IPS ENVIRONMENTAL AND ANALYTICAL SERVICES
Appleton, Wisconsin

LAKE MANAGEMENT PLAN
ROUND LAKE
SHAWANO COUNTY, WISCONSIN

REPORT TO:
CLOVERLEAF LAKES PROTECTIVE ASSOCIATION

June, 1992

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ACKNOWLEDGEMENTS

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GLOSSARY OF TERMS (1, 2, 3)

Anoxic	Water that has extremely low or no dissolved oxygen.
Chlorophyll a	Green pigment present in all green plant life and needed in photosynthesis. The amount present in lake water is related to the amount of algae and is therefore used as an indicator of water quality.
Eutrophic	From Greek for "well nourished", describes a lake of high photosynthetic activity and low transparency.
Eutrophication	The process of lake aging or enrichment with nutrients, generally with associated increases in algae or weeds. The extent to which this process has progressed is described by trophic status terms, e.g., oligotrophic, mesotrophic, or eutrophic.
Fetch	The longest distance over which the wind can sweep unobstructed.
Hypolimnion	Lower, cooler layer of a lake during summertime thermal stratification.
Immediately Adjacent Watershed	Here defined as the drainage area immediately around a lake, i.e. within 1,000 feet of shore and any inlet(s).
Littoral	The shallow area of a lake from the shore to the depth where light no longer penetrates to the bottom.
Macrophyte	Commonly referred to as lake "weeds", actually aquatic vascular plants that grow either floating, emergent or submergent in a body of water.
Mesotrophic	A lake of intermediate photosynthetic activity and transparency.
N/P Ratio	Total nitrogen divided by the total phosphorus found in a water sample. A value greater than 15 indicates that phosphorus is limiting for primary production.

GLOSSARY OF TERMS
(Continued)

Physicochemical	Pertaining to physical and/or chemical characteristics.
Oligotrophic	A lake of low plant productivity and high transparency.
Secchi Depth	A measure of optical water clarity as determined by lowering a weighted Secchi disk (20 cm in diameter) into the water body to a point where it is no longer visible.
Spring Lake	A natural lake having spring water (groundwater) as its primary water source.
Stratification	Layering of water caused by differences in water density. Thermal stratification is typical of most deep lakes during the Summer. Chemical stratification can also occur.
Thermocline (Metalimnion)	Layer of rapid temperature and density change in a thermally stratified lake. The layer acts as a barrier to mixing of the upper (epilimnion) and the lower (hypolimnion) layers of a lake.

SUMMARY

Round Lake, Shawano County, is the upper, smallest and deepest (on average) lake of a three lake "chain" known as the Cloverleaf Lakes. Groundwater is a primary source of inflow to the chain. This, combined with a primarily wooded watershed for the chain, results in a relatively low potential for sediment and nutrient input. Because of its small size, somewhat restricted access, and "no wake" speed limit, this lake receives comparatively lower use than the other lakes (Grass and Pine) in the chain.

Water quality was fair to good for all parameters measured; transparency, nutrients and **chlorophyll a**[1] indicated a **mesotrophic** status. The lake stratified during summer and exhibited high nutrient levels and near-**anoxic** conditions below the **thermocline**. Event samples collected on the north shore of the lake showed significantly higher (than in-lake) nutrient (and probably sediment) input to Round Lake.

Macrophyte growth is restricted to a narrow **littoral** zone which makes up only 10% of the lake area and appears to benefit the fishery resource through forage production. A predominantly softer (muck) substrate may cause compositional differences from those macrophyte assemblages observed in Grass and Pine Lakes.

Overall management objectives for Round Lake should emphasize protection and improvement/enhancement of existing good water and high aesthetic quality.

- Regular water quality monitoring should be continued to track water quality trends. Event monitoring may further target creek inflows or other sources of runoff (parking areas, roads).
- Riparian land owner education and diligence with respect to runoff control, yard waste and fertilizer management should be encouraged to minimize sediment and nutrient input to the lake. Runoff or erosion prone areas should be identified and protective measures implemented where possible.
- Macrophyte management should be limited to localized individual landowner manipulation to improve aesthetics or recreational use and, if necessary, to control nuisance populations. Water milfoil species should be determined; Eurasian Milfoil, if present, should be selectively removed.

[1] Text terms in bold print defined in glossary (pp. vi-vii)

INTRODUCTION

Round Lake is located in the Town of Belle Plaine in south-central Shawano County, Wisconsin. Round Lake is the upper lake of a three lake "chain" also consisting of Grass (middle) and Pine (lower) Lakes. This chain of primarily groundwater fed natural lakes is collectively referred to as the Cloverleaf Lakes.

The Cloverleaf Lakes Protective Association (CLPA) was formed in 1930 to provide leadership and coordination of lake preservation and educational activities pertinent to the Cloverleaf Lakes. Overall objectives of the CLPA, and their major concerns in development of a lake management plan included general water quality upkeep, weed growth, and the problem of swimmer's itch. Currently, the CLPA has seven elected officers and about 220 members.

The CLPA, in late-1990, decided to pursue the development of a long range management plan under the Wisconsin Department of Natural Resources (WDNR) Lake Management Planning Grant Program. The CLPA officers selected IPS Environmental & Analytical Services (IPS) of Appleton, Wisconsin as its consultant to develop the plan. A grant application, incorporating required or recommended program components and the following objectives, was

prepared, submitted, and approved in April, 1991:

- establishment of a monitoring study designed to track long-term lake quality trends,
- acquisition of existing historic data and analysis, along with current data, to assess the present status of the resource,
- location, identification and quantification of aquatic macrophyte concentrations,
- development of the awareness of the lake property owners and establishment of a base of support for lake management efforts.

A Planning Advisory Committee, comprised of representatives from CLPA, IPS, WDNR and the Town of Belle Plaine was formed and met initially in May, 1991 to provide program guidance and direction.

DESCRIPTION OF AREA

Round Lake (T26N R15E S33) is a **spring lake** located northeast of Clintonville in Shawano County, Wisconsin (Figure 1). The general topography of Shawano County is related to glacial activity. The Cloverleaf Lakes' watershed is predominantly forested with agricultural areas. Topography adjacent to the lakes is level to gently sloping. The major soil types in the Cloverleaf Lakes area are somewhat poorly drained Au Gres loamy sands on 0-3 percent slopes, excessively drained Menahga loamy sands on 2 to 6 percent slopes and moderately well drained Croswell loamy sands on 0 to 3 percent slopes (4). Soil permeability is rapid in all soils.

Round Lake has a surface area of 27 acres, an average depth of about 26 feet, and a maximum depth of 39 feet (5). The **fetch** is 0.4 miles and lies in a northwest-southeast orientation and the width is 0.3 miles in a southwest-northeast orientation. The Round Lake watershed to lake ratio is about 24 to 1 which means that 24 times more land than lake surface area drains to the lake. Lake volume is approximately 700 acre-feet (5,6).

The **immediately adjacent watershed** of the Round Lake is about 170 acres and is predominantly forested and wooded residential; that of the Cloverleaf Lakes chain overall (i.e., about 1,000 acres)

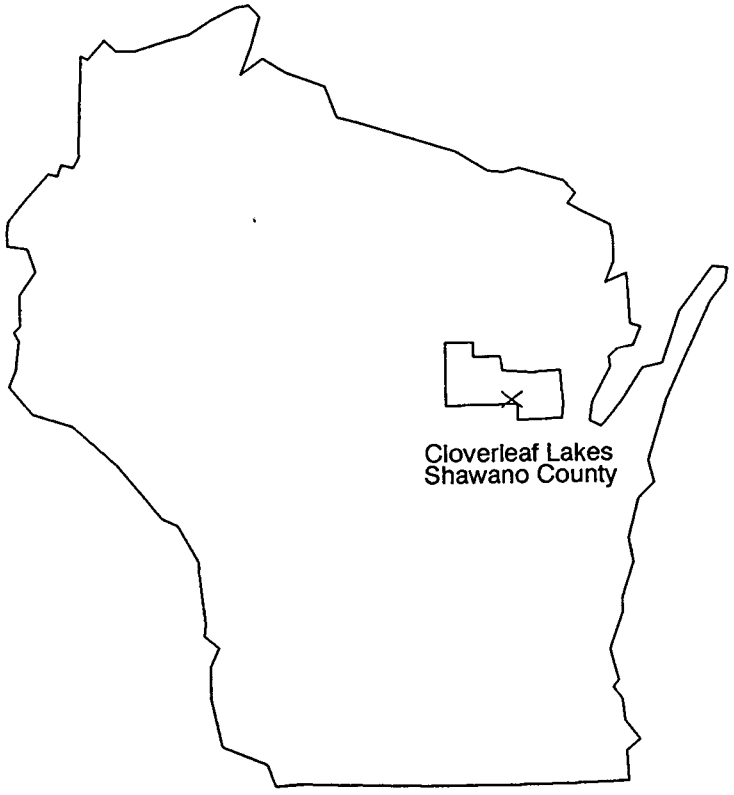

Figure 1. Location Map, Cloverleaf Lakes, Shawano County, WI.

consists of wooded residential (45%), forested (35%), wetlands (17%) and agricultural (2%) areas. Woodlands are comprised mainly of hardwood forests (maples and oaks) with areas of conifers and pine plantations.

The predominant littoral substrate is muck with minor sand areas. The littoral zone is very narrow in most places and comprises only about 10% of the total lake area.

Round Lake supports fish species including largemouth bass (Micropterus salmoides), smallmouth bass (Micropterus dolomieui), rock bass (Ambloplites rupestris), walleye (Stizostedion vitreum), yellow perch (Perca flavescens), black crappie (Pomoxis nigromaculatus), sunfish (Lepomis sp.), northern pike (Esox lucius), muskellunge (Esox masquinongy), black bullhead (Ictalurus melas), longnose gar (Lepisosteus osseus), bowfin (Amia calva), burbot (Lota lota), carp (Cyprinus carpio), white sucker (Catostomus commersoni), buffalo (Ictiobus sp.) and golden shiner (Notemigonus crysoleucas) (6).

One or more species of fish have been sampled containing mercury and currently there is a consumption advisory for fish taken from the chain (7). Fish have been stocked in Grass, Round and Pine Lakes by the WDNR or the CLPA (Pers. Comm. CLPA, Table 1).

Table 1. Stocking Effort, Cloverleaf Lakes.

YEAR	SPECIES (NUMBER:SIZE)					
	WALLEYE	MUSKELLUNGE	LARGEMOUTH BASS	NORTHERN PIKE	YELLOW PERCH	SUNFISH
1939						3,800:Ad./fing.
1940	500,000:fry					
1941	500,000:fry					
1943			300:fingerlings			
1956				2,010:Adult		
1961	16,200					
1962		160:yearlings				
1963		50:yearlings				
1964		1,600:fingerlings				
1965		1,280:fingerlings				
1966		200:fingerlings				
1970		400:fingerlings				
1973		1,300:fingerlings				
1974		1,300:fingerlings				
1976		625:12"				
1977		630:8"				
1978		630:9"				
1979		630:8"				
1980		630:8"				
1982	10,000:fry	315:10"				
1983	17,085:1-5"	455:10"				
1984	1,500					
1985	15,100:2-3"	840:12"				
1986	1,297:2-3"					
1987	11,050:5"	640:10"				
1988	400:4"		1,364:4-5"			
1989	4,500:5"	640:8"		828:9-24"	198:4-6"	
1991	15,000:fingerlings	640:7-9"				

Waterfowl observed nesting in the Cloverleaf Lakes include mallards, black ducks and blue-winged teal. Migratory waterfowl that use the Cloverleaf Lakes include other puddle and diving ducks, coots and Canada geese (6).

Public access to Round Lake is available directly via a largely undeveloped walk-in or carry-on site on the north shore off County Highway "Y" and indirectly via the navigable channel to the boat ramp (with parking) on Grass Lake. Round Lake currently is limited to "no wake" speed at all times.

METHODS

FIELD PROGRAM

Water sampling was conducted in late-Spring (May 21, 1991), mid-Summer (August 1, 1991), late-Summer (August 27, 1991) and Winter (January 27, 1992) at Station 0701, the deepest point in Round Lake (Table 2, Figure 2). This site was sampled near surface (designated "S") and near bottom (designated "B").

An event site (05E1) was established at the mouth of a small stream tributary to Round Lake on the north shore to yield information on possible nutrient input to the lake. This site was designated to be sampled after a major rain event (greater than 1" in a 24 hour period) to evaluate nutrient input at times of increased overland flow. One event sample was collected on August 8, 1991.

Physicochemical parameters measured in the field were **Secchi depth**, water temperature, pH, dissolved oxygen (DO), and conductivity. Field measurements were taken using a standard Secchi disk and either a Hydrolab Surveyor II or 4041 multiparameter meter; Hydrolab units were calibrated prior to and subsequent to daily use.

Table 2. Sampling Station Locations, Round Lake, 1991 - 1992.

WATER QUALITY

Site	Latitude/Longitude		Depth
0701	44°41.50'	88°40.68'	39.0 ft.
07E1			1.0 ft.

MACROPHYTE TRANSECTS

Transect	Latitude/Longitude Origin	End	Transect Length (m)	Bearing (Degrees)	Depth Range[1]
A	44°39.97' 88°41.53'	44°41.33' 88°40.54'	37	357	1/2/3/4
B	44°41.51' 88°40.69'	44°41.47' 88°40.74'	30	91	1/2/3
C	44°41.45' 88°40.77'	44°41.45' 88°40.78'	33	28	1/2/3
D	44°41.47' 88°40.44'	44°41.45' 88°40.48'	17	171	1/2/3
E	44°41.34' 88°40.53'	44°41.37' 88°40.54'	27	286	1/2/3

[1] 1 = 0.0 - 0.5m (0.0 - 1.7ft)
2 = 0.5 - 1.5m (1.7 - 5.0ft)
3 = 1.5 - 3.0m (5.0 - 10.0ft)
4 = >3.0m (>10.0ft)

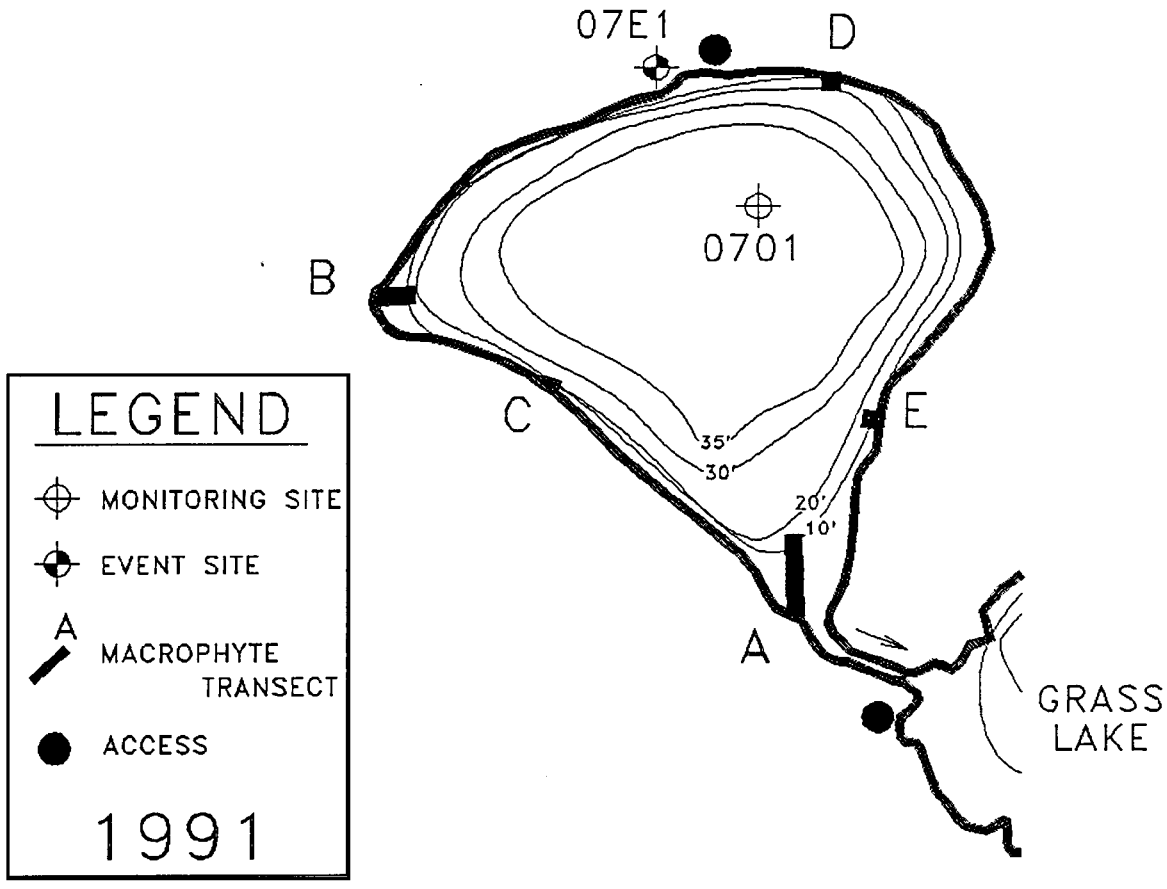

Figure 2. Sampling Sites, Round Lake, Shawano County, WI, 1991 - 1992.

Samples were taken for laboratory analyses with a Kemmerer water bottle. Samples were labelled, preserved if necessary, and packed on ice in the field; samples were delivered by overnight carrier to the laboratory. All laboratory analyses were conducted at the State Laboratory of Hygiene (Madison, WI) using WDNR or APHA (8) methods. Spring parameters determined by the laboratory included laboratory pH, total alkalinity, total Kjeldahl nitrogen, ammonia nitrogen, nitrate/nitrite nitrogen, total phosphorus and dissolved phosphorus, total solids, color and chlorophyll a. Summer and late Summer laboratory analyses included total Kjeldahl nitrogen, ammonia nitrogen, nitrate/nitrite nitrogen, total phosphorus, dissolved phosphorus, and chlorophyll a. Winter water quality parameters included total Kjeldahl nitrogen, ammonia nitrogen, nitrate/nitrite nitrogen, total phosphorus and dissolved phosphorus.

Macrophyte surveys were conducted in early Summer (July 19) and again later in the season (September 6) using a method developed by Sorge et al and modified by the WDNR-Lake Michigan District (WDNR-LMD) for use in the Long Term Trend Lake Monitoring Program (9). Transect endpoints were established on and off shore for use as reference from one sampling period to the next. These points were determined using a Loran Voyager Sportnav latitude/longitude locator and recorded with bearing and distance of the transect (line of collection) for future surveys. Five

transects sampled in 1991 were chosen to provide information from various habitats and areas of interest.

Data were recorded from three or four depth ranges, i.e., 0 to 0.5 meters (1.7 feet), 0.5 to 1.5 meters (5.0 feet), 1.5 to 3.0 meters (10.0 feet), and 3.0 to 4.6 meters (15.0 feet) as appropriate along each transect. Plants were identified (collected for verification as appropriate), density ratings assigned (see below), and substrate type recorded along a six foot wide path on the transect using a garden rake, snorkel gear or SCUBA where necessary. Macrophyte density ratings, assigned by species, were: 1 = Rare, 2 = Occasional, 3 = Common, 4 = Very Common, and 5 = Abundant. These ratings were treated as numeric data points for the purpose of simple descriptive statistics in the Field Data Discussion section of this report.

OTHER PHYSICOCHEMICAL CHARACTERISTICS

Water Quality Information

Additional lake information was retrieved from the WDNR Surface Water Inventory (6), CLPA water quality data, Wisconsin Self Help Monitoring Program (10) and from the WDNR Wisconsin Lakes publication (5).

Land Use Information

Details of zoning and specific land uses were obtained from the UW-Extension, Shawano County zoning maps, United States Soil Conservation Service soil maps (4), aerial photographs, and United States Geological Survey quadrangle maps. This information, when considered questionable or out-dated, was confirmed by field reconnaissance.

Ordinance information was taken from Shawano County Zoning Ordinance, Shawano County Floodplain Zoning Ordinance, and Shawano County Erosion Control and Animal Waste Management Plans which were acquired from the Shawano County Land Conservation Department.

Swimmer's Itch Literature Search

A literature search was conducted through the Dialog network, various environmental computerized bulletin board systems and the Universities of Wisconsin - Madison and Milwaukee library card catalogs. Information gathered and results obtained are outlined in the Field Data Discussion section of this report.

Public Involvement Program

A summary of public involvement activities coordinated with the lake management planning process is outlined in Appendix I.

FIELD DATA DISCUSSION

A precise or universally applicable definition of "lake" is rather difficult given the wide size range and differences of origin of basins with standing water. The term is further complicated by the common usage of "lake" in reference to dammed reaches of flowing water (riverine) systems.

Round Lake is a natural lake, as opposed to an artificial lake, i.e., dammed riverine system. Physicochemical characteristics of natural lakes tend toward a state of dynamic equilibrium (e.g., seasonally variable but relatively consistent within that framework over the long-term) as defined by basin morphometry and watershed characteristics.

Round Lake is, by definition, a spring lake because it lacks a permanent inlet and has a permanent outlet (continually receives groundwater inflow); the Cloverleaf Lakes overall, receive major inflow from groundwater. At least five (and probably many more) active springs are located along the west shore of Round Lake. Lake level for the Cloverleaf Lakes is controlled by a splash-board weir on the outlet stream from Pine Lake (operated by the CLPA and owned by the town of Belle Plaine). Land use in the immediately adjacent Round Lake watershed is primarily wooded residential and forested (Figure 3).

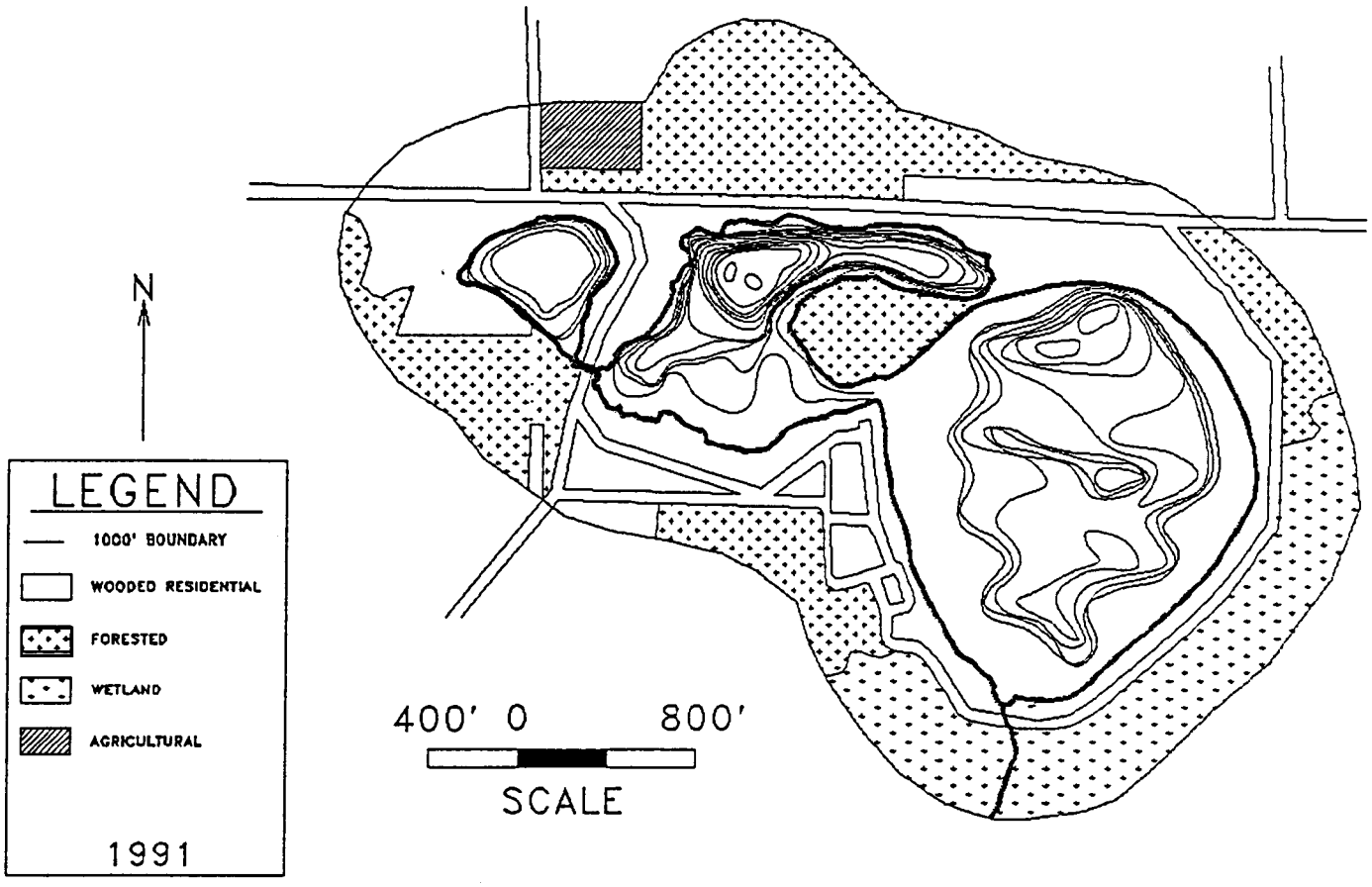

Figure 3. Land Uses in the Immediately Adjacent Watershed, Cloverleaf Lakes, 1991 - 1992.

Phosphorus is often the limiting major nutrient in algal and plant production in lakes. Surface total phosphorus during 1991-1992 monitoring ranged from 0.007 to 0.026 mg/l (parts per million) with a mean value of 0.012 mg/l (Table 3). During available past monitoring (1980-1982), in-lake surface total phosphorus ranged from <0.02 to 0.03 mg/l, with a mean value of 0.02 (Appendix II). Nitrogen to phosphorus ratios (**N/P ratio**) generally greater than 15 indicated Round Lake to be phosphorus limited.

Summer surface phosphorus levels in 1991 (0.007 and 0.008 mg/l) were, according to a recent compilation of summer total phosphorus levels in upper midwestern lakes (11), much lower than typical (.030 to .050 mg/l) for the transitional region in which Round Lake is located. Much higher values for total phosphorous and most other nutrient parameters were observed near bottom and suggested nutrient release from the sediments under anoxic or near-anoxic conditions in the **hypolimnion** during summer **stratification** at this relatively deep point (Figure 4).

Total surface nitrogen for the 1991-1992 monitoring dates ranged from about 0.407 mg/l to 1.689 mg/l. Bottom samples, during spring and summer, showed significantly higher levels and reflected relatively high ammonia nitrogen present in this dissolved oxygen limited strata.

Table 3. Water Quality Parameters, Station 0701, Round Lake, 1991 - 1992.

PARAMETER	SAMPLE[1]	05/21	08/01	08/27	01/27
Secchi (feet)		24.7	13.0	7.0	NR[2]
Temperature (°C)	S	23.32	23.18	27.71	2.84
	B	5.79	6.84	7.89	4.19
pH (S.U.)	S	8.13	8.62	8.70	7.66
	B	7.33	6.22	6.90	7.29
D.O. (mg/l)	S	7.97	9.76	9.49	7.14
	B	0.96	0.27	0.39	0.22
Conductivity (μmhos/cm)	S	383	338	333	425
	B	596	648	584	451
Laboratory pH (S.U.)	S	8.5	NR	NR	NR
	B	7.6	NR	NR	NR
Total Alkalinity (mg/l)	S	160	NR	NR	NR
	B	242	NR	NR	NR
Color (Pt-Co Units)	S	5	NR	NR	NR
	B	15	NR	NR	NR
Total Solids (mg/l)	S	254	NR	NR	NR
	B	370	NR	NR	NR
Total Kjeldahl N (mg/l)	S	0.5	0.5	0.4	1.4
	B	3.2	6.2	4.1	1.2
Ammonia Nitrogen (mg/l)	S	0.093	0.018	0.015	0.610
	B	2.46	4.25	2.50	0.891
$NO_2 + NO_3$ Nitrogen(mg/l)	S	0.239	0.025	<0.007	0.289
	B	0.030	0.007	0.010	0.346
Total Nitrogen (mg/l)	S	0.739	0.525	<0.407	1.689
	B	3.23	6.207	4.11	1.546
Total Phosphorus (mg/l)	S	0.008	0.008	0.007	0.026
	B	0.091	0.130	0.090	0.022
Diss. Phosphorus (mg/l)	S	0.007	0.005	<0.002	<0.002
	B	0.007	0.005	<0.002	0.015
N/P Ratio	S	92.4	65.6	<58.1	65.0
	B	36.5	47.7	45.7	70.3
Chlorophyll a (μg/l)	S	1	3	4	NR

[1] S = Near Surface; B = Near Bottom
[2] NR = No Reading

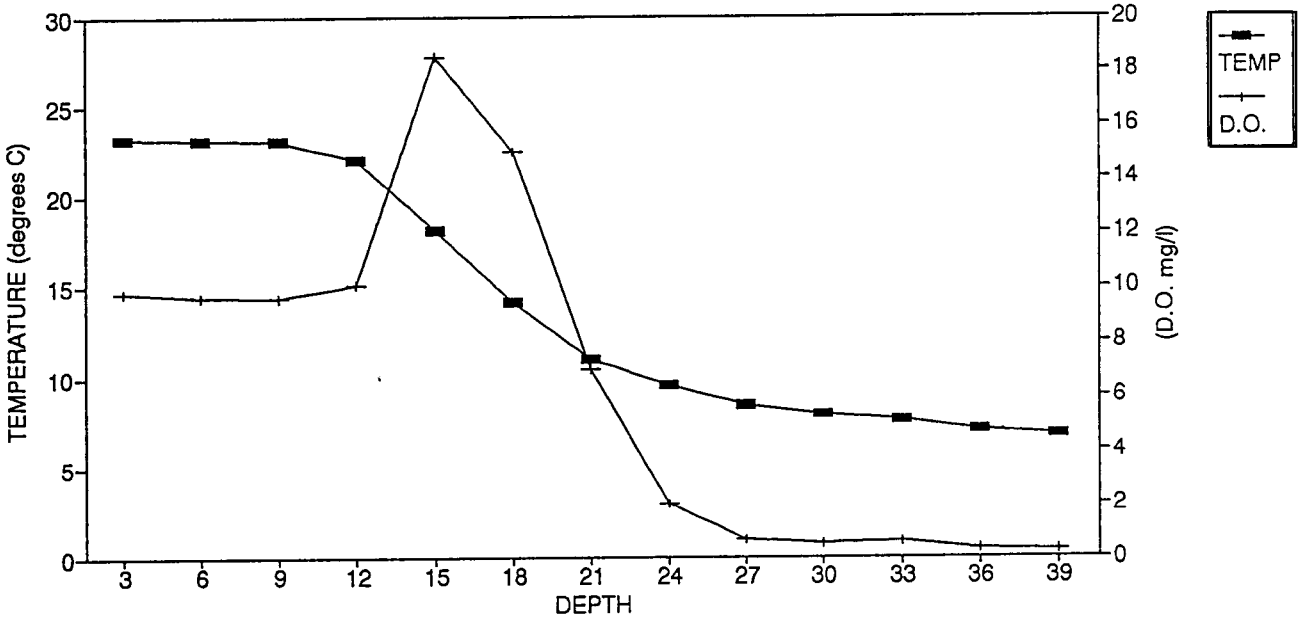

Figure 4. Temperature/DO Profile, Round Lake, August 1, 1991.

Round Lake monitoring suggested that nutrient levels are relatively low in comparison to other lakes in the region and to those observed entering the lake from the watershed, which may be significant at times. Event sampling of a small creek draining an area adjacent to County "Y" showed somewhat higher values (compared to summer surface readings) of NO_2+NO_3 nitrogen, total Kjeldahl nitrogen, ammonia nitrogen and total phosphorous entering the lake on the north shore (Table 4).

Table 4. Event Water Quality Parameters, Station 07E1, Round Lake, August 8, 1991.

Total Kjeldahl N	mg/l	1.6
Ammonia Nitrogen	mg/l	0.082
NO_2+NO_3 Nitrogen	mg/l	0.693
Total Phosphorus	mg/l	0.023
Diss. Phosphorus	mg/l	No Data[1]
Total Nitrogen	mg/l	2.293
N/P Ratio		9.97

[1] Analysis rejected: no bottle received

Other indicators of lake **eutrophication** status include light penetration and algal production. Numerous summarative indices have been developed, based on a combination of these and other parameters, to assess or monitor lake eutrophication or aging. The Trophic State Index (TSI) developed by Carlson (12) utilizes Secchi transparency, chlorophyll a, and total phosphorus. As with most indices, application is generally most appropriate on a relative and trend monitoring basis. This particular index does not account for natural, regional variability in total phosphorus levels nor in Secchi transparency reduction unrelated to algal growth (e.g. that associated with color). TSI numbers for Round Lake, in general, indicated a mesotrophic classification; values for total phosphorus and chlorophyll a (TSI for historical data

recorded as < not shown) were most variable and ranged from those indicative of **oligotrophic** to **eutrophic** classifications (Figures 5-7).

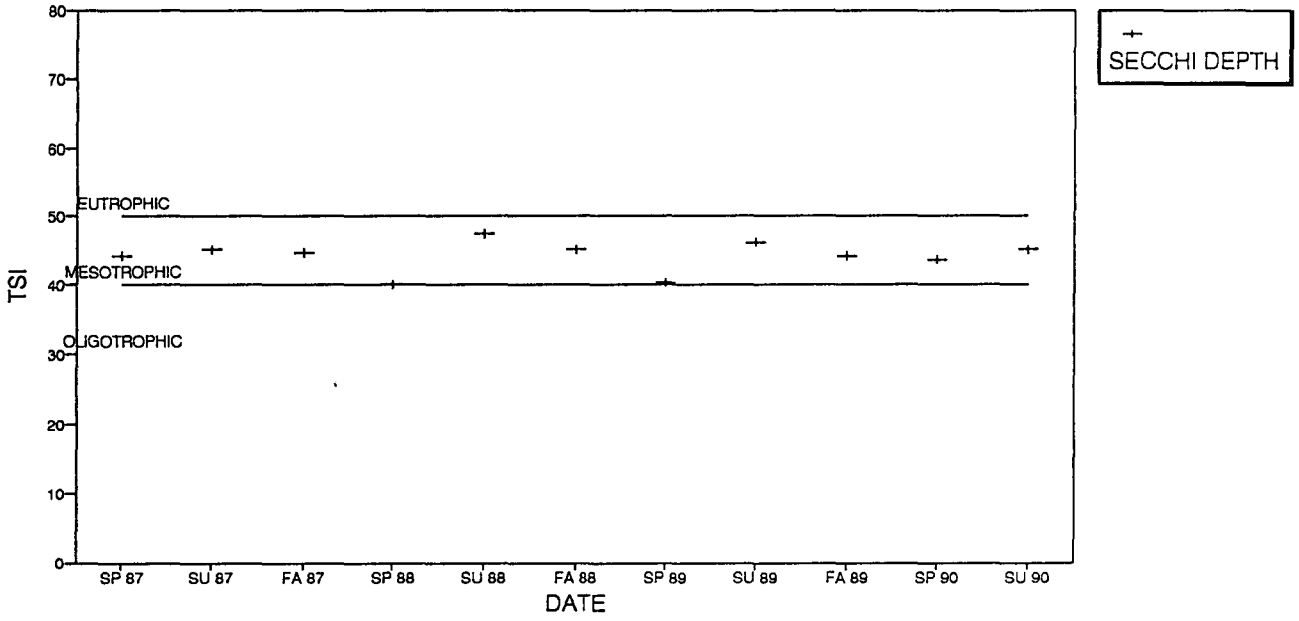

Figure 5. Trophic State Index for Secchi Depth, Round Lake.

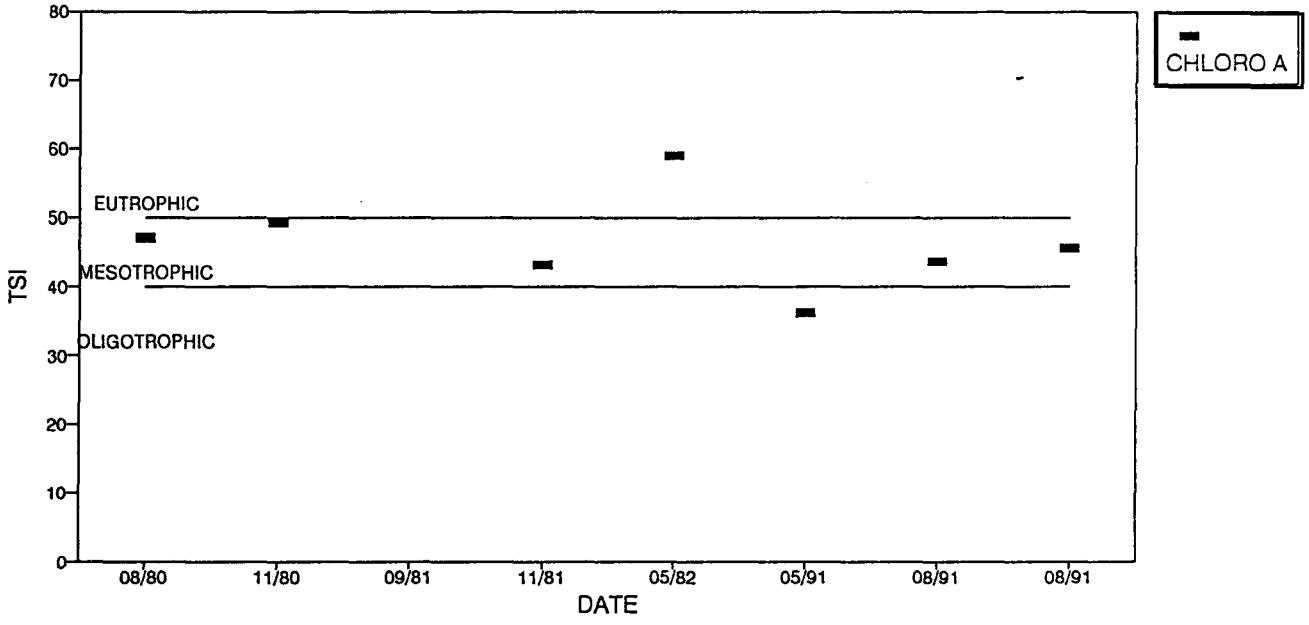

Figure 6. Trophic State Index for Chlorophyll a, Round Lake.

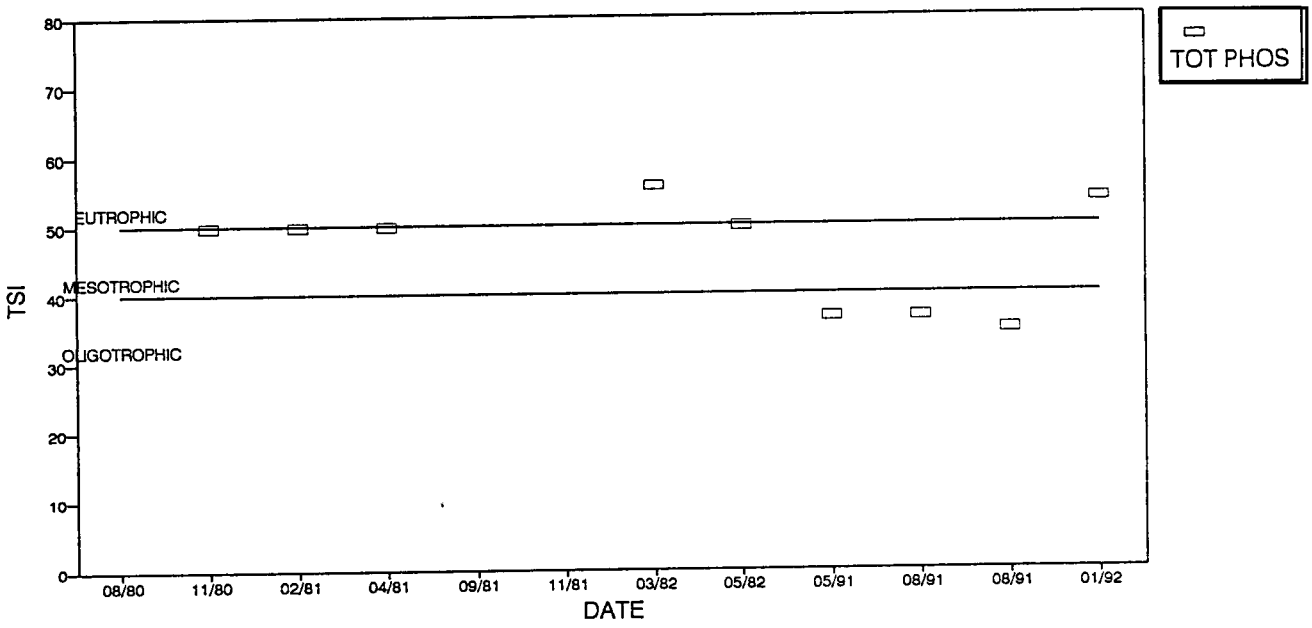

Figure 7. Trophic State Index for Total Phosphorus, Round Lake.

During recent macrophyte surveys (Appendix III), macrophytes (Table 5) were found at 32 sample sites (sample sites = number of depth ranges sampled on both survey dates) and to a maximum observed depth of 12 feet. Nitella sp. was widely distributed (at 27 of 32 sites) and overall most abundant (Tables 6-9). Nitella is actually an algae (a lower developed plant), but grows macroscopically and resembles the higher developed macrophytes. Nitella grows completely submerged in hard water and is often found encrusted with lime deposits (13).

Water milfoil (Myriophyllum sp.) was the second most abundant

Table 5. Macrophyte Species Observed, Round Lake, 1991 (13).

Taxa	Code
Watershield (Brasenia schreberi)	BRASC
Coontail (Ceratophyllum demersum)	CERDE
Common waterweed (Elodea canadensis)	ELOCA
Small duckweed (Lemna minor)	LEMMI
Water milfoil (Myriophyllum sp.)	MYRSPE
Bushy pondweed (Najas sp.)	NAJSP
Nitella (Nitella sp.)	NITSP
Yellow pond lily (Nuphar sp.)	NUPSP
White water lily (Nymphaea sp.)	NYMSP
Pickerel-weed (Pontedaria cordata)	PONCO
Large-leaf pondweed (Potamogeton amplifolious)	POTAM
Curly-leaf pondweed (Potamogeton crispus)	POTCR
Leafy pondweed (Potamogeton foliosus)	POTFO
Illinois pondweed (Potamogeton illinoensis)	POTIL
Sago pondweed (Potamogeton pectinatus)	POTPE
White-stem pondweed (Potamogeton praelongus)	POTPR
Clasping-leaf pondweed (Potamogeton richardsonii)	POTRI
Flat-stem pondweed (Potamogeton zosteriformis)	POTZO
Rush (Scirpus sp.)	SCISP
Broad-leaf cattail (Typha latifolia)	TYPLA
Eel grass (water celery) (Vallisneria americana)	VALAM

Table 6. Comparison of Occurrence as Percent of Total Abundance for Selected Macrophytes by Depth, Round Lake, 1991.

Species Code	Depth Range					
	1		2		3	
	JULY	SEPT	JULY	SEPT	JULY	SEPT
NITSP	27	17	40	28	33	32
MYRSPE	11	5	15	9	47	20
NYMSP	18	16	11	16	0	0
POTPE	13	10	6	7	12	7
SCISP	16	10	11	3	0	0

plant occurring at 22 of 32 sample sites. The plants did not exhibit the general characteristics of Eurasian Milfoil (M. spicatum, i.e. red tinged ends of shoots, greater than 12 pairs of leaflets), but the lack of floral bracts at the time of sampling prevented accurate species determination. Eurasian Milfoil is an exotic species transferred to Wisconsin that has demonstrated the ability to outcompete native plant populations and thus change plant and animal assemblages (14) within lakes. White water lily (Nymphaea sp.) was widely distributed and relatively abundant in the shallower depth ranges.

Swimmer's itch (schistosome dermatitis) has been a recurrent problem in the Cloverleaf Lakes (primarily Pine Lake) and is caused by penetration of the skin by larval schistosome parasites known as cercaria. The larvae die shortly after penetration in humans but swelling and redness can increase (especially when scratched) and persist for several days to a week.

Table 7. Occurrence and Abundance of Macrophytes by Depth, Round Lake, July, 1991.

CODE	Depth Ranges 1 (N=5) % of Sites	1 (N=5) Σ Abundance (range)	2 (N=5) % of Sites	2 (N=5) Σ Abundance (range)	3 (N=5) % of Sites	3 (N=5) Σ Abundance (range)
BRASC	0	0	0	0	0	0
CERDE	40	2(1)	0	0	0	0
ELOCA	0	0	20	1(1)	20	1(1)
LEMMI	0	0	0	0	0	0
MYRSPE	80	6(1-2)	60	7(1-4)	100	20(3-5)
NAJSP	0	0	0	0	0	0
NITSP	80	15(3-4)	100	19(2-5)	80	14(2-4)
NUPSP	0	0	40	4(1-3)	0	0
NYMSP	100	10(1-3)	60	5(1-2)	0	0
PONCO	0	0	0	0	0	0
POTAM	0	0	20	1(1)	0	0
POTCR	20	1(1)	20	1(1)	0	0
POTFO	0	0	0	0	0	0
POTIL	0	0	0	0	0	0
POTPE	80	7(1-3)	20	3(3)	60	5(1-2)
POTPR	0	0	0	0	0	0
POTRI	0	0	20	1(1)	60	3(1)
POTZO	0	0	0	0	0	0
SCISP	60	9(1-4)	40	5(2-3)	0	0
TYPLA	40	3(1-2)	0	0	0	0
VALAM	40	2(1)	0	0	0	0

The cercaria larvae are an intermediate stage of the flatworm life cycle. Adult flatworms are carried by birds and rodents in blood vessels where females lay eggs which travel to the intestine and are then expelled in feces. The eggs hatch into miracidia larvae that are taken up in snails where they develop into cercaria larvae which then penetrate rodents and birds to complete the cycle.

Table 8. Occurrence and Abundance of Macrophytes by Depth, Round Lake, September, 1991.

	Depth Ranges					
CODE	1 (N=5)		2 (N=5)		3 (N=5)	
	% of Sites	Σ Abundance (range)	% of Sites	Σ Abundance (range)	% of Sites	Σ Abundance (range)
BRASC	20	1(1)	0	0	0	0
CERDE	60	6(1-3)	20	1(1)	80	4(1)
ELOCA	40	3(1-2)	20	2(2)	0	0
LEMMI	40	3(1-2)	0	0	0	0
MYRSPE	40	4(2)	60	6(2)	80	9(1-3)
NAJSP	0	0	0	0	20	3(3)
NITSP	100	14(2-3)	100	19(3-4)	80	14(3-4)
NUPSP	0	0	20	1(1)	0	0
NYMSP	100	13(2-3)	80	11(2-4)	0	0
PONCO	20	1(1)	0	0	0	0
POTAM	0	0	80	5(1-2)	40	3(1-2)
POTCR	0	0	0	0	0	0
POTFO	40	3(1-2)	40	4(2)	40	3(1-2)
POTIL	0	0	20	1(1)	0	0
POTPE	80	8(2)	80	5(1-2)	40	3(1-2)
POTPR	0	0	20	2(2)	0	0
POTRI	80	7(1-3)	80	8(1-3)	40	2(1)
POTZO	0	0	20	1(1)	20	2(2)
SCISP	60	8(2-4)	20	2(2)	0	0
TYPLA	60	6(1-3)	0	0	0	0
VALAM	40	4(2)	0	0	20	1(1)

Attempts to control swimmer's itch have largely been through snail or cercaria control. Biological and chemical controls have met only with limited success and introduction of exotic snail species (resistant to larvae) can lead to displacement of native populations and change animal and plant assemblages. Chemical controls (usually copper sulfate or copper carbonate) are often

Table 9. Abundance Distribution and Substrate Relations for Secected Macrophytes, Round Lake, 1991.

Transect	Substrate	Species Code									
		NITSP	MYRSPE	NYMSP	POTPE	SCISP	POTRI	CERDE	POTFO	POTAM	TYPLA
		J[1] S	J S	J S	J S	J S	J S	J S	J S	J S	J S
A1	MUCK/SAND	4 3	1 2	1 2	2 0	0 0	0 1	0 0	0 0	0 0	0 0
A2	MUCK	4 3	0 2	1 4	0 1	2 0	0 1	0 0	0 0	0 1	0 0
A3	MUCK	0 0	4 3	0 0	1 2	0 0	1 1	0 1	0 2	0 0	0 0
A4	MUCK	0 0	4 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0
B1	SAND/MUCK	3 3	0 2	2 3	1 2	0 2	0 2	1 0	0 0	0 0	1 1
B2	SAND/MUCK	4 4	0 2	0 3	0 1	0 0	0 2	0 0	0 0	1 1	0 0
B3	MUCK	2 4	4 0	0 0	2 0	0 0	0 0	0 0	0 1	0 0	0 0
C1	MUCK	4 2	1 0	3 3	0 2	4 4	0 3	1 2	0 2	0 0	2 2
C2	MUCK	2 4	4 2	2 2	0 2	3 2	0 3	0 0	0 2	0 1	0 0
C3	MUCK	4 3	5 3	0 0	0 0	0 0	1 1	0 1	0 0	0 1	0 0
D1	SAND	0 3	2 0	1 2	3 2	4 0	0 0	0 3	0 1	0 0	0 3
D2	MUCK/SAND	4 4	2 0	2 2	3 0	0 0	1 2	0 0	0 2	0 0	0 0
D3	MUCK/SAND	4 4	4 1	0 0	2 1	0 0	1 0	0 1	0 0	0 0	0 0
E1	PEAT/MUCK	4 3	2 0	3 3	1 2	1 2	0 1	0 1	0 0	0 0	0 0
E2	MUCK	5 4	1 0	0 0	0 1	0 0	0 0	0 1	0 0	0 2	0 0
E3	MUCK	4 3	3 2	0 0	0 0	0 0	0 0	0 1	0 0	0 2	0 0

[1] J = July survey; S = September survey

undesirable because they cannot ensure eradication of cercaria and snails and can cause native mollusk and vegetation die-off, reduced DO levels and fishkills (15). Infestation of snails is most common during dry and hot summer months (16) and the swimmer's itch problem can persist longer than a month.

Suggestions to prevent swimmer's itch are designed to minimize contact with cercaria (17). These include avoid swimming when an onshore wind is present and swim away from shore [cercaria move in the top 1 mm of water and often near shores (18)], towel down or shower immediately after swimming to prevent penetration of the cercaria, discourage birds from staying near swimming areas, and avoid swimming in areas with large accumulations of snails.

BASELINE CONCLUSIONS

- Round Lake aesthetic quality is high and water quality is good with respect to all parameters measured. Summer total phosphorus varied only slightly (though much less historical data was available for Round Lake than the other Cloverleaf Lakes) and was much lower than expected for lakes in this region. Good water quality appears to be related to a combination of substantial groundwater inflow (low surface runoff), a primarily wooded watershed and low use (compared to Grass and Pine Lakes). Nutrient (and probably sediment) inputs from the immediate watershed appear significant as higher (than summer in-lake surface) levels of nitrogen and phosphorous were observed entering the lake via a small creek on the north side of the lake. In-lake water chemistry parameters were generally similar to those observed in the other Cloverleaf Lakes; surface total phosphorus in summer was somewhat lower than in the lower Cloverleaf Lakes.

- Round Lake macrophyte growth is limited to a narrow littoral zone; relatively softer substrate (i.e., muck) may explain compositional differences from macrophyte assemblages observed in Grass and Pine Lakes.

MANAGEMENT ALTERNATIVES DISCUSSION

WATER QUALITY

Round Lake is a natural lake which benefits from high groundwater inflow and relatively low surface runoff from a predominantly forested/wooded watershed. Water quality relative to transparency, productivity and nutrients is good.

An event sample taken by the CLPA showed significant nutrient (and probably sediment) input from the immediately adjacent watershed. Efforts should be made to identify runoff or erosion prone areas and control (to the extent practical) nutrient and sediment inflows.

Riparian land use practices can, cumulatively, have a significant influence on water quality and land owner diligence should be strongly emphasized and encouraged. Common sense approaches are relatively easy and can be very effective in minimizing inputs.

Yard practices can minimize both nutrient and sediment inputs. Lawn fertilizers should be used sparingly, if at all. If used, the land owner should use phosphate-free fertilizers and apply small amounts more often instead of large amounts at one or two times. Composting lawn clippings and leaves away from the lake

can reduce nutrient inputs to the lake. If leaves are burned, it should be done in an area where the ash cannot wash directly into the lake (19), or indirectly to the lake via roadside ditches.

Creation of a buffer strip with diverse plants at least 20 feet wide immediately adjacent to the lake can control wave erosion, trap soil eroded from the land above, increase infiltration (to filter nutrients and soil particles), shade areas of the lake to reduce macrophyte growth (especially on south shores) and provide fish cover. Placement of a low berm in this area can enhance effectiveness of the buffer strip by further retarding runoff during rainfalls. A buffer zone protects lake water quality, creates habitat for wildlife, and provides privacy (19).

There are a number of informational sources for land owners with questions regarding land management practices. Some sources are outlined in Appendix IV.

MACROPHYTES

Macrophyte growth in Round Lake is restricted to a relatively narrow littoral zone around most of the lake and probably benefits the fishery resource through forage production. Macrophyte management alternatives for Round Lake should be limited to localized harvest for improvement of aesthetics or

recreational use (e.g., swimming) and possible (after species determination for water milfoil) control of nuisance populations.

Raking weeds (using an ordinary garden rake) in the frontage area by individual landowners can be a very effective localized plant control method when done on a regular basis. Care should be taken to manage only nuisance populations and only less beneficial plants in those populations, if possible. In this way, reduced plant numbers and greater species diversity can be achieved. Harvested plants should be removed from the lakeshore area to prevent nutrients from re-entering the lake.

Selective SCUBA assisted harvest has been shown to selectively manage macrophytes. It can be used in deeper areas and to target only desired species (e.g., Eurasian milfoil) or nuisance growth areas. This method is labor intensive, but has proved to effectively reduce nuisance plant levels for up to two years (20). Because this method is species selective, it can give native plants a competitive advantage by shading out and limiting the growth (and subsequent reproduction) of exotic or nuisance plants. SCUBA assisted harvest may be a viable management option in the limited littoral area in Round Lake.

MANAGEMENT RECOMMENDATIONS

CLPA management objectives for Round Lake should be maintenance and protection of existing good water and high aesthetic quality, and protection against development of nuisance macrophyte populations. Overall, the CLPA should also consider conducting a user or landowner survey to better define desired uses of, and minimize potential user conflicts in, the Cloverleaf Lakes chain.

CLPA should strongly encourage riparian land owner education and diligence with respect to nutrient input and erosion control.

- Water quality monitoring should be continued to track long-term water quality trends. Self-Help Monitoring as well as regular monitoring by a similar protocol should be continued. Event monitoring should be continued to provide additional information in areas of concern (i.e., roadside and agricultural areas).

- There is the potential for nutrient runoff or infiltration to surface or groundwater because soils in the immediate Round Lake watershed may not filter runoff adequately. Residential input, cumulatively, can have a large impact. Yard and frontage practices,

including fertilizer management, nuisance macrophyte raking and buffer stripping can all have positive effects, especially in near-shore areas.

- Nutrient/sediment input from the immediate watershed may be significant. Riparian owners should be encouraged to identify runoff/erosion prone localized areas and to implement protective measures.

- Localized and selective macrophyte manipulation may be implemented to improve aesthetics or recreational use. Water milfoil should be positively identified; if determined to be Eurasian milfoil, selective SCUBA aided harvest should be implemented.

IMPLEMENTATION

The success of any lake management plan relates directly to the ability of the association/district to obtain funds and regulatory approval necessary to implement the plan. The CLPA is a voluntary association that does not have a lake district's specific legal or financial powers (to adopt ordinances or levy taxes or special assessments) to meet plan objectives.

The Round Lake watershed is located within the political jurisdictions of the Town of Belle Plaine, County of Shawano and the State of Wisconsin. These units have the power to regulate land uses and land use practices. Shawano County ordinances and plans possibly pertinent to the Round Lake plan are summarized in Appendix V.

Potential sources of funding are listed in Appendix VI.

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APPENDIX I
SUMMARY OF PUBLIC INVOLVEMENT ACTIVITIES
Round Lake Management Plan

The Cloverleaf Lakes Protective Association (CLPA) initiated steps to develop a comprehensive lake management plan under the Wisconsin Department of Natural Resources (WDNR) Lake Management Planning Grant Program in the fall of 1990. The grant was received on December 20, 1990. A public involvement program was immediately initiated as part of the planning process. The following is a summary of major public involvement efforts.

Planning Advisory Committee

A Planning Advisory Committee comprised of representatives from WDNR, CLPA, IPS, the Town of Belle Plaine, the Shawano County UW-Extension, the Shawano County Land Conservation Department and the Shawano County Board was established at the start of the program. The committee provided direction during the planning program and served as main reviewer of the draft plan document.

Meetings

The CLPA conducted meetings for its board, its members and interested parties. IPS presented progress reports, provided information about the resource and interpretations of these results at board meetings and at the 1991 and 1992 CLPA annual meetings.

Print Media

The Clintonville newspaper, "Tribune Gazette" was present at the initial meeting of the Planning Advisory Committee and published articles throughout the course of the program.

An IPS newsletter entitled "Lake Management News" was developed and distributed to the CLPA for the Board's use and distribution among the membership. A special "Clover Lakes Edition" was also developed to notify the CLPA of any late developments in the planning program.

APPENDIX II
HISTORIC WATER QUALITY DATA
Round Lake, Shawano County, WI
Water Chemistry: 08/80 - 09/81
Lake Center
(Source: WDNR)

Parameter (Units)	Date									
	08/80	08/80	11/80	11/80	02/81	02/81	04/81	04/81	09/81	09/81
Depth (feet)	3	36	3	46	3	33	3	36	3	33
Water Temperature (°F)	NR	NR	39	39	41	43	46	39	68	41
Air Temperature (°F)	NR	--	25	--	50	--	45	--	65	--
Cloud Cover (%)	NR	--	0	--	10	--	100	--	85	--
Dissolved Oxygen (mg/L)	NR	NR	8.8	6.8	5.4	0	11.2	1.4	9.9	0.5
Secchi Depth (feet)	NR	--	9.9	--	NR	--	7.3	--	NR	--
pH (SU)	8.8	7.4	NR	NR	7.6	7.6	8.3	7.6	8.4	8.1
Alkalinity (mg/l $CaCO_3$)	128	228	180	180	104	184	170	200	130	200
Reactive Phos. (mg/l)	<0.004	<0.004	<0.004	<0.004	0.011	0.014	<0.004	<0.004	<0.004	0.004
Total Phosphorous (mg/l)	<0.02	0.10	0.02	0.02	0.02	0.02	0.02	0.04	<0.02	0.02
NH_4-Nitrogen (mg/l)	<0.02	2.5	0.47	0.47	0.61	0.44	<0.02	0.56	<0.02	0.31
NO_2/NO_3-Nitrogen (mg/l)	<0.02	<0.02	0.18	0.18	0.84	0.51	0.53	0.24	0.12	0.31
Organic Nitrogen (mg/l)	0.6	1.1	0.5	0.5	0.4	0.4	<0.48	0.64	<0.58	0.49
Total Nitrogen (mg/L)	>0.6	<3.62	1.15	1.15	1.85	1.35	<1.03	1.44	<0.72	1.11
N/P Ratio	NR	<362.0	57.5	57.5	92.5	67.5	<51.5	36.0	NR	55.5
Chlorophyll "a" (µg/L)	5	NR	7	NR	NR	NR	NR	NR	<5	NR

[1] NR denotes no reading given

APPENDIX II
HISTORIC WATER QUALITY DATA
Round Lake, Shawano County, WI
Water Chemistry: 11/81 - 05/82
Lake Center
(Source: WDNR)

Parameter (Units)	Date					
	11/81	11/81	03/82	03/82	05/82	05/82
Depth (feet)	0	36	3	36	0	36
Water Temperature (°F)	50	45	NR	NR	62	41
Air Temperature (°F)	60	--	NR	--	78	--
Cloud Cover (%)	0	--	NR	--	10	--
Dissolved Oxygen (mg/L)	8.5	0.1	NR	NR	14.3	0.1
Secchi Depth (feet)	NR	--	NR	--	5.8	--
pH (SU)	8.0	7.0	NR	NR	8.3	7.6
Alkalinity (mg/l $CaCO_3$)	164	212	184	192	162	218
Reactive Phos. (mg/l)	<0.004	0.024	0.010	0.044	<0.004	NR
Total Phosphorous (mg/l)	<0.02	0.12	0.03	0.06	0.02	0.02
NH_4-Nitrogen (mg/l)	0.14	4.4	0.61	0.91	<0.02	0.06
NO_2/NO_3-Nitrogen (mg/l)	0.21	0.02	0.36	0.30	0.36	0.09
Organic Nitrogen (mg/l)	0.46	5.0	0.59	0.39	<0.58	- 0.44
Total Nitrogen (mg/L)	0.81	9.42	1.56	1.6	<0.96	0.59
N/P Ratio	>40.5	78.5	52.0	26.7	<48.0	29.5
Chlorophyll "a" (µg/L)	2.8	NR	NR	NR	29	NR

[1] NR denotes no reading given

APPENDIX II
HISTORIC WATER QUALITY DATA
Round Lake, Shawano County, WI
Secchi Readings: 05/87 - 07/90
Lake Center
(Source: CLPA Water Quality Files)

DATE	SECCHI DEPTH (ft)	DATE	SECCHI DEPTH (ft)
05-10-87	11.5	09-18-88	8.2
05-25-87	6.5	10-01-88	9.0
06-07-87	11.1	10-22-88	8.8
06-27-87	6.6	11-16-88	9.8
07-12-87	8.0	05-14-89	18.0
07-25-87	7.5	06-03-89	10.3
08-09-87	9.6	06-11-89	12.0
08-22-87	10.2	06-17-89	11.2
09-07-87	11.3	06-25-89	9.6
09-19-87	11.1	07-09-89	9.2
09-26-87	12.1	07-30-89	7.8
10-24-87	9.8	08-20-89	7.2
11-14-87	6.3	09-02-89	9.8
04-17-88	12.4	09-17-89	8.5
04-30-88	13.0	10-08-89	11.0
05-14-88	13.5	10-22-89	9.7
05-30-88	12.0	11-11-89	9.2
06-12-88	15.2	04-21-90	7.2
06-19-88	13.0	05-13-90	9.0
06-26-88	8.5	05-28-90	10.8
07-09-88	8.0	06-09-90	14.0
07-24-88	9.3	06-29-90	11.9
08-07-88	9.1	07-09-90	8.5
08-20-88	6.2	07-20-90	6.7
09-05-88	6.7		

APPENDIX III
MACROPHYTE SURVEY DATA
Round Lake, 1991

Transect	Substrate	Species Code																			
		NITSP		MYRSPE		NYMSP		POTPE		SCISP		POTRI		CERDE		POTFO		POTAM		TYPLA	
		J[1]	S	J	S	J	S	J	S	J	S	J	S	J	S	J	S	J	S	J	S
A1	MUCK/SAND	4	3	1	2	1	2	2	0	0	0	0	1	0	0	0	0	0	0	0	0
A2	MUCK	4	3	0	2	1	4	0	1	2	0	0	1	0	0	0	0	0	1	0	0
A3	MUCK	0	0	4	3	0	0	1	2	0	0	1	1	0	1	0	2	0	0	0	0
A4	MUCK	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
B1	SAND/MUCK	3	3	0	2	2	3	1	2	0	2	0	2	1	0	0	0	0	0	1	1
B2	SAND/MUCK	4	4	0	2	0	3	0	1	0	0	0	2	0	0	0	0	1	1	0	0
B3	MUCK	2	4	4	0	0	0	2	0	0	0	0	0	0	0	0	1	0	0	0	0
C1	MUCK	4	2	1	0	3	3	0	2	4	4	0	3	1	2	0	2	0	0	2	2
C2	MUCK	2	4	4	2	2	2	0	2	3	2	0	3	0	0	0	2	0	1	0	0
C3	MUCK	4	3	5	3	0	0	0	0	0	0	1	1	0	1	0	0	0	1	0	0
D1	SAND	0	3	2	0	1	2	3	2	4	0	0	0	0	3	0	1	0	0	0	3
D2	MUCK/SAND	4	4	2	0	2	2	3	0	0	0	1	2	0	0	0	2	0	0	0	0
D3	MUCK/SAND	4	4	4	1	0	0	2	1	0	0	1	0	0	1	0	0	0	0	0	0
E1	PEAT/MUCK	4	3	2	0	3	3	1	2	1	2	0	1	0	1	0	0	0	0	0	0
E2	MUCK	5	4	1	0	0	0	0	1	0	0	0	0	0	1	0	0	0	2	0	0
E3	MUCK	4	3	3	2	0	0	0	0	0	0	0	0	0	1	0	0	0	2	0	0

[1] J = July survey; S = September survey

Transect	Substrate	Species Code																			
		ELOCA		VALAM		NUPSP		LEMMI		NAJSP		POTZO		POTCR		POTPR		BRASC		PONCO		POTIL	
		J[1]	S	J	S	J	S	J	S	J	S	J	S	J	S	J	S	J	S	J	S	J	S
A1	MUCK/SAND	0	1	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
A2	MUCK	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0
A3	MUCK	1	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0
A4	MUCK	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
B1	SAND/MUCK	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0
B2	SAND/MUCK	0	2	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1
B3	MUCK	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
C1	MUCK	0	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0
C2	MUCK	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
C3	MUCK	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0
D1	SAND	0	0	1	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
D2	MUCK/SAND	1	0	0	0	3	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
D3	MUCK/SAND	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E1	PEAT/MUCK	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E2	MUCK	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E3	MUCK	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

[1] J = July survey; S = September survey

APPENDIX IV
SOURCES OF INFORMATION AND ASSISTANCE (21)
Round Lake, Shawano County, WI

Bell Plaine Town Board
Jerry C. Eckers, Supervisor
B-617 Rustic Drive
Route 4, Box 870
Clintonville, WI 54929

Can answer questions regarding ordinances, zoning and permitting.

Department of Natural Resources:

Shawano Area Office
647 Lakeland Road
Shawano, WI 54116

Lake Michigan District Office
Tim Rasman
Lakes-LMD
1125 N. Military Road, Box 10448
Green Bay, WI 54307-0448
414-497-6034

Can answer questions on lake management, groundwater, water quality, fisheries, regulations, zoning and wildlife or direct you to someone that can be of help.

East Central Wisconsin Regional Planning Commission:

Ken Theine
RP, ECWRPC
132 N. Main Street
Menasha, WI 54952
414-729-4770

Has information regarding zoning and building planning information as well as information on land use.

APPENDIX IV
(Continued)

Environmental Task Force:

Environmental Task Force
College of Natural Resources
UW-Stevens Point
Stevens Point, WI 54481

Will test soils, lake water or well water.

IPS Environmental and Analytical Services

IPS Environmental and Analytical Services
ATTN: Lake Management Program
P.O. Box 446
Appleton, WI 54912-0446
(414) 749-3040 (Business Phone)
(414) 749-3046 (FAX)

Has specific information on the Round Lake Management Plan and development of other management plans in the area.

Shawano County Land Conservation Department:

Ronald Ostrowski
Courthouse
311 N. Main Street
Shawano, WI 54166

Can provide soil erosion prevention measures and water quality problems related to your area.

Shawano County Land Conservation Service (USDA):

Steve Persteiner
Courthouse
311 Main Street
Shawano, WI 54116

Can provide information on soil types and limitations, depths to groundwater and bedrock and related information.

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(Continued)

Shawano County University of Wisconsin Extension:

Jim Resick
UWEX, Courthouse
311 N. Main Street
Shawano, WI 54116
715-526-6136

Has information of agricultural practices, waste disposal and conservation practices.

Shawano County Zoning Administration:

Roger Mathison
ZA, Courthouse
311 N. Main Street
Shawano, WI 54116
715-526-6766

May have information on development, land uses, floodplain and regulations regarding land parcels in your area.

State Laboratory of Hygiene:

University of Wisconsin
Center for Health Sciences
465 Henry Mall
Madison, WI 53706
608-262-3458

Can give information on costs for testing of water and soils.

Wisconsin Geological and Natural History Survey:

Ron Hennings
3817 Mineral Point Road
Madison, WI 53705
608-263-7384

Can give information on groundwater and mineral exploration.

APPENDIX V
SUMMARY OF PERTINENT SHAWANO COUNTY ORDINANCES AND PLANS

Shawano County Zoning Ordinance

Included in this ordinance are regulations for floodplain zoning, general shoreland provisions, and land subdivisions.

- Floodplain Zoning: Section 87.30 Wis. Stats. requires all counties to adopt floodplain zoning as part of their local zoning ordinance. This type of zoning is used to minimize flood damage in areas subject to flooding.

  Shawano County's floodplain ordinance regulates all lands that would be inundated by a "regional flood" or a flood the magnitude that could be expected on the average of once per hundred years. Floodplain districts include a floodway and flood fringe area. The floodway is the channel of a stream and that portion of the floodplain adjoining the channel that would carry and discharge the floodwaters of the stream. Only open space uses that have a low flood damage potential and will not obstruct flood flows are permitted within the floodway.

  The flood fringe is that portion of the floodplain between the outer limits of the general floodplain and the floodway that would be covered by flood waters during a regional flood. The flood fringe is generally associated with standing water rather than rapidly flowing water. A number of structural land uses are permitted in the flood fringe, provided they meet certain floodproofing standards.

  Shoreland Zoning: As required under Section 59.971 Wis. Stats., Shawano County was required to adopt shoreland zoning. This type of zoning provides the means to protect valuable natural resources that are common along lakes and rivers. The ordinance can prevent development of land and certain land use activities from adversely affecting the waterbody.

  Subdivision Ordinance: the Subdivision Ordinance "...regulates any division of land that creates two or more parcels. No land can be subdivided which is determined by the county planning and zoning committee

APPENDIX V
(Continued)

to be unsuitable for development because of potential flooding, inadequate drainage, ... (or) severe erosion potential...." (Shawano County, 1982)

Sanitary Ordinance. The Sanitary Ordinance provides measures to preclude the installation of private on-site waste disposal systems in areas not suited for such systems. Such areas are frequently located near rivers and lakes where high groundwater tables can prevent adequate percolation and thereby contribute to surface runoff of septate or groundwater contamination.

Soil Erosion Control Plan

In 1987, Shawano County adopted a Soil Erosion Control Plan based on guidelines contained in Chapter AG 160 of the Wisconsin Administrative Code. The purpose of the plan is to "... determine where the most serious erosion is occurring and to establish a strategy to address the problem." (Shawano County, 1987). Specifically, the plan provides educational programs, technical assistance, and seeks cost sharing funds to reduce soil erosion to acceptable limits and reduce the amount of sediment being carried to surface waters. Based on maintaining a tolerable soil loss level (expressed as "T"), the plan delineates areas in the county that should receive priority assistance in reducing soil loss. Although the plan looks at soil loss in relation to maintaining agricultural productivity, it can also have a significant impact in reducing nutrient loadings to rivers and lakes. (The Cloverleaf Lakes watershed, in the Belle Plaine Township is currently not identified as a priority area.)

Animal Waste Water Pollution Control Plan

In 1985, Shawano County adopted an Animal Waste Management Plan. The purpose of this plan is to "...identify those areas within the county that have the greatest potential for water pollution caused by animal waste." As with the Soil Erosion Control Plan, these priority areas will be eligible to receive technical and cost share assistance, as available. (The Cloverleaf Lakes watershed is currently not a priority area for assistance at this time.)

APPENDIX VI
POTENTIAL FUNDING SOURCES FOR PLAN IMPLEMENTATION

Potential sources of funds to assist plan implementation include:

County:

- Conservation funds from the state to be used for natural resources projects (old predator fund). Erosion control cost share funds through Land Conservation Committee.

State:

- WDNR Priority Watershed Program. This program has been modified to include priority lakes. The program provides 50-80% cost share for installing "best management practices" to combat nonpoint source water pollutants. Projects are selected by the WDNR and administered by the County Land Conservation Committee.

- WDNR Lake Management Grants. This program is still in draft stage. When finalized, it is intended to be funded by a $1M appropriation from an expanded motorboat gas tax formula. Up to 50% cost share for projects would be available. Projects may include: conservation or purchase of land, construction or restoration of a wetland, development of local regulations/ordinances to protect lake ecology or the water quality tributary to a lake, activities identified in a WDNR approved lake management plan (may include harvesting, biomanipulation, installation of BMPs, aeration, dilution, sediment treatment, drawdown and habitat improvement). The program will <u>not</u> include: dredging, dam maintenance/repair and chemical treatment of aquatic nuisances.

- WDNR's Recreational Boating Facilities Program (NR 7). Program has been expanded to include qualified lake associations as applicants. This program is administered by the WDNR and supervised by the Wisconsin Waterways Commission. Forty per cent of funds are allocated to the Great Lakes, 40% to inland lakes and 20% is discretionary. Financial assistance is available for safe recreational boating projects including: "...dredging of channels of waterways for recreational boating purposes, acquisition of capital equipment necessary to cut and remove

APPENDIX VI
(Continued)

aquatic plants, and acquisition of aids to navigate and regulatory markers." A 50% cost share is provided.

- DATCP Farmers' Fund (AG 165). Assists farmers with construction of animal waste management installations (county sets design standards). Soil Erosion Control (AG 160) funds targeted to areas that counties have identified as priorities in the County Erosion Control Plan (the watershed including the Cloverleaf Lakes is not currently identified as a priority soil erosion area).

- Stewardship Program. Ten year program to protect environmentally sensitive areas and acquire or maintain recreational areas. The funds are raised by state sale of bonds. Potential lake applications include:

  Habitat Restoration Areas - $1.5M annually to encourage private landowners and non-profit organizations to adopt management practices favorable to wildlife.

  Urban Green Space - $750,000 annually for 50% grants to municipalities to protect scenic or ecological sites from development.

  Streambank Protection - $1M annually to WDNR to purchase streambank easements of at least 66 feet and to provide fencing.

Federal:

- EPA Clean Lakes Program (appropriations pending). Limited amount of cost share funding for planning and implementing public lake protection and restoration projects. WDNR must apply for the funds on behalf of lake organization. Requires EPA feasibility study.

- US Army Corps of Engineers. Can provide limited cost share funds to states to support selected aquatic plant management projects. Must be identified by WDNR as high priority and have an in-depth aquatic plant management plan.

- USDA (1985 Federal Farm Bill). Program to take

APPENDIX VI
(Continued)

land out of agricultural production. While these funds go to individual farmers, lake leaders may want to encourage farmers to use these programs. Conservation Reserve Program is purchasing the right to keep some Wisconsin farmland out of cultivation for 10 years. County office administers the program.

- FmHA Loan program to farmers in exchange for Conservation Easements. Long-term easements take land adjacent to wetlands, lakes and streams out of production. Annual multi-year set-aside programs.

- SCS. Beginning in 1983, SCS has provided large grants to selected areas to enhance water quality.

Miscellaneous:

Programs that might be useful in certain situations include: Trout Stamp land purchase program (WDNR), Water Bank Program (ASCS), water safety patrol aids (WDNR), Land and Water Conservation Fund (US Dept. of Interior and WDNR), Forest Incentive Program (ASCS), Mining Investment and Local Impact Fund (Wis. Dept. of Revenue) and Septic Tank Replacement Program (WDNR).