Lac La Belle

Planning Grant

Developed For The

Lac La Belle Management District

1993

By

Aron & Associates

26111 W. Loomis Rd

Wind Lake, WI 53185

Lac La Belle Planning Grant

Introduction -

In 1991 the Lac La Belle Management District (LLMD) applied for, and received a Wisconsin Lake Management Planning Grant. The LLMD grant application contained three primary components. Each component would develop a publication for area distribution.

- Recreational Use surveys including riparian boat counts, access surveys, lake use surveys and public education.
- Sensitive and environmentally important areas and ordinance development, including survey of adjacent landowners, and public education.
- Compile and review water quality data, and public education.

The grant was later amended to publish one "Lake Book" that would encompass each of the three educational components, and would provide a more complete picture of Lac La Belle.

RECREATIONAL USE

The Recreational Use section was comprised of four components.

- Lake District Survey
- Public Access Survey
- Riparian Boat Count
- Recreational Use Counts

Lake District Survey

In fall 1990, the LLMD, in cooperation with the City of Oconomowoc Recreation Department, distributed a survey to all the residents and property owners. The district wanted to find out how residents felt about the lake, the level of use, and the expectations and concerns they may have about their lake. A total of 650 were mailed out by direct mail. 210 surveys were returned, for a response rate of 32%. The actual survey and the results are included in Appendix A. Although the survey itself was not part of this planning project, the review of the survey in the context of the surveys under this project, is a part of this project. Figures 1 through 7 illustrate the results of the survey as it was presented to district residents.

Public Access Survey

In summer of 1991, a survey of public access users was undertaken. After the proposed survey was reviewed by Bob Wakeman, Department of Natural Resources (DNR) and University of Wisconsin Extension (UWEX) specialists, the survey was printed for distribution. A total of 350 surveys

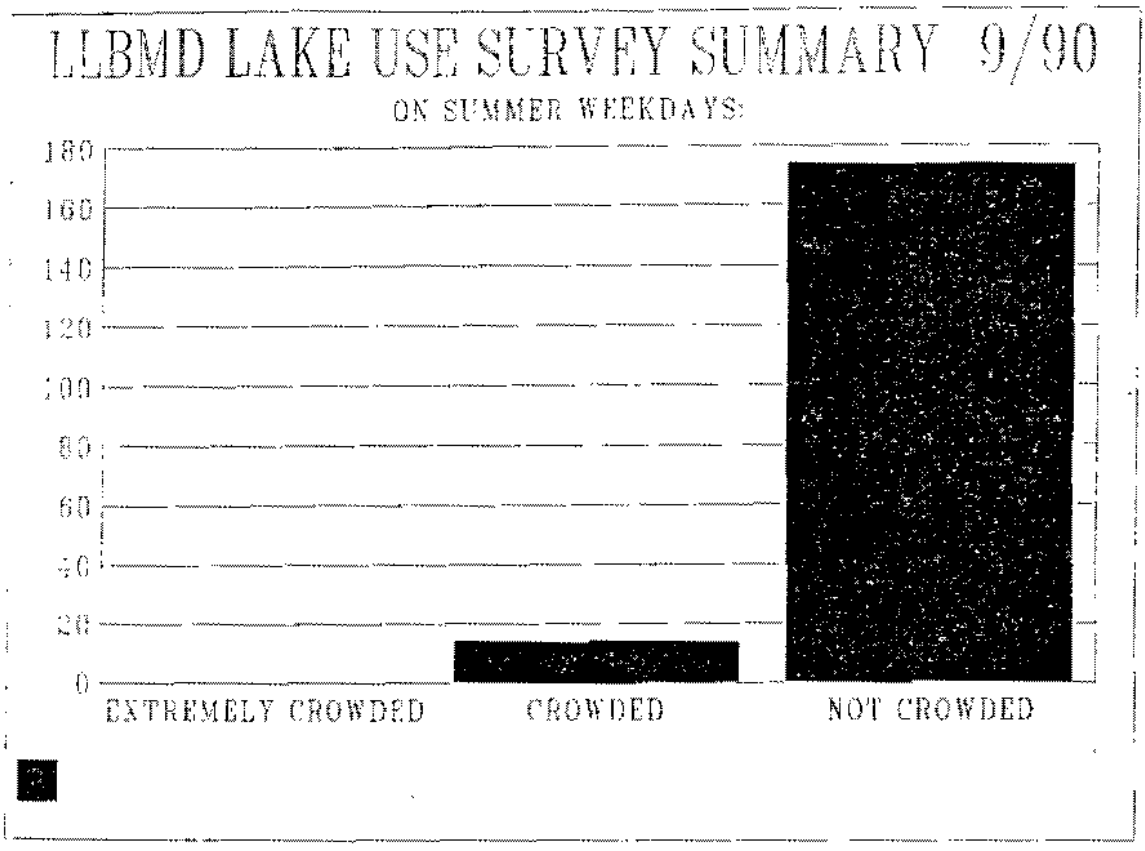


Figure 1

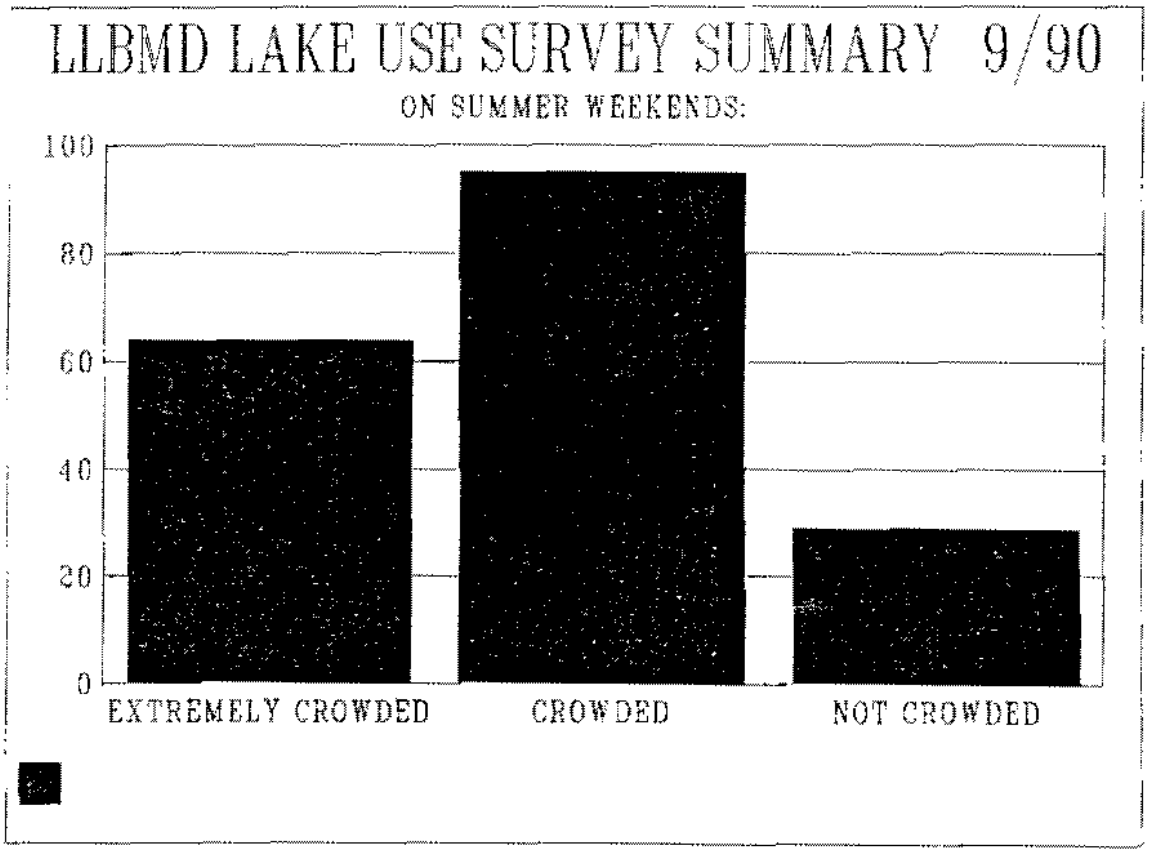


Figure 2

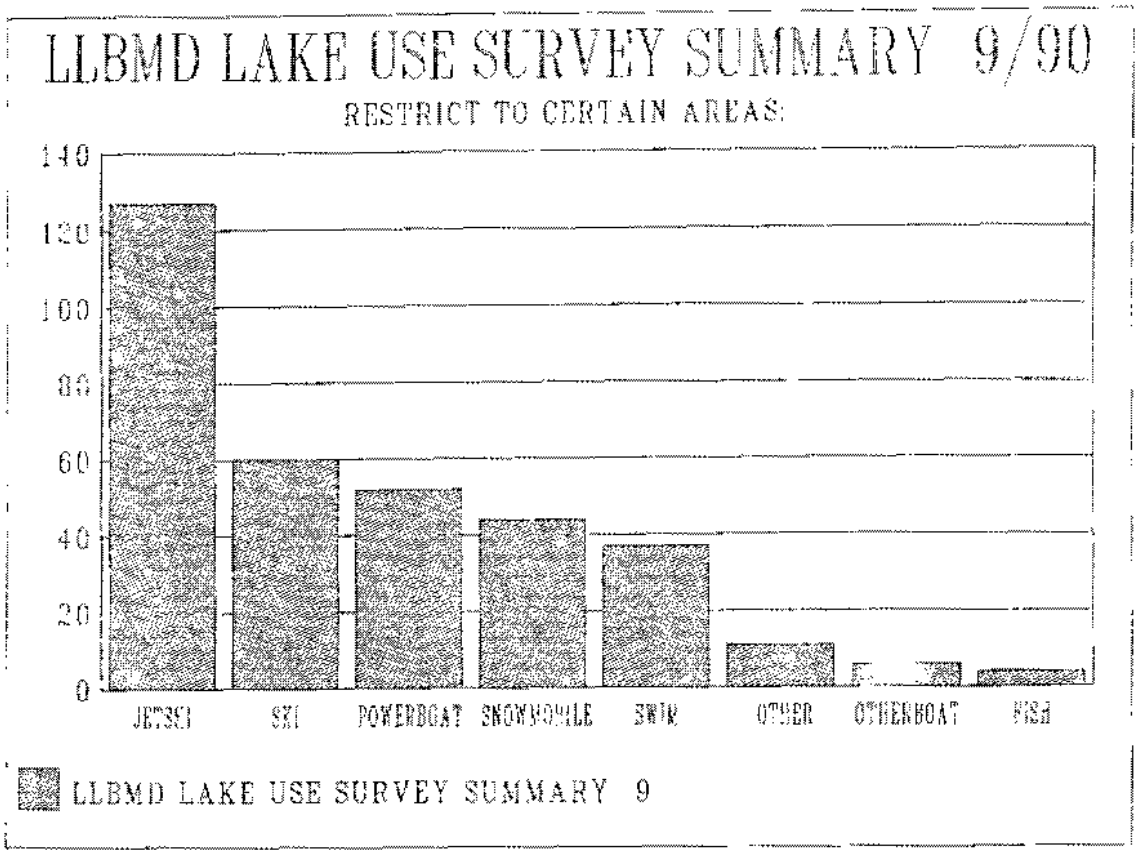


Figure 3

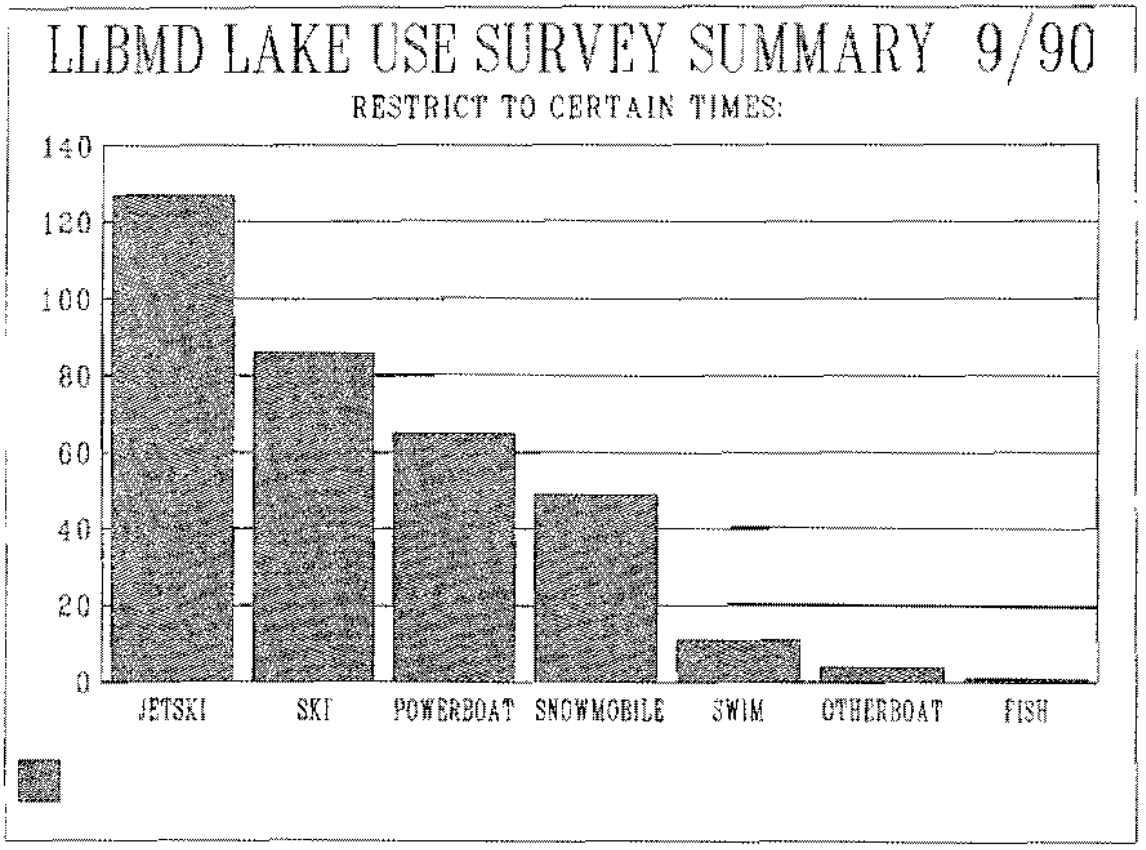


Figure 4

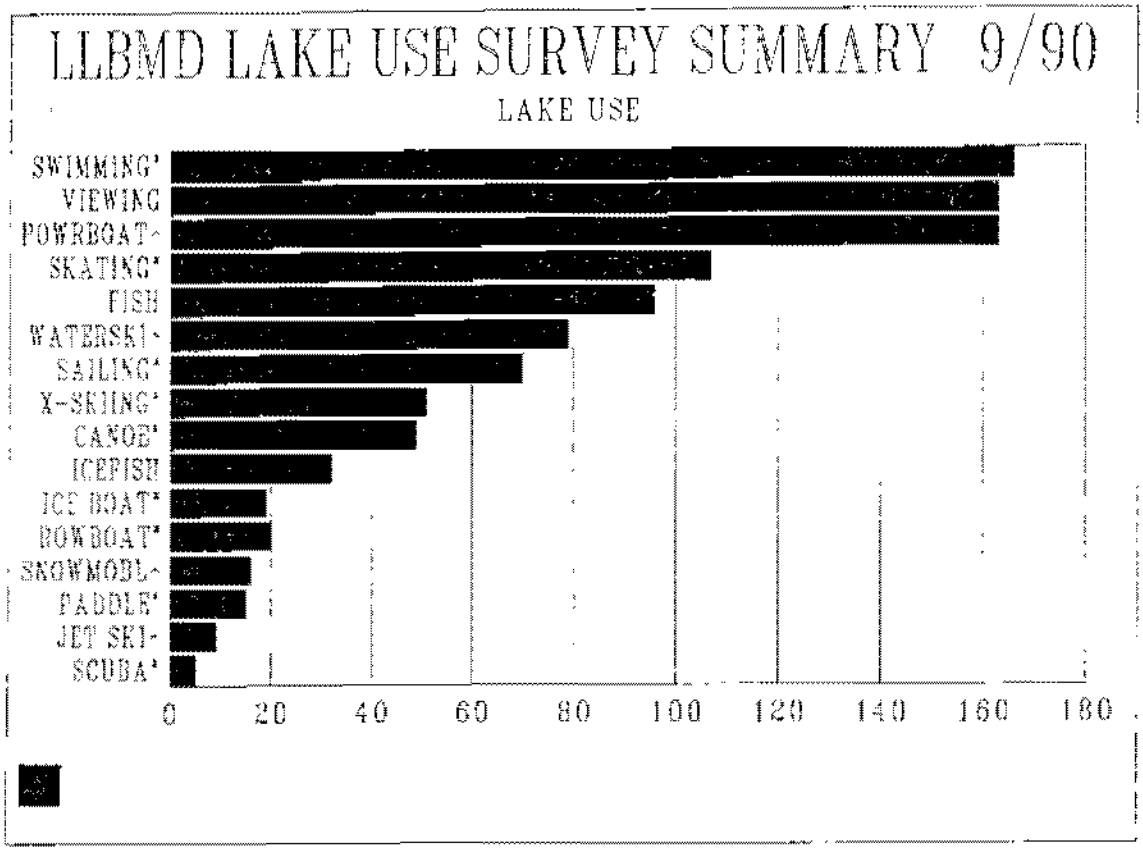


Figure 5

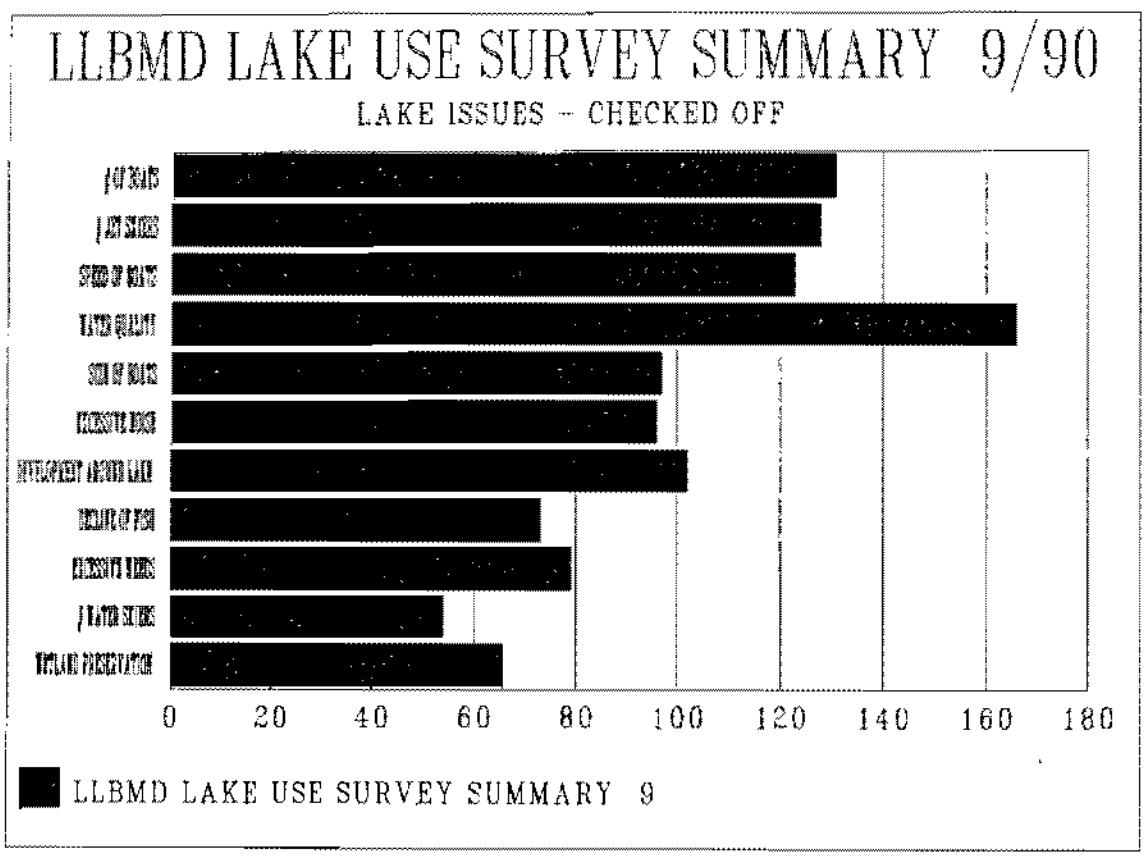


Figure 6

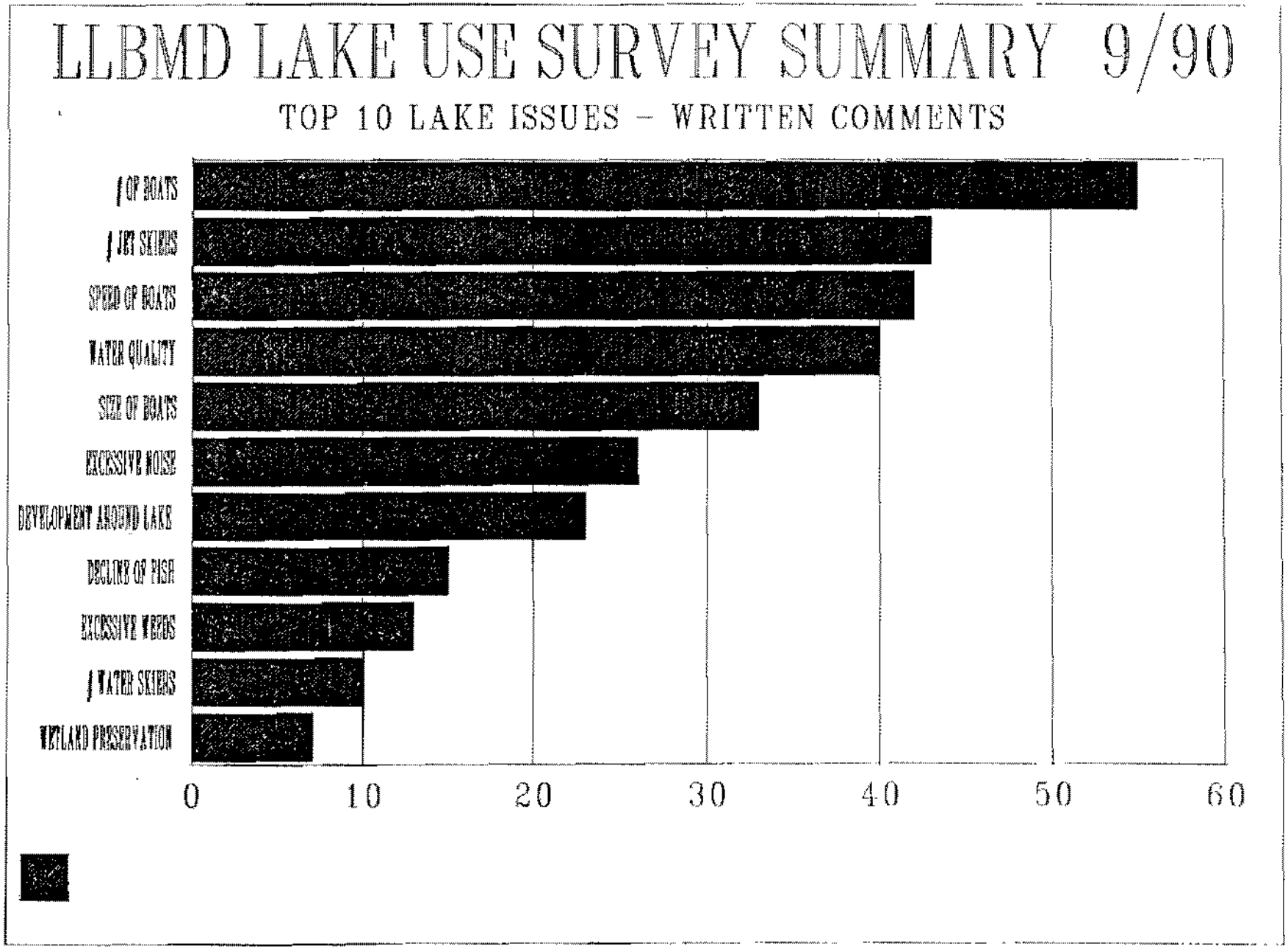

LLBMD LAKE USE SURVEY SUMMARY 9/90
TOP 10 LAKE ISSUES – WRITTEN COMMENTS
OF BOATS
JET SKIERS
SPEED OF BOATS
WATER QUALITY
SIZE OF BOATS
EXCESSIVE NOISE
DEVELOPMENT AROUND LAKE
DECLINE OF FISH
EXCESSIVE WEEDS
WATER SKIERS
WETLAND PRESERVATION
0
10
20
30
40
50
60

Figure 7

were printed and distributed to anyone launching boats at the City of Oconomowoc launch site during the summer of 1991. City staff distributed the surveys when launch fees were paid. Recipients could complete the survey at their leisure and return by first class mail. Surveys were pre-stamped with first class postage. A total of 68 were completed and returned for a response rate of 19 %. The actual survey that was distributed and the complete results of the survey are included in Appendix B.

Riparian Boat Count

A riparian boat count was conducted on Lac La Belle in summer of 1991. The count was done on a low riparian use day, Tuesday June 30, 1991. All boats moored at shorelines, pier, on shorelines, or in boat houses (if visible) were counted.

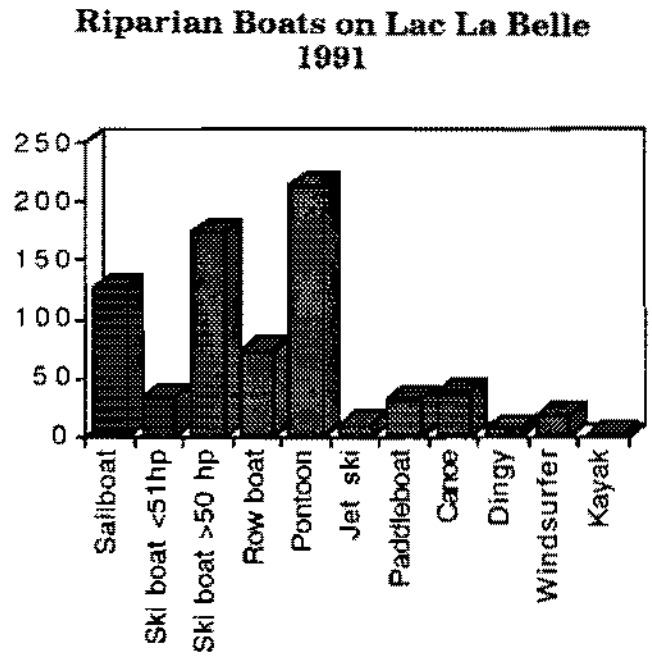


Figure 8. The total number of water craft located on or adjacent to the shore of Lac la Belle, 1991.

A total of 727 water craft were counted during the survey. There were four boats out on Lac La Belle during the survey, each was interviewed to determine residency, and included in the final counts. The district should count the riparian boats on an annual or semi-annual basis.

Recreational Use Counts

A recreational use count was also conducted as part of this planning project. The goal of this was to ascertain the highest use levels that were occurring, and advise the district as to protection efforts. The assumption was made that the highest existing levels would be indicative of increased lake use over time. The counts were taken primarily on holidays and weekends. A Wednesday night use count was also done. As many as 300 boats congregate at the south end of the lake for the band shell concerts at the City Park on Wednesday evenings throughout the summer.

Recreational use was classified into the following categories of use:

- Sailing
- Fishing
- Water-skiing
- Pontooning
- Fast boating
- Swimming
- Jet skiing
- Shorefishing
- Scenic viewing
- Other (paddle boating, canoeing, wind surfing)

Figures 9 through 14 show the numbers seen within each category by time. The average count of boats per weekend day are shown in Figures 9 and 10. The highest number of boats were found between 4:00 PM and 6:00 PM with fast boating being the highest number found.

Figures 11 and 12 show the total boats counted by time period during the project period. Figures 13 and 14 illustrate all of the totals counted for the various lake use activities on weekends in 1991. Actual counts are included in Appendix C.

These counts vary significantly from those documented by Randy Schumacher and Sue Beyler of the Wisconsin Department of Natural Resources (DNR). A lake use survey was conducted in 1992 as part of a creel survey. 1992 was a significantly cooler, wetter summer and many lakes saw reduced lake use levels. This may be reflected in the numbers presented by the DNR report.

Additional Investigations

The City of Oconomowoc operates a lake patrol on Lac La Belle. The Village of Lac La Belle and the Town of Oconomowoc contribute financially to the patrol costs. The Lake Patrol Chief was interviewed as part of this project, to determine the level of patrol and the philosophy behind the patrol.

The patrol has two boats, one located permanently on Lac La Belle. The part time lake patrol officers vary the hours on patrol. The patrol responds to

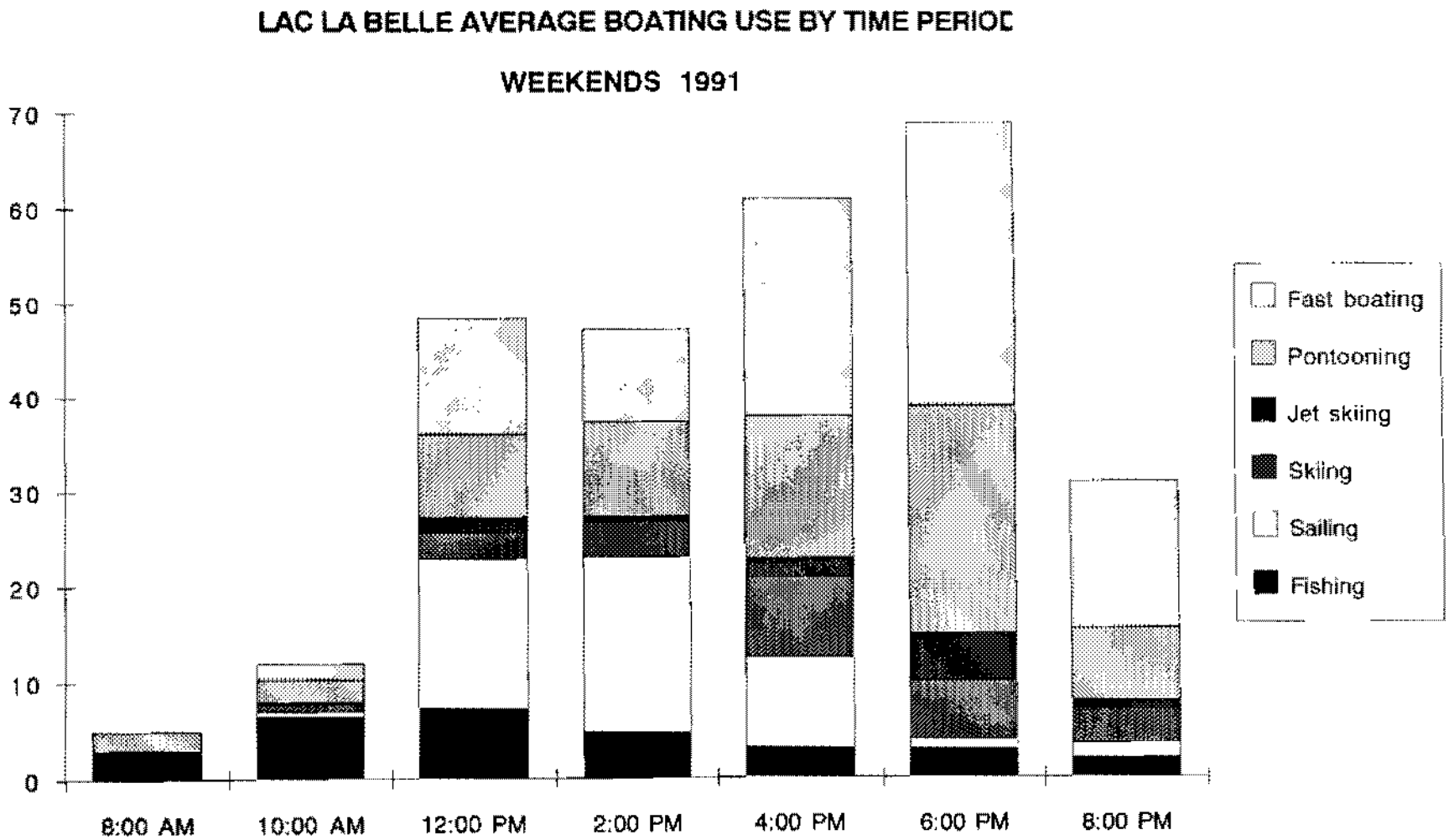

LAC LA BELLE AVERAGE BOATING USE BY TIME PERIOD
WEEKENDS 1991
70
60
50
40
30
20
10
0
8:00 AM
10:00 AM
12:00 PM
2:00 PM
4:00 PM
6:00 PM
8:00 PM
Fast boating
Pontooning
Jet skiing
Skiing
Sailing
Fishing

Figure 9

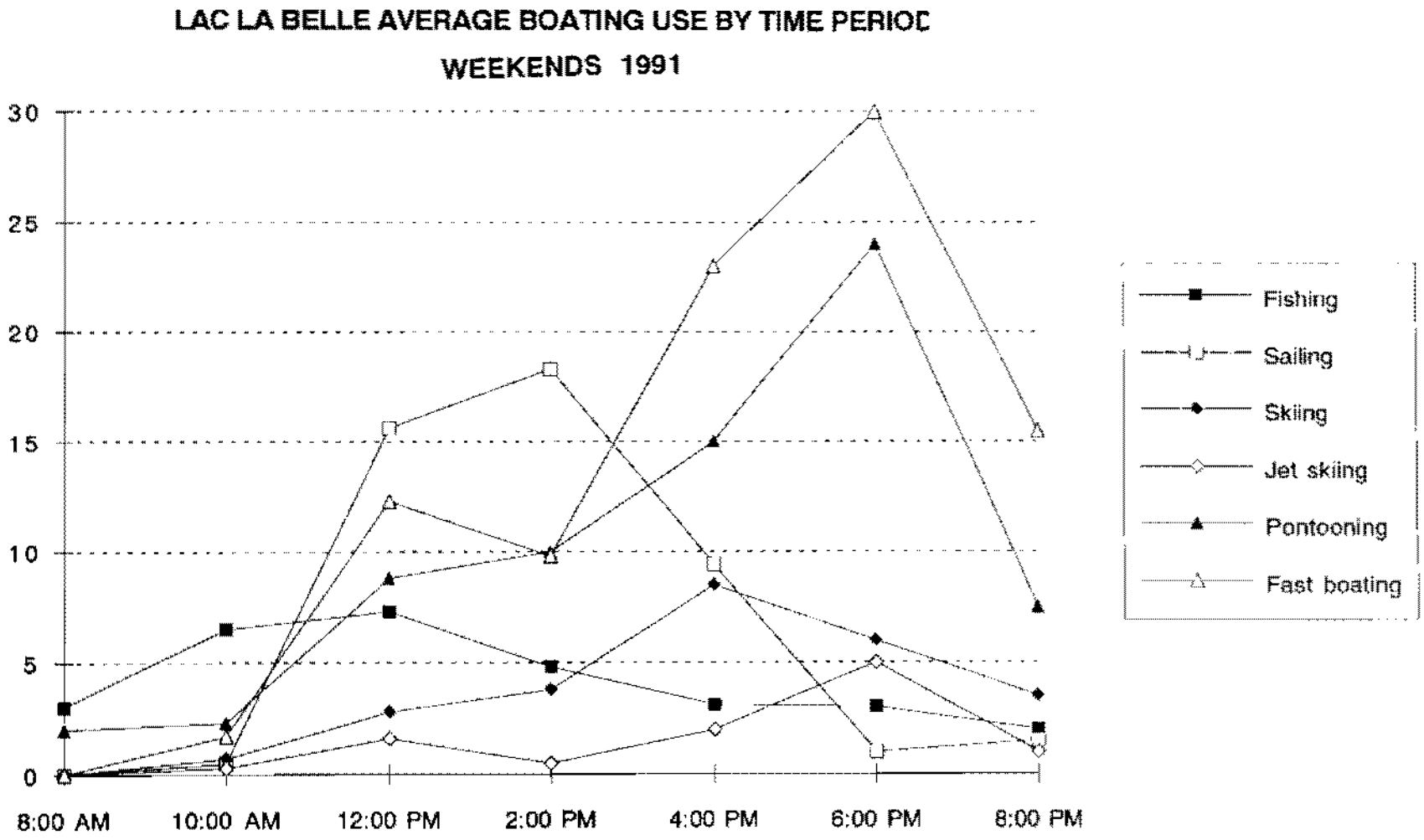

LAC LA BELLE AVERAGE BOATING USE BY TIME PERIOD
WEEKENDS 1991
30
25
20
15
10
5
0
8:00 AM
10:00 AM
12:00 PM
2:00 PM
4:00 PM
6:00 PM
8:00 PM
Fishing
Sailing
Skiing
Jet skiing
Pontooning
Fast boating

Figure 10

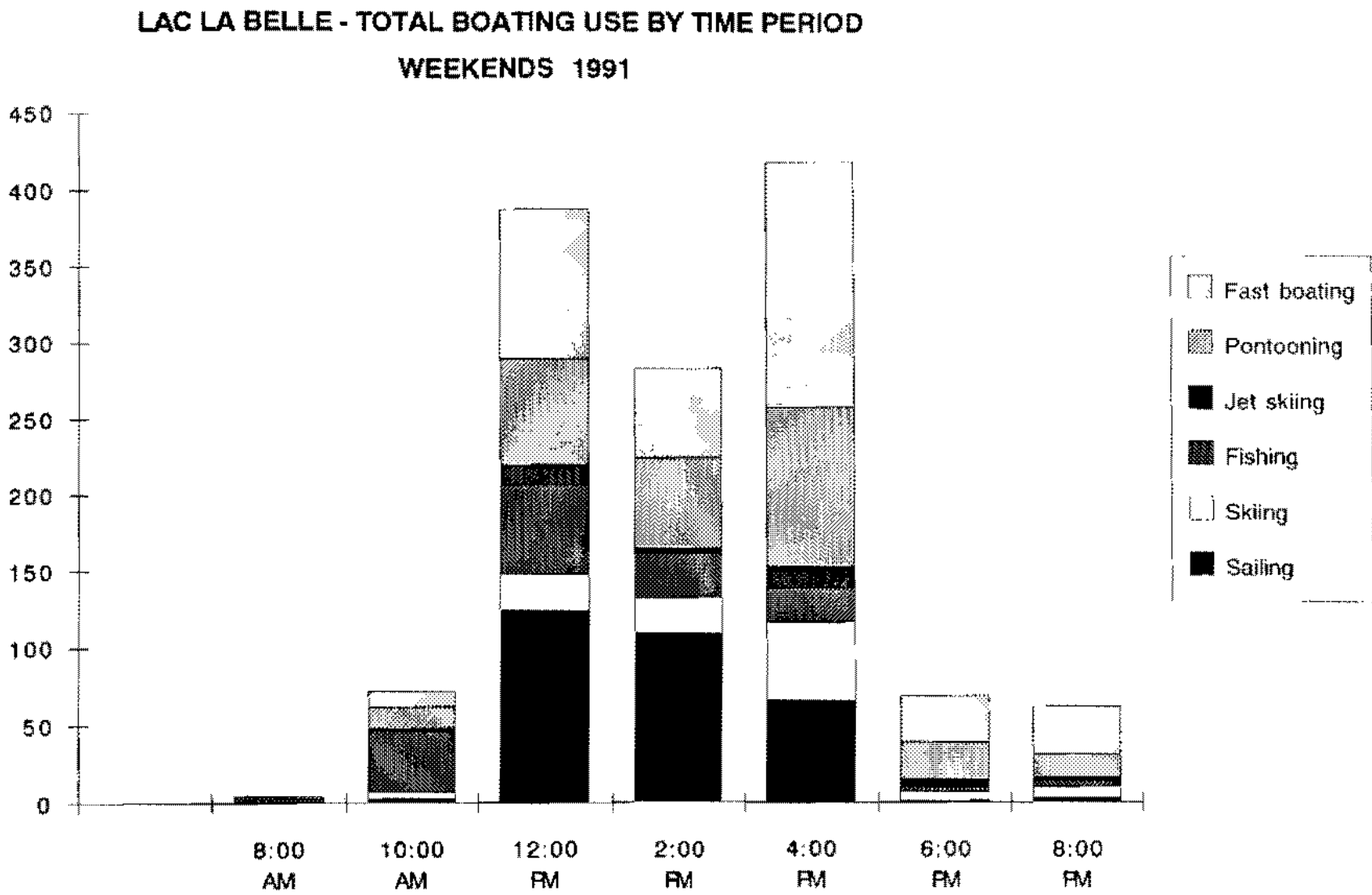

LAC LA BELLE - TOTAL BOATING USE BY TIME PERIOD
WEEKENDS 1991
450
400
350
300
250
200
150
100
50
0
8:00 AM
10:00 AM
12:00 PM
2:00 PM
4:00 PM
6:00 PM
8:00 PM
Fast boating
Pontooning
Jet skiing
Fishing
Skiing
Sailing

Figure 11

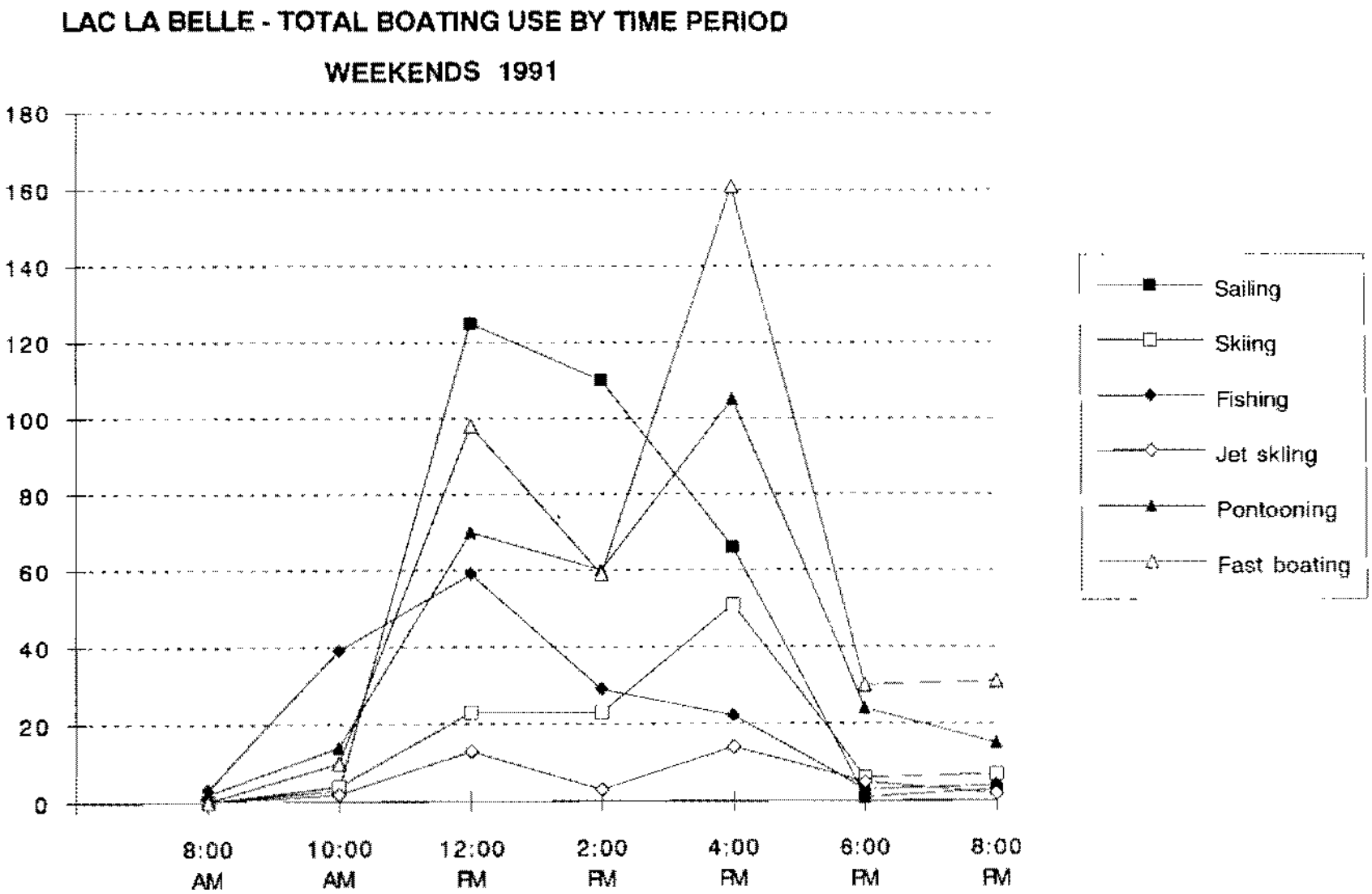

LAC LA BELLE - TOTAL BOATING USE BY TIME PERIOD
WEEKENDS 1991
180
160
140
120
100
80
60
40
20
0
8:00 AM
10:00 AM
12:00 PM
2:00 PM
4:00 PM
6:00 PM
8:00 PM
Sailing
Skiing
Fishing
Jet skiing
Pontooning
Fast boating

Figure 12

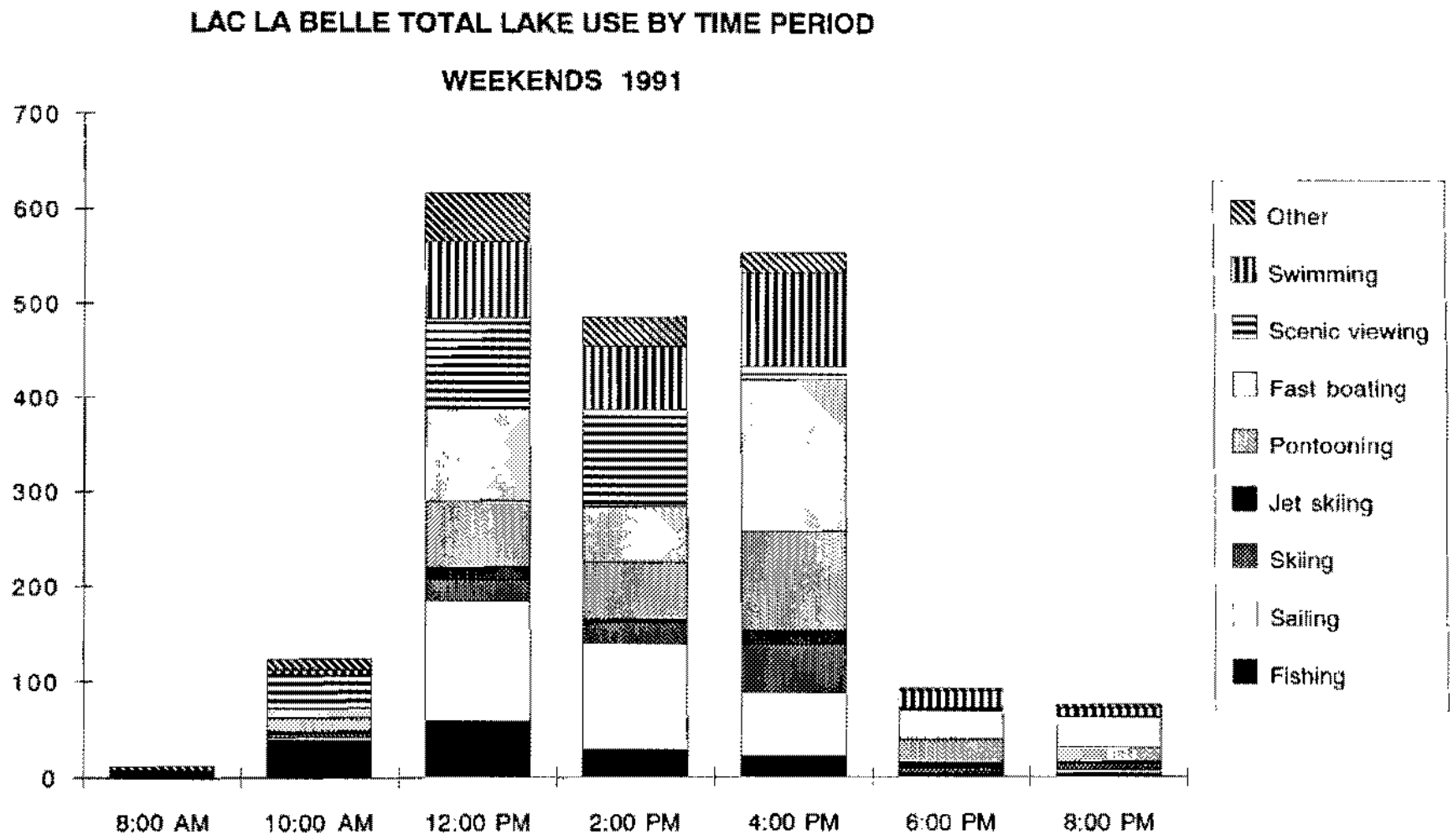

LAC LA BELLE TOTAL LAKE USE BY TIME PERIOD
WEEKENDS 1991
700
600
500
400
300
200
100
0
8:00 AM
10:00 AM
12:00 PM
2:00 PM
4:00 PM
6:00 PM
8:00 PM
Other
Swimming
Scenic viewing
Fast boating
Pontooning
Jet skiing
Skiing
Sailing
Fishing

Figure 13

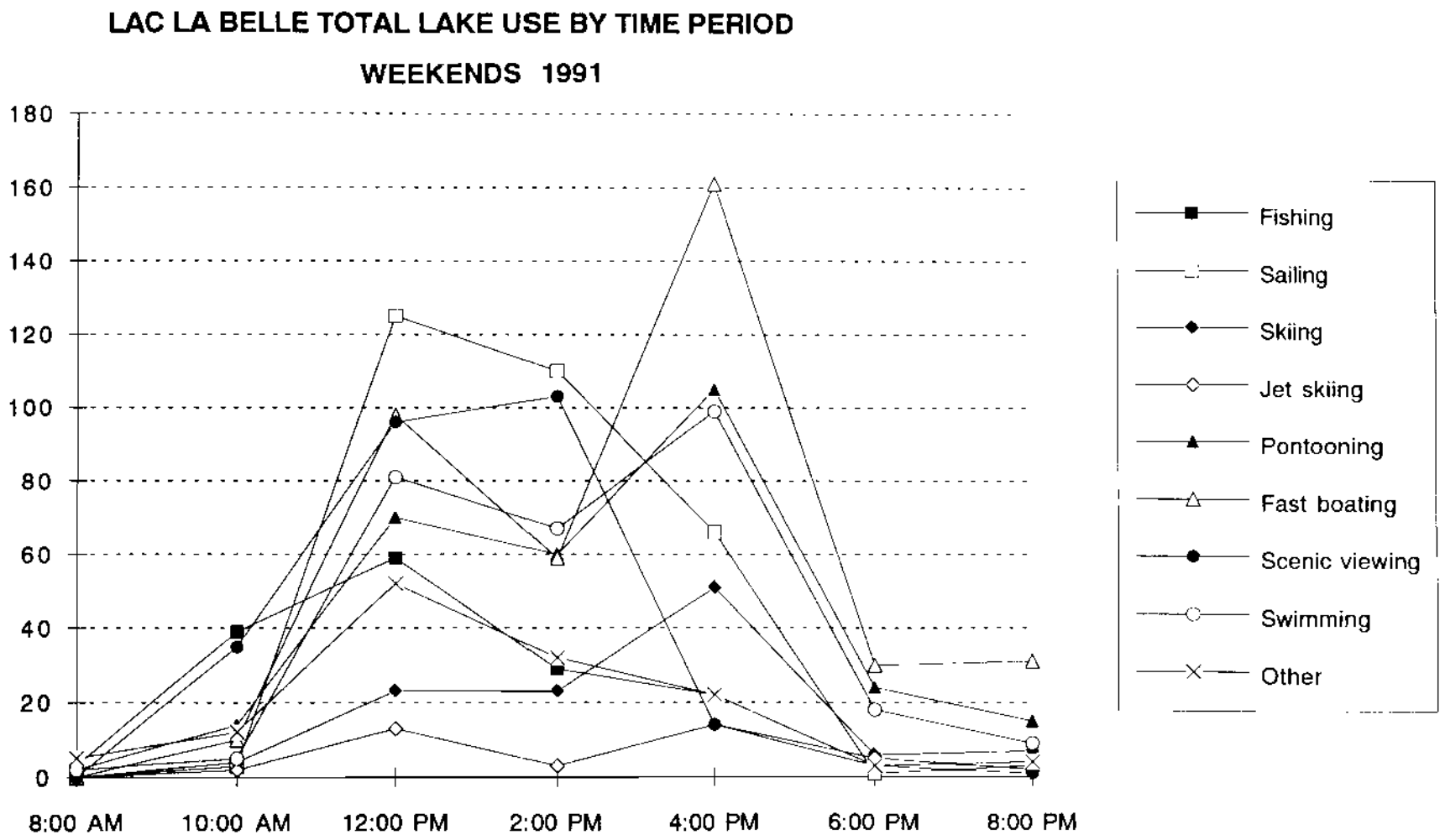

LAC LA BELLE TOTAL LAKE USE BY TIME PERIOD
WEEKENDS 1991
180
160
140
120
100
80
60
40
20
0
8:00 AM
10:00 AM
12:00 PM
2:00 PM
4:00 PM
6:00 PM
8:00 PM
Fishing
Sailing
Skiing
Jet skiing
Pontooning
Fast boating
Scenic viewing
Swimming
Other

Figure 14

complaints from residents. That is supplemented by sporadic patrol times. The patrol indicated that one major problem area is that lake users often have difficulty determining distance from shore. The district may want to consider requesting slow no wake buoys be installed periodically around the lake to provide references for lake users. The Lake Patrol was generally supportive of possible changes to the boating ordinance. The patrol feels that "reasonable and prudent" is very difficult, if not impossible to enforce. They would prefer "slow no wake". A 45 mph daytime speed limit would not in their opinion, prohibit water-skiing and could be enforced. The patrol feels that many of the problems on the lake come from those who have not taken the boater safety courses.

During our field inspections and surveys, the lake patrol was observed on the lake twice. The first instance they were on the lake for about an hour and a half. The patrol cruised the shoreline area, and were not seen making any stops. At least two safety violations occurred in the general vicinity of the patrol, but were apparently unnoticed. The second time the patrol was seen occurred during a Wednesday evening band concert.

SENSITIVE AREAS

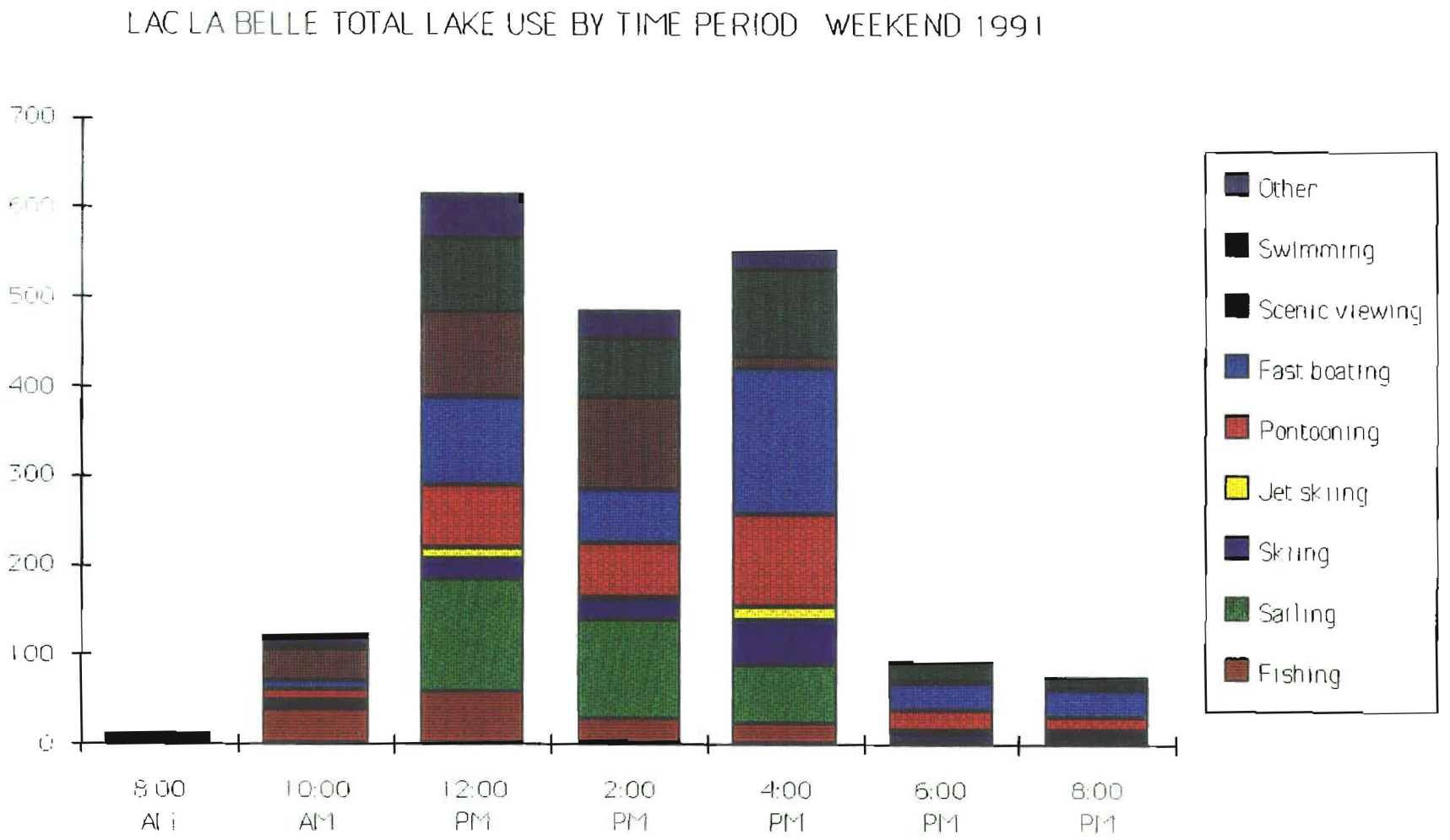
Another component of the project was a review of the DNR's sensitive areas for Lac La Belle, and the impact recreational users had on the lake during times of high activities, considering lake depth, sediments, aquatic plants, etc.

Sediments

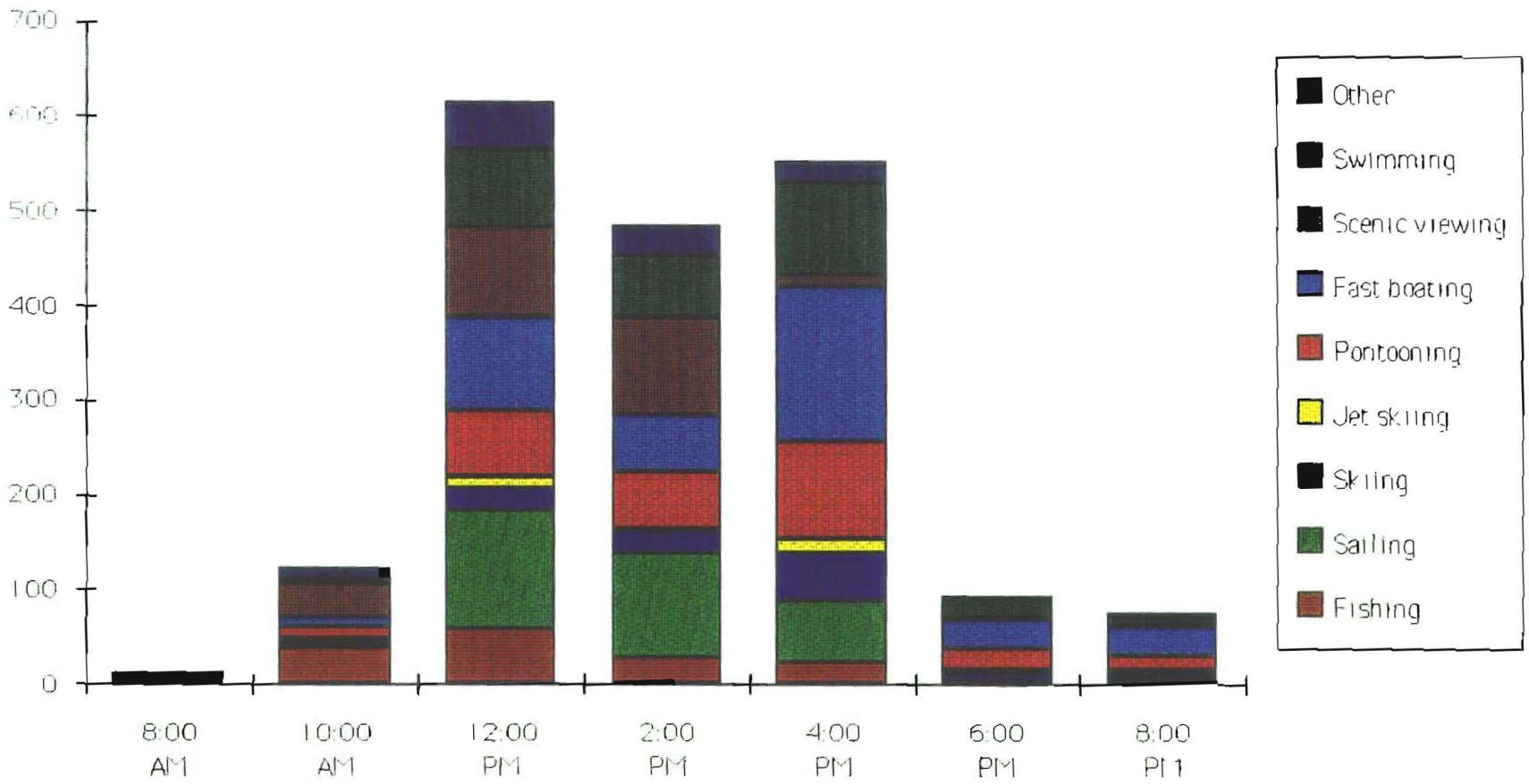
Sediment cores were taken to determine the depth of the materials, and to determine if there were sediments suitable for plant growth underneath the actual lake bed. The question was raised as to whether dredging could be used as a plant management improvement tool, and whether the dredging would unearth more suitable substrate, or provide a location for material and debris to settle.

The sediment cores were taken at various points around the lake (see Figure 15). Most of the areas contained sand, gravel, and marl substrates, with lower depths of substrate containing blue-gray clay. One of the exceptions to the sand and gravel areas were the areas that had been dredged in years back. The Mary Lane area, a mushroom shaped channel contained muck and peat to depths of twelve feet, then the lower substrates contained clay material. Immediately outside the dredged area the sand and gravel substrate was intact, although it contained somewhat more muck and silt. Another dredged area was the old 'mailboat' channel. A long narrow channel that extends almost due north from the south shore south of Islandale, the channel contains high amounts of silt and muck, immediately bordered by the sand and gravel substrates. The Rosenow Creek inlet had four feet of very black muck and silt. The underlying

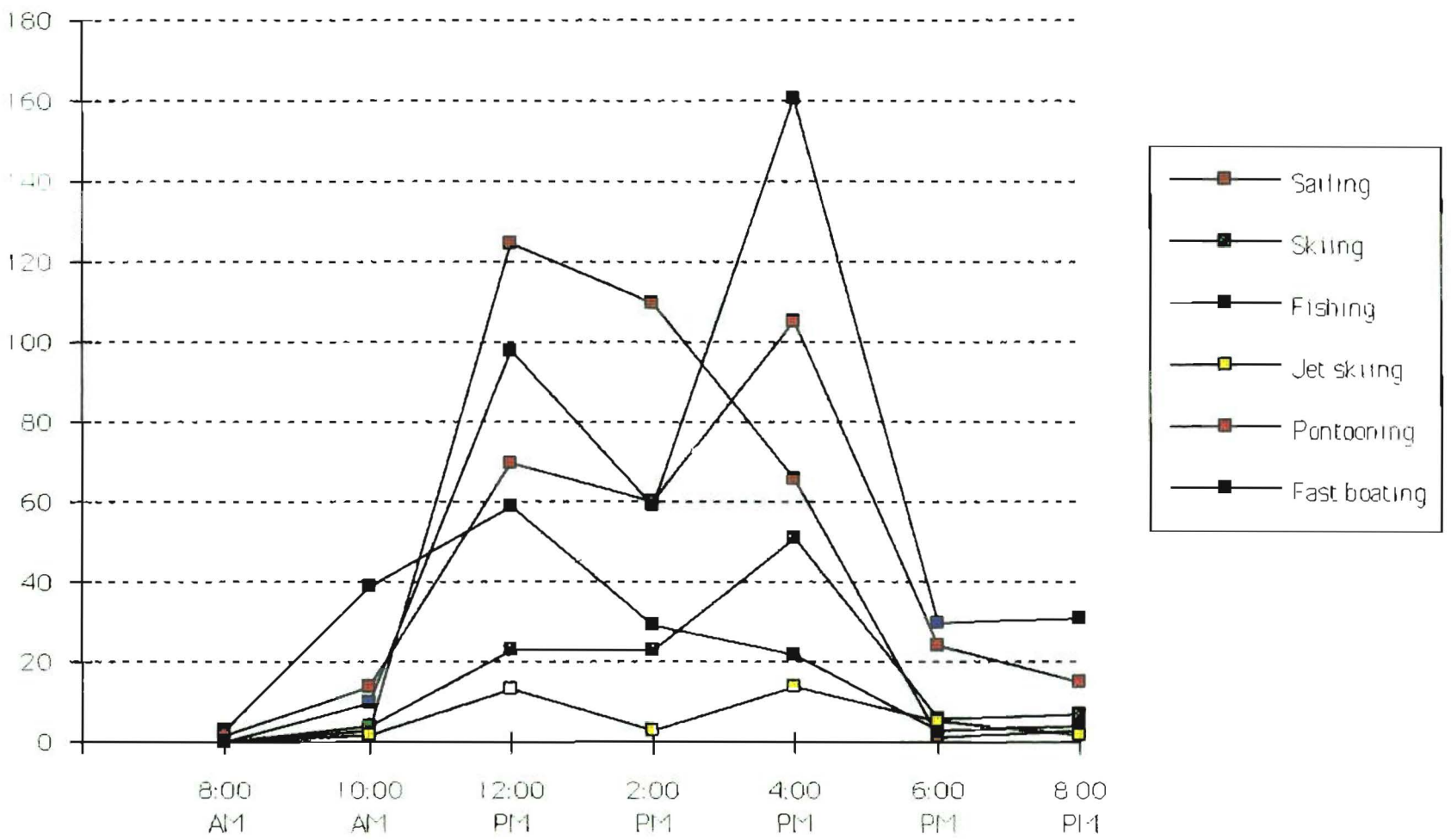
LAC LA BELLE TOTAL LAKE USE BY TIME PERIOD


LAC LA BELLE TOTAL LAKE USE BY TIME PERIOD WEEKEND 1991
700
600
500
400
300
200
100
0
8:00 AM
10:00 AM
12:00 PM
2:00 PM
4:00 PM
6:00 PM
8:00 PM
Other
Swimming
Scenic viewing
Fast boating
Pontooning
Jet skiing
Skiing
Sailing
Fishing

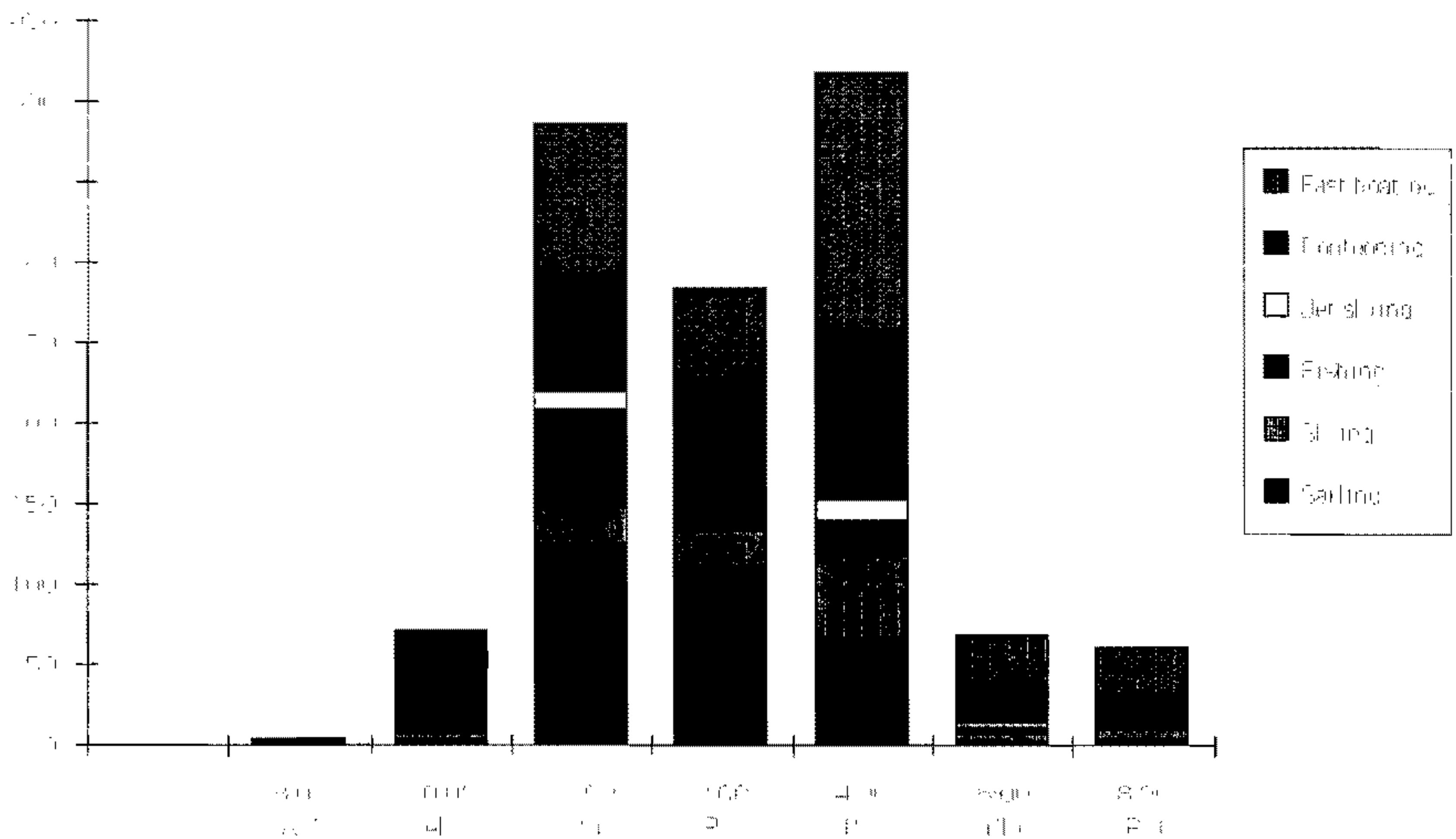
LAC LA BELLE TOTAL LAKE USE BY TIME PERIOD WEEKEND 1991



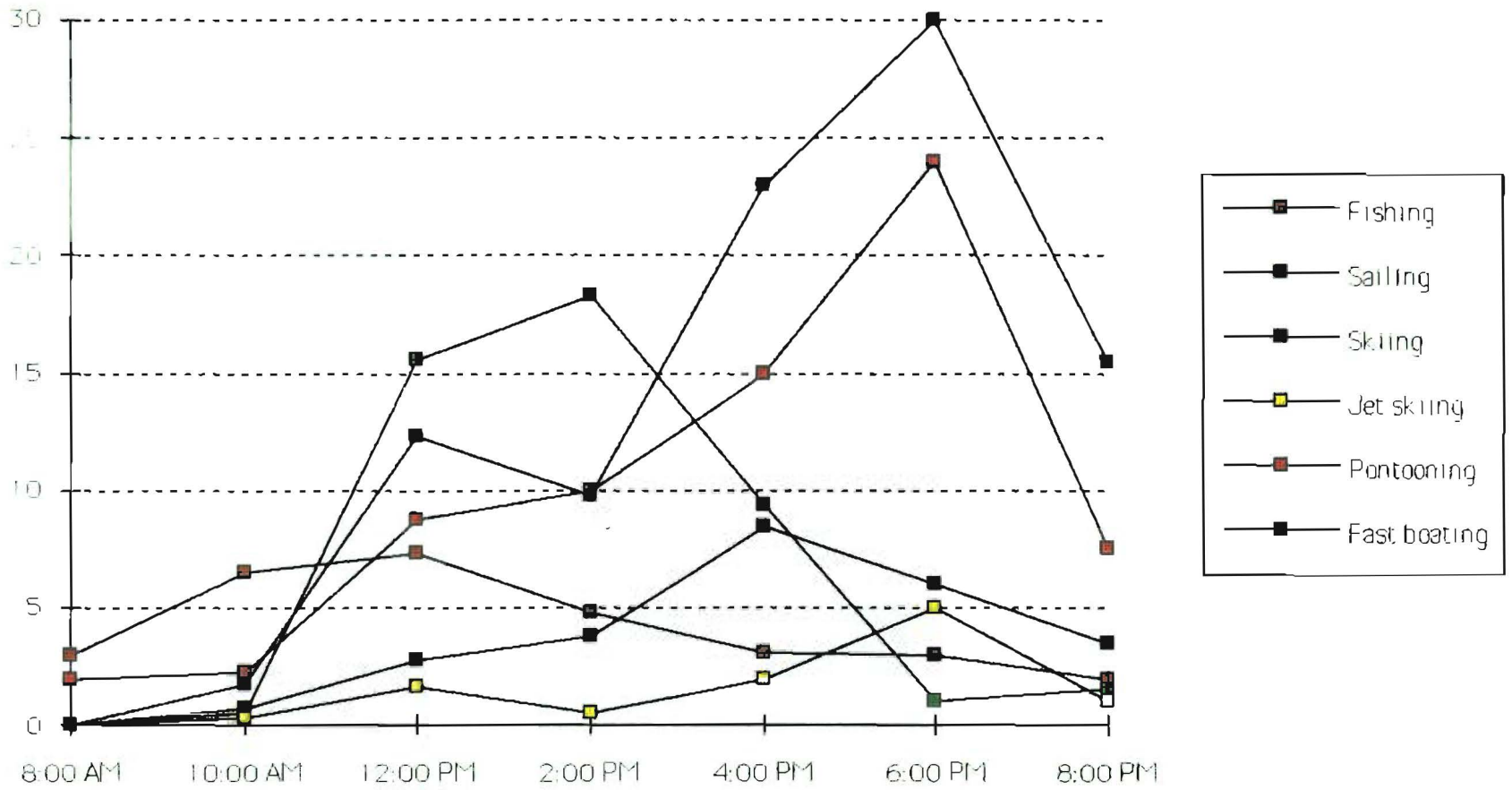
LAC LA BELLE - TOTAL BOATING USE BY TIME PERIOD WEEKENDS 1991



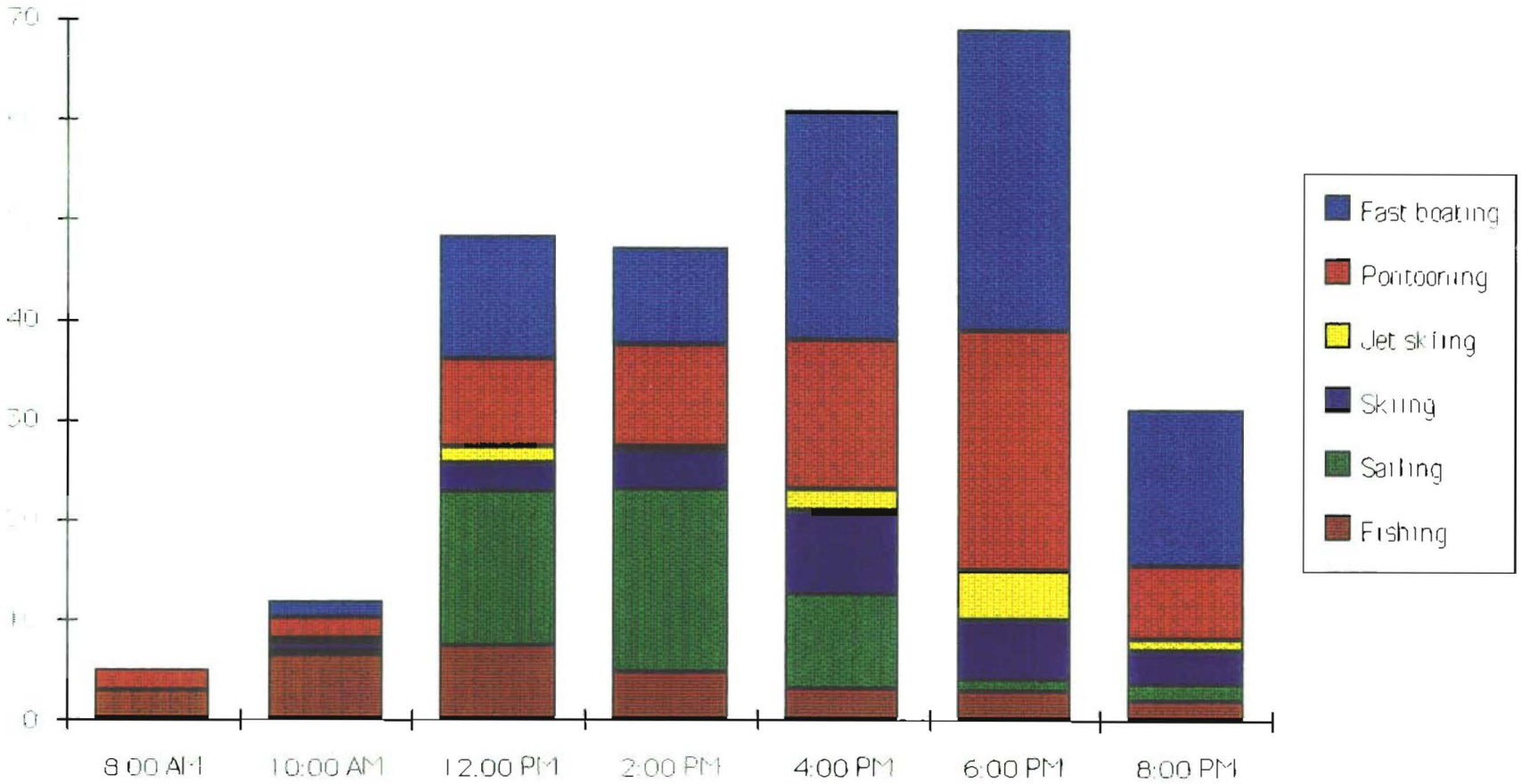
LAC LA BELLE – TOTAL BOATING USE BY TIME PERIOD – WEEKENDS 1991



LAC LA BELLE AVERAGE BOATING USE BY TIME PERIOD



LAC LA BELLE AVERAGE BOATING USE BY TIME PERIOD



Locations of Sediment Sampling - Lac La Belle

Figure 15

substrate was clay. The channel near the city boat launch contained silt and muck.

Clay substrate was found under all of the sample points. It appears that wave action and lake currents transport the sediment and debris into the dredged areas where they create a good support material for aquatic plant growth. Plants located within the dredged areas were generally larger, and more diverse than plants nearby. These plants also remained in better shape, i.e. were larger and more plentiful, as the summer progressed.

It appears that clay underlies most if not all of Lac La Belle. The sand and gravel substrate found over the clay does not encourage dense macrophyte stands. Historical dredging has ultimately provided areas of healthy plants in a lake with few plants. Although highly unusual from a plant management perspective, dredging may be a means of improving the aquatic plant habitat that should be seriously considered.

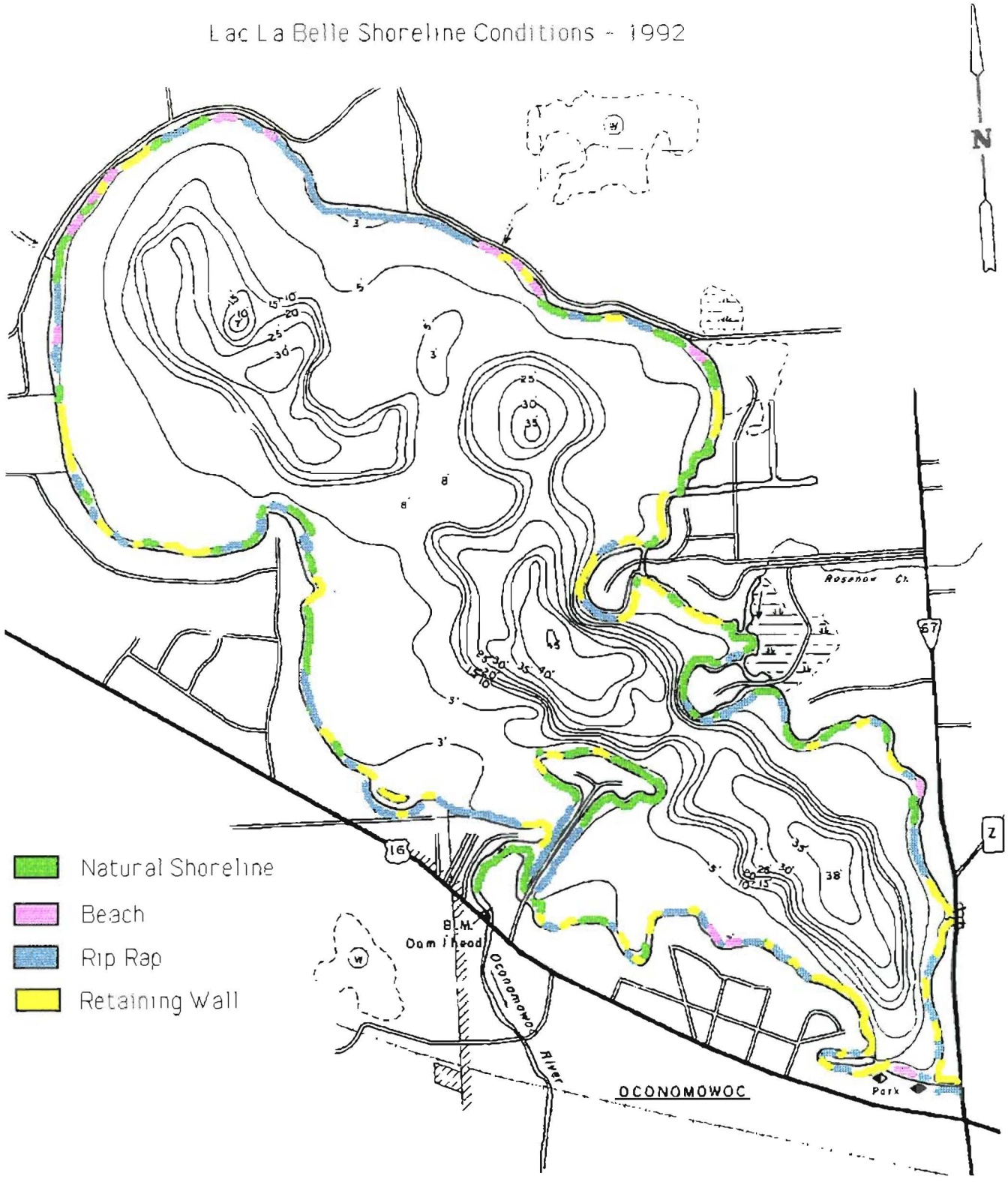
Shorelines

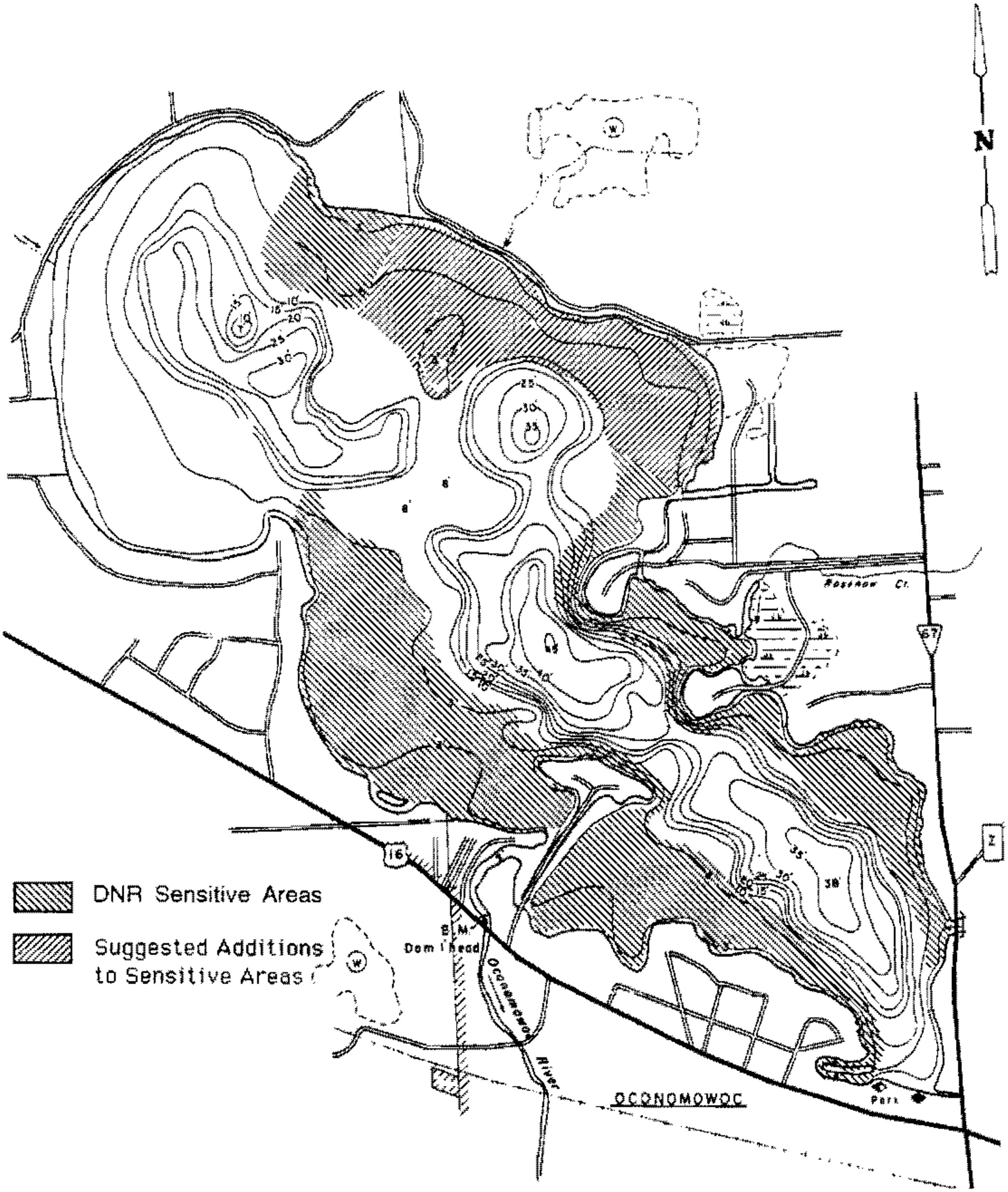
The shoreline of Lac La Belle were surveyed. The results are shown in Figure 16. Much of the shoreline has been altered, using either seawalls or rip rap. Seawalls provide no habitat for fish fry, or macro invertebrates. They also do little for the aesthetic value of the lake. Rip rap does provide nooks and crannies that can be used by fish or macro invertebrates, however, it is often unnatural in appearance. A few beaches can be found around the lake. The rest of the natural shoreline should be protected. Information should be provided to landowners to illustrate the value and beauty of natural shorelines. Its fish and wildlife value should also be emphasized. A large number of the natural shorelines fall outside of the DNR's Sensitive Area Designation. (see Figure 17.) Steps should be taken to prevent construction of seawalls and installation of rip rap in favor of more natural vegetation. The district should request the that the area indicated in Figure 17 be included in the DNR Sensitive Areas Designation.

Lake Use

Observations during the recreational use surveys showed that boaters use the near shore areas regularly for high speed activities. These activities included skiing, jet skiing and cruising. Significant disruption of the sediments and aquatic plants took place in each instance. The turbid conditions in the areas continued for at least the remainder of the day. In some instances these activities were taking place within the existing slow no wake areas, however, more often they took place just outside. In each situation observed, amending the slow no wake shoreline zone to that shown in Figure 18 would prevent the activity, assuming that enforcement took place.

Lac La Belle Shoreline Conditions - 1992





N
DNR Sensitive Areas
Suggested Additions to Sensitive Areas
Rosenow Ct.
67
16
Z
B.M. Dam Head
Oconomowoc River
OCONOMOWOC
Park

Figure 17

Resident Survey

After the ordinances were developed for consideration by the lake district, areas that may be considered more "sensitive" than others was determined. A list of adjacent landowners in these areas was then obtained from the lake district. The acceptance levels or needs for the ordinances would be discussed with the residents. The areas included Kohls Bay, the Islandale area, and Mary Lane. These landowners would be most affected by any proposals to restrict boat traffic. If it appeared these landowners could be "sold" on the ideas by the district after the completion of the planning grant, the ordinances would be more likely to be approved by the municipalities involved.

Property owners were contacted by phone at random, with at least 25 % responding in each affected area. There were few differences by area in the responses of the residents. Residents were generally supportive of the night time speed limit proposal. The majority of the residents did not see a need to institute a daytime speed limit unless it applied only to weekends. They saw no need to punish the relatively few week day users when the crowding and problems occurred on weekends. The residents were initially evenly split on the need for increasing the shoreline slow no wake zone. Some changed their opinion after questioning what the change would protect. Most felt that enforcement on the lake was adequate except that it could be increased on weekends. All felt the 1000 foot slow no wake zone at the boat launch had solved many of the problems in that area.

Recommendations

Based on the results of surveys, as well as personal observations of lake use problems and conditions, a number of recommendations have been developed for the LLMD. Initially a phased approached to the ordinances was considered, however the difficulty in dealing with three municipalities led to the decision to pursue the ordinances in total.

Based on the findings of the surveys conducted as part of this planning project, the district should pursue implementing the following:

- **Slow no wake on entire lake from sunset to sunrise.** This ordinance would improve the opportunity to provide safe boating experiences during nighttime hours. No wake is generally easier for the local lake patrol to enforce than "reasonable and prudent". Variations of this ordinance could include setting a fixed time of day rather that designating sunset or sunrise. Fixed evening times present a problem because of the varying length of daylight hours throughout the year. The morning time would not be as much of a problem in this respect. Increasing the amount of no wake hours, beyond sunset to sunrise, will likely meet with opposition.

Note: During this planning project period, the district pursued this suggestion and the three municipalities have now passed a 10 mph speed limit that is in effect from sunset to sunrise.

- **Create slow no wake zones on north and south edge of Islandale.** There appears to have been an overall reduction of plant densities in shallow water since at least 1987 (Aquatic Plant Survey, 1990, DNR). Reducing motorboat access may help reverse this by providing a quiet water area for native aquatic plants. Motor use in shallow areas severely disturbs the bottom sediments and plants, increasing turbidity and destroying fish habitat. This ordinance would also increase the quiet water area available for fish and wildlife. This recommendation will likely meet with some opposition from adjacent landowners. This can be minimized by an educational project to sell the concepts.

  An alternative or additional recommendation for the south side of Islandale is to:

- **Designate a traffic lane for residents on the south side of Islandale.** Confining traffic to one or two navigational channels that are clearly marked would protect large areas of the bay from repeated boating traffic. It would be anticipated that the sediments in those channels may be suspended and moved from the channel. This would create another "sink" for silt and muck in the area and may provide a base for plant growth. Should this occur, consideration should be given to then moving the channel to protect this new plant bed.

- **No motor traffic in Spauldings Channel from the bridge east.** The depth of the water in this channel is such that any motor use severely disturbs and resuspends the bottom sediments. This ordinance would create a shallow water refuge for fish and wildlife without the disturbance of motors. There are no residences or cottages along this channel that would be inconvenienced by such an ordinance.

- **Slow no wake in Kohl's Bay.** This secluded area of Lac La Belle contains beds of Water Lily and Eurasian Water Milfoil. This is one of the few areas of the lake that contains relatively dense stands of aquatic plants in water less than 8 feet deep. Minimizing motorboat impacts would benefit native plants that grow in this area. The proximity of the bay to the wetland, and the quiet water of the bay, could provide improved refuge for fish and wildlife.

- **Expanded slow no wake in Mary Lane area.** This area was dredged a number of years ago by landowners. As materials and sediment were deposited in the channel, a nutrient rich foundation for aquatic plants was created. Since this area is now used by adjacent residents for skiing, this activity would have to be shifted to waters further from shore. This would minimize the boating impact to "pass through"

boating. This should provide better growing opportunities for the pondweeds.

- **Expand size of marked shoal area and designate as slow no wake.** The areas surrounding the shoal provides spawning and fish habitat. Enlarging the area would protect the habitat and may provide better opportunity for the survival of aquatic plants. This area is relatively barren. Encouragement of emergent vegetation here would greatly improve the habitat.

- **Adopt a speed limit on Lac La Belle.** As nearby lakes restrict speeds in response to increasing lake use levels, pressure on lakes without such restrictions will likely increase dramatically. An enforceable speed limit (such as 35 mph or 40 mph) would allow multiple uses such as skiing and tubing, and would protect the safety of those engaged in other activities.

- **Extend the shoreline no wake to a minimum of 200 feet from shore, ideally 300 feet.** Because Lac La Belle has extended areas of shallow shoreline, continued boating pressures cause significant damage to the lake bottom and aquatic plants. Studies have found prop wash from boats to affect depths much greater than five feet. Buoys should be installed intermittently along this line to provide a reference for lake users.

- **Develop a lake use zoning ordinance.** Zoning areas of Lac La Belle for specific activities would protect public safety, and would provide increased protection of the resource. Specific areas could be zoned for activities such as sailing, swimming, water skiing and jet skiing, and zoning other areas as designated quiet water for low-intensive uses such as canoes, paddle boats, etc. Also, the shoreline slow no wake could be directly related to the lake depths rather than a fixed distance from shore.

  This ordinance would need to be carefully developed so as to more positively ensure its adoption. Adjacent landowners may not initially understand the value of such ordinances.

  Another option is to:

- **Develop an ordinance to define a rotational direction for water skiing in the southern half of Lac La Belle.** During high use periods, the traffic area from Islandale to the boat launch becomes very congested. Cross traffic of the conflicting boating uses creates some hazardous conditions. This ordinance would provide better consistency and safer conditions.

- **The DNR Sensitive Area restrictions should be extended to include the remaining northern shoreline.** (see Figure 17) This

shoreline area is less traveled than other areas of the lake. It's proximity to wooded areas and wetlands could encourage wildlife use if native plants were protected and expanded. This area has very few constructed retaining walls. Most of the shoreline is natural shoreline, beach and rip rap.

- **Property should be acquired for parking car-trailers near the launch.** There is currently no parking of car-trailers on the boat launch site. Car-trailers must find street parking. This contributes greatly to the backlog at the launch. Boats take up space at the public pier while owners walk some distances to retrieve their cars and trailers. Backlogs of more than 25 cars have been observed at the launch.

In the event it becomes apparent that the municipalities cannot agree upon which ordinances are needed on the lake, the district should consider:

- **Request delegation of enforcement authority from the three municipalities.** Under recent legislation, local municipalities may delegate their authority to adopt and enforce ordinances on water bodies. Because of the workload involved, this should be considered a last resort. If attempted the district should hire staff to pursue this and set up and run the program.

To expand the areas available for plant growth in Lac La Belle, the district should consider:

- **Implement a long range experimental program of spot dredging to create areas for suitable sediments for aquatic plant growth.** Certain factors should be considered in determining areas for this activity. Accessibility for dredge equipment would greatly affect the potential cost of such a program. Water flow must be considered so that the plants grown would provide seeds available for natural distribution throughout the lake.

A modification of this project could be to dredge out the native soils and replace them with sediments more conducive to plant growth. This would need to be carefully planned and implemented. Barrier curtains would need to be installed. A source of material to place in the lake would need to be located. Plants, including emergents if warranted, would need to be planted immediately. The district may wish to apply for a Lake Management Planning Grant to do this on a small scale and to make recommendations for larger scale implementation if successful.

WATER QUALITY

Over the years, a various agencies have collected water quality data on Lac La Belle. The US EPA collected data back in 1946 and since then the US Geological Survey (USGS) and the Wisconsin DNR have collected the data. Lac La Belle has been part of the DNR Long Term Trend Program.

According to the USGS report for the 1991 water year:

> • *the water quality in Lac La Belle is good to very good and can be classified as a mesotrophic lake.*
> • *Algal growth appears to be dependent upon the amount of available phosphorus rather than nitrogen.*
> • *In July and August, oxygen disappears from the bottom portion of the lake which is then unable to support a fish population.*
> • *During the summer anoxic period, there are minor amounts of phosphorus being released from the bottom sediments.*

The data has been compiled and is included in Appendix D. The trophic status index has been calculated using all the available data and can be seen in Figure 19. The index used here and elsewhere in Wisconsin has been modified from Carlson, 1977. Figure 20 graphically illustrates the secchi disk readings from 1946 to 1992. In addition to those shown in Figure 20, a volunteer monitor has taken secchi disk readings on the lake. Those results are compiled regularly by the DNR and are not included in this report.

There were a number of issues or problems identified with the data for Lac La Belle. These are listed below.

- Data not in Storet
  July 1, 1975
  Feb. 9, 1978
  April 1979
  1978

- Suspect data errors:
  April 18, 1990 - no data for 40 foot depth
  March 4, 1991 - 350 µg/l total phosphorus
  Nov. 19, 1974 - 110 µg/l total phosphorus
  April 21, 1986 - No sample taken at 45 feet, lab slips indicate only 38 ft., Storet reports the same results at 38 ft and 45 ft.
  June 13, 1986 - deep sample results missing
  July 22, 1991 - Missing top sample data, no lab sheet in file
  August 21, 1991 - Missing data

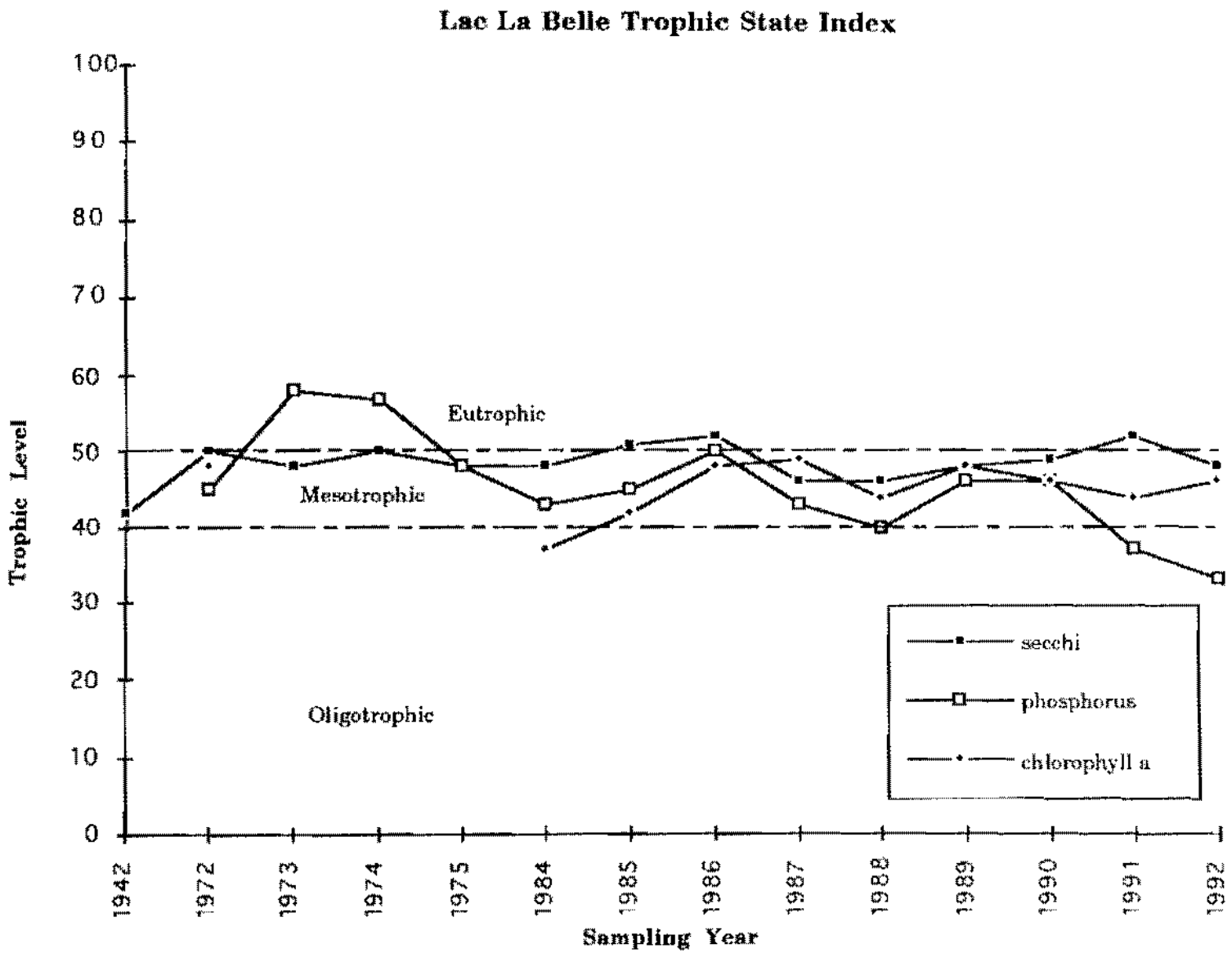

Lac La Belle Trophic State Index
Trophic Level
100
90
80
70
60
50
40
30
20
10
0
Eutrophic
Mesotrophic
Oligotrophic
secchi
phosphorus
chlorophyll a
1942
1972
1973
1974
1975
1984
1985
1986
1987
1988
1989
1990
1991
1992
Sampling Year

Figure 19

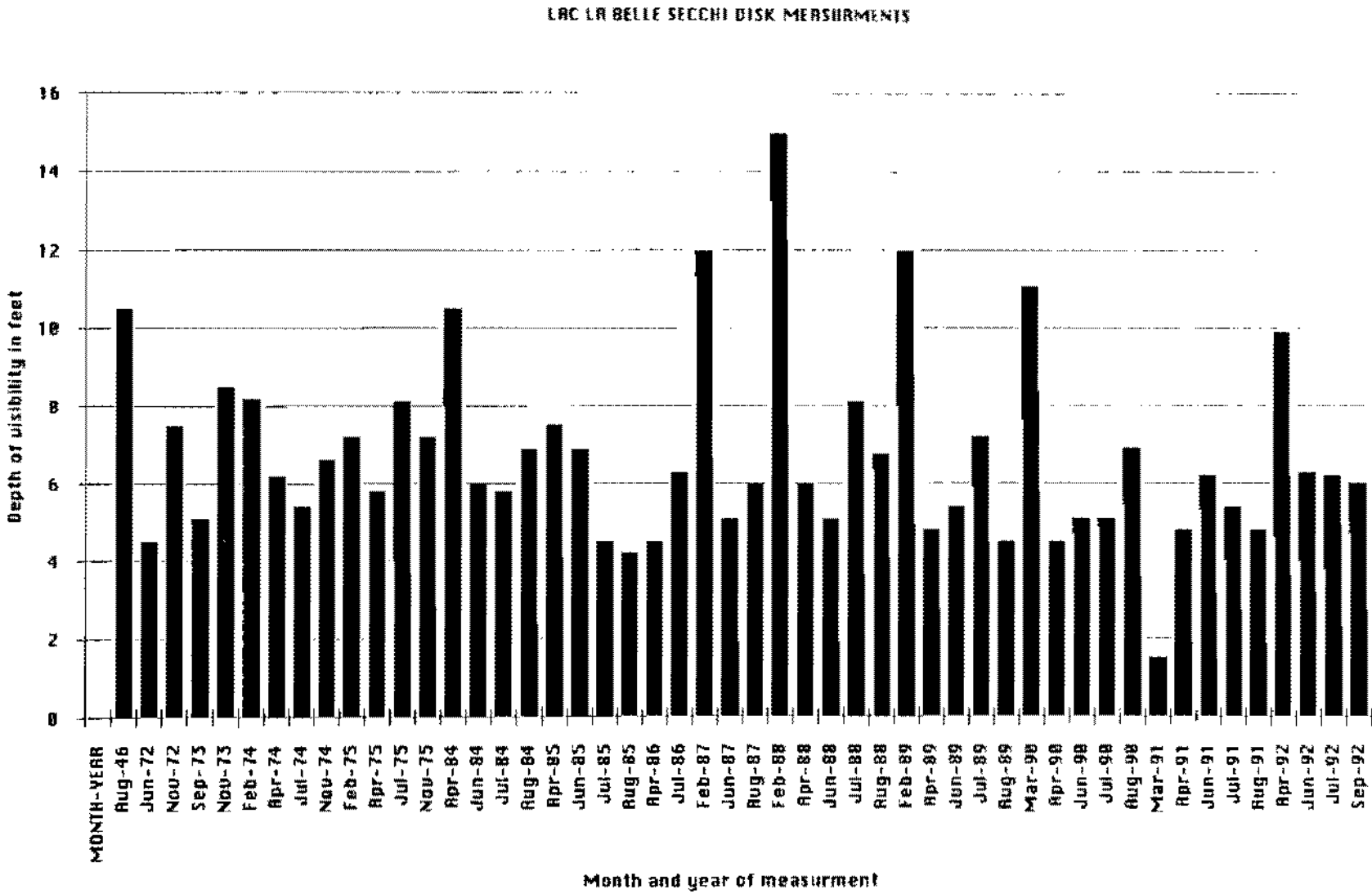

LAC LA BELLE SECCHI DISK MEASURMENTS
Depth of visibility in feet
0
2
4
6
8
10
12
14
16
MONTH-YEAR
Aug-46
Jun-72
Nov-72
Sep-73
Nov-73
Feb-74
Apr-74
Jul-74
Nov-74
Feb-75
Apr-75
Jul-75
Nov-75
Apr-84
Jun-84
Jul-84
Aug-84
Apr-85
Jun-85
Jul-85
Aug-85
Apr-86
Jul-86
Feb-87
Jun-87
Aug-87
Feb-88
Apr-88
Jun-88
Jul-88
Aug-88
Feb-89
Apr-89
Jun-89
Jul-89
Aug-89
Mar-90
Apr-90
Jun-90
Jul-90
Aug-90
Mar-91
Apr-91
Jun-91
Jul-91
Aug-91
Apr-92
Jun-92
Jul-92
Sep-92
Month and year of measurment

Figure 20

WATER QUALITY RECOMMENDATIONS

An attempt should be made to locate the missing data and enter it into Storet. This information was not in the lake files reviewed by this project.

The Storet data should be corrected where problems are indicated.

A high quality program of water quality sampling should be continued indefinitely.

There appears to be a fair discrepancy between the 1991 USGS data and the 1991 DNR data. The following table shows the differences between the two results. The district should consider USGS sampling again so as to determine the accuracy of the two sampling programs.

Total Phosphorus Concentrations 1991

	DNR		USGS	
	Top	Bottom	Top	Bottom
April 4	11	21		
April 15			11	15
June 12			6	12
June 18	12	20		
July 10			8	17
July 22	14	19		
August 7			7	31
August 21	22	5		

PHYSICAL CHARACTERISTICS

The following are brief discussions of some of the more common parameters in water quality analysis. For more information contact the DNR or UWEX.

Dissolved Oxygen and Temperature

Dissolved oxygen (DO) and temperature are the life support of all living organisms in an aquatic environment. The two factors are directly related in an aquatic system; if the temperature goes up the water cannot hold as much oxygen; if the temperature drops the water has the potential to hold more oxygen.

In the spring, after ice out, the lake is completely mixed by the wind and is re-oxygenated. As summer begins the lake surface is warmed by the suns rays and the upper layer (epiliminion) of water is heated. As the wind begins to mix this warmed water, a density barrier begins to form separating the underlying colder water This barrier is called the thermocline. In Lac La Belle the thermocline depth averages approximately 22 feet each year. When the thermocline is present the layers of water below it do not receive fresh-mixes of oxygenated water. The lake bottom is where decomposition of plants and other organic matter take place. Decomposition uses oxygen and if there are excessive amounts of organic matter the bottom water (hypolimnion) tends to become devoid of oxygen (anoxic).

Most warm water fish species need 5.0 mg/l DO to survive, and some species of cold water fish require higher levels. Those species of fish that require cold water with high oxygen levels are not capable of surviving in Lac La Belle, since the lower depths become anoxic. On average only the top 20 feet of Lac La Belle are capable of supporting most species of fish. During all other times of the year the entire water column is capable of supporting fish.

pH and Alkalinity

pH is the measure of hydrogen ions, or simply stated the acidity, neutrality or basisity of a substance. pH has a range from 0-14. 0, being very acidic (battery acid), 7 being neutral (pure water), and 14 being basic or alkaline (bleach).

pH Scale

0----------7---------8.0----------14

very acidic	neutral	**	very basic
(battery acid)	(pure water)		(bleach)

**average pH for Lac La Bell
6.0-8.5 is the average pH for most of Wisconsin's inland lakes

The pH of Lac La Belle has remained quite stable over the past 50 years. readings have ranged from 7.0 - 8.7 (neutral - slightly basic).

Alkalinity is a measurement of the amount of bicarbonates in the water. Bicarbonates are basic in nature so they neutralize acids. This means that acid rain could be neutralized if it occurred. The alkalinity range for Lac La Belle is from 164 to 338 mg/ liter. Lac La Belle is adequately buffered and the threat of acid rain negatively impacting the lake is low.

Sensitivity of Lakes to Acid Rain

Sensitivity level	Alkalinity values
High	0 - 39
Moderate	40 - 199
Low	200 - 499
Non-sensitive	>500

Phosphorus

Phosphorus is an important nutrient found in lakes. Addition of phosphorus to lakes often results in increased production of plants and algae, sometimes in excessive amounts. Phosphorus comes from a variety of sources, many of them are related to human activities. Major sources are human and animal waste, soil erosion and runoff from farms and lawns and construction sites. When the lake bottom becomes anoxic (oxygen depleted), the phosphorus that is stored in the sediments (from decayed plant and animal material) can be released when the lake turns over in the spring or fall. The nutrients are mixed into the entire water column, which is why many lakes experience algae blooms in the late spring and early fall. This is why many lakes experience algae blooms and excessive plant growth for years after the phosphorus influx is controlled.

The Total Phosphorus (measured as all the available phosphorus in the water; dissolved and in suspension) levels in Lac la Belle have fluctuated tremendously over the past 50 years. This is due, in part, to fluctuating precipitation levels, erosion, runoff, hot dry summers, boating activities, excessive carp problems and other natural and human related activities. The data for Lac La Belle have ranged from 4 to 60 µg/l of total phosphorus. Ideally, phosphorus levels should be at 20 µg/l total phosphorus or less at spring turnover to prevent summer algae blooms and excessive plant growth. Average total phosphorus levels in µg/l for Wisconsin's inland lakes range from 0-20 (excellent to good water quality), 20-50 (fair water quality), and above 50 (poor to very poor water quality).

In general, over the years spring levels of total phosphorus in Lac La Belle have ranged between 10 and 30 µg/l total phosphorus, summer levels have ranged from 10 to 60µg/l total phosphorus, fall levels have ranged between 20 and 40µg/l total phosphorus, and winter levels ranged between 10 and 40µg/l total phosphorus. Even though the values are fairly consistent year round there have been some seasons that have higher than desired phosphorus levels.

Nitrogen

Nitrogen, like phosphorus can cause algae blooms when abundant. Lakes with a total nitrogen : total phosphorus ratio larger than 15:1 are considered phosphorus limited. A ratio between 10:1 and 15:1 may indicate transitions; and a ratio smaller than 10:1 generally means the lake is nitrogen limited.

That is, the amount of algae growth is dependent upon the nitrogen rather than the phosphorus.

Specific Conductance

Specific conductance is the waters ability to conduct an electrical current and is a indicator of the amount of dissolved solids in the water. As the amount of dissolved solids increases so does the specific conductance. Also, as you compare the specific conductance to a depth profile you will usually note the deeper down you sample, the specific conductance tends to increase. This is due in part to the suspended solids settling out of upper layers of water.

Lac La Belle has average to high specific conductance readings, showing that there is a plentiful amount of dissolved minerals in the water to support a healthy aquatic ecosystem.

Secchi Disk Readings

Secchi disk readings (measurement of water clarity and algae density) are one of the simplest yet one of the most important tools to a lake manager. An eight inch, black and white disk, is lowered into the water column until it disappears. This not only shows how transparent the water is but can also give an insight to the trophic status (health status) of the lake. Wisconsin lakes have secchi disk readings that range from 0 feet to over 30 feet. Secchi disk readings of over 10 feet are considered to be very good or desirable from an readings aesthetic stand point. Measurements of less than 10 feet usually indicate low water quality and lower aesthetic appeal.

PUBLIC PRESENTATION

The development of this planning project took place over two years. The issues presented herein were discussed and considered over many lake district board meetings and public hearings. The final results of the planning grant will be presented at the 1998 annual district meeting in August.

LAC LA BELLE USE SURVEY

Conducted by the Lac La Belle Management District
In Cooperation with the City of Oconomowoc Recreation Department

Note: 210 surveys were returned of the 650 surveys that were mailed out, for a return rate of 32 %

Part I - BACKGROUND (Please circle one)

A. Are you a

1. year round lake resident		150	71 %
2. part year lake resident, summer		17	8 %
3. non-lake resident		38	18 %
53066 zipcode	39		
misc zipcodes	12		

B. How many years have you used Lac La Belle?

1. less than 1 year	7	3 %
2. 1 year to 5 years	50	24 %
3. 6 years to 10 years	19	9 %
4. More than 10 years	125	60 %

II - RECREATIONAL USE

How do you use Lac La Belle? (Check all that apply)

Activity	Number of respondents	Average number of days
Fishing		
Fishing	99	20
Ice fishing	34	11
Boating		
Power boating	166	36
*Motor size	56	260 hp max, 70 hp average
Water skiing	82	18
Jet skiing	9	27
Sailing	72	19
Canoe/Kayak	50	10
Paddle boating	15	17
Row boating	20	19
Swimming	169	39
Scenic viewing	166	168
Skin/scuba diving	6	4
Snowmobiling	18	17
Cross-country skiing	51	11
Ice skating	108	10
Ice boating	20	10
Other - misc	5	

A. What are your concerns about Lac La Belle?

General water quality	168	80 %
Number of boats	131	62 %
Number of jetskiers	129	61 %
Speed of boats	124	60 %
Development around lake	102	49 %
Farm runoff	101	48 %
Size of boats	98	47 %
Excessive noise	97	46 %
Stormwater runoff	91	43 %
Construction erosion	84	40 %
Excessive weeds	81	39 %
Sediment-shallow areas	78	37 %
Decline of fishery	74	35 %
Wetland preservation	66	31 %
Excessive algae	62	30 %
Shoreline erosion	62	30 %
Number of waterskiers	54	26 %
Water levels too low	48	23 %
Unpleasant odors	33	16 %
Water levels too high	24	11 %

*

* Total exceeds 100 % because respondents were permitted multiple answers

B. On summer **weekdays**, how crowded do you feel when on the water?

Not crowded	176	84 %
Crowded	15	7 %
Extremely crowded	0	

C. On summer **weekends**, how do you feel when on the water?

Crowded	96	46 %
Extremely crowded	65	31 %
Not crowded	30	14 %

D. What are presently your greatest concerns about Lac La Belle?

FISHING

Boats too close to shore disrupt spawning
Traffic destroying fishery
Carp

WATER QUALITY

Pollution	
Runoff from golf course	
Skiboats dig up bottom when pulling up	
Boater sanitation on lake all day	
Boaters using lake for bathroom	
Get an allergic reaction to swimming in lake	
Excessive turbulence on weekends	
Pollution-allow only electric trolling motors	

LAKE USE

Lake unsafe of weekends- don't use then	3
Crowded weekends	5
Dangerous traffic on weekends	2
Boats racing	2
Mary Lane shoal crowded	
Motorboats/skiers too close to shore/piers	10
No regard for sailboats	
Noise all night	
Jetskiis too close to swimmers	2
Boats and swimmers too close together	
Drinking boaters	3
Jet skiis and large fast boats dangerous & bothersome	
Boats parking in front of house	
Noisy	
Noisy jetskiis	
Increased activity	
Reckless boat traffic/skiers	4
Reckless jet ski traffic	8
Out of towners crowding and polluting lake	2
Over crowding	2
Loss of serene ambiance	
Unsafe conditions	
Pontoon drivers inattentive	
Powerboats	
Safety	
Safety of swimmers	
Safety-increasing number of high-powered boats	
Sailboats take up too much room	
Motor boats going too close to anchored boats	
Skiers out too early	
Snowmobiling	
Speed limits not enforced in River channel	

LITTER

Litter from beach and boats	
Garbage in lake	

LAUNCH CONDITIONS

Too busy on weekends
Limit number of boats launched
Too many boats launched 2
Too many non-residential boats on weekends
Trailer parking
Weekend powerboats too large and fast for La Belle
Crowded launch

DEVELOPMENT

New building giving excessive boat slips
Runoff
Zoning
Erosion control needed
Growth of area
High density of population will be lake's downfall
Condos equal crowded lake
Condominium development 3

MISC

Lower swimming fee for larger families
Need more boat docks
Protection for future
Season passes
Taxes 2
Too many concerned about too many things
Your efforts have removed greatest concerns-thanks
Keep lake safe for all boaters
Ineffective weed spraying 2
Chemical weed spraying
Don't want it to get too busy like other area lakes
Overflow traffic from other lakes

REGULATIONS

No posted boating regulations
Over regulation
Stupid laws
Too many rules
Want to use La Belle without restrictions
Enforce what we have
Lack of boat law knowledge
Fanatics will over-restrict lake use
Lack of regulation on boating
We do not want a no wake rule
New laws by you and the DNR

IV - MANAGEMENT

A. What days and hours would you like the Safety Patrol on the lake?

Weekends	134
Daily	6
Weekdays	4
Afternoons	3
Holidays	2
Randomly	2
Miscellaneous	5

B. Do you think that the present local boating ordinances are:

1. Not strict enough	60	29 %
2. Strict enough	104	50 %
3. Too strict	5	2 %

C. Is the present boating ordinance adequately enforced?

1. Yes	99	47 %
2. No	52	25 %

If no, why not?

RESOURCE LIMITATIONS

Not enough manhours, patrol time	8
Need more enforcement	2
Need another boat	2
Not enough funding	
Don't patrol when traffic is high	3
Police travels at high speed	
Seldom see police	3
Cops avoid areas of activity	
Patrol boat visible	
Patrol on wrong days	

VIOLATIONS

Boating too close to boats, skiers, shore	8
Boats speeding near shore	2
Excessive speed	3
Inconsiderate boaters	
Need to park and observe speeders	
No lights	
No numbers on many boats	
See violations on lake	
Ski/speeding after dark	6
Kids hanging feet over edge of boat	

VIOLATIONS CONTINUED:

Jetskiis pulling water skiers
Jetskiis with no numbers
Jetskiis too close to shore
Jetskiis violating laws
Jetski issue
Enforce speed limits
Too many near misses observed with no action taken due to lack of patrol
Skiers with no third person

MISCELLANEOUS
Too strict - no common sense
Too many violations - give warning first
Wake after sunset and before sunrise
Except negligent minors
Can't sleep with noise from boats in River Channel
Need better public education
Need input at launch
Need speed limit
Ordinances unknown
Number of boats

D. Which of the following activities, if any, should be restricted to certain **areas**?

Swimming	37	18 %
Power boating	52	25 %
Water skiing	60	29 %
Jet skiing	127	60 %
Fishing	4	2 %
Other boating	6	3 %
Snowmobiling	44	21 %
Other	11	5 %

17. Which of the following, if any, should be restricted to certain **hours**:

Swimming	11	5 %
Power boating	65	31 %
Water skiing	86	41 %
Jet skiing	127	60 %
Fishing	1	0 %
Other boating	4	2 %
Snowmobiling	49	23%
Other	0	0 %

18. How would you improve the present boating ordinance?

JET SKIIS

Ban Jetskiis	8
Discourage jet skiis	
Jetskiing in lake lake only	
Jetski noise limits	2
Jet skiis should follow motorboat regulations	
Put mufflers on jetskiis	
Jetskiis away from shore	

ENFORCEMENT

Enforce it	
Enforce speed limits	
Enforce 100 foot rules	
Enforce noise limits	
Patrol better for careless drivers- drinking	

SPEED LIMITS

10 mph 1-4 pm on weekends & holidays	
10 mph 6pm - 10 am weekends, pm - 10 am weekdays	
15 mph 1/2 hour before sunset to 1/2 hour before sunrise	
30 mph 10 am - 4 pm only	
No powerboating 6 pm - 10 am	2
Powerboating over 15 mph only from 10 am to 5 pm	
No powerboating before 9 am anyday	
No powerboating after dark	
Slow down bigger boats	
Need speed and noise limits	2
Need speed limit and enforce it	
Slow everyone down	
Speed limits on weekends	
30 mph speed limit	2
40 mph speed limit	
50 mph speed limit	
Speed limits needed	7
Speed	
More no wake areas/bays	6
Need a 200 foot no wake zone-buoys every 500 feet	
Need a 300 foot no wake zone	
No wake along shore for safe swimming	2
Move back no wake zone	
No wake hours	
No wake 9 am - 9 pm	
Time restriction on powerboating for anglers and sailors	
No powercraft before 9 am for anglers	

BOAT, MOTOR SIZE

Limit horsepower	3
Limit size and power of boats	2
Horsepower limit - 150 hp	
Keep power boats off lake	
Maximum length 21 feet	
Maximum length less than 24 feet	
Boat size limits	2
Motor size limits	
Charge by horsepower	
No rooster tails	

LAUNCH

Limit boat launches	11
Limit number of boats	2
Raise launch fee	
Limit weekend launches	3
Limit number of boats on or admitted on lake	2
Raise launch fees	2
Higher launch fees for non-Oconomowoc residents	

SNOWMOBILING

Keep snowmobiles away from shoreline-too noisy
Keep snowmobiles off private property and seawalls
Ban snowmobiles
Almost run over by snowmobiles at night
No snowmobiling midnight to 6 am
No drunken snowmobiling
Restrict or ban snowmobiles
Snowmobile daylight only
Ban snowmobiles or limit hours

EDUCATION

Educate lake users	
Need education at launch	2

MISC

There are more than enough ordinances now
No limits
Abolish ordinance 2
Doesn't need improvement
Fine the way it is-have enough restrictions
Don't limit skier hours or days
Don't change anything-leave alone!
Strict fines for littering
No cars and trucks on ice
Patrol down river to the dam
Marked buoys on lake from May to October
May need different regulation for different size lakes, and uses
Need a total use plan
New pier caters only to fishermen

MISCELLANEOUS CONTINUED:

Would like boat mooring at city end to access businesses
Promote sailing and non-destructive lake uses
Numbers of boats on lakes is getting worrisome
Post open dam area in winter
No pets allowed at community beaches
Bigger fines
Raise age limits
Highway runoff discolors lake
Boaters should move counter-clockwise around lake
Delay ski season to protect spawning
Noise control/limits
Noise of powerboats before 6 am is annoying
No racing of powercraft, inc. jetskiis

V - COMMENTS

LAKE USE CONCERNS

Boat drivers getting wilder
Charge more for launches-$25 resident annual, $5 resident base
Control boat size and noise level
Don't restrict activities to certain areas
Early morning water skiing a problems
Exhaust noise too loud on jetskiis and drag boats
Fishermen harassed by other boats
Ban jet skiis
Jet ski noise irritating 3
Encourage non-motorized use of lake
Powerboating/skiing 10-2 on Sundays
No wake hours would help non-motorized boaters feel safe
not in favor of future boating restrictions
Ordinance should address max horsepower
Powercraft coming too close to swimming areas
Mandatory boating license for all
Snowmobiling ruins ice skating
Waterskiers dangerously close to shore & swimmers
Weekends becoming overcrowded, noisy
Would like safe and quiet times to swim, paddle etc
Too much jetskiing in bay
Who would want jet skiis relegated to area near them?
Boat tax or license fee to pay for control
We live 2 blocks from lake and are annoyed by jet ski noise
Weekdays quite lovely
Restrictions not required
This is a free country - no more restrictions
Reduced speed limits early am & early evenings
Severe congestion Sunday afternoons
Bigger swim areas
No cars on ice
No safe place to swim
The fewer restrictions the better

ENFORCEMENT CONCERNS

Police should concentrate on speed & noise, not nitpicking
Some DNR inspections not called for
Town boat patrol is hassling residents
Violations reviewed by committee
Wants advance notice before any restrictions enacted
Large lake, we don't need restrictions

PUBLIC ACCESS CONCERNS

Hire someone to expedite boat launching Fri-Sun
Limit boats launched to 20 on weekends
Limit hours of launch-what is human life worth?
Milwaukee people go home
Need more launch areas
Free or reduced launching to LLBMD off lake residents
Question closing of Mary Lane access
Restrict number of boats launched
Sign at launch-No littering
Would like Mary Lane access be reopened for rowboat launching

WATER QUALITY CONCERNS

Ban liquid fertilizers
City storm water
Water seems cleaner this year
Bottom getting dug up by powerboats
Excessive herbicides
Hay sickle better weed control than spraying
Likes new sewers-improved water quality
Monitor remaining septic systems
Water quality and fishery improving
Worried about human pollution all day at sand bar
Continue carp control

MISCELLANEOUS CONCERNS

Get non-district residents off lake district board
Protect our lake
Save Lake Road
Special interest groups more a threat to lake than a few careless individuals
Support efforts to clean up lake, improve fishery, and make lake available to all
Thanks for doing a great job
We have responsibility to allow lake use with all in mind, mutual respect
We're making progress
Flood lights, parking lots on lake
Stop condos and marinas
Basic courtesy would answer many problems
Excellent survey
Forced to be in lake district but don't have lake access
Get taxes down
Hope municipalities can work together
Can management district take control of these issues?
Lake landscaping - want to be able to see lake
Lake management too focused on fishing
No problems
Please spend money - buy wetlands
Consider limited dredging of shallow areas
Too much tax
When balancing public right to lake vs. quality of life, the balance of nature should prevail
Silt in Woodland Lane channel
Don't want any restricted hours on any activities
Don't change anything - leave it alone
Haven't been here long enough to comment further

OTHER CONCERNS

LAKE USE CONCERNS

Drunk boaters
Garbage and sewage around ice fishing huts
Glass and debris from winter washing into swimming areas
Jet ski accidents
Minors negligent in boats
New city pier useless for boaters
More fast boats launched on weekends
Trespassing
Juveniles on dam
Water skiers too early 5:30 - 6 am
User safety
Unsupervised ice fishing

WATER QUALITY CONCERNS

Boaters use lake for bathroom
Carp 3
Chemical weed control
Constantly stirred up
Water sudsy
Rough fish
Lawn fertilizers
Herbicides in lake
Fate of sodium arsenate in lake
Golf course runoff
Odor from Spaulding Canal
Open Islandale Causeway circulation to decrease sediment

PUBLIC ACCESS CONCERNS

Launch fees too low 2
On crowded days can't park boat at city beach

MISCELLANEOUS

Areas need dredging
City marina-lake overpopulated with boats
Condos
Ducks - number and pollution source
High taxes
Loosestrife
Non-lake residents
None of above
Rosenow Creek needs cleaning up
Runoff from creek through golf course
Sediment in Blackhawk area
Shorehaven expansion
Weed control
Woodland channel filling in
Woodland Lane channel

RECREATIONAL USE SURVEY - LAC LA BELLE - 1991

date/time	FISHING	SAILING	SKIING	JETSKIING	SWIMMING	PONTOONING	FASTBOATING	SHOREFISHING	SCENIC VIEWIN	OTHER
RECREATIONAL USE SURVEY - LAC LA BELLE - 1991										
date/time	FISHING	SAILING	SKIING	JETSKIING	SWIMMING	PONTOONING	FASTBOATING	SHOREFISHING	SCENIC VIEWIN	OTHER
19 May, 1991, Sunday										
8:00 AM	0	0	0	0	0	0	0	0	3	0
11:00 - 11:20 am	3	46	0	0	0	0	0	6	9	14
12:30-12:50 am	4	48	4	0	2	9	0	0	2	11
1:30-1:50 am	7	1	0	0	4	4	3	0	3	0
27 May, 1991, Memorial Day										
8:40-9:00 am	20	2	1	1	0	5	5	7	7	0
10:00-10:20 am	21	19	9	3	2	11	8	0	21	0
11:20-11:45 am	11	22	5	6	27	23	38	10	9	1
2:20-2:50 pm	9	6	11	4	23	32	53	0	13	4
5:30-5:50 pm	3	1	6	5	18	24	30	0	9	3
29 June, 1991, Saturday										
7:00-7:30 am	3	0	0	0	2	2	0	4	0	1
9:20-9:45 am	4	1	1	0	3	1	3	0	9	1
11:00-11:25 am	8	31	2	1	7	9	10	3	17	2
2:00-2:20 pm	2	27	8	2	6	6	9	2	21	0
9 July, 1991, Tuesday										
8:00-8:15 am	5	0	0	0	0	3	0	4	2	0
11:30-11:50 am	3	0	2	0	3	4	2	3	7	0
3:30-4:00pm	1	3	5	1	7	1	5	0	4	2
20 July, 1991, Saturday										
9:30-10:00 am	5	0	1	0	0	1	0	0	7	0
11:00-11:30 am	3	3	3	0	23	2	1	4	19	1
1:00-1:35 pm	1	6	6	0	24	9	10	4	26	3
3:00-3:30 pm	0	5		1	17	8	6	1	18	2
24 July, 1991, Wednesday										
6:30-6:50 pm	3	1	3	0	2	4	6	1	5	0

RECREATIONAL USE SURVEY - LAC LA BELLE - 1991

date/time	FISHING	SAILING	SKIING	JETSKIING	SWIMMING	PONTOONING	FASTBOATING	SHOREFISHING	SCENIC VIEWIN	OTHER
11 August, 1991, Sunday										
12:30-1:00 pm	6	17	8	1	27	20	22	4	40	0
3:00-3:25 pm	9	11	15	5	18	32	47	0	21	1
6:45-7:15 pm	1	2	4	2	7	11	25	2	8	1
24 August, 1991, Saturday										
8:15-8:45 am	5	0	1	1	2	4	2	0	7	0
11:00-11:30 am	2	4	2	3	18	19	36	2	8	3
3:00-3:30 pm	1	6	7	1	26	22	26	4	17	5
1 September, 1991, Sunday										
10:00-10:25 am	8	0	0	0	1	2	3	3	6	0
1:10-1:40 pm	3	7	3	1	3	9	14	4	9	1
315-3:45 pm	0	8	5	0	2	4	15	1	4	0
Maximum	21	48	15	6	27	32	53	10	46	14
Minimum	0	0	0	0	0	0	0	0	0	0
Average	5	9	4	1	9	9	13	2	11	2
Total	151	277	112	38	274	281	379	69	337	56