

**WATER QUALITY STUDY
OF LONG LAKE 1998-2001
LAKE GRANT LPL-589**

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Introduction

Long Lake is known as one of the premier, high quality fisheries in the northwestern part of the state. Located on the headwaters of the Brill River in southeastern Washburn County, it is the largest lake in the county. Long Lake and its watershed form one of the headwaters of the Red Cedar River Basin. It has been listed as an Outstanding Water Resource (OWR) in the January 1993 issue of the Washburn County Community Connection Newsletter (Lake Lines). In 1996 the Wisconsin DNR named this lake as the busiest inland waterway in Northwest District.

The Lake is 19 miles long, has a shoreline of approximately 99 miles, and a surface area of 3290 acres. The lake has a maximum depth of 74 feet and an average depth of 26 feet. Its 38,000-acre watershed is largely undeveloped. Watershed development consists of approximately 800 riparian residents and several resorts along the lake's shoreline and some agriculture use near the lake. The Tomahawk Scout Reservation has preserved approximately 8 miles of shoreline. The Lake has five developed public boat landings. Several streams and lakes contribute to the water flow to Long Lake including Slim Lake, Two Twin Lakes, Devils Lake, Harmon Lake Big Mud Lake, Little Mud Lake. The creeks are Pepper, Slim, Baileys, and Dennisons.

In ancient times, the Long Lake basin consisted of at least three glacially formed lakes and their interconnected streams. In the late 1800s, a dam was constructed to raise the water level approximately 8 feet, fusing these three bodies of water into one whole. Loggers then used the lake to transport logs downstream. The raised water level has resulted in a very complex body of water. The lake contains several basins with depths varying from 8 to 74 feet.

Since its "discovery" in the late 1800's as a logging site, until the mid 1900's development around the lake has been slow. In recent years however, as development has increased the LLPA is concerned that additional development in the watershed result in degradation of the lakes water quality.

The areas that were monitored are shown on figure 1. After the first year it was recommended that Stations A and F and the creeks be more heavily monitored and this was done. Graph 1 shows the average of total phosphorus tests in 1994. Graphs 2 and 3 show the average of tests from 1998 to 2001.

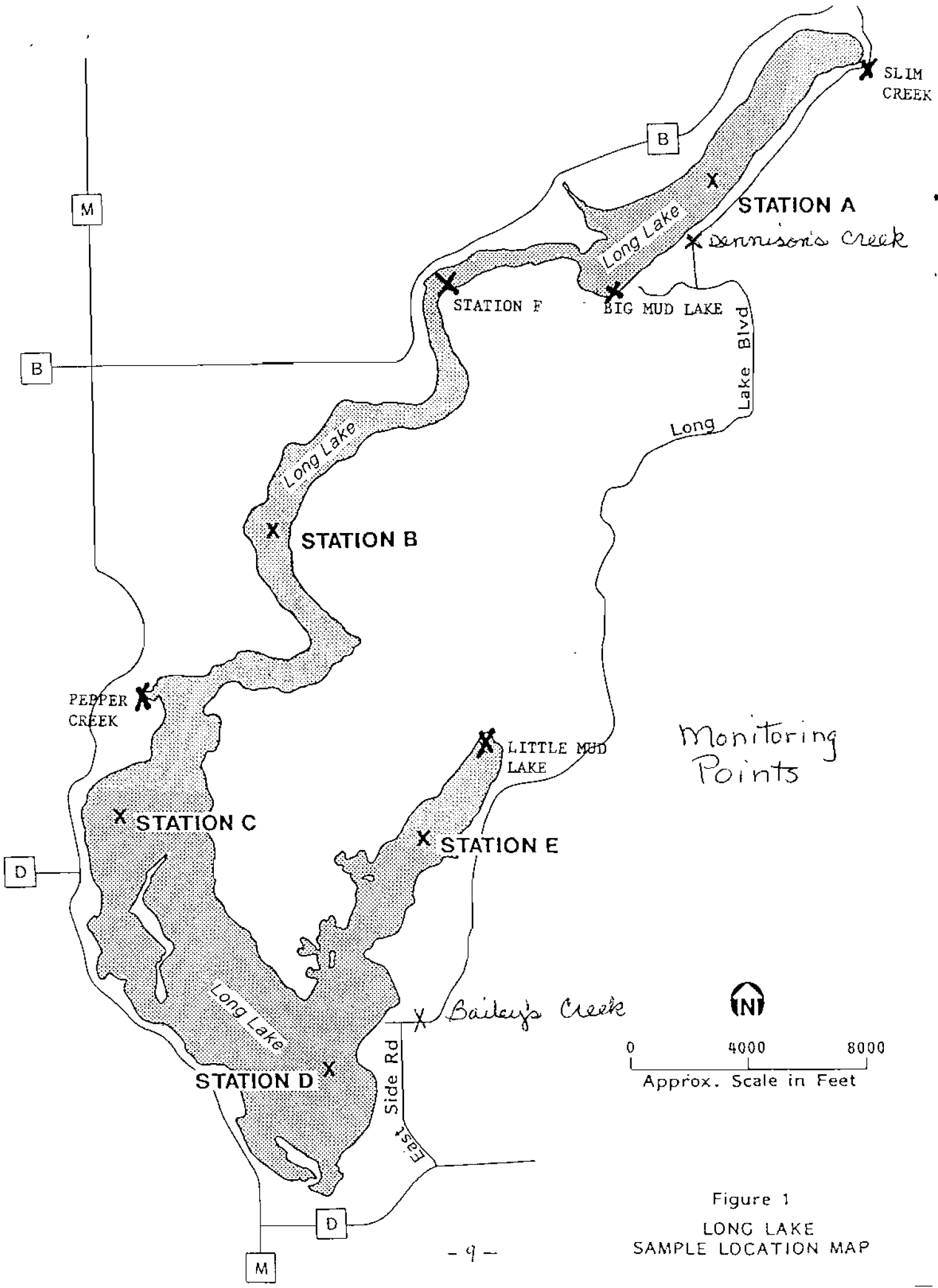
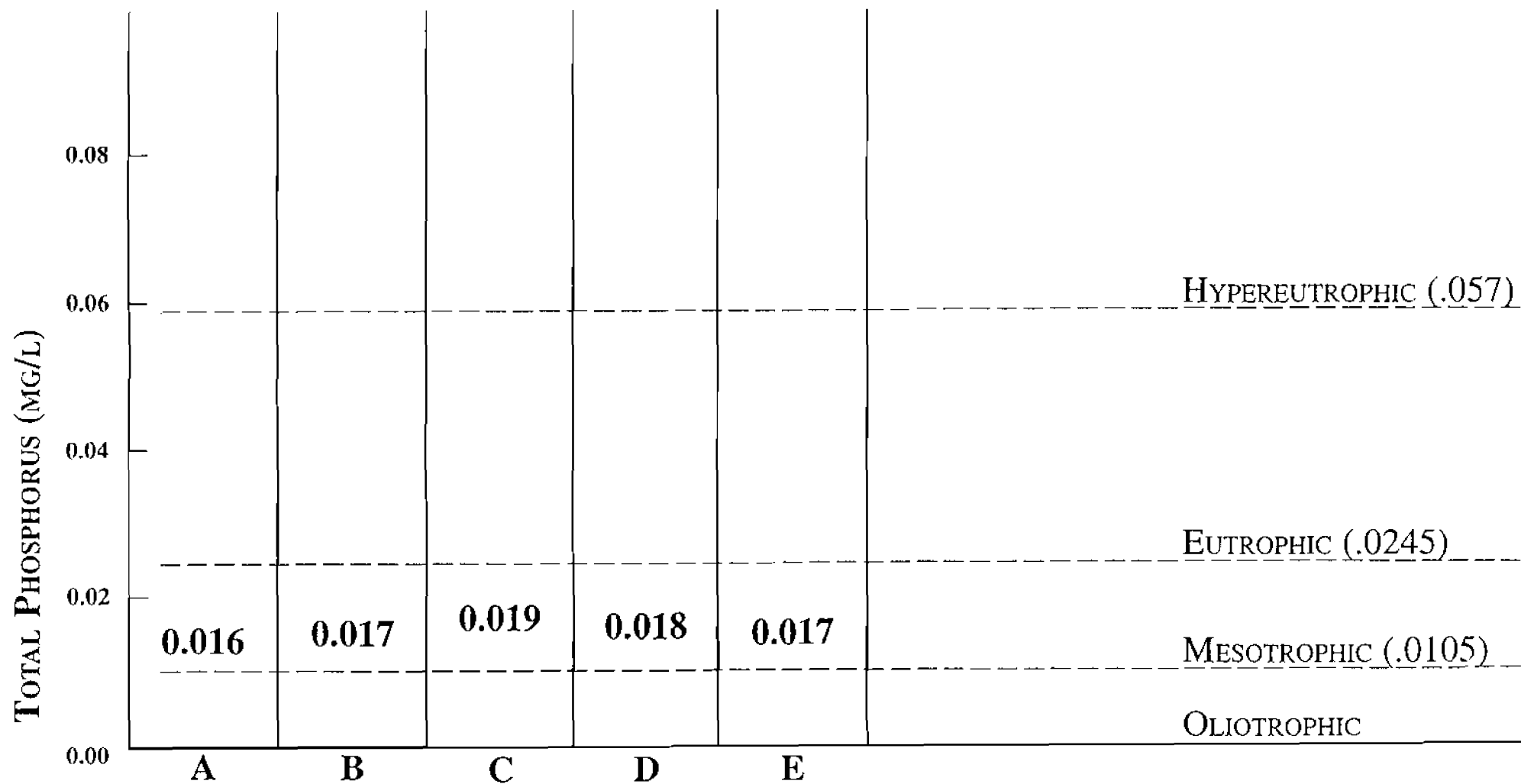


Figure 1
 LONG LAKE
 SAMPLE LOCATION MAP

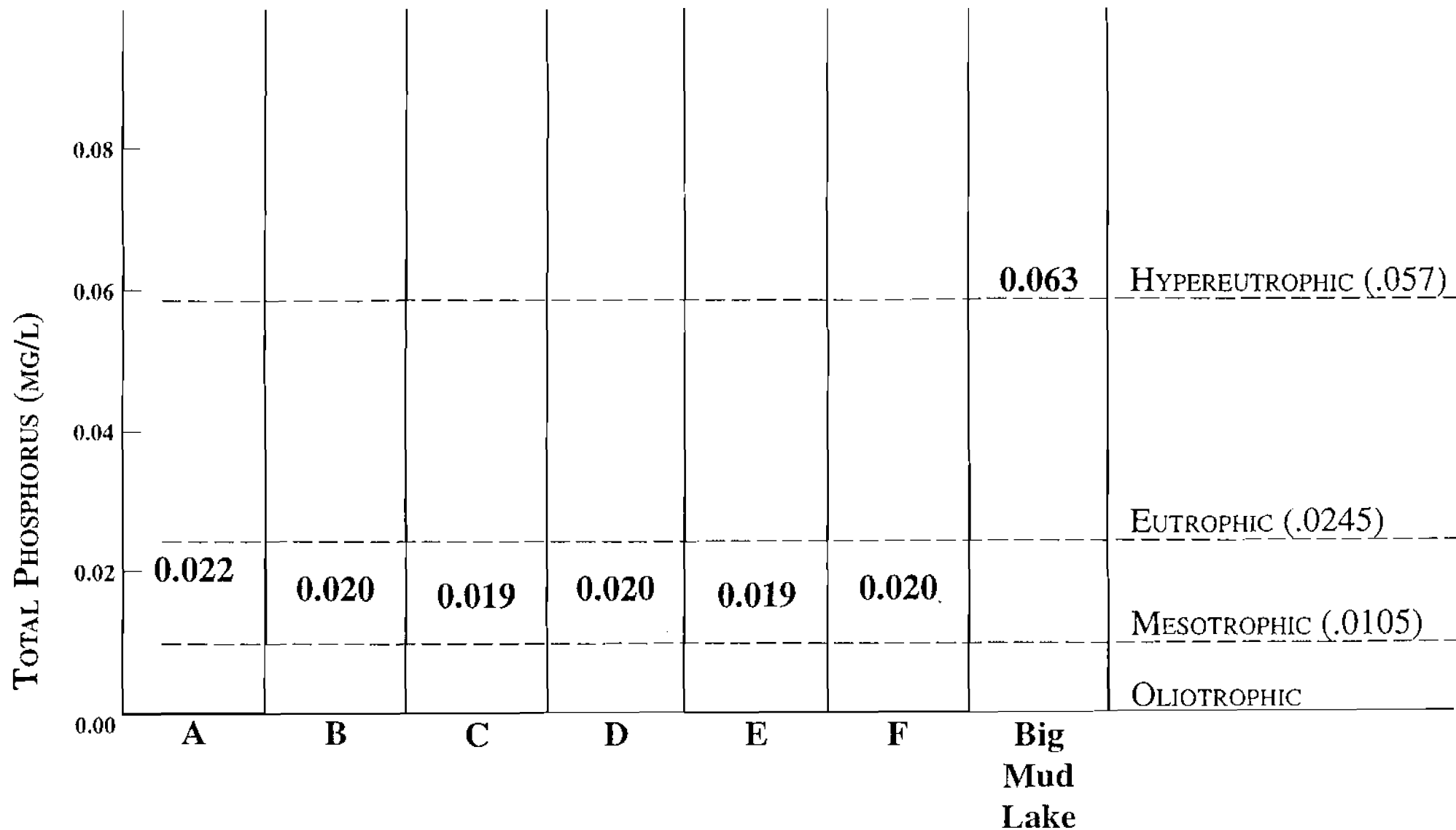
TOTAL PHOSPHORUS (1994) LONG LAKE: JUNE, JULY, AUGUST
AVERAGE: ALL SAMPLINGS FOR EACH STATION

Graph 1



TOTAL PHOSPHORUS AVERAGE OF SAMPLINGS 1998-2001 FOR EACH STATION

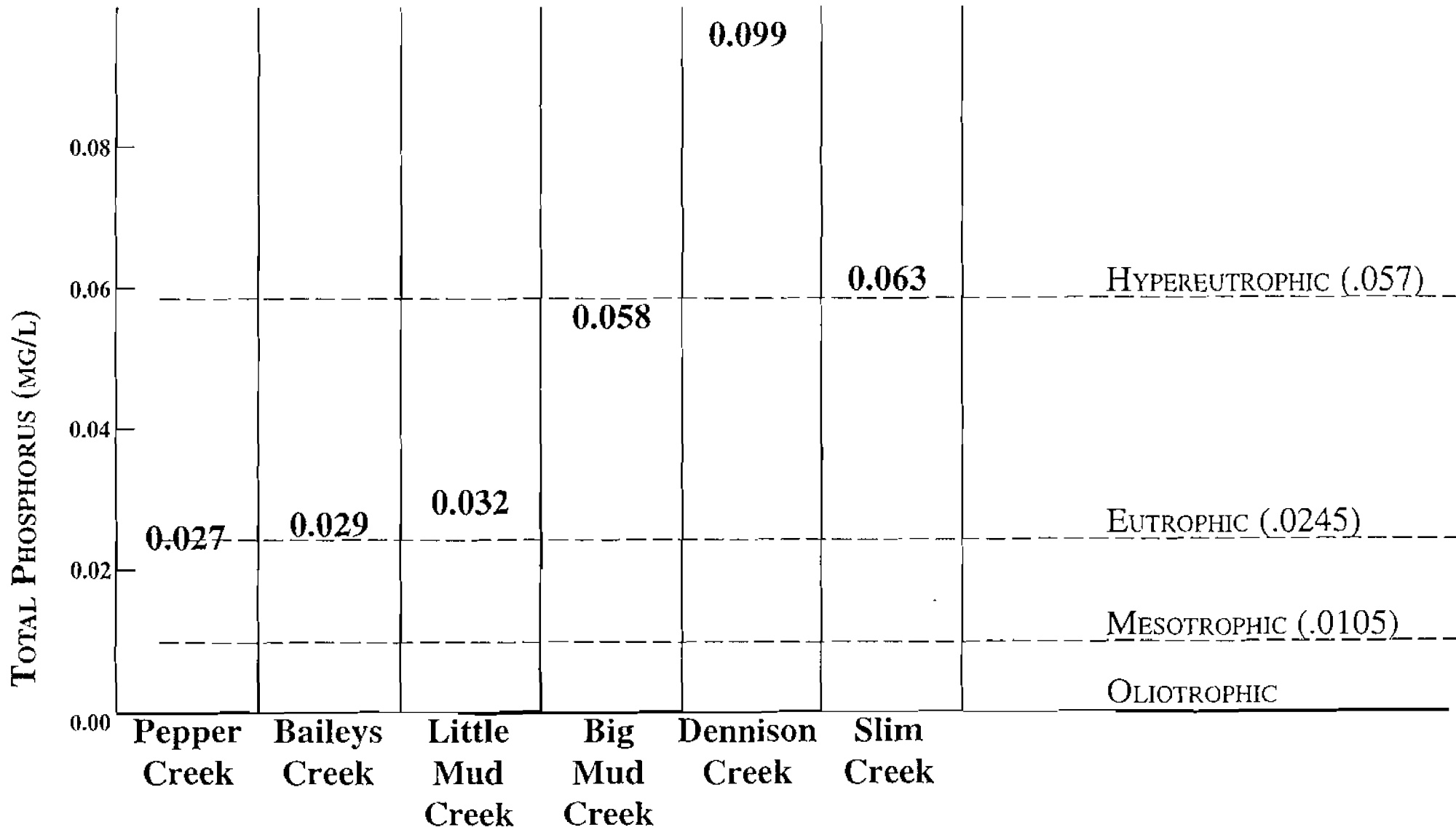
Graph 2



Note: Station F located near Butternut Hills Golf Course was added for this study.

TOTAL PHOSPHORUS AVERAGE OF SAMPLINGS 1998-2001 FOR CREEKS AND DRAINAGE AREAS.

Graph 3



Interpretation of Graphs 1, 2 and 3

The average total phosphorus for stations A through E has not changed significantly since the study of 1994. There is a slight increase, however, all stations are in the mesotrophic range.

Graph 3 shows the average total phosphorus for creeks and drainage areas. Pepper Creek, Baileys drainage and the culvert of Little Mud Lake contribute water to stations C, D and E. The total phosphorus averages between 0.027 to 0.032 mg/l which seems to be a reasonable amount.

Slim Creek, Dennisons Creek and Big Mud Lake channel contribute their water to Station A, the north part of Long Lake. The averages ranged from 0.058 to 0.099 mg/l. This area appears to drain a wetland.

Graph 2 shows Big Mud Lake has an average total phosphorus of 0.063 mg/l and Graph 3 shows the channel to average 0.058 mg/l. It appears that the watershed area for Station A contributes a major amount of phosphorus to the lake.

Barr Engineering's book Phase II, figure 4 agrees with this. They determined that the phosphorus loading budget was 4.5% from Slim Lake and 15.4% from watershed A and 3.7% from Big Mud Lake for a total of 23.6% of the entire budget.

Residents of the Rockford area, which is the start of the most northerly part of the narrows, have talked of more dense aquatic plant growth and heavy algal blooms.

I feel there should be more study using the entire watershed area of Long Lake to determine sources of phosphorus. A specific land use management plan should be developed to try to slow down eutrophication. Some testing was done for nitrogen. Lab tests were given as Kjeldahl nitrogen (as N) which I believe is total nitrogen.

In to the book Understanding Lake Data, Shaw states "Nitrogen is second only to phosphorus as an important nutrient for plant and algae growth. Nitrogen compounds often exceed 0.5 mg/l in rainfall, so that precipitation may be the main source for seepage and drainage lakes."

"In most cases, however, the amount of nitrogen in lake water corresponds to local use. Nitrogen may come from fertilizer and animal wastes on agricultural lands, human waste from septic systems, and lawn fertilizers used on lakeshore property. Nitrogen may enter a lake from surface runoff or groundwater sources."

The stations A-F ranged from 0.45 to 0.54 mg/l which, according to Shaw, would be normal. Big Mud Lake ranged from 0.54 to 0.72 mg/l which would be somewhat high.

The creeks and drainage areas had a wide range, 0.441 to 1.01 mg/l. This was likely caused by runoff of fertilizer and manures after heavy rain. Pepper, Baileys and Dennison creeks all were in the 0.42 to 0.53 mg/l range. Little Mud Lake culvert and Slim Creek were consistently higher ranging from 0.60 to 0.914 mg/l. This would seem to go hand in hand with the total phosphorus readings, which is usually the case.

The following article was written by Allen Barta, LLPA president. All or part of it would be good material for the start of a lake management program.

PRESIDENT'S MESSAGE

By Allan Barta

Welcome to all our new members and to those of you who are receiving your first or second Newsletter as we expand our circulation to include more of the Long Lake watershed. We hope that you will become actively involved in your lake association. We welcome your membership and participation.

The substance of my message for this Newsletter is to report to you on the progress that has been made in achieving the long-term water quality goals of Long Lake as outlined in the Barr Report.

STATUS OF BARR REPORT RECOMMENDATIONS
JUNE, 2001

In August 1997, Barr Engineering Company completed Phase III of its study to provide information regarding the management of Long Lake: the Long Lake Management Plan. (Phase I was designed to assemble the necessary data of the various processes that control the water quality of Long Lake. Phase II involved preparing hydrologic and phosphorous budgets to gain an understanding on the sources of phosphorus and their effects on the lake's water quality.) What I will do in this report is list the significant Barr recommendations and the progress that has been made in their implementation. Special thanks to Craig Conroy, Washburn County Zoning Administrator, and Ed Olund for their technical help.

- **Recommendation:** The LLPA should work with Washburn County to establish new shoreline ordinances with the key recommendations listed below.

Status: The LLPA brought to the County's attention the need to establish new ordinances, recommended a professional project leader, and participated in a task force to formulate new ordinances that would be sensitive to ensuring our water quality and also sensitive to the concerns of property owners. Pertinent standards are listed below.

| Requirement for a Class I Lake | Minimum Lot Area | Minimum Lot Width | Buildable Maximum (Maximum impervious surface allowed) | Minimum Shoreline Setback | Vegetation Removal |
|--------------------------------|------------------|-------------------|--|---------------------------------|--|
| Recommend action | 40,000 sq. ft. | 150 ft. | 25% | 100 ft. Setback/ Buffer Zone | 30 ft. or 30% of the shoreline area, whichever is less |

| | | | | | |
|--------|----------------|---------|--|----------|---|
| Status | 30,000 sq. ft. | 150 ft. | None established because of frequent large driveway requirements | 75 ft/ * | 30 ft. limited removal corridor within 50 ft. of OHWM ** |
|--------|----------------|---------|--|----------|---|

*A setback greater than 75ft. could not be agreed upon.

** The adopted standard is in recognition of the lake's many small lots. Mitigation standards were adopted for buffer zone implementation and lake shore restoration upon reconstruction, major addition, or variance approval. A grant program was established by the county to assist in voluntary restoration. The shoreland buffer is defined as commencing 25ft. from the required building setback which typically is 75 ft. If non-conforming structures or other existing development (pre October 1, 1998) require mitigation the 35 ft NR115 standard buffer criteria is the minimum standard. Special zoning permission (structures in the setback area) requires mitigation to the standard of October 1, 1998.

- **Recommendation:** A minimum lot size of 5 acres should be required for all second tier and beyond development within the watershed.

Status: It is possible in RR 1 to have a 20,000 sq. ft. lot, but in most cases the impact is too severe and 3 or more acres are required.

- **Recommendation:** All septic systems must be tested when properties change hands or building permits are issued for improvement.

Status: State mandate COM83 requires 3 year pumping and inspection of existing private sewage systems, regardless of when installed, on all fire numbered properties. Upon County Board approval (anticipated on June 26th), this will become effective for Washburn County

- **Recommendation:** The LLPA should establish a Lake District that includes the entire Long Lake watershed.

Status: The LLPA has not been in favor of the recommendation because of the tax consequences and the belief that water quality can be maintained without forming a Lake District.

- **Recommendation:** Lake and inflow water sampling should be completed on a 3-year cycle to determine goal achievement.

Status: The LLPA has continued to monitor water quality as recommended not only in the lake basins but in runoff areas as well. A proposal for additional water testing is being drafted by UW-Ext., Stevens Point to determine problem areas and receive more timely information to develop action strategies.

- **Recommendation:** Maps and a ground truth search should identify All wetland around the lake. Regulations should be established to protect the wetlands from further development as a supplement to protection currently provided.

Status: Many parts of Long Lake are classified as Resource Conservation. Washburn County is developing a wetland map in the Smart Growth Planning Process. Digital orthophoto of 1996 flight is available from G.I.S. Dept., and could be used with GPS to map particularly important features such as rice beds, fens, springs, etc.

- **Recommendation:** Efforts should be made to ensure that the Boy Scout Camp remains in place and that they continue their policy of minimum development in the camp.

Status: The LLPA has developed sound lines of communication with the Tomahawk Scout Reservation and the Indianhead Council. We have worked together to review potential additional undeveloped lands that the Scouts may acquire and discussed the concept of conservation easements that would benefit the water quality of Long Lake. The Scouts will be actively engaged in additional conservation projects on their lands to manage run-off into the lake by working on shoreline restoration and improving trails. Projects that improve habitat for wildlife are also planned. Jeff Sulzbach, TSR Camp Director is Vice-President of the LLPA.

- **Recommendation:** The LLPA should continue to work with the DNR and other organizations to obtain grants for the purchase of land for conservation purposes.

Status: The LLPA has reviewed Stewardship Funds with the DNR should the appropriate situation arise for the purchase of lands beneficial to the lake. Currently an in depth study is taking place on Land Trusts and Conservation Easements should lands or easements be donated to the LLPA. We have had meetings with various organizations including the Nature Conservancy, Gathering Waters, The River Alliance, and the Wisconsin Farmland Conservancy in order to gain a better understanding of these issues.

- **Additional Actions Relating to the Barr Report:** We have increased our membership mailings within the watershed and now are prepared to evaluate the additional costs and work required to mail to the entire Long Lake watershed.
- A web site has been established to communicate important information between newsletters, relate important information to our Snowbirds during the winter, and serve as a library for important reports and documents.
- The LLPA has requested that the Washburn County Highway Department work to reduce run-off into the lake and eliminate the severe erosion problems. An onsite review was conducted with county officials and input given about road safety problems as well as erosion impact to the lake. The LLPA has the support of the Long Lake Town Board in requesting that scheduled paving on County Highway M include a restructuring of the road to alleviate the environmental as well as safety hazards.