Illinois State Water Survey Division
SURFACE WATER SECTION
AT THE
UNIVERSITY OF ILLINOIS

SWS Contract Report 398

SEDIMENTATION SURVEY OF MAYNARD LAKE, CHAMPAIGN COUNTY, ILLINOIS

by
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Prepared for the
Maynard Lake property owners

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INTRODUCTION

The Illinois State Water Survey conducted a sedimentation survey of Maynard Lake on September 18, 1985. The results are presented in this report.

Background

Maynard Lake is located approximately 0.5 mile southwest of the city of Champaign in the northeast quarter of Section 21, T.19N., R.8E., in Champaign County (figure 1).

The lake was originally used as a borrow area in the construction of Interstate 57 in the early 1960s. I-57 is 700 feet west of the lake. The lake was later developed as a residential area and the shoreline is now nearly completely occupied by homes. The large peninsula in the southern portion of the lake and the adjacent island are developed as commons areas.

Drainage into the lake is overland from adjacent residential lots and from storm sewer outlets draining the surrounding residential neighborhood. Water from a drilled well is used in summer months to maintain a recreational pool level. An overflow drain in the southeast corner of the lake releases surcharged water to Phinney Branch, a tributary to the Kaskaskia River. The lowest point on this drainage outlet is used as the point of reference for all depth measurements in this report.

Acknowledgments

This work was carried out by the author as part of his regular duties at the Water Survey under the administrative guidance of Richard J. Schicht, Acting Chief; Michael L. Terstriep, Head of the Surface Water Section; and Nani G. Bhowmik, Assistant Head of the Surface Water Section.

William Zehrt, an undergraduate student at the University of Illinois, assisted in the field data collection for this project. The

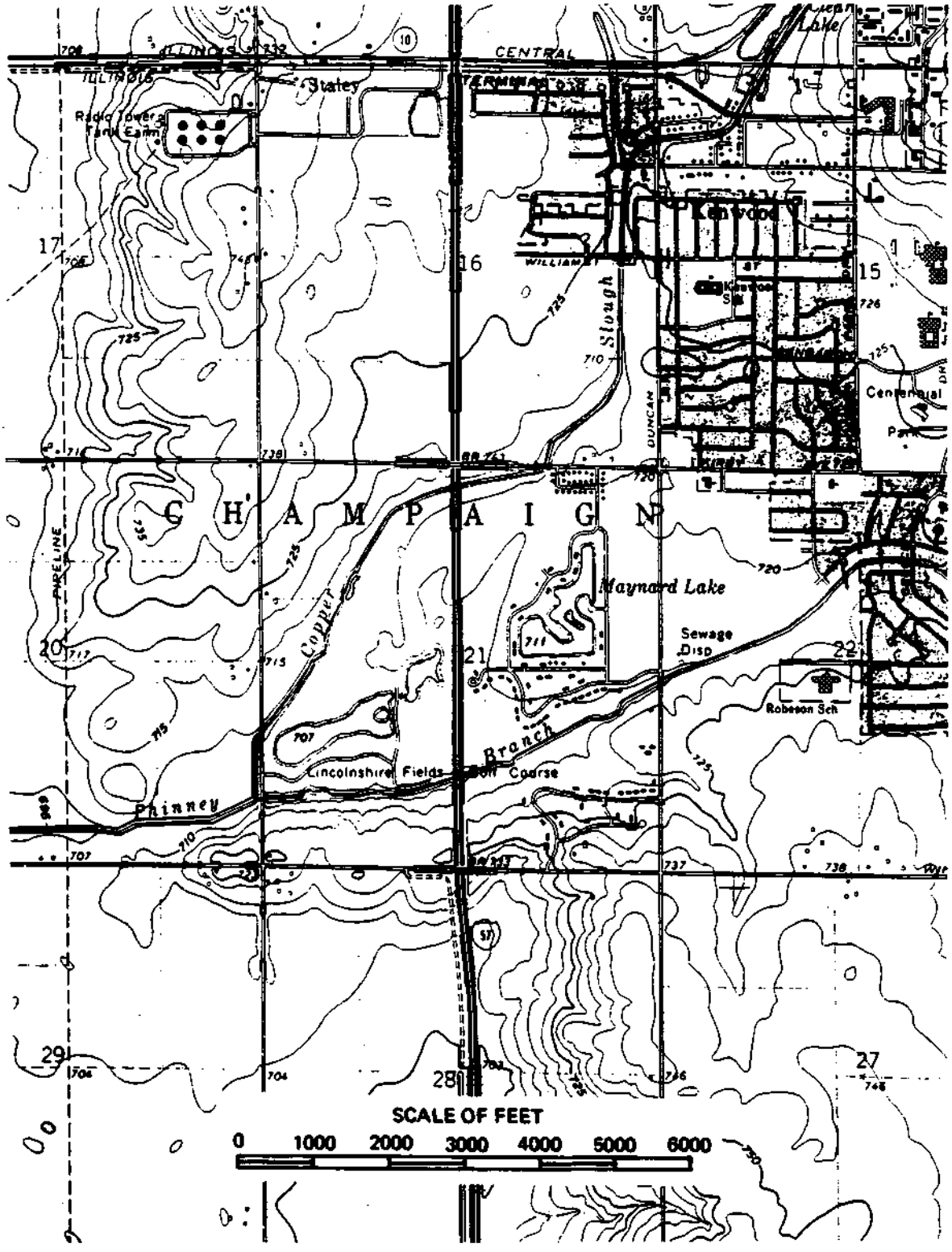

Figure 1. Location of Maynard Lake

particle size analyses were performed by Becky Roeper. The report was typed by Becky Howard.

SEDIMENTATION SURVEY

The plan of the sedimentation survey is shown in figure 2. Five lines were surveyed for original and 1985 water depths. Depth measurements were made by using a 2-inch-diameter sounding pole with an 8-inch-diameter sounding shoe. Horizontal distances were measured by using a marked cable.

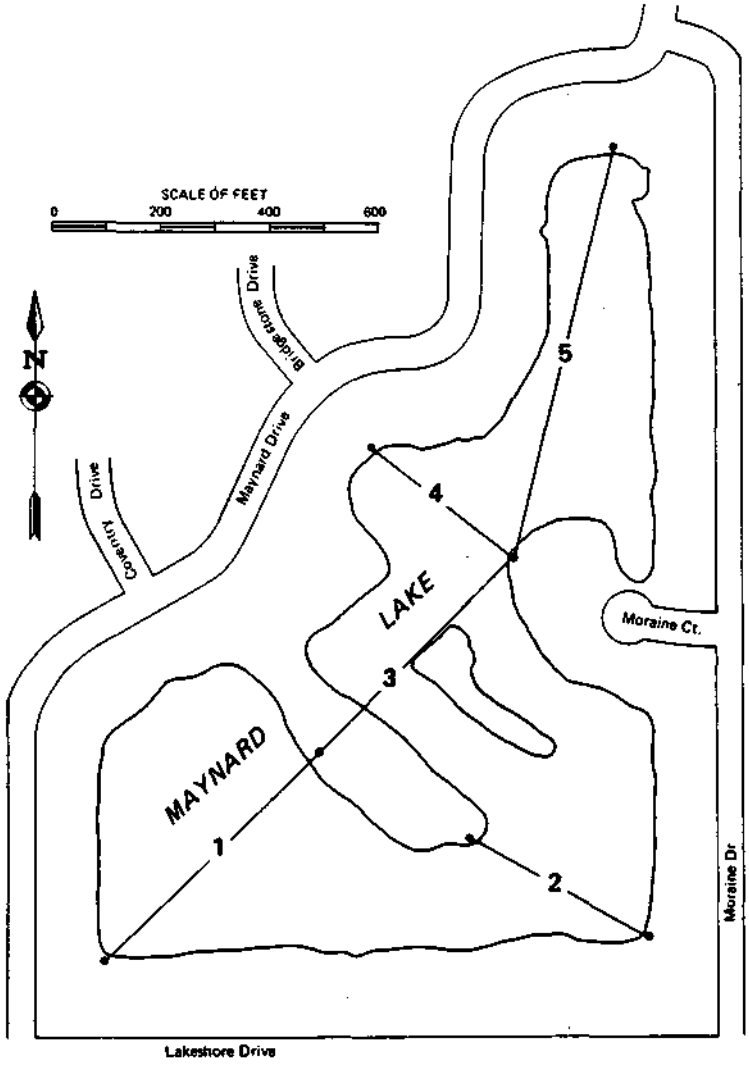

Figure 2. Maynard Lake survey plan

Depth measurements were taken by lowering the sounding pole to the sediment-water interface. At this point, the sounding shoe floated on the interface, producing a more sensitive water depth measurement. The pole was then manually driven through the accumulated sediment to a point of refusal. This was assumed to be the original lakebed surface.

Three samples of the accumulated sediments were collected for particle size distribution analysis. These samples were taken from surface sediments collected at the following locations:

1) area south of commons peninsula
2) area northwest of island
3) northern finger of lake

No unit weight samples were taken due to the thin, unconsolidated nature of the sediments. These materials could not be sampled for unit weight with the equipment available.

Sediment Distribution

Table 1 shows the change in depth in the lake for the 5 lines surveyed as well as for the combined (total lake) depth. The ratio given in Table 1 indicates the percentage of original depth which still is available. Plots of the surveyed cross sections are given in figures 3a-e.

This analysis indicates that sediment accumulations are highest in the areas of lines 1 and 3. These higher rates may result from a larger watershed for these portions of the lake or from differences in yard maintenance, residential construction, water depth, in-lake currents, or proximity to bank erosion sources.

Table 1. Changes in Depth of Maynard Lake, Original to 1985

Survey line number	Average depth (feet) original	1985	1985 sediment	Depth ratio (1985/original in %)
1	9.8	8.2	1.6	84
2	5.5	4.4	1.1	80
3	5.7	3.9	1.8	70
4	4.6	4.0	0.6	87
5	5.0	4.0	1.0	82
combined	6.15	4.97	1.18	81

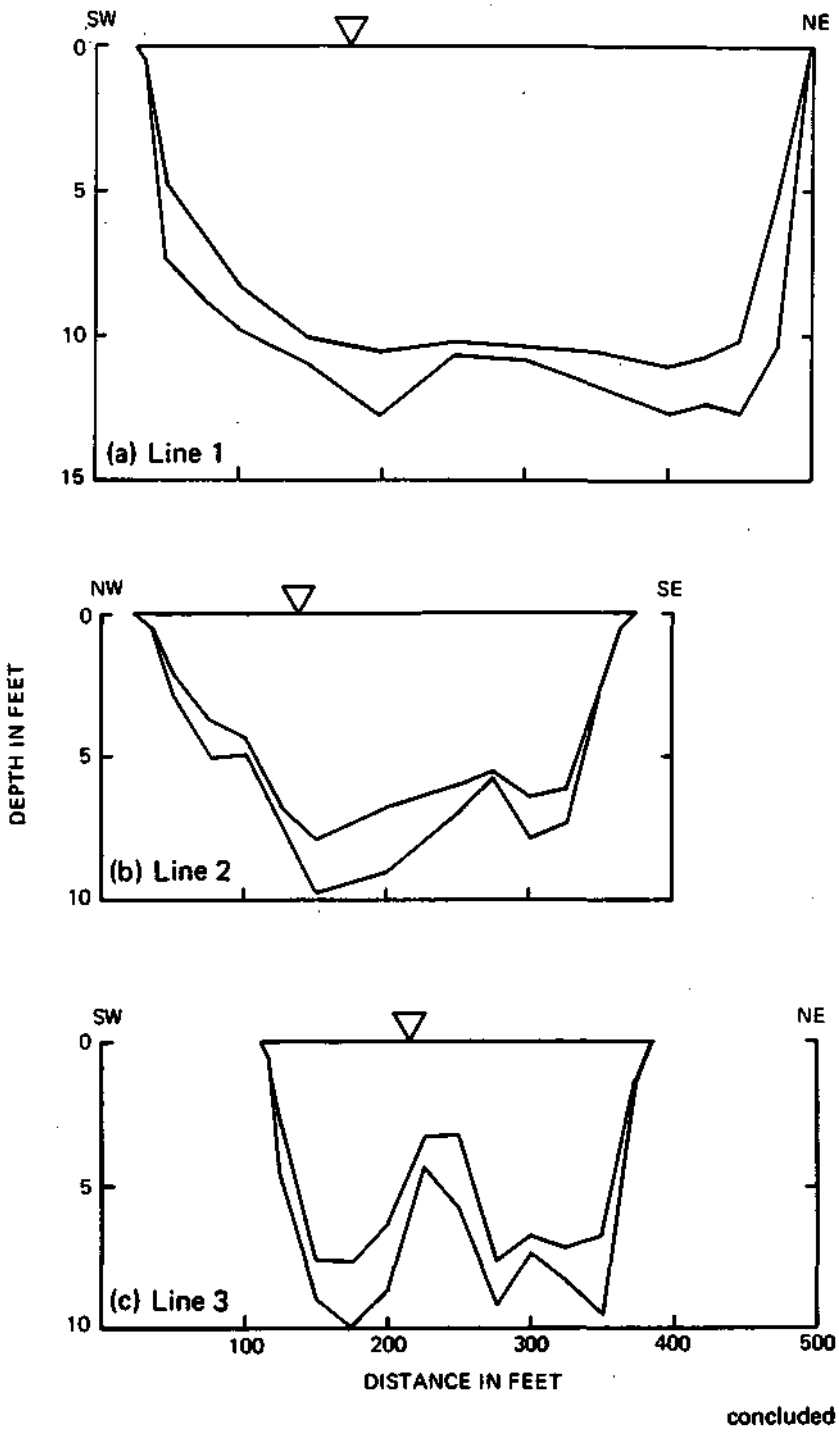

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Figure 3. Maynard Lake surveyed profiles

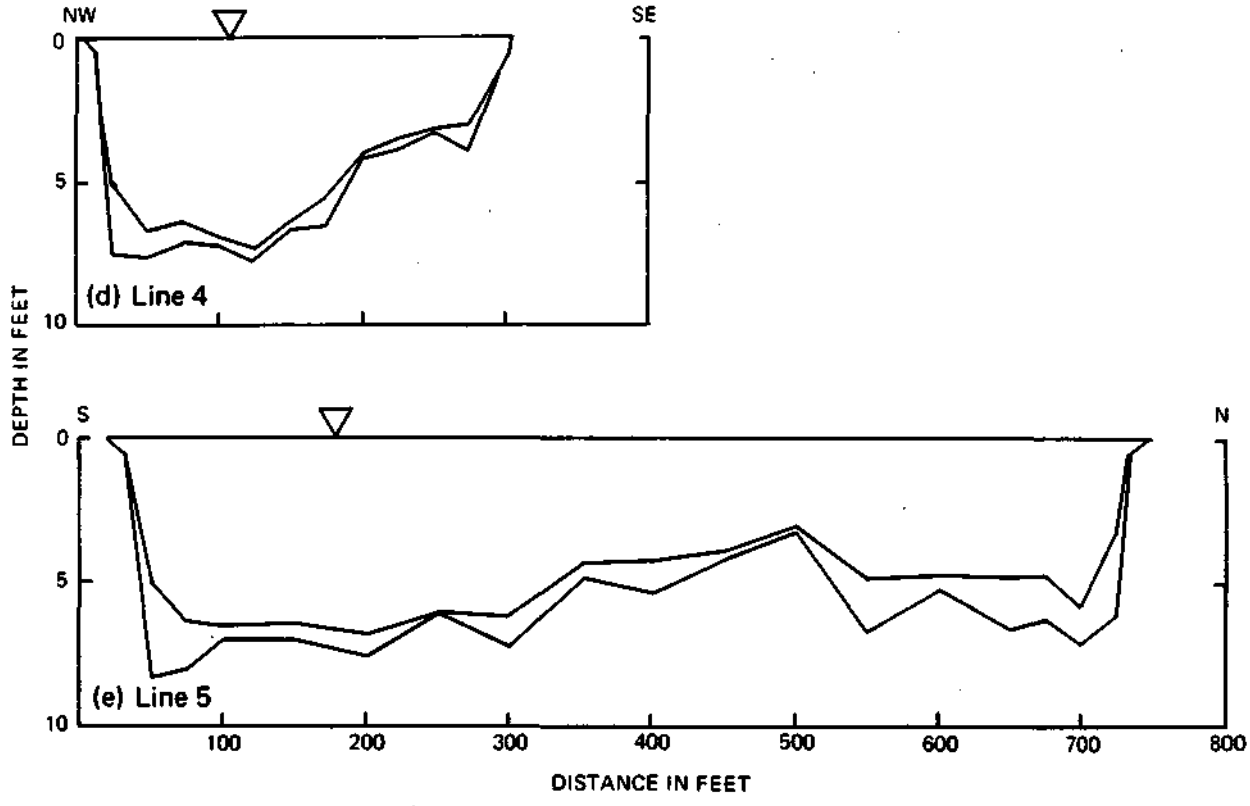

Figure 3. Concluded

Figure 4 shows the particle size distribution of each of the 3 sediment samples collected from the lake. The similar nature of these samples indicates that little if any variation exists in sediments removed from the watershed. These samples indicate that less than 1% of the center lake sediments are sand. Thus no sand-size materials circulate in the center portions of the lake. Several areas of sand deposition were observed at the outlets to storm drains, but low in-lake water velocities do not transport sand.

Sedimentation Rates

No reliable information exists concerning the area of Maynard Lake outside of its use as a borrow pit in the construction of 1-57. For purposes of this report, 1960 is presumed to be the date of origin.

Table 2 summarizes the sedimentation of Maynard Lake over the period 1960 to 1985. The lake has lost an average of 1.18 feet of depth. The lake originally had an average depth of 6.15 feet but was reduced to 4.97 feet by 1985.

The summary of loss of depth rates by survey line indicates that the area northwest of the island has lost depth at a rate of 0.86 inch per year. This portion of the lake is also the shallowest and will therefore be impaired by sediment accumulation sooner than other sections of the lake.

The southern section of the lake has the second highest sediment accumulation rate (0.77 inch/year) but will not be impaired as soon by sediment due to its greater depth.

DISCUSSION

The rates of sedimentation presented in this report are probably higher than should be expected in the future. The 25-year period covered by this survey corresponds to a period of rapid development in the watershed of the lake. This development resulted in considerable land disturbance with resulting high rates of soil erosion. Future sedimentation in the lake will result from a well developed residential area with very limited new construction or other erosion sources.

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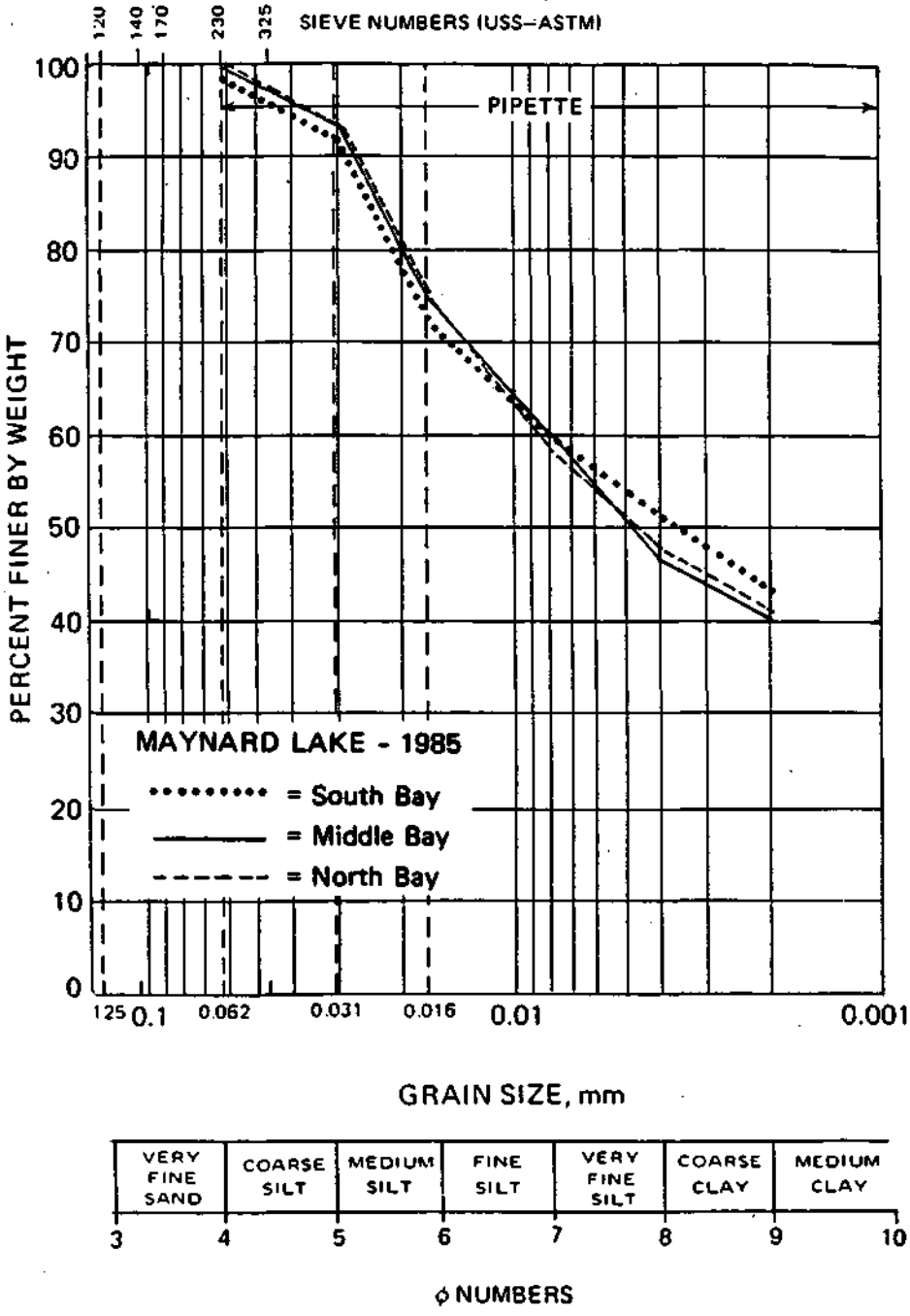

Figure 4. Particle size distribution for Maynard Lake sediments

Table 2. Maynard Lake Sedimentation Rates

Age	25 years
Original average depth	6.15 feet
1985 average depth	4.97 feet
Average sediment thickness	1.18 feet
Rate of loss	0.57 inches/year
One foot accumulation time	21 years/foot

Survey line number	Rate of depth loss (inches/year)	One foot accumulation time (years/foot)
1	0.77	16
2	0.53	23
3	0.86	14
4	0.29	41
5	0.48	25

Future efforts in managing the lake should include the following:

- Perform limited dredging at storm sewer outlets and around the island as needed to maintain water depth.

- Reduce nutrient loading to the lake through control of lawn fertilizer applications. (Seminars might be given on proper application rates, or negotiations might be made with a recommended landscaping specialist to promote proper application.)

- Control weed growth, preferably by physically removing weeds from the lake through harvesting (might provide mulch, etc., for gardening). Continued chemical control of weeds is another alternative; however, this method merely recycles the plant nutrients for use by the next generation of plants.

- Maintain a staff gage in the lake for recording water level. Have water samples analyzed in consultation with the Illinois Department of Public Health to assure chemically and bacteriologically acceptable water quality for water contact activities. Maintain records on all water level measurements, water quality, and any other changes in the lake.

- Conduct another sedimentation survey in the distant future (15 to 20 years). An earlier resurvey would not be statistically significant given the low sedimentation rate in the lake.

SUMMARY

Maynard Lake was originally created as a borrow area for the construction of I-57 during the early 1960s. It has since been used as the center of a residential development southwest of the city of Champaign, Illinois. The lakeshore lots and most of the watershed lots are now completely developed.

Over the period 1960 to 1985, sediment accumulated in the lake at an overall rate of 0.57 inches per year. Within the lake this rate has varied from 0.29 to 0.86 inches per year. These sedimentation rates reflect the intensive development rate over the last 25 years. Future rates can be expected to be significantly lower due to reduced soil disturbance in the watershed.