the algae and chlorophyll data from the feasibility study (Figure 14). During late July through September there was an abundance of blue-green algae. The amount of chlorophyll present in the lake during that time period ranged from 19 mg/m^3 in July to a high of 45 mg/m^3 in late August. The two dominant blue-green algae were Anabaena and Lyngbya, and both can create nuisance conditions. The type of algae (blue-green) and the chlorophyll concentrations of greater than 10-20 mg/m^3 confirm that North Twin Lake is experiencing signs of excess fertility.

The attached aquatic plants were growing to a depth of 20 feet in North Twin Lake and the plants were growing over 125 of the 135 surface acres. A map showing the location of the major plant species is presented in Figure 15 and a species list is given in Table 4. There has been some aquatic weed control using chemicals, e.g. endothal; however, the area treated has always been less than one (1) acre since 1976.
The aquatic plants were surveyed on two occasions during the feasibility study, June 26 and August 11, 1980. Between the two sampling periods, there was a considerable die-off of one particular species, Potamogeton richardsonii. The resultant recycling of nutrients from the dead plant tissue may have been utilized by the algae and other aquatic plants. The seasonal pattern of whole lake weighted average concentration of total phosphorus for North Twin Lake is presented in Figure 16. There was a 33-pound increase of total phosphorus in the lake between June 23 and late July 28, 1980. Some of the total phosphorus increase may have been as a result of plant decay, while urban runoff during several storm events would also have been a contributor. In addition, sediment phosphorus would be released under the anoxic conditions present near the lake bottom (Figure 11).

3. South Twin Lake

South Twin Lake is much shallower than Pike and North Twin lakes, with a maximum depth of 9 feet. As a result of being shallow, the lake will only occasionally thermally stratify (Figure 11). When the lake stratifies, the dissolved oxygen in the bottom waters is rapidly depleted until the lake mixes again as a result of a strong wind and/or cooler weather fronts that move through the area.

The largest sources of phosphorus to South Twin Lake are urban runoff and the influx from North Twin Lake (Table 2, p.7). The total phosphorus loading rate suggests an acceptable water quality (Figure 17). A plot of the total phosphorus weighted average concentrations illustrates that levels are generally satisfactory (e.g. 10-30 mg/m^3), although exceptionally high values were present on occasion (e.g. 71 mg/m^3; see Figure 18). The model used in this illustration does not, however, account for rooted aquatic plants and is limited to relationships between the free floating microscopic plants (algae), water transparency and nutrients.

A graphical presentation of the algal biomass (chlorophyll) and seasonal succession of the various algal genera is presented in Figure 19. The chlorophyll concentrations were above 20 mg/m^3 on 5 occasions, June, August (2), and September (2). These chlorophyll levels are indicative of waters in the eutrophic category (nutrient rich) and show that the actual water quality is not as satisfactory to the lake users as suggested in Figure 18.

MANAGEMENT ALTERNATIVES

The three lakes -- Pike, North Twin and South Twin -- are partially within the urban setting of Amery. There are several environmental factors that differentiate these lakes, such as mean depth, thermal stratification, nutrient loading. Each lake was reviewed separately and the following management alternatives are suggested for Lake District consideration.

Pike Lake

Urban development has encroached upon the south shore of Pike Lake. During the present study, however, the urban contribution to the phosphorus loading was estimated at only 13 percent of the total annual loading to the lake. Because of the potential increase in phosphorus and sediment contributions that could occur from future urban development about the lake, the lake district should the practices in appendix A.

In most cases, a combination of limited grading, limited time of exposure and a judicious selection of erosion control practices and sediment trapping facilities will prove to be the most practical method of controlling erosion and the associated production and transport of sediment.

B. Divert new urban drainage towards existing wetlands within the watershed. Wetlands can play an important role in ameliorating stormwater runoff from a variety of developments and drainage areas. There are four apparent mechanisms at work in a wetland. These are: (1) physical entrapment, (2) microbial utilization, (3) plant uptake, and (4) adsorption. Physical

entrapment is a reality; 94 percent of the total suspended solids discharged to the wetlands were retained during a detailed study of wetlands in Wayzata, Minnesota. Each of the other 3 mechanisms have also been shown to be important by research activities elsewhere.

C. Require of any new development either connection to city sewers or properly installed private waste disposal systems that have a minimum drainage field setback from the lake of 100 feet. Soils can sorb phosphates readily. However, the proper drainage and distance from the lake is important. Figure 21 was determined from a series of studies about septic system drain fields in Wisconsin and illustrates how the soils sorb phosphates. The farther from the source, the less phosphate was in the groundwater. Groundwater concentrations of phosphorus are already relatively elevated about Pike Lake and any further impacts upon the nutrient concentrations should be avoided.

At the present, Pike Lake does not appear to be plagued with algal problems, fish winterkills, or a poor fishery. The only apparent problem is an overabundance of attached aquatic vegetation in the western part of the lake. Much of the western basin is completely dominated by attached plants and during the summer months, very little open water is present.
However, the western basin offers a very diverse habitat for wildlife, fishery and aesthetics, and although some restriction of movement within the area is evident, the lack of any urban development about the basin precludes immediate pressures for creation of more open water. In addition, channels now exist between Pike and North Twin lakes and from the eastern to the western basins of Pike Lake.

The present condition of Pike Lake suggests that lake management efforts should be directed towards protecting the existing resource. Local units of government are a mechanism available to establish and enforce zoning requirements that will protect the water quality of Pike Lake into the future. Construction ordinances, waste disposal requirements, and diversion of any potential sources of sediment and nutrients away from the lake or through a biofiltration system (wetland) should be the primary concern of the lake district.

North Twin Lake - Watershed

The source of existing and potential water quality problems for North Twin Lake can be summed up in two words, "urban runoff." The lake is surrounded on 3 sides by residential and some light commercial development. The western end is generally undeveloped and is in communication with a substantial wetland area. Approximately 75 percent of the total phosphorus budget to the lake is from the urban setting. Any attempt to improve the water quality involves the treatment of the urban runoff.

There are several practices available for treating the urban runoff to North Twin Lake.

1. Use of wetlands as sediment traps and filters. The existing channel between the Apple River and North Twin Lake could be developed into a wetland and sedimentation basin. A semi-wetland already exists along the present channel. A sediment basin would have to be constructed and the channel enlarged to accommodate urban stormwater from the northeast

portion of the watershed (see Figure 22). A diversion ditch under Highway 47 would be sized to handle the increased flow to the lake through the existing wetland on the northeast corner of North Twin, or the stormwater could preferably be pumped to the Apple River Flowage. The small existing wetland should be modified to spread the incoming water over the soils rather than following the present channel.

Advantages - Urban runoff has the highest yield of nutrients and sediments of the various land-use categories. The use of wetlands and sedimentation traps can be beneficial in reducing the nutrient/sediment loading to North Twin Lake. Similar practices elsewhere, using wetlands to control urban runoff, reduced phosphorus by 70-80 percent and suspended solids by 90 percent. The decreased phosphorus input into North Twin Lake, as a result of wetland utilization, would have a beneficial effect upon the nutrient status of the lake. The possible reduction in phosphorus loading is presented in Figure 23.

Disadvantages - The development of a wetland and sedimentation pond in the city park would decrease the usable area for public enjoyment. There is a possibility of stagnant water remaining in the wetlands and pond for extended periods of time. Trash collection would be necessary periodically to clean debris from the outlet structure. The potential for greater mosquito production will exist, although stagnant water is already present in the channel.

2. Diversion of remaining urban runoff to the outlet channel from South Twin Lake. It may be possible to divert a portion of the remaining urban runoff to the outlet of South Twin Lake. A possible diversion could encompass the area shown in Figure 22. The direct effect of this practice on the phosphorus loading to North Twin Lake is illustrated in Figure 26.

3. Combination of (1) and (2). This would offer the most complete management program for North Twin Lake. The combined effect on the phosphorus loading rate to North Twin is presented in Figure 23.

Other lake districts have diverted urban stormwater runoff away from their lakes. For example, the Waupaca Inland Lake Rehabilitation District (City of Waupaca) diverted storm drainage away from two lakes, Mirror and Shadow lakes. The watershed area involved was 94 acres and the cost of the diversion project was approximately $400,000.

Also, the Eau Claire Inland Lake Rehabilitation District diverted the major storm sewer draining to Half Moon Lake. The watershed area diverted was 1,200 acres and the cost of the diversion was approximately $230,000.

A project using wetland treatment of urban runoff in Waseca, Minnesota, has improved the water quality of Clear Lake considerably. The majority of urban storm drainage from the City of Waseca has been diverted to a 50-acre wetland for "treatment" before being pumped to Clear Lake. The total cost of the project was approximately $700,000.

Another area of local concern has been the high water level of North Twin Lake. There have been periodic problems associated with debris that accumulates at the outlet channel and causes some damming effect. The culvert between North Twin and South Twin lakes appears to have shifted through the years and the lower edge of the culvert on the North Twin Lake side may now be higher than previously, thereby causing some increase in water level elevation for North Twin Lake. This problem is not one that directly affects water quality and therefore is not eligible for state cost-sharing, however, the problem does affect local riparians and should be resolved within the district.

South Twin Lake

The basic problems associated with South Twin Lake are shallowness (maximum depth of 9 ft) and extensive growth of attached aquatic plants. The largest singular source of phosphorus to South Twin Lake is the inflow from North Twin Lake. Improvement of water quality in North Twin Lake may reduce the loading to South Twin Lake; however, because of the morphological factors (shallowness) there would be little visible improvement from the present condition.

Direct approaches to alleviating the restrictions on recreational usage are, however, available. Weed harvesting and use of aquatic herbicides are the most practical options. Each method offers economical and logical relief to the problem of weed control in South Twin Lake. Weed harvesting would be the recommended technique because of nutrient and organic tissue removal benefits. State cost sharing may be available in the future.

Other techniques, such as water level drawdown, may not be practical. Drawdown would dewater the associated wetlands and may cause slumping of organic material towards the lake basin. Dredging could be used to deepen the lake basin, thereby changing the basin morphometry and possibly reducing weed growth. However, because of the close proximity of two relatively deep lakes (Pike and North Twin), such a project would not be recommended by the Department.

South Twin Lake has experienced fish winterkills. The most recent documentation of winterkills were the winters of 1956, 1975 and 1979. The most practical solution to this problem would involve the installation of an aeration system to protect the fishery resource. An aeration system would involve a blower unit, plastic tubing and weights and a building to house the blower. More detailed plans can be prepared if the lake district wishes to proceed with this alternative. The approximate installation cost would be $12,000 and the system is cost-sharable with state funds. The operational cost should be approximately $100/month.

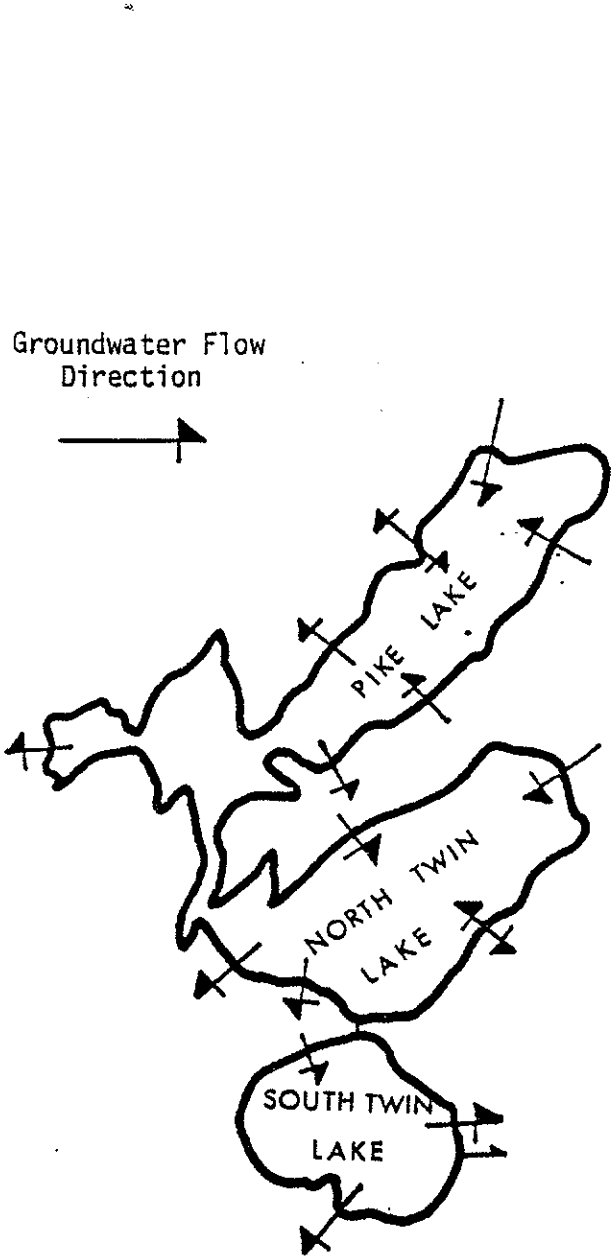


FIGURE 5

GROUNDWATER FLOW DIRECTION FOR THE AMERY LAKES

The following charts are a summary of the lake study done in 1980 as a beginning project of the Amery Lakes District. We do not have Nitrogen values for that study.

Pike Lake 1980 Study - Phosphorus

June 55 ug/L
July 45 ug/L
Sept. 43 ug/L

North Twin 1980 Study- Phosphorus

June 15 ug/L
July 25 ug/L
Sept. 27 ug/L

South Twin 1980 Study- Phosphorus

35 ug/L
70 ug/L
20 ug/L

GRANT WATER ANALYSIS SUMMER 1991-92

Sample Taken 8/29/91

North Twin:

Total Nitrogen	1.0 mg/l to 1.4 mg/l
Total Phosphorus	Maximum of 96 ug/l
Tot Nit to Phos	14:1 to 20:1

South Twin:

Total Nitrogen	1.0 mg/l to 1.75 mg/l
Total Phosphorus	Maximum of 181 ug/l
Tot Nit to Phos	25:1 to 70:1

Pike Lake:

Total Nitrogen	.506 mg/l to 1.45 mg/l
Total Phosphorus	Maximum of 48 ug/l
Tot Nit to Phos	17:1 to 30:1

Sample Taken 6/22/92

North Twin:

Total Nitrogen	.4 mg/l to .9 mg/l *
Total Phosphorus	Maximum of 40 ug/l
Tot Nit to Phos	10:1 to 30:1

South Twin:

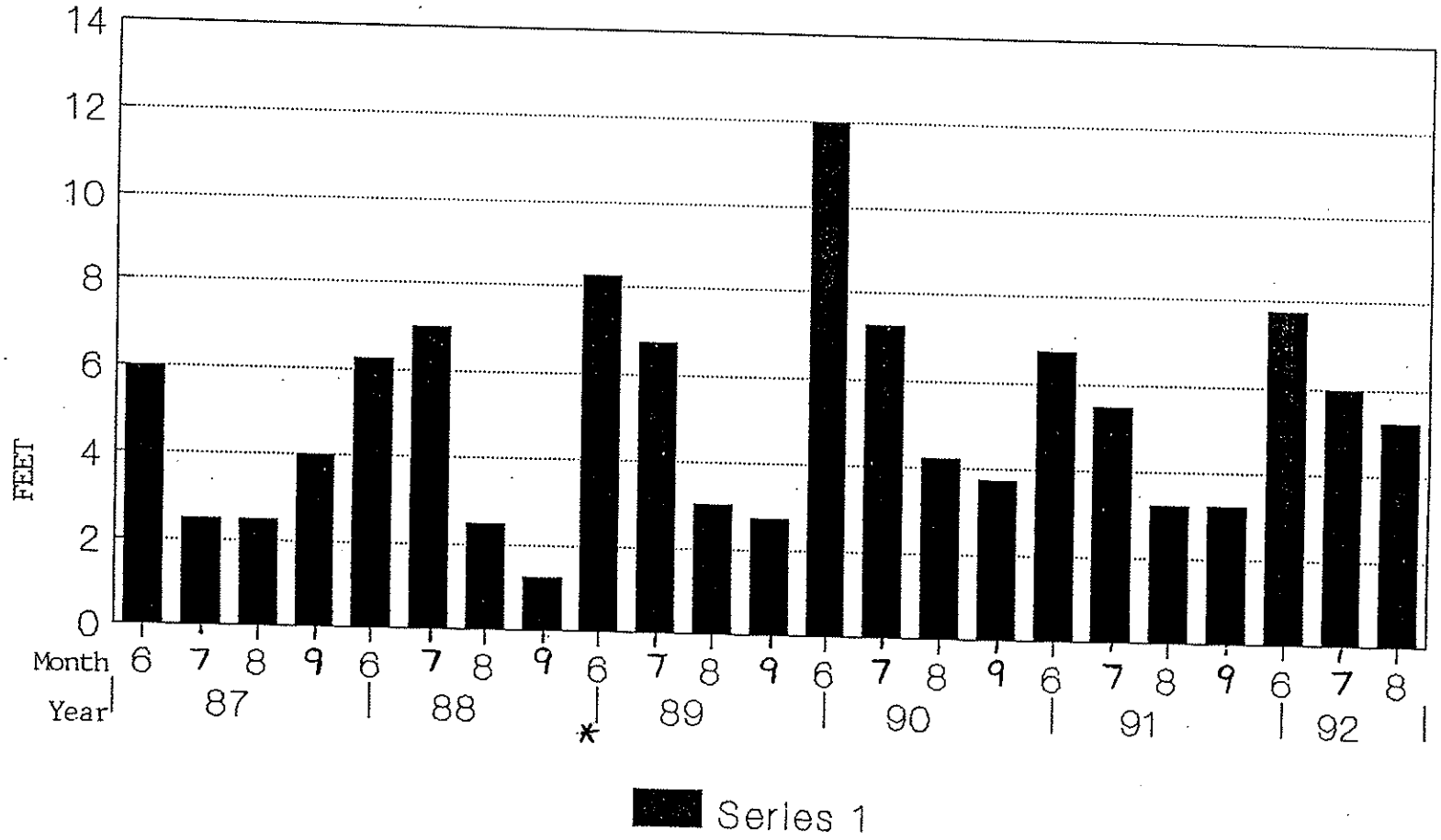
Total Nitrogen	.5 mg/l to .71 mg/l
Total Phosphorus	Maximum of 52 ug/l
Tot Nit to Phos	12:1 to 27:1

Pike Lake:

Total Nitrogen	.4 mg/l to .52 mg/l
Total Phosphorus	Maximum of 20 ug/l
Tot Nit to Phos	18:1 to 25:1

* A sample taken on the West end near the houses on Baker Terrace had a total Nitrogen of 1.422 mg/l, Phos of 130 ug/l and a ratio of Nit to Phos of 11:1. This one reading for an unknown reason was much higher than all the others taken with this sampling.

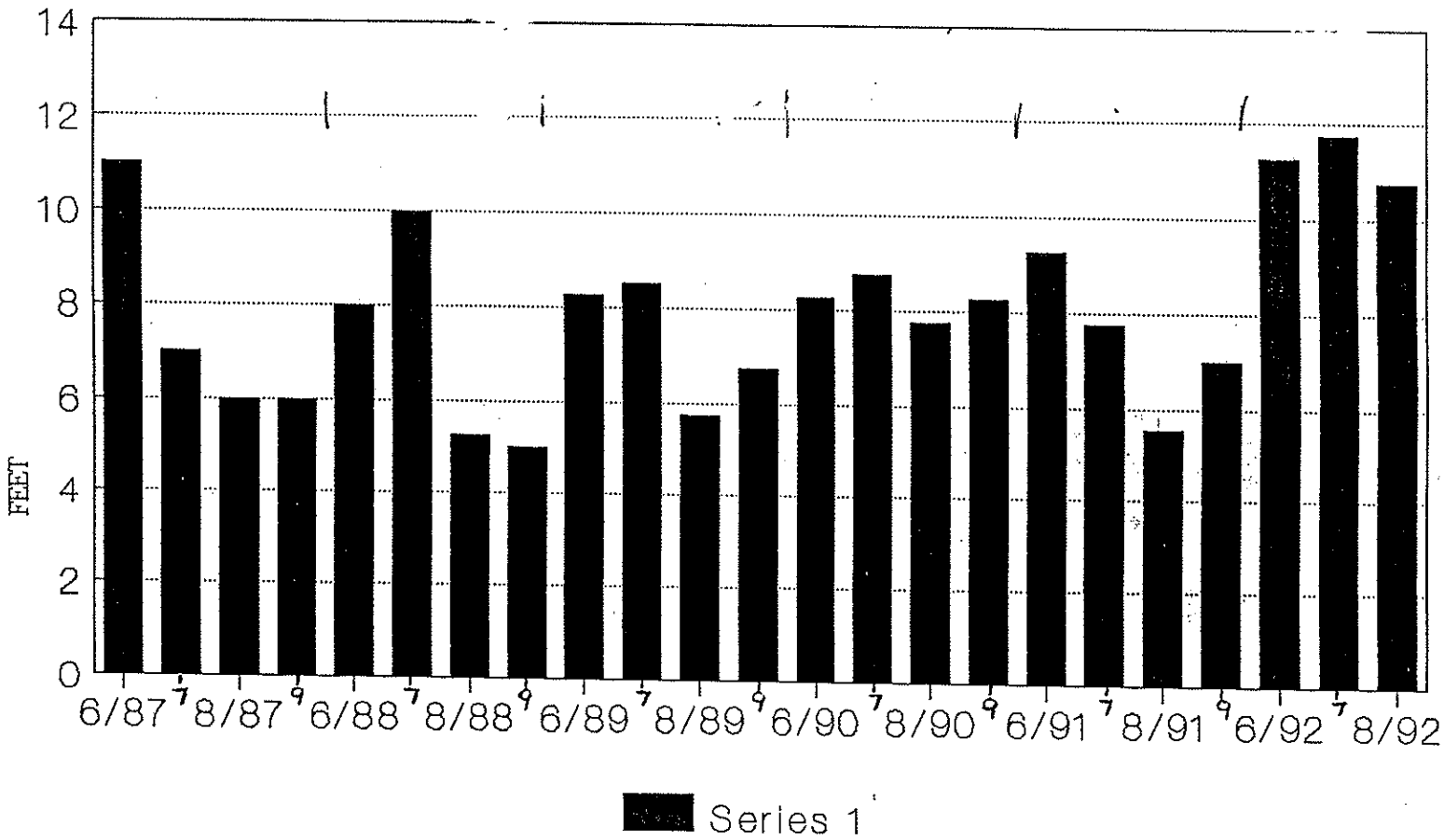
SECCHI DISK READINGS
NORTH TWIN LAKE



AMERY LAKES DISTRICT

These are the tests taken the closest to the end of each month.
Other samples are taken during the course of each month and registered with the DNR Self Help Lake Monitoring Program.
The creek flowing water from the Apple River to North Twin was closed on May 5, 1989.

SECCHI DISK READINGS
PIKE LAKE

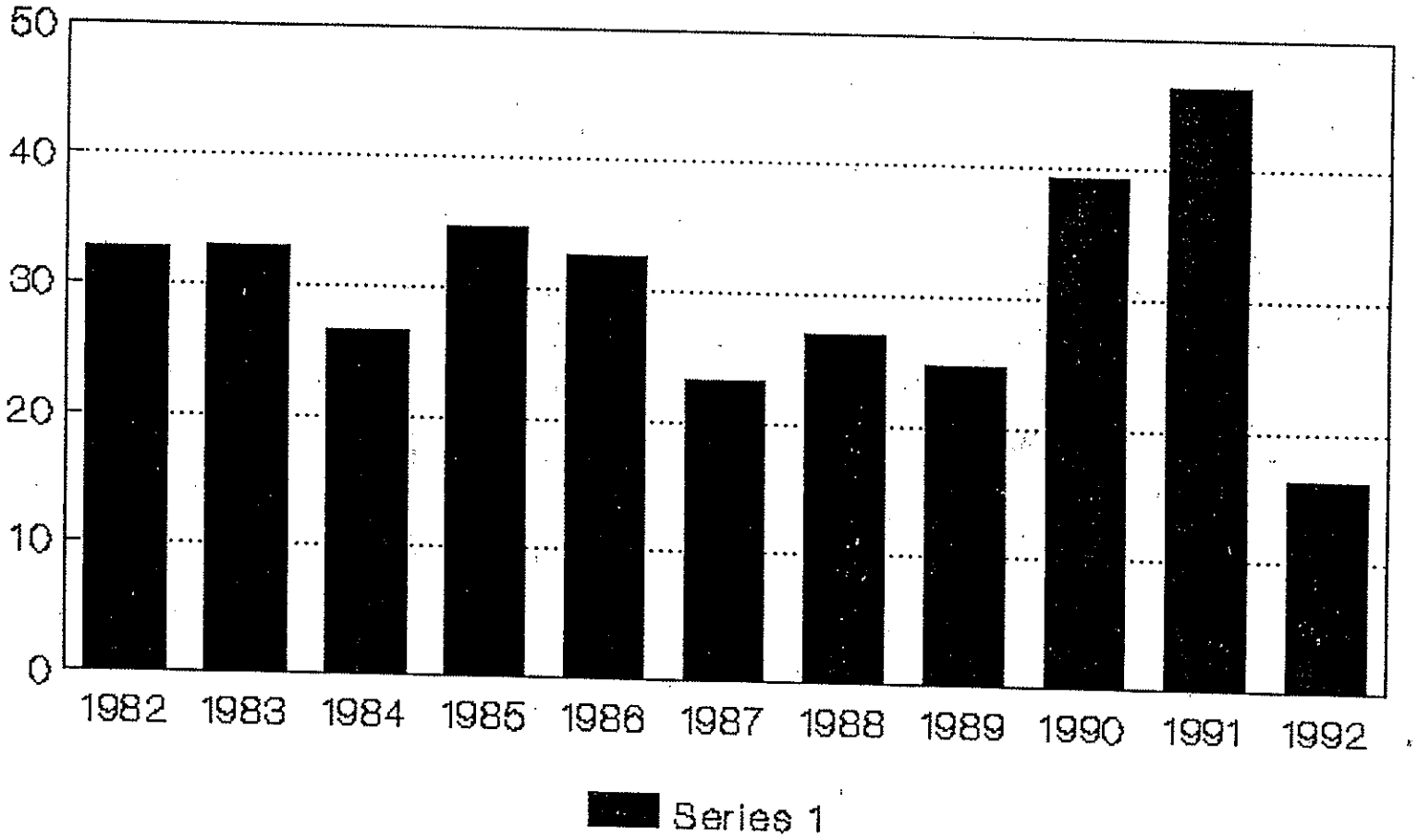


AMERY LAKES DISTRICT

These are the tests taken the closest to the end of each month. Other samples are taken during the course of each month and registered with the DNR Self Help Lake Monitoring Program.

YEARLY RAINFALL IN AMERY

INCHES OF ANNUAL RAIN



AMERY WEATHER STATION

10 Year Average: 32.01 inches

1992 reading through 8-18-92

On May 1, 1991 the Amery Lakes Board addressed the Amery City Council with the following issues:

1) On May 5, 1989 the drainage basin (Creek) in North Park was closed for a two year study period. It was noted at that time that during the years 1987-88 the creek in North Park was running Apple River water to North Twin Lake with the gate all the way open. Drought conditions of 1988 caused lower water level everywhere and the South Creek leaving South Twin Lake dried up at times. We agreed that during times of drought the south creek may not have much water flow, but improving the lakes was our goal and the 1980 study said closing the North Park Creek would help improve the water quality in North Twin and South Twin Lakes.

It appears that the lake clarity is improving slightly, and the south creek has continued to flow without the north creek flowing Apple River water. It is our recommendation to the council that the North Park creek be permanently closed and no longer divert Apple River water to North Twin Lake. This study period has shown that the underground water flow will maintain the lakes just like the 1980 study showed.

2) In an effort to help eliminate some of the urban runoff problems we would like to see the city make an effort to divert storm sewers away from the lakes instead of co them. Urban runoff is the major problem facing our lakes. It is much easier and less expensive to keep them clean than to pollute them and then try to clean them up. Because of this we applied for a grant to do topographic mapping of the Amery area. (Note: In 1992 a major storm sewer project was done in North Amery which diverts the runoff to the Apple River below the Amery dam instead of to North Twin Lake.) We hope that further projects may do the same.

****

In this report we are including the secchi disc readings for North Twin and Pike Lakes, rainfall data for the past ten years, and chemical analysis summaries of this grants testing.

The water samples were taken by volunteers of the Amery Lakes District in several locations in each of the lakes. Both surface and bottom samples were taken as well as runoff areas to each of the lakes. The testing was done by the State Lab of Hygiene. The secchi disk readings are done by Tom Butcher, a member of the Lakes District and are registered with the DNR. The annual rainfall reports are from the Amery weather station.

GRANT WATER ANALYSIS SUMMER 1991-92

Sample Taken 6/27/91

North Twin:

Total Nitrogen	.4 mg/l to .6 mg/l
Total Phosphorus	Maximum of 20 ug/l
Tot Nit to Phos	20:1 to 30:1

South Twin:

Total Nitrogen	.5 mg/l to .78 mg/l
Total Phosphorus	Maximum of 30 ug/l
Tot Nit to Phos	25:1 to 30:1

Pike Lake:

Total Nitrogen	.2 mg/l to .81 mg/l
Total Phosphorus	Maximum of 20 ug/l
Tot Nit to Phos	20:1 to 40:1

Sample Taken 7/15/91

North Twin:

Total Nitrogen	.4 mg/l to .6 mg/l
Total Phosphorus	Maximum of 20 ug/l
Tot Nit to Phos	20:1 to 30:1

South Twin:

Total Nitrogen	.5 mg/l to .80 mg/l
Total Phosphorus	Maximum of 30 ug/l
Tot Nit to Phos	16:1 to 26:1

Pike Lake:

Total Nitrogen	.2 mg/l to .84 mg/l
Total Phosphorus	Maximum of 20 ug/l
Tot Nit to Phos	10:1 to 40:1

The following pages are excerpts from the booklet, Interpreting Lake Water Quality Data: A Citizens Guide, which is published by the College Of Natural resources at the University of Wisconsin- Stevens Point. It may be helpfull in understanding the data charts from our study.

Lake Water Levels

Fluctuations in lake levels occur naturally in response to precipitation which varies widely from season to season and year to year. While some lakes with stream inflows respond almost immediately to precipitation, other lakes (seepage lakes) do not reflect changes in precipitation until months later. As an example, heavy fall rains often result in gradually rising lake levels during the following winter as the rain enters the lake as groundwater.

Lake level fluctuations can have significant effects on lake water quality and usability. Low water levels may lead to stressful conditions for fish and an increase in the amount of nuisance aquatic plants. High water levels may result in increased nutrients from runoff and newly flooded lakeshore soils. Older septic systems installed near the lake may not function properly with high groundwater levels. Water level fluctuations can also result in shoreline erosion. Records of lake water elevations can, therefore, be very useful in understanding changes that may occur in lakes.

Water Clarity

Water clarity has two main components: true color (materials dissolved in the water) and turbidity (suspended materials such as algae and silt). The algae population is usually the largest and most variable component. Water clarity gives an indication of the overall water quality in a lake, especially the amount of algae present. Figure 3 shows the inverse relationship between *Secchi disc* depth (a measure of clarity) and *chlorophyll a* (a measure of algae) for different lake types. Secchi disc readings are taken using an 8 inch diameter weighted disc painted black and white. The disc is lowered over the downwind, shaded side of the boat until it just disappears from sight, then raised until it is just visible. The average of those two depths is recorded. These readings should be taken on calm, sunny days between 10 a.m. and 2 p.m.; as cloud cover, waves, and the angle of the sun can affect the Secchi disc reading.

Water Quality Index	Secchi Depth (ft)
Very poor	3
Poor	5
Fair	7
Good	10
Very good	20
Excellent	32

Figure 3. Water quality index based on Secchi disc depth.

Secchi disc values will vary throughout the summer months as algal populations increase and decrease. Measurement at several sites may be useful in some lakes, depending on how uniform the water quality is. Year to year changes result from weather and nutrient loading. Weekly or biweekly Secchi records (April-November) over a number of years provide an excellent and inexpensive way to document long-term changes in water quality.

The Wisconsin Department of Natural Resources has initiated a "Self-Help Monitoring Program" for lakes. Local volunteers take Secchi disc readings and the Department

provides computer data storage and annual reports. For further information, contact a district DNR office or write to DNR Lake Management Program, WRM/2, PO Box 7921, Madison WI 53707.

Color of lake water is related to the type and amount of dissolved organic chemicals. It is measured and reported as standard color units on filtered samples. Its main significance is aesthetics; it may also reduce light penetration which affects weed and algal growth. Many lakes have naturally occurring color compounds from decomposition of plant material in the watershed. Brown-colored water results from drainage of bogs into the lake. The color compounds are largely humic and tannic acids from plant decomposition. As algae decompose, they may also impart a greenish color to the water.

Color will affect the Secchi disc reading. Table 2 lists color values associated with varying degrees of water color.

Table 2. Water color. (Adapted from Lillie and Mason, 1983)

0-40 units	Low
40-100 units	Moderate
greater than 100 units	High

Turbidity is another measure of water clarity, but is due to particulate matter rather than dissolved organic compounds. It affects light penetration due to scattering of light and therefore also affects the depth at which plants can grow. It obviously also affects the aesthetic quality of water. High turbidities are often found in lakes receiving runoff from silt or clay soils. Values will vary widely due to seasonal runoff events. Turbidity is also caused by suspended plants and animals. Many small organisms will have a greater effect on turbidity than a few larger ones. The turbidity caused by algae is the most common cause for low Secchi disc readings.

Trophic State

Lakes can be divided into three categories based on trophic state: oligotrophic, mesotrophic, and eutrophic. These categories are a general indicator of nutrient levels and observed water clarity in a lake. *Oligotrophic* lakes are generally clear, cold, and free of weeds or large blooms of algae. Although beautiful to look at, they are low in nutrients and don't support large fish populations. However, they often have an efficient food chain with a very desirable fishery of large game fish. *Eutrophic* lakes are high in nutrients and therefore support a large *biomass*. They are likely to be either weedy or experience algae blooms, and sometimes both. They often support large fish populations, but are also susceptible to oxygen depletion. Small, shallow lakes are especially vulnerable to "winterkill" which can reduce the number and types of fish. Rough fish are often common in eutrophic lakes. *Mesotrophic* lakes are in an intermediate stage between oligotrophic and eutrophic. Their hypolimnions often are devoid of oxygen in late summer months, limiting cold water fish and resulting in phosphorus cycling from sediments.

A natural aging process occurs in all lakes, causing them to progress from oligotrophic to eutrophic over time, and to eventually fill in (Figure 4). However, people can greatly accelerate this process of *eutrophication* by allowing nutrients from agriculture, lawn fertilization, streets, septic systems, and urban storm drainage to enter lakes. In areas that are nutrient poor, the aging process may lead instead to dystrophic lakes, bog lakes that are highly colored, acid, and lower in productivity than eutrophic lakes.

Various methods have been used by researchers to calculate the trophic state of lakes. The three water quality characteristics often used to classify the trophic state are: total phosphorus concentration (an indicator of the nutrients available for algae growth); chlorophyll *a* concentration (a measure of the amount of algae present); and Secchi disc readings (an indicator of water clarity). The trophic states associated with these three

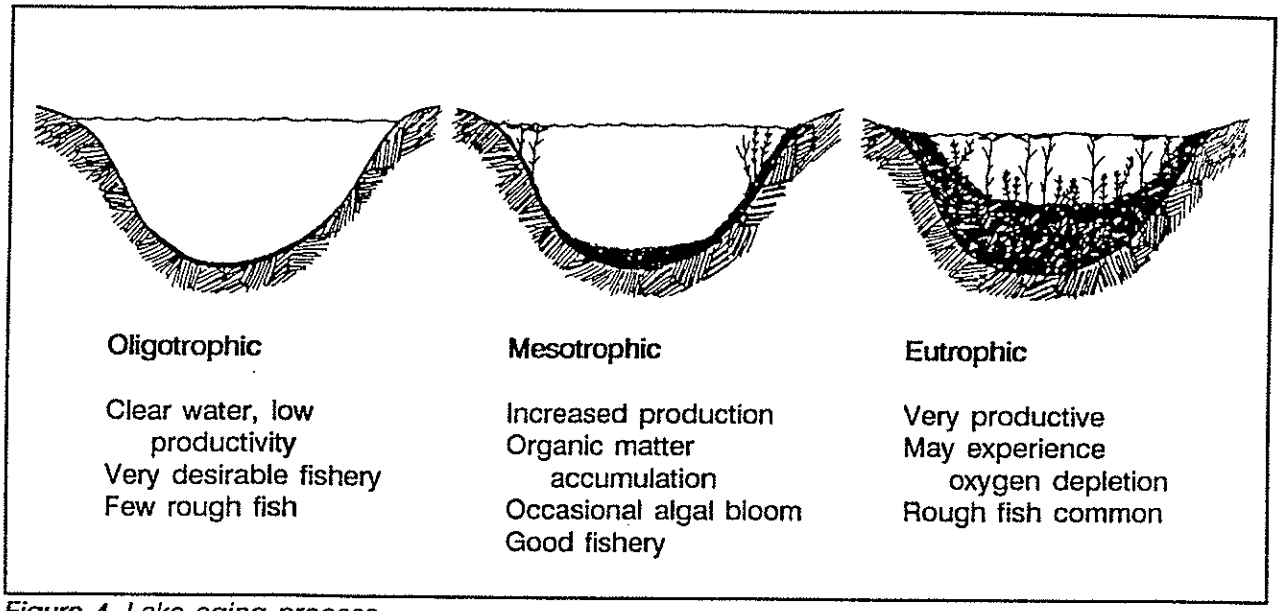


Figure 4. Lake aging process.

measures are shown in Table 3. Clearly, low levels of phosphorus are associated with low levels of algae (chlorophyll *a*), which are associated with high Secchi disc readings.

Natural lakes which do not stratify are subject to nutrient inputs from sediment during summer months. Impoundments differ from other lake types, as their summer weed and algae growth is often related to the quality of water flowing into the impoundment during summer months.

Table 3. Trophic classification of Wisconsin lakes based on chlorophyll *a*, water clarity measurements, and total phosphorus values. (Adapted from Lillie and Mason, 1983)

Trophic class	Total phosphorus ug/l	Chlorophyll a mg/l	Secchi Disc ft
Oligotrophic	30	2	12
	100	5	8
Mesotrophic	180	8	6
	270	10	6
Eutrophic	300	11	5
	500	15	4

NUTRIENTS AND CHEMICAL PROPERTIES

Phosphorus

Phosphorus reactions in lakes can be complex. Phosphorus is known to be the most important nutrient limiting the amount of algae and weed growth in over 80% of Wisconsin lakes. Addition of phosphorus to these lakes will result in additional production of algae. Phosphorus originates from a variety of sources, many of which are related to cultural (human) activities. Major sources are human and animal wastes, soil erosion, runoff from farmland or lawns, and detergents.

Phosphorus analysis often includes both soluble reactive phosphorus and total phosphorus. The soluble reactive phosphorus is dissolved in the water and thus is readily available for plant growth. Its concentration, however, varies widely in most lakes over short periods of time, as plants take up and release this nutrient. Total phosphorus has, therefore, been found to be a better indicator of the

lake's nutrient status. Total phosphorus includes the plant and animal fragments suspended in lake water.

Water Quality Index	Total Phosphorus (ug/l)	
Very Poor	150	
	140	
	130	
	120	
	110	
Poor	100	
	90	
	80	
	70	Average
	60	for im-
	50	poundments
Fair	40	
	30	Average
Good	20	for natural
Very Good	10	lakes
Excellent	1	

Figure 5. Total phosphorus concentrations for Wisconsin natural lakes and impoundments. (Adapted from Lillie and Mason, 1983)

Ideally, soluble reactive phosphorus concentrations should be 10 ug/l or less at spring turnover to prevent summer algal blooms. A concentration of 10 micrograms per liter is equal to 10 parts per billion (ppb) or 0.01 milligrams per liter (mg/l). A concentration of total phosphorus below 20 ug/l for lakes and 30 ug/l for impoundments should be maintained to prevent nuisance algal blooms (Figure 5).

Phosphorus is not highly soluble in water and forms insoluble precipitates with calcium, iron, and aluminum. In hard water areas of Wisconsin, where limestone is dissolved in the water, *marl* (calcium phosphate) precipitates on the bottom. This marl formation helps to control phosphorus concentrations and therefore algae growth. The sediment phosphorus in marl lakes will still be available for aquatic weeds with roots in the marl bottom. These lakes often have clear water, but may be weedy.

Iron can also precipitate phosphorus and store it in the lake sediments--but only if oxygen is present. When lakes lose oxygen in winter or when the deep water (hypolimnion) loses oxygen in summer, the iron and phosphorus become soluble again. The iron and phosphorus are then both released into the overlying water and may be cycled into surface water by strong summer winds or by spring and fall turnover. For this reason, algae blooms may continue in lakes for many years after all possible sources of phosphorus input are controlled. Figure 6 shows this increase in total phosphorus for stratified water bodies following fall turnover. Shallow and wind-swept lakes that stay mixed do not experience a summer anaerobic layer (oxygen

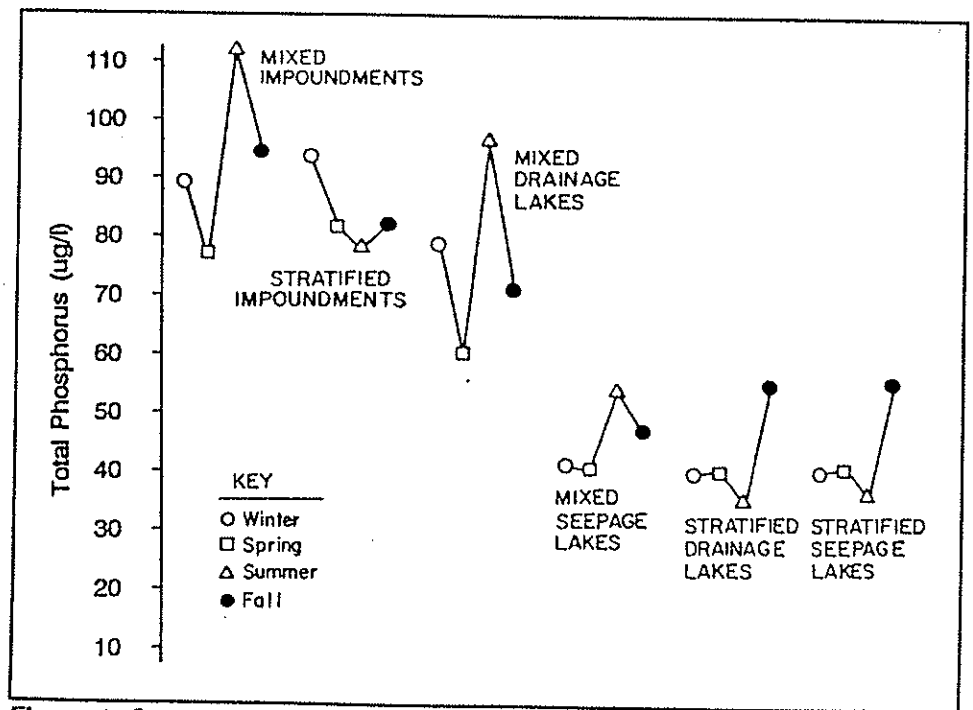


Figure 6. Seasonal total phosphorus averages for six lake types by season. (Lillie and Mason, 1983)

depletion) over the sediment; they have highest total phosphorus levels in summer following spring and early summer runoff.

The amount of iron in a lake that might react with phosphorus varies widely in Wisconsin. Southern lakes are often low in iron due to a higher pH and more sulfur, both of which limit iron solubility. This in turn affects whether phosphorus cycled into lakes during fall turnover will be reprecipitated or stay in solution during the winter.

In other words, lakes with low iron and insufficient calcium (limestone) to cause marl formations are the most likely ones to retain phosphorus in solution once it is released from sediments or brought in from external sources. These lakes are the most vulnerable to naturally-occurring phosphorus or to phosphorus loading from human activities and often respond with increased frequency and extent of algae problems.

Figure 6 also shows that impoundments have the highest phosphorus levels; drainage lakes have intermediate levels, and seepage lakes have the lowest. Even with internal cycling of phosphorus, the deeper stratified lakes still tend to have lower phosphorus levels than their mixed counterparts.

Control of internal phosphorus has been attempted in some deep lakes by using alum (aluminum sulfate) to precipitate phosphorus. Sewage treatment plants with tertiary treatment use the same process to remove phosphorus. This aluminum phosphate precipitate, unlike iron phosphate, is not redissolved when oxygen is again depleted.

Nitrogen

Nitrogen is the second most important nutrient, after phosphorus, causing weed and algae problems in Wisconsin lakes. Sources of nitrogen to a lake vary widely. Nitrogen compounds often exceed 0.5 mg/l in precipitation; thus, rainfall may be the major source for seepage lakes and some drainage lakes. However, concentrations of nitrogen in lake water usually correspond to local land use. Nitrogen may enter the lake from surface runoff or groundwater sources, including fertilizer

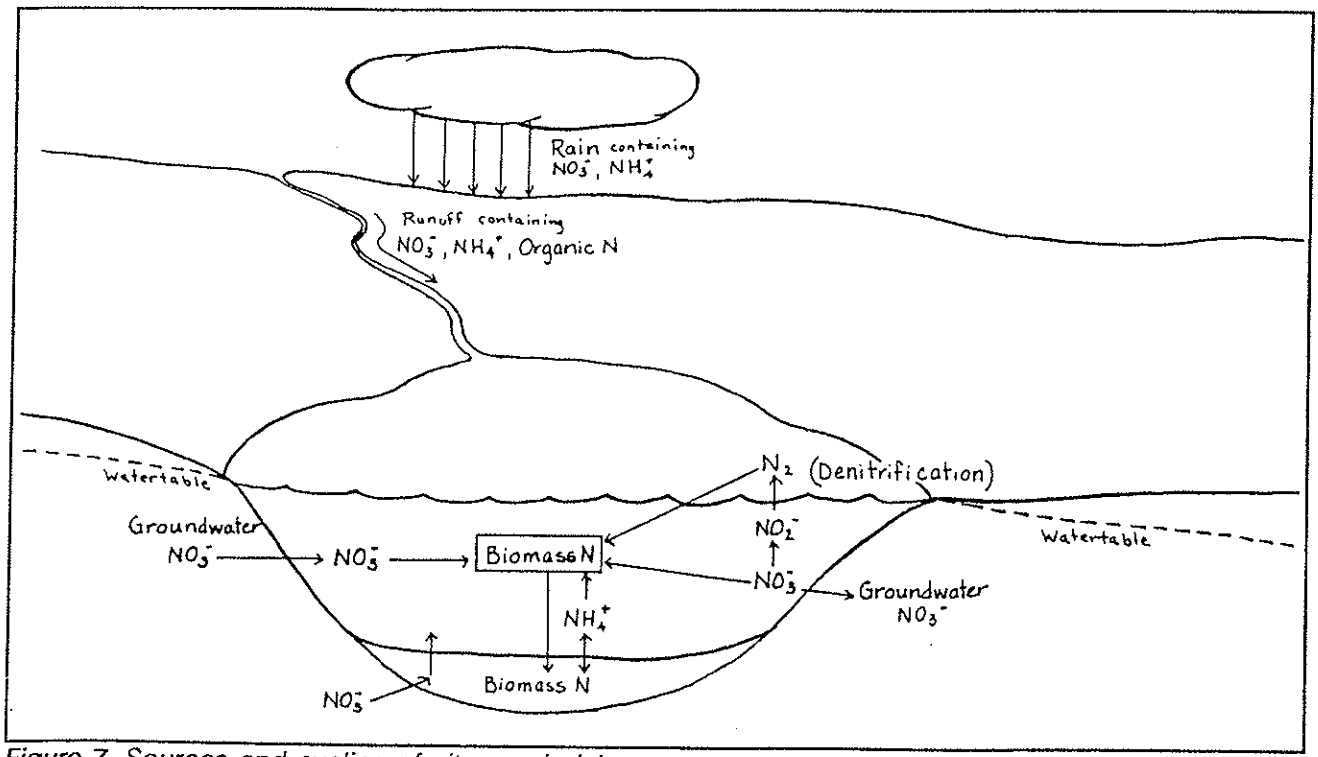


Figure 7. Sources and cycling of nitrogen in lake.

and animal wastes on agricultural lands, human waste from sewage treatment plants or septic systems, and lawn fertilizers used on lakeshore property.

The algae growth in about 10 percent of Wisconsin's lakes is limited by nitrogen rather than by phosphorus. Nitrogen is believed to limit growth if the ratio of total nitrogen to total phosphorus is less than 10:1. Values between 10:1 and 15:1 are considered transitional, while lakes with values greater than 15:1 are considered phosphorus limited.

Low levels of nitrogen will not guarantee limited algae growth the way low levels of phosphorus will. Nuisance blue-green algal blooms are often associated with lakes that have low nitrogen to phosphorus (N:P) ratios. These algae are able to use atmospheric nitrogen gas (N_2) dissolved in lake waters as a nitrogen source; other types of algae and plants depend on the inorganic nitrate and ammonium forms of nitrogen.

Nitrogen occurs in lakes in several forms. Analysis usually includes nitrate (NO_3^-) plus nitrite (NO_2^-), ammonium (NH_4^+), and organic plus ammonium (Kjeldahl nitrogen). Total nitrogen is calculated by adding nitrate and nitrite to Kjeldahl nitrogen. Organic nitrogen is often referred to as biomass nitrogen.

Nitrogen does not occur naturally in soil minerals, but is a major component of all organic (plant and animal) matter. Decomposition of organic matter releases ammonia, which is converted to nitrate if oxygen is present. This conversion occurs more rapidly at higher water temperatures. All inorganic forms of nitrogen (NO_3^-, NO_2^-, and NH_4^+) are available to aquatic plants and algae. If these inorganic forms of nitrogen exceed 0.3 mg/l in spring, there is sufficient nitrogen to support summer algal blooms.

Figure 7 shows the various ways that nitrogen enters and cycles within a lake. Nitrogen clearly undergoes a number of changes in a lake, including sediment release. Nitrogen recycled back into overlying water at spring and fall turnover will increase the levels of ammonia in samples taken during turnover, similar to what occurs with phosphorus. Nitrogen can also be lost from the lake by denitrification as shown in Figure 7. This only occurs if oxygen is depleted, allowing nitrate to be converted back to nitrogen gas.

Since the beginning of the Amery Lakes District we have tried to carry out those projects that are economically possible. The original study made some recomendations that have been carried out.

1) The water flow from the Apple River has been stopped eliminating one source of nutrient loading to the lakes.

2) South Twin Lake had an aeration system installed in 1989. The oxygen levels have been sustained high enough to avoid the usual fish kill that occured during the winter.

3) A storm sewer project in 1992 has diverted some of the urban runoff to the river below the Amery dam.

4) An ordinance is being implemented banning phosphate loaded fertilizers and controlling application of fertilizers along the lakeshore.

5) Docks have been installed at the public landings.

The topographical maps that have been made as a part of this study will help for years to come in avoiding possible runoff problems to the lakes as development continues around the Amery area. The set of water samples gives us a basis to compare to as other water sampling is done over the next few years.

The quality of our lakes are still good and it is much less expensive to work to keep them clean than to clean them up after we have damaged them.

The Lakes District is continuing to work with the DNR to increase the fish stocking that is done in the lakes. Hopefully through these efforts we can help restore the fishery nearer a level that it once was.

This study was made possible by the DNR Lakes Management Program. We appreciate their help and financial assistance in this matter.

APPENDIX C

Phosphorous Ordinance

taken from said newspaper, was printed [illegible] published in the regular edition once each week of ____ successive weeks and that the first publication date was the 8 day of September, 1992, and the last publication date was the 8 day of September, 1992.

Notary Public, Polk County, Wisconsin
My Commission Expires 4-30-95

Total Publication Fee $ 64.80

AN ORDINANCE AMENDING SECTION 6-1-10 LAWN FERTILIZER APPLICATION AND PHOSPHATE CONTROL, OF THE CODE OF ORDINANCES OF THE CITY OF AMERY, WISCONSIN

The Common Council of the City of Amery, Polk County, Wisconsin, do ordain as follows:

PURPOSE: The purpose of this amendment is to allow the use of organic phosphate fertilizer within the City of Amery.

1. Section 6-1-10 (c) (3) of the Code of Ordinances of the City of Amery is amended to read as follows:

   Except for Subsection (6) the fertilizer applied shall not contain inorganic phosphate. Fertilizer applied shall contain no more than 1% organic phosphate by weight or volume.

2. The effective date of this ordinance is January 1, 1993.

____, A.D., 19____

CITY OF AMERY

BY:
Jerome Wittstock, Mayor

ATTESTED:
Julie Riemenschneider
City Administrator/Clerk

Dated Adopted: September 2, 1992
Date Published: September 8, 1992
Effective Date: January 1, 1993

ORDINANCE
TITLE 6 - CHAPTER 1
SECTION 6-1-10

LAWN FERTILIZER APPLICATION AND PHOSPHATE CONTROL

The Common Council of the City of Amery do ordain as follows: Hereby added to the City Code is the following ordinance: Title 6 - Chapter 1, Section 6-1-10 LAWN FERTILIZER APPLICATION AND PHOSPHATE CONTROL.

PURPOSE: The Amery Lakes Protection and Rehabilitation District has conducted a study to determine the current and projected water quality of South Twin Lake, North Twin Lake, Pike Lake and the Apple River. The data indicates that the water quality of the lakes and river may be maintained and improved if the City is able to regulate the amount of chemicals and nutrients entering the lakes and river as a result of water runoff and other causes. The purpose of this ordinance is to define regulations which will aid the city in maintaining and improving water resources which are enjoyed by its residents and other users and to further educate the residents and users to some of the steps they can take to maintain the water quality of their lakes and river.

(a) Regulations for Control of Lawn Fertilizer Applications.

(1) License Required. No person, firm, corporation or franchise shall engage in the business of lawn fertilizer application within the City of Amery unless a license has been obtained from the City Administrator as provided herein. There shall be no fee charged for the issuance of this license.

(2) License Application Procedure. Application for a lawn fertilizer license shall be submitted to the City Administrator. The application shall consist of the following:

a. Name, address and telephone number of applicant and any individuals authorized to represent the applicant.

b. Description of lawn fertilizer formula proposed to be applied on lawns within the City of Amery.

c. A sample of the lawn fertilizer to be applied in the City, if it is requested by the City. Said sample shall be large enough to permit laboratory testing.

(b) Regulation for Property Owners.

Upon the City's request, a property owner shall provide the City with sample of lawn fertilizer to be applied by property owner. The quantity of the sample should be large enough to permit laboratory testing.

(c) General Regulations.

(1) Time of Application. A lawn fertilizer application shall not be applied between November 15 and April 15 of the succeeding year or when the ground is frozen. Application is recommended during the autumn months rather than in the spring wet weather. Care is to be exercised so as to apply the fertilizer during periods

of low wind conditions which will allow for the placement of the fertilizer in the designated area.

(2) Sample Analysis Cost. The cost of analyzing fertilizer samples taken from property owner shall be paid by the property owner if the sample analysis indicates that the phosphorus content exceeds the levels authorized herein.

(3) Fertilizer Content. The fertilizer being applied must contain zero % (0 percent) phosphate by weight or volume.

(4) Impervious Surfaces. No person shall apply fertilizer to any impervious surfaces (roadway, walkway, stairway, patio, etc.), or to areas within drainage ditches or waterways. Nor shall any person pile, store or burn lawn clippings or leaves on an impervious surface, drainage ditch or waterway where they could be washed or transported into a storm sewer or into South Twin Lake, North Twin Lake, Pike Lake and the Apple River.

(5) Buffer Zone. Fertilizer applications shall not be made within 35 feet of any wetland or water resources.

(6) Exempt. Newly established turf areas shall not be banned from the use of a fertilizer containing phosphorus for the first growing season. Active garden areas shall not be banned from the use of a fertilizer containing phosphorus. Those established lawn areas in need of a fertilizer containing phosphorus will be allowed if the property owner provides the City with certified soil test results showing the need for such fertilizer. In all of these cases, the amount of phosphorus applied shall not exceed one-half (1/2#) pound per 1,000 square feet of application area per year.

(7) Penalty. Except as hereinafter provided, any person, firm, corporation or franchise who is convicted of a violation of this ordinance shall be dealt with pursuant to Section 1-1-7 of the Code of Ordinances. Abatement shall be additional remedy as permitted under Section 9-7-6 and Section 9-7-7 of the Code of Ordinances.

(d) The effective date of this ordinance is January 1, 1993.

Passed and adopted by the Common Council of the City of Amery, Polk County, Wisconsin, this 7th day of August, 1991.

CITY OF AMERY

By: Jerome Wittstock
Jerome Wittstock
City Mayor

Attest: Julie Riemenschneider
Julie Riemenschneider
City Administrator/Clerk

APPENDIX D

Educational Brochures

SAMPLING LAWN AND GARDEN SOILS FOR SOIL TESTING

You ask, what is the point of soil testing and how does it affect me as a citizen of Amery?

"Fertilizing without soil testing is like treating a disease without knowing what the disease is!" (G. Ganje).

Testing soil can give information on the soil's ability to supply nutrients for best plant growth, thereby providing a scientific basis for deciding if and how much fertilizer is needed.

How often should I take samples?

Sample once every three years. Sampling in early Spring or late Fall assures that you will have recommendations within a few weeks. It takes at least two weeks for the laboratory to complete your analysis.

Where and how should I collect my samples?

Using a shovel, trowel, or soil auger; go about 5-7 inches down into the soil and collect five samples in different locations around your yard. Mix them into one container, then take one cup from that container and use this as the composite sample. Separate sections of your lawn that are different, like the garden and the front lawn.

What to do with the soil samples?

Put soil samples in a clean plastic bag or get a waxed-lined box from your Extension Office. Deliver soil samples to your Extension office for forwarding to a Soil Laboratory. The address is Polk County U.W. Extension Office, 215 Main Street, P.O. Box 160, Balsam Lake, WI 54810, 715-485-3136.

If you don't want to send in your soil sample you can take it to a local business that would send it in. For example, in Amery you could bring it to Amery Equity.

WASTE DISPOSAL (SEPTIC SYSTEM)

- Be sure that the required percolation tests have been made and are satisfactory. Place the septic tank drain field as far from the lake as possible.
- Conserve water to avoid stressing your septic system. *Avoid running laundry for few items; *Space out laundry loads, *Use water saving showers and toilets; *Use non-phosphate detergents.
- Keep solvents, paper, and plastic diapers out of the septic system.
- Have your septic tank pumped at least every three years.

When living on a lake...

- *Don't let your house intrude upon the lake. Keep a buffer zone between the house and lake.*
- *Avoid putting a road or wide path down to the lake where pollution from your lawn can easily wash into the lake. Curve any path you do construct.*

The lakes are important to all of us, even to those who don't live on the lake. We all come in contact with the lakes on a daily basis, whether directly or indirectly depends on you personally. If we all work together, we can get our lakes back into shape, but the choice is yours.

•The City of Amery has an ordinance banning phosphorus content fertilizers.

Let's Clean Up Our

"Green" Lakes in Amery

The following brochure has been produced by the 1995 Amery High School Freshwater Ecology Class in conjunction with the Amery Lakes Association. It's goal is to help our community and surrounding area maintain and improve its water quality.

Have you noticed how "green" the lakes in the Amery area have become over the past few summers? Do you know why? The answer is simple. Our lakes have become polluted by a number of sources. Some of these sources of pollution are: fertilizers, ashes, grass clippings, leaves, and wastes of both humans and animals. To help improve your lawn and save our lakes and water supplies, read on.

FERTILIZERS

Plants cannot live without the primary nutritional elements: nitrogen, phosphorus and potassium. Plants obtain all of these elements from the soil. Soils may be deficient in nutrients because of: natural conditions, leaching, or intensive crop cultivation.

The usefulness of a fertilizer depends on its chemical composition. A 10-20-20 fertilizer contains 10% nitrogen, 20% phosphate, and 20% potassium

When a body of water is overly rich in plant nutrients, the growth of algae and other aquatic vegetation expands far beyond normal limits. If this process, called eutrophication, continues for a considerable length of time, the water may eventually fill in and the area will become a bog. The important nutrients involved in eutrophication are nitrogen and phosphorus. Excessive nitrogen is readily leached from the soil in the form of nitrates. Nitrate ions are the most damaging to the soil.

Nitrates are needed for chlorophyll which is what gives the plant their color. Phosphates are what give the plant new tissue growth. Potassium is what gives them root development.

Fertilizers, soil particles, and leaves contain nitrogen and phosphorus, which can cause weed and algae growth. These nutrients can be washed through storm sewers into waterways. When the plants die and decompose in the water, they use up limited oxygen in the water endangering fish and other oxygen breathing organisms. In addition, decomposing leaves and grass clippings can rob aquatic life of oxygen.

YARD CARE

- Minimize the use of pesticides and fertilizers.
- If you need to fertilize, you should fertilize your lawn twice a year; once in the spring (after Memorial Day), and once in the early fall (between August 15 and your final mowing).
- Fertilizing in the Fall encourages root growth and storage of food for winter.
- The worst time to fertilize your lawn is after the first frost. When Spring arrives the frozen fertilizer will wash away with the Spring showers.
- You only need to put a small amount of fertilizer on each time, because then it will be absorbed, not washed away. (Remember, you may need none at all).
- Fertilize with phosphate-free fertilizer as phosphorus usually is the cause of algae blooms.
- Don't burn leaves on a slope from which the ash (natural fertilizer) can wash into the lake.
- Leave grass clippings on the lawn to help naturally fertilize, but be sure to mow regularly so they do not contribute to thatch buildup.
- Thatch is the dead organic matter on your lawn, it should be removed in late summer or early fall.
- When mowing your lawn, leave the lawn 3" or higher.
- Never remove more than 1/3 of the leaf blade itself at one time when mowing.
- A short lawn results in shallow root systems.
- Shallow root systems require a lot of watering and fertilizing.
- The worst thing to do is water your lawn during a drought. This causes the grass to work harder to survive. The result is poor grass.
- If natural vegetation has been damaged, plant a vegetative buffer zone. Buffer zones are a strip of vegetation adjacent to a body of water that acts as a filter for run off water. It is a low maintenance zone of natural vegetation which removes excess nutrients and pollution from runoff. It also helps protect the water quality of the lake.

Use the smallest amount for fertilizer to maintain a good grass cover, preferably without phosphorus. Fertilize with nitrogen in the spring using a small amount of soluble form of nitrogen. Do not rake leaves in the lake! They will decompose and add harmful nutrients.

What more can I do?

* **Keep natural vegetation.** Destroying shoreland vegetaion leads to build up of sediments and loss of critical shallow water habitat.

***Plant a 35-foot buffer.** These plants will absorb nutrients and toxins before they reach the water and also help to prevent erosion. This end may also be acheived by simply not mowing the area. Seeds in dormanc y will begin to root and provide a barrier with no effort.

***Install Bio-friendly wave breakers.** See DNR literature for ideas. Keep in mind, rip rap shorelines are only acceptable where a rocky shoreline is natural. Lilly pads, reeds, and dead falls are critical parts of amphibian, reptile and game fish habitats.

By Landscaping your property in an environmentally safe way and practicing basic shoreline stewardship, you can help prevent future algae blooms and potential fish kills as well as protect fresh water wildlife.

For more information contact:
Wisconsin Dept. of Natural Reasorces
715-349-2158
or

Polk County Land Conservation Committee
PO Box 460
Balsam Lake WI 54810
715-485-8637

Prepared by:
Paula Johnson

Shoreland Zoning & Stewardship

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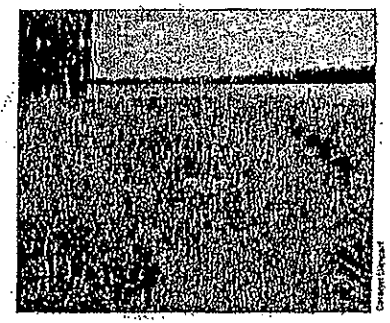
What every lake homeowner should know



Protecting Your Property

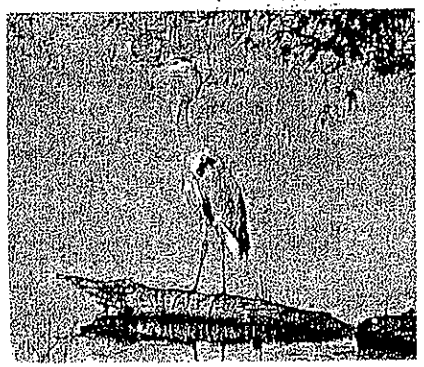
A recent UW-Extention survey concerning the reasons why homeowners most enjoyed their lake shore property cited quietness, abundance of wildlife, and natural beauty as the most important.

Also, eighty percent of plants and animals on the endangered species list live most or all of their lives in near-shore areas, areas which include your lakeshore property.

To protect these aspects of lakeshore living for both humans and critters, there are a few things every homeowner should understand.

Basic Ecology

A delicate balance. Small variations in water chemistry cause big changes in water quality for fresh water lakes and streams. The greatest of these problems is eutrophication. Eutrophication is plant over-production, namely algae blooms and heavy weed growth. It is caused by the introduction of natural nutrients, such as phosphorus and nitrates, by unnatural sources. Not only is eutrophication bad for swimming, but plant production left unchecked may lead to oxygen problems, and finally fish kills.



Unatural causes. To become a shoreland steward, one must recognize what adds to eutrophication and be aware of one's water shed. Here are a few every day things that are bad news to lakes and streams.

*** Fertilizer**

*** Soap**

*** Detergents**

*** Grass clippings**

*** Leaves**

*** Human and animal waste**

*** Road salt**

What you can do to prevent Eutrophication.

-- Use phosphorus free fertilizer or don't fertilize at all. Watering your lawn with lake water will make it just as green.

--Bag clippings and leaves or mulch. Don't put them in the water or mulch near shore.

--Wash your car on the lawn and don't bathe yourself in the lake.

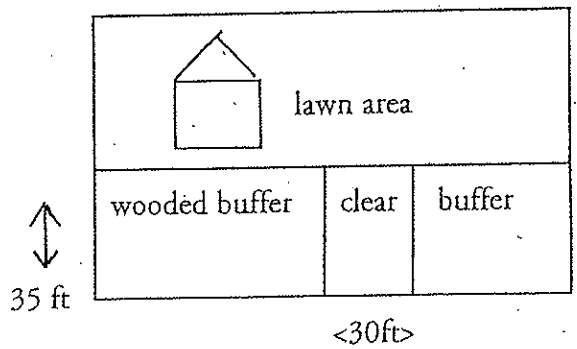
--Bag animal waste.

--Follow lakeshore zoning laws.

It's not just a good Idea, It's the Law!

Wisconsin law requires:

1) Sewered lots must have a minimum width of 65 feet and a minimum area of 10,000 square feet.
2) Public sewered lots must have a minimum width of 65 feet and a minimum area of 20,000 square feet.
3) Clear cutting of trees and shrubs is NOT ALLOWED in the strip of land from the shore to a point 35 feet inland, except for a 30 foot wide path to the water.



APPENDIX E

Amery High School Freshwater Ecology Course

Freshwater Ecology
Amery High School

Welcome to freshwater ecology. This course will involve studying various freshwater ecosystems in and around Amery. It is mainly a field course, which means we will be outside and in the lab collecting data from these systems. There is probably less "book work" involved then you are accustomed to in other courses. For this reason, it is imperative that you are actively involved at all times. We need good quality data and a safe working atmosphere. We may also be involved in some other projects associated with Amery Lakes such as help in clean up activities, education of the public, archiving data, and other needs that may come up.

The course is divided into two areas. The first is the study of standing water such as lakes and ponds. The second is to study flowing bodies of water such as the Apple River or a stream such as Balsam Branch. In addition, we may get time to study a bog ecosystem and other wetlands. This, of course, is all after giving you some basics on water and ecology.

Requirements:

Permission slip signed by parents releasing you from school and going into water.
Hip boots or waders if you need to (we will discuss this)
Access to a life jacket (we have quite a few but not to cover big classes)
Lab notebook for data and analysis

Grading:

The students will be graded on a point system. Basically you will have the opportunity to earn a maximum number of points in 6 different areas. Due to the fact that this course is a field course, participation is essential. The points are designated as follows:

- Max of 100 pts.....Weekly quizzes(7 weeks at 15 pts each)
- Max of 100 pts.....Lake Data and Analysis (data collected in Amery lakes) This will involve collecting a large array of data from the three lakes in Amery and analyzing that data based on knowledge and research.
- Max of 100 pts.....Stream data analysis(data collected and then analyzed) This will involve the collection of chemical and biological data from area streams. Usually we concentrate on the Balsam Branch.
- Max of 100 pts.....Classroom activities and participation in field
- Max of 100 pts.....Microecosystem setup and analysis. Each team of students build and maintain a miniature ecosystem and observe the changes that occur.

This course has been offered for 5 years. Each year we have had an average of 50+ students take the course, with as many as 80 students in a given year. This means that over 250 students have been through this course and the experiences that come with it.

Now, with the addition of a research boat, we spend approximately 12-15 hrs. on the lakes for each student during the course of the semester.

APPENDIX F

Pike Lake and North Twin Lake Planning Grants

Wisconsin Department of Natural Resources
http://www.dnr.state.wi.us/org/caer/ce/news/on/2002/ON020507.htm

DNR News

May 7, 2002

The DNR News & Outdoor Report is usually updated every Tuesday afternoon, except weeks with Monday state holidays when it is updated on Wednesdays. Click on this link to reach the most current issue.
Previous DNR News are also available on-line.

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34 lake groups get grants to study how to protect their lakes

MADISON – Thirty-four Wisconsin lake associations, districts, municipalities and nonprofit organizations have been awarded state grants totaling more than $348,000 to fund projects to help their communities study ways to improve areas in and around their lakes.

"The diversity and quality of the projects in this round of awards really reflects the maturity of the 12-year-old grant program and the asset it is to Wisconsin in managing lakes," says Carroll Schaal, who coordinates the grant program for the DNR Lakes Partnership.

"First, there are several phased or multiple grant projects which demonstrate that planning efforts are becoming more detailed and thorough. Secondly, there are some unique partnerships and projects that are on the leading edge of lake science."

For example, the Sokaogon Band of the Chippewa will be investigating the impact zebra mussels, a relatively new invasive species to inland lakes, are having on Lake Metonga and the Lake Poygan Sportsman's Club will be working with the University of Wisconsin to use satellites to monitor the lake's water quality conditions instead of labor intensive and costly water sampling and laboratory analysis, Schaal says.

The grants range from about $5,000 to $10,000 each, and will help pay for projects that assist organizations in developing a lake management plan. The grants cover up to 75 percent of eligible project costs; the applicants are responsible for providing the other 25 percent, which can be cash, in-kind contributions, or donated services.

For more information on these projects or the grant program, contact Carroll Schaal at (608) 261-6423 or visit the Lakes Planning pages of the DNR Web site.

Wisconsin
Department of Natural Resources

The DNR Lake Planning Grants Program was established in 1990 to help municipalities and lake management organizations pay to collect and analyze information needed to manage lakes. Recommendations resulting from these plans often serve as the basis for subsequent grants to implement protection or restoration projects. Since its founding, the program has awarded more than 800 grants totaling more than $5.9 million to groups across the state.

Award recipients are listed below by county, with the lake, applicant, type of project and the amount of the state grant.

- Adams, McGinnis Lake, Town of New Chester, McGinnis Lake Phase III – Report, $10,000
- Barron, Upper Turtle Lake, Upper Turtle Lake Association, Lake Management Plan Project, $10,000
- Buffalo, Rieck's Lake, Buffalo County, Sediment Sampling, $5,400
- Burnett, Big Bear Lake, Town of Webb Lake, Management Plan, $10,000
- Clark, Mead Lake, Clark County, Aquatic Ecosystem Assessment-Phase 2, Tasks 3 & 4, $10,000
- Clark, Mead Lake, Clark County, Aquatic Ecosystem Assessment-Phase 1, Task 1 & 2, $10,000
- Dunn, Lake Menomin, City of Menomonie, Water Quality Monitoring, $10,000
- Forest, Lake Metonga, Sokaogon Chippewa Community, Zebra Mussel Study – Part 1, $7,500
- Forest, Lake Metonga, Sokaogon Chippewa Community, Zebra Mussel Study – Part 2, $7,500
- Kenosha, George Lake, George Lake Rehab District, Aquatic Plant Management, $10,000
- Marquette, Twin Lakes, Twin Lakes Conservancy, Appraisal & Leader Develop. - Phase 1a, $10,000
- Marquette, Twin Lakes, Twin Lakes Conservancy, Appraisal & Leader Develop. - Phase 1b, $10,000
- Oneida, Lake Julia , Lake Julia Association, Lake Julia Stewardship Project - Wetland/Watershed Phase, $7,125
- Outagamie, Black Otter Lake, Black Otter Lake District, Comprehensive Management Plan, $10,000
- Pierce, Lake St. Croix, City of Prescott, Planning Project – Phase III, $10,000
- Pierce, Spring Valley Watershed, Pierce County, Water Quality Monitoring, $10,000
- **Polk, North Twin Lake, Amery Lakes Protection District, Amery Lakes Planning Project, $10,000**
- **Polk, Pike Lake, Amery Lakes Protection District, Amery Lakes Planning Project, $10,000**
- Polk, Lost Lake, Polk County Land & Water Resources Department, Lake Assessment Study, $9,271.94
- Portage, Portage County Lakes, Portage County, Water Quality Monitoring, $9,500
- Portage, Portage County Lakes, Portage County, Water Quality Monitoring, $7,480
- Price, Butternut Lake, Price County LCD, Internal Loading Assessment, $5,000
- Rock, Dane, Lake Koshkonong , Rock-Koshkonong Lake District LPG, Water Quality Sampling for Comprehensive Planning, $9,000
- Sauk, Mirror Lake, Town of Delton, Sediment Reduction Strategy, $10,000
- Shawano, Loon Lake, Loon Lake Management District, Comprehensive Management Plan, $8,713.23
- Sheboygan, Little Elkhart lake, Little Elkhart Lake Rehabilitation District, Aquatic Plant Management, $10,000
- St. Croix, Squaw Lake, Squaw Lake P & R District, Alum Study, $5,625
- Taylor, Lake Wissota/Rice Lake, Taylor County, Watershed Land Use Inventory, $8,100
- Walworth, Geneva Lake, Geneva Lake Conservancy, Inventory & Protection Plan, $10,000
- Washburn, Spooner Lake, Spooner Lake District, Lake Planning Project, $10,000
- Washburn, N & Mid Twin Lakes, Twin Lakes Preservation Association, Phase I Water Quality Study, $9,804

- Washburn, S. Twin Lake, Twin Lakes Preservation Association, Phase I Water Quality Study, $5,340
- Waukesha, Big Muskego Lake/Bass Bay, City of Muskego, Management Plan, $10,000
- Waukesha, Pewaukee Lake, Lake Pewaukee Sanitary District, Chemical & Biological Sampling, $10,000
- Waupaca, White Lake, White Lake Preservation Association, Comprehensive Management Plan, $10,000
- Waushara, Alpine Lake, Alpine Lake P & R District, Aquatic Plant Mgmt Plan Development & Preliminary Watershed Assessment, $9,936.30
- Waushara, Marl Lake, Marl Lake District, Comprehensive Management Plan Development Project, $8,197.50
- Waushara, Little Hills Lake, Little Hills Lake Management District, Comprehensive Management Plan, $7,897.50
- Winnebago, Waushara, Lake Winnebago, Lake Poygan Sportsman's Club, Remote Sensing & Trophic Monitoring, Phase 1 of 3, $6,672.75

The next application deadline is Aug. 1, 2002. Eligible applicants are cities, villages, towns, counties, tribal governments, sanitary districts, lake districts, qualified lake associations and nonprofit conservation organizations. More information and an application for funding are available from regional lake coordinators or environmental grant specialist at the DNR Regional Headquarters or on the DNR Web site.

FOR MORE INFORMATION CONTACT: Carroll Schaal (608) 261-6423 or Sheila Henneger (608) 266-9426

APPENDIX G

South Twin Lake Planning Grant

Wisconsin
Department of Natural Resources

http://www.dnr.state.wi.us/org/caer/ce/news/on/2002/ON021119.htm

DNR News

November 19, 2002

The DNR News is usually updated every Tuesday afternoon, except weeks with Monday state holidays when it is updated on Wednesdays. Click on this link to reach the most current issue. Previous DNR News are also available on-line.

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Lake groups get grants to study how to protect their lakes

MADISON – Wisconsin lake associations, districts, municipalities and nonprofit organizations will receive 60 state grants totaling more than $290,000 to fund projects to help their communities improve areas in and around their lakes.

The grants range from about $2,000 to $10,000 each, and will help pay for projects that help organizations develop lake management plans, monitor water quality, or conduct education projects. The grants cover up to 75 percent of eligible project costs; the applicants are responsible for providing the other 25 percent, which can be cash, in-kind contributions or donated services.

"Thirty-eight of these projects were small-scale grants all less than $3,000 each," says Carroll Schaal, who coordinates the grant program for the Department of Natural Resources Lakes Partnership.

"These small projects, many of which are for monitoring water quality in lakes, let organizations get their feet wet and hopefully, develop a solid foundation for future, more comprehensive, planning. The response has been quite dramatic."

The small-scale grant category was created two years ago within the DNR Lake Planning Grants Program to provide an opportunity for groups that weren't ready to tackle a larger planning project. The Lake Planning Grants Program itself was established in 1990 to help municipalities and lake management organizations pay to collect and analyze information needed to manage lakes. Recommendations resulting from these plans often serve as the basis for subsequent grants to implement protection or restoration projects. Since its founding, the program has awarded more than 850 grants totaling more than $6 million to groups across the state.

Wisconsin
Department of Natural Resources

The 38 small-scale grants, totaling $68,026, have been awarded to the following entities, listed by county:

- Bayfield County: Barnes/Eau Claire Area Property Owners Assoc. (2 grants); Namekagon Lake Assoc.; Tahkodah Lake District, Town of Barnes.
- Burnett County: Birch Island Lake Assoc., Inc.; Mud Hen Lake Protection & Rehabilitation District; Yellow Lake Sportsman's Club, Inc.
- Chippewa County: Long Lake Protection and Rehabilitation District (2 grants).
- Douglas County: Town of Wascott.
- Florence County: Keyes Lake Improvement Assoc.
- Marquette County: Montello School District.
- Oconto County: Maiden Lake Club Assoc., Inc.
- Oneida County: Little Bearskin Lake Assoc.; Horsehead Protection & Rehabilitation District.
- Polk County: Lake Magnor Lake Assoc.
- Sawyer County: Big Sissabagama Lake Shoreowners Assoc.; Clear Lake Property Owners Assoc., Nelson Lake Association; Spider Chain of Lakes Improvement Assoc., Town of Spider Lake (2 grants).
- St. Croix County: St. Croix County Land Conservation Department.
- Washburn County: Lake Nancy Protection Assoc.; Washburn County Lakes & Rivers Assoc.
- Waukesha County: Pretty Lake Protection & Rehabilitation District.
- Waushara County: Mount Morris Lake Management District.
- Winnebago County: Channel Preservation Assoc.
- Vilas County: Birch Lake Assoc.; Deerskin Lake Assoc., Inc.; School District of Phelps; Squaw Lake Assoc.; Vilas County Lakes Assoc. (2 grants); Vilas County Land & Water Conservation Department (2 grants); Van Vliet Lake Assoc.

The 22 large-scale Lakes Planning grants, which total $208,964, are awarded to the following entities:

COUNTY	APPLICANT	PROJECT	LAKE	STATE SHARE
Bayfield	Town of Delta	Town of Delta Comprehensive Plan - Phase I: Inventory & Analysis	Township Lakes	$10,000
Bayfield	Town of Delta	Town of Delta Comprehensive Plan - Phase II: Recommendations	Township Lakes	$10,000
Burnett	Birch Island Lake Assoc.	Lake Mgmt. Plan - Phase I	Birch Island Lake	$10,000
Chippewa	Lake Hallie Assoc.	Lake Hallie Mgmt. Planning	Lake Hallie	$8,080.80
Clark	Clark County LCD	Ecosystem Assessment - Phase 3 - Task 1 & 3	Mead Lake	$10,000
Clark	Clark County LCD	Ecosystem Assessment - Phase 4 - Task 3 & 5	Mead Lake	$10,000
Door	Kangaroo Lake Assoc.	Comprehensive Lake Mgmt. Plan Development - Phase I	Kangaroo Lake	$9,675
Door	Kangaroo Lake Assoc.	Comprehensive Lake Mgmt. Plan Development - Phase II	Kangaroo Lake	$7,706.25
Jackson	Jackson County Parks	Lake Monitoring	Wazee Lake	$10,000

	Dept.			
Marquette	Montello Lake P & R District	Lake Drawdown Evaluation	Montello Lake	$10,000
Milwaukee	Kelly Lakes Assoc.	Wetland Aquatic Plant Mgmt. Planning Program	Kelly Lake	$10,000
Oconto	Archibald Lake Assoc.	Lake Hydrology Evaluation - Phase II	Archibald Lake	$10,000
Oconto	Munger Bear Lake District	Comprehensive Mgmt. Plan Development Project	Bear Lake	$8,193.75
Oconto	Munger Bear Lake District	Comprehensive Mgmt. Plan Development Project	Munger Lake	$8,193.75
Polk	Amery Lakes Protection District	Amery Lakes Planning Project	South Twin Lake	$10,000
Polk	Long Lake P & R District	Mgmt. Plan - Phase 5	Long Lake	$10,000
Polk	Long Lake P & R District	Mgmt. Plan - Phase 6	Long Lake	$10,000
Waupaca	Fox-Wolf Watershed Alliance	Water Quality Evaluation & Mgmt. Plan Development	Mirror Lake	$10,000
Waupaca	Fox-Wolf Watershed Alliance	Water Quality Evaluation & Mgmt. Plan Development	Shadow Lake	$10,000
Waushara	Long Lake District	Comprehensive Study - Phase II	Long Lake	$7,115.29
Waushara	Spring Lake P&R District	Waushara Co Diagnostic Feasibility Study	Spring Lake	$10,000
Winnebago	Town of Nepeuskun	Town of Nepeuskun Land Use Plan & Integration	Rush Marsh	$10,000

The next application deadline for large-scale grants and some categories of small-scale grants is Feb. 1, 2003. Eligible applicants are cities, villages, towns, counties, tribal governments, sanitary districts, lake districts, qualified lake associations and nonprofit conservation organizations. For more information or an application for funding, contact your regional lake coordinator or environmental grant specialist at the DNR Regional Office listed in the state government pages of the telephone book. More information can be found on the DNR lake grant programWeb site.

FOR MORE INFORMATION CONTACT: Carroll Schaal (608) 261-6423; Sheila Henneger (608) 266-9426

APPENDIX H

Chapter NR 190: Lakes Management Planning Grants

Chapter NR 190

LAKE MANAGEMENT PLANNING GRANTS

Note: Chapter NR 190 as it existed on December 31, 2000 was repealed and recreated, Register, December, 2000, No. 540, eff. 1–1–01.

Subchapter I — General Provisions

NR 190.001 Purpose. The purpose of this chapter is to establish procedures for implementing a lake management planning grant program as provided for in s. 281.68, Stats. Grants made under this program will assist lake planning projects. They will assist local organizations by helping to provide information and education on the uses of lakes, the quality of water in lakes, and the quality of fish, aquatic life and their habitat in lakes and the general quality of lake ecosystems. They will be used to improve lake management assessment and planning, by increasing local understanding of the causes of lake problems, and by aiding in the selection of activities to prevent degradation of lakes and protect or improve the quality of lakes and their ecosystems. This grant program is intended to provide support and guidance to local organizations which are interested in helping to manage and protect lakes and which will often have limited resources and organizational capabilities to do so.

History: Cr. Register, December, 2000, No. 540, eff. 1–1–01.

NR 190.002 Applicability. This chapter applies to all counties, cities, towns, villages, tribes, qualified lake associations as defined in s. 281.68 (1) (b), Stats., that charge an annual membership fee of not less than $5 and not more than $50, public inland lake protection and rehabilitation districts, and town sanitary districts and other local governmental units as defined in s. 66.0131 (1) (a), Stats., qualified nonprofit conservation organizations as defined in s. 23.0955 (1), Stats., and qualified school districts as defined in s. 281.68 (3m) (c), Stats., applying for financial assistance under s. 281.68, Stats., for a planning project for a public inland lake or lakes.

Note: Under s. 281.68 (3m), Stats., to be a qualified lake association, an association shall do all of the following:

1. Demonstrate that it is incorporated under ch. 181.
2. Specify in its articles of incorporation or bylaws that a substantial purpose of its being incorporated is to support the protection or improvement of one or more inland lakes for the benefit of the general public.
3. Demonstrate that the substantial purpose of its past actions was to support the protection or improvement of one or more inland lakes for the benefit of the general public.
4. Allow to be a member any individual who for at least one month of the year resides on or within one mile of an inland lake for which the association was incorporated.
5. Allow to be a member any individual who owns real estate on or within one mile of an inland lake for which the association was incorporated.
6. Not have articles of incorporation or bylaws which limit or deny the right of any member or any class of members to vote as permitted under s. 181.072.
7. Demonstrate that is has been in existence for at least one year.
8. Demonstrate that is has at least 25 members.
9. Require payment of an annual membership fee as set by the department by rule under par. (b).

(b) For the purposes of par. (a) 9., the department shall set by rule the maximum amount and the minimum amount that may be charged as an annual membership fee.

Note: Under s. 281.68 (3m), Stats., to be a qualified school district, the board of the school district shall adopt a resolution to conduct a lake management planning project that will do all of the following:

1. Provide information or education on the use of lakes or natural lake ecosystems, on the quality of water in lakes, or on the quality of natural lake ecosystems.
2. Allow another eligible recipient of grants under this section to cooperate with the school district in the project.

History: Cr. Register, December, 2000, No. 540, eff. 1–1–01; **CR 03–013: am. Register September 2003 No. 573, eff. 10–1–03.**

NR 190.003 Definitions. The following definitions are applicable to terms used in this chapter:

(1) "Department" means the Wisconsin department of natural resources.

(2) "Grant period" means the time period stated in the grant agreement during which the sponsor is eligible to expend program grant funds for a project.

(3) "Local share" means that portion of the cost of the project other than state funds administered by the department.

(4) "Management unit" means a county, town, village, city, federally recognized Indian tribe, public inland lake protection and rehabilitation district, nonprofit conservation organizations, qualified lake association, as defined in s. 281.68 (1) (b), Stats., or a qualified school district as defined in s. 281.68 (3m) (c), Stats.

(5) "Nonprofit conservation organization" has the meaning in s. 23.0955 (1), Stats.

(6) "Planning project" means a specific lake data acquisition, assessment, or evaluation activity to provide information on the existing or expected future quality of public inland lakes and their ecosystems or activities that may affect the quality of public inland lake ecosystems. It may also include activities related to the collection and dissemination of educational information for the purpose of promoting an understanding of lakes, lake ecosystems and their uses.

(7) "Planning project priority list" means a ranking by the department of lake planning projects in the order of their scheduled receipt of funds.

(8) "Public inland lake" means part or all of a lake, reservoir or flowage, or millpond within the boundaries of the state that is presently accessible to the public by contiguous public lands or easements giving public access.

(9) "Sponsor" means the management unit that is applying for and receiving a grant under s. 281.68, Stats., and this chapter.

History: Cr. Register, December, 2000, No. 540, eff. 1–1–01; **CR 03–013: am. (2) and (4), cr. (9) Register September 2003 No. 573, eff. 10–1–03.**

NR 190.004 Sponsor accountability. (1) Accounting for all planning project funds shall conform to generally accepted accounting principles and practices, and shall be recorded by the

sponsor in a separate account. Supporting records of grant expenditures shall be maintained in sufficient detail to show that grant funds are used for the purpose for which the grant is made. All financial records, including invoices and canceled checks or bank statements, that support all planning project costs claimed by the sponsor shall be maintained and available for inspection for 3 years after final payment.

(2) The sponsor shall submit to the department a claim for payment on forms provided by the department within 6 months after the planning project ending date. All costs claimed for payment shall be documented and shall be consistent with the grant agreement relative to expenditures made within the grant period, within the scope of work, and within estimated costs. The sponsor may request, for good cause, a grant agreement amendment for expenditures in excess of those identified as estimated costs in the grant agreement.

(3) All of the sponsor's records pertaining to the planning project are subject to post audit. Post audit occurs after the final payment and payments made for reimbursement may be adjusted by the results of post audit.

(4) All water tests, which require laboratory analyses and which are part of the planning project, shall be analyzed by a laboratory, which has been selected by the department.

(5) Any grant provided for funding of a planning project that includes acquisition of physical or chemical data may be conditioned upon the sponsor being required to implement a quality control and quality assurance plan approved by the department.

(6) Data and information acquired as part of the planning project shall be reported to the department in a format specified by the department in the grant agreement.

(7) All planning projects shall have as an element a final report that is suitable for use by the general public. For some projects the department may allow the use of standardized forms as a substitute for a final report.

(8) No more than 2 planning grants per funding cycle will be awarded per lake.

(9) The cumulative state share of the cost of all planning projects funded under this chapter may not exceed $100,000 for any one lake.

(10) A grant awarded under this chapter may be terminated by the department for nonperformance of any term or condition of the grant agreement and the department may seek reimbursement of the state share previously distributed to the sponsor.

(11) If the department finds that the planning project has not been satisfactorily completed by the end of the grant period, the department may seek reimbursement of the state share previously distributed to the sponsor.

History: Cr. Register, December, 2000, No. 540, eff. 1–1–01; **CR 03–013: am. (1) to (3), (5), (8), (10) and (11) Register September 2003 No. 573, eff. 10–1–03.**

NR 190.005 Eligible and ineligible costs. (1) ELIGIBLE COSTS. Reasonable and necessary project costs, which are consistent with the approved project, as determined by the department, and incurred during the project period are eligible for grants. Eligible costs may include:

(a) Labor costs required for carrying out activities identified in the grant agreement. Costs shall be based on management unit rates for the position including salary, fringe benefits and other items determined to be appropriate by the department.

(b) Direct costs for laboratory analysis, surveys, newsletters, brochures, mailings, professional service contracts and similar items.

(c) The cost of necessary supplies and equipment used exclusively for project–related purposes over its useful life or the cost of the portion of supplies or equipment used for the project.

(d) The costs of leased equipment and facilities for the length of the project.

(e) The substantiated value of donated materials, equipment, services and labor as all or part of the local share of the project cost subject to all of the following:

1. All sources of local share donation shall be indicated when the application for a grant is submitted.

2. The maximum value of donated labor requirements is $8 per hour.

3. The value of donated equipment shall conform to the Wisconsin department of transportation highway rates for equipment.

Note: The county highway rates for equipment are formulated under s. 84.07, Stats., and can be found in chapter 5 of the State Highway Maintenance Manual published by the Wisconsin Department of Transportation, 4802 Sheboygan Avenue, Madison, WI 53705.

4. The value of donated materials and services shall conform to market rates and be established by invoice.

(f) Other costs determined by the department to be necessary to carry out an adequate planning project.

(2) INELIGIBLE COSTS. Costs not directly associated with or necessary for the implementation of the project as determined by the department are ineligible for grants. Ineligible costs include:

(a) Fines and penalties due to violation of, or failure to comply with, federal, state or local laws and regulations.

(b) Ordinary operating expenses of local government sponsors, such as salaries and expenses of public officials, that are not directly related to the project.

(c) Purchase of boats, autos or office furniture.

(d) Capital improvement project costs.

History: Cr. Register, December, 2000, No. 540, eff. 1–1–01; **CR 03–013: am. (1) (e) 2. and (2) (b) Register September 2003 No. 573, eff. 10–1–03.**

NR 190.006 Variances. The department may approve in writing a variance from a requirement of this chapter upon the written request of a sponsor if the department determines that a variance is essential to effect necessary grant actions or program objectives and where special circumstances make a variance in the best interest of the program. Before approving a variance, the department shall take into account factors such as good cause and circumstance beyond the control of the sponsor. The department may not grant variances from statutory requirements.

History: Cr. Register, December, 2000, No. 540, eff. 1–1–01; **CR 03–013: am. Register September 2003 No. 573, eff. 10–1–03.**

Subchapter II — Small–scale Projects

NR 190.01 Purpose. Small–scale projects are intended to address the planning needs of lakes where education and public awareness, obtaining basic information on lake use and conditions, or enhanced organizational capacity are the primary project objectives. These will be protection–oriented, often volunteer–led efforts, that will be used to develop a foundation for lake management efforts or updating existing plans.

History: Cr. Register, December, 2000, No. 540, eff. 1–1–01.

NR 190.02 Applicability. This subchapter applies to all sponsors for and recipients of small–scale planning grants.

History: Cr. Register, December, 2000, No. 540, eff. 1–1–01; **CR 03–013: am. Register September 2003 No. 573, eff. 10–1–03.**

NR 190.03 Eligible sponsors. All management units are eligible sponsors for small–scale projects.

History: Cr. Register, December, 2000, No. 540, eff. 1–1–01; **CR 03–013: am. Register September 2003 No. 573, eff. 10–1–03.**

NR 190.04 Eligible planning projects. Planning projects eligible for funding under this subchapter include:

(1) LAKE TREND MONITORING PROJECTS. Projects that collect and report chemical, biological and physical data about lake ecosystems to provide long term base line information and monitor trends in lake ecosystem health. Projects may include participation in the department's expanded self–help citizen lake monitoring program.

(2) LAKE EDUCATION PROJECTS. Projects that will assist management units in collecting and disseminating existing information about lakes for the purpose of broadening the understanding of lake use, lake ecosystem conditions and lake management techniques.

(3) ORGANIZATION DEVELOPMENT PROJECTS. Projects that will assist management units in the formation of goals and objectives for the management of a lake or lakes.

(4) Studies, assessments and other activities as needed to implement or augment management goals or a plan for a lake or lakes or combinations of other activities listed in this subchapter.

History: Cr. Register, December, 2000, No. 540, eff. 1–1–01; CR 03–013: am. (1) Register September 2003 No. 573, eff. 10–1–03.

NR 190.05 Applications. (1) Applications from management units for funding of small–scale planning projects shall be made on forms provided by the department and shall be submitted to the region director for the region in which the planning project is located.

Note: Forms may be obtained free of charge from the following DNR region headquarters located at:

1. Southeast — 2300 N. Dr. Martin Luther King Jr. Dr., Box 12436, Milwaukee 53212
2. South Central — 3911 Fish Hatchery Road, Fitchburg 53711
3. Northeast — 1125 N. Military Ave., Box 10448, Green Bay 54307
4. Northern/Rhinelander — 107 Sutliff Ave., Rhinelander 54501
5. Northern/Spooner – 810 W. Maple St., Spooner 54801
6. West Central — 1300 W. Clairemont Ave., Call Box 4001, Eau Claire 54702

(2) The department shall review the application for completeness and may return the application with a request for more detailed information. The application is not considered complete until the additional information requested by the department has been received.

(3) The department shall receive planning project applications by February 1 and by August 1 of each year for a project to be eligible for grant awards in the subsequent 6–month period. New applications for lake trend monitoring under the department's expanded self–help citizen lake monitoring program shall be received by August 1 only.

History: Cr. Register, December, 2000, No. 540, eff. 1–1–01; CR 03–013: am. (3) Register September 2003 No. 573, eff. 10–1–03.

NR 190.06 Determination of planning project eligibility. (1) Following receipt of the application, the department shall make a determination of planning project eligibility. The department may accept the application and include the project in the priority list developed under s. NR 190.07 (1), or deny the request for funding based on consideration of the factors identified in s. 281.68 (1), (1r), (2) or (3), Stats.

(2) The total state share of the cost of a small–scale project may not exceed $3,000.

(3) The department shall state the basis for determination of ineligibility in writing to the affected management unit.

History: Cr. Register, December, 2000, No. 540, eff. 1–1–01.

NR 190.07 Priorities. (1) The department shall prepare or update a planning project priority list by April 1 and October 1 of each year. The planning project priority list shall include new applications received and accepted by the department under s. NR 190.05.

(2) Priorities shall be set on a statewide basis.

(3) Applications for lakes which meet the minimum boating access standards of s. NR 1.91 (4) or where the department determines that existing facilities are sufficient to meet existing public demand for access, shall receive priority over lakes which do not meet these conditions.

(4) The department shall consider the following factors when developing a project priority list:

(a) The utility of the data and information that will be generated for assessing lake ecosystems.

(b) The degree to which the project will enhance knowledge and understanding of lake ecosystems.

(c) The degree to which the project will provide information for local decision–making and for the formation of goals or a strategy to protect a lake or lakes and lake ecosystems.

(d) The degree to which the project will contribute to the improvement in the management of a lake or lakes and lake ecosystems.

(e) The degree of public access to the lake.

(f) Whether it is a first–time small scale application.

History: Cr. Register, December, 2000, No. 540, eff. 1–1–01; CR 03–013: am. (1) and (4) (c) and (d) Register September 2003 No. 573, eff. 10–1–03.

NR 190.08 Grant awards. (1) The department shall issue grant awards based upon the planning project priority list developed under s. NR 190.07. Grant awards shall be made twice each year.

(2) The grant award may not exceed the state share of the estimated costs of the planning project as set out in the grant application.

(3) The state share of the planning project cost may not be greater than 75% of the eligible planning project costs.

(4) The local share of the planning project cost may not be less than 25% of the eligible planning project costs.

(5) The department may distribute up to 100% of the state share of the small–scale planning project costs based upon the estimated cost to the sponsor following acceptance of the grant agreement by the sponsor.

History: Cr. Register, December, 2000, No. 540, eff. 1–1–01; CR 03–013: am. (5) Register September 2003 No. 573, eff. 10–1–03.

Subchapter III — Large–scale Projects

NR 190.11 Purpose. Large–scale projects are intended to address the needs of larger lakes and lakes with complex and technical planning challenges. The intent of these projects is to result in a lake management plan that may require more than one grant to complete.

History: Cr. Register, December, 2000, No. 540, eff. 1–1–01.

NR 190.12 Applicability. This subchapter applies to all management units applying for large–scale projects.

History: Cr. Register, December, 2000, No. 540, eff. 1–1–01.

NR 190.13 Eligible sponsors. All management units are eligible sponsors for large–scale projects.

History: Cr. Register, December, 2000, No. 540, eff. 1–1–01; CR 03–013: am. Register September 2003 No. 573, eff. 10–1–03.

NR 190.14 Eligible planning projects. (1) Activities eligible for funding under this subchapter include:

(a) Acquisition of new or updated, physical, chemical and biological information within lakes or lake ecosystems.

(b) Definition and mapping of lake watershed boundaries, sub–boundaries and drainage system components.

(c) Descriptions and mapping of existing and potential land conditions, activities and uses within lake watersheds that may affect the water quality of a lake or its ecosystem.

(d) Assessments of water quality and of fish, aquatic life and their habitat.

(e) Review, evaluation or development of ordinances and other local regulations related to the control of pollution sources, recreational use or other human activities that may impact water quality, fish and wildlife habitat, natural beauty or other components of the lake ecosystem.

(f) Acquisition of sociological information such as census data and lake use information that is necessary to the development of a long–term lake use plan.

(g) The analysis, evaluation, reporting and dissemination of information obtained as part of the planning project.

(h) The development of alternative management strategies, plans and specific project designs necessary to identify appropriate lake protection or improvement projects.

(2) Planning projects in this subchapter may apply to groups of lakes particularly for the purpose of coordinating and organizing regional and countywide lake organization, education, monitoring, planning and protection.

History: Cr. Register, December, 2000, No. 540, eff. 1–1–01.

NR 190.15 Applications. (1) Applications from management units for funding of large–scale planning projects shall be made on forms provided by the department and shall be submitted to the region director for the region in which the planning project is located.

Note: Forms may be obtained free of charge from the following DNR region headquarters located at:

1. Southeast — 2300 N. Dr. Martin Luther King Jr. Dr., Box 12436, Milwaukee 53212
2. South Central — 3911 Fish Hatchery Road, Fitchburg 53711
3. Northeast — 1125 N. Military Ave., Box 10448, Green Bay 54307
4. Northern/Rhinelander — 107 Sutliff Ave., Rhinelander 54501
5. Northern/Spooner — 810 W. Maple, Spooner 54801
6. West Central — 1300 W. Clairemont Ave., Call Box 4001, Eau Claire 54702

(2) A complete application shall contain all of the following information:

(a) A clear description of the project's goals and objectives including a description of how the results of the project will lead to the development of a plan to protect or improve lake water quality or a lake's natural ecosystem and how they will be disseminated and made available to the public.

(b) A complete description of the project methods.

(c) An estimated itemized budget for the full costs of the project including a statement of the sponsor's capacity for financing its completion.

(d) A general time line for project completion.

(e) A signed and dated resolution from the sponsor authorizing the application and identifying a representative to act on its behalf.

(f) Identification of any other groups or management units that will be involved, their roles and their level of support for the project.

(g) A description of the existing and proposed availability of public access to, and public use of, the lake or lakes.

(h) A description of how the proposed project complements other lake management efforts and plans including local government comprehensive plans developed pursuant to s. 66.1001, Stats.

(i) Other information as may be required by the department to evaluate the project.

(3) If the project is proposed as a phase in the development of a multiple element plan, or when more than one grant is being proposed, the sponsor shall provide a description of and schedule for all past and future phases.

(4) The department shall review the application for completeness and may return the application with a request for more detailed information. The application is not considered complete until the additional information requested by the department has been received.

(5) The department shall receive planning project applications by February 1 and by August 1 of each year for a project to be eligible for grant awards in the subsequent 6–month period.

History: Cr. Register, December, 2000, No. 540, eff. 1–1–01; **CR 03–013: renum. (2) to (4) to be (3) to (5), am. (3), cr. (2) Register September 2003 No. 573, eff. 10–1–03.**

NR 190.16 Determination of planning project eligibility. (1) Following receipt of the application, the department shall make a determination of planning project eligibility. The department may accept the application and include the project in the priority list developed under s. NR 190.17, or deny the request for funding based on consideration of eligibility.

(2) The total state share of the cost of a planning project may not exceed $10,000.

(3) The department shall state the basis for determination of ineligibility in writing to the affected management unit.

History: Cr. Register, December, 2000, No. 540, eff. 1–1–01; **CR 03–013: am. (1) Register September 2003 No. 573, eff. 10–1–03.**

NR 190.17 Priorities. (1) The department shall prepare or update a planning project priority list by April 1 and October 1 of each year. The planning project priority list shall include new applications received and accepted by the department under s. NR 190.05.

(2) Priorities shall be set on a statewide basis.

(3) Applications for lakes which meet the minimum boating access standards of s. NR 1.91 (4) or where the department determines that existing facilities are sufficient to meet existing public demand for access, shall receive priority over lakes which do not meet these conditions.

(4) The department shall consider the following factors when developing a project priority list:

(a) The degree to which the project contributes toward a holistic set of alternatives to assist local decision–making or contributes to the formation of a strategy to enhance or maintain the quality of a lake ecosystem.

(b) The degree to which the planning project will enhance knowledge and understanding of a lake's fish, aquatic life and their habitats.

(c) The degree to which the planning project will enhance knowledge and understanding of a lake's watershed conditions that affect or have potential to affect a lake's ecosystem.

(d) The degree, to which the proposed planning project enhances local understanding of the lake's water quality, potential uses and factors which affect a lake's water quality.

(e) The degree to which the project will likely result in significant improvement in the management of a lake or lakes and lake ecosystems.

(f) The availability of public access to, and public use of, the lake.

(g) The degree, to which the proposed planning project complements other lake management efforts, is supported by other affected management units and leverages other local community funds for the project.

(h) The importance of the information obtained from a planning project to the state as identified in its resource management plans.

(i) Whether the project is a first–time large–scale project for a lake.

History: Cr. Register, December, 2000, No. 540, eff. 1–1–01; **CR 03–013: am. (1) Register September 2003 No. 573, eff. 10–1–03.**

NR 190.18 Grant awards. (1) The department shall issue grant awards based upon the planning project priority list developed under s. NR 190.17. Grant awards shall be made twice each year.

(2) The grant award may not exceed the state share of the estimated costs of the planning project as set out in the grant application.

(3) The state share of the planning project cost may not be greater than 75% of the eligible planning project costs.

(4) The local share of the planning project cost may not be less than 25% of the eligible planning project costs.

(5) The department shall withhold 25% of the state share for a final payment and shall withhold final payment until it has made a determination that the planning project and any required audits have been satisfactorily completed.

History: Cr. Register, December, 2000, No. 540, eff. 1–1–01.

NR 190.19 Eligibility for lake protection grants. Upon completion of a lake planning project, the sponsor may

request the department to approve recommendations made as a result of the project as eligible activities for a lake protection grant under ch. NR 191. Approval of plans for payment under this chapter does not constitute approval as a department–approved plan or approval of recommendations for project funding under ch. NR 191. The requirements and conditions for plan recommendation approval are described in s. NR 191.45 (2).

History: CR 03–013: cr. Register September 2003 No. 573, eff. 10–1–03.