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

**SWS** Contract Report **401**

# SEDIMENTATION SURVEY OF LAKE PITTSFIELD, PIKE COUNTY, ILLINOIS

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**Prepared for the City of Pittsfield**

**Champaign, Illinois**
**September 1986**

*Illinois Department of Energy and Natural Resources*

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## INTRODUCTION

The Illinois State Water Survey in cooperation with the City of Pittsfield conducted a sedimentation survey of Lake Pittsfield in August 1985. The results of this survey are presented in this report and compared to those from earlier surveys conducted in 1974 (by Benton and Associates, Consulting Engineers, Jacksonville, Illinois) and 1979 (by the Water Survey, assisted by Benton and Associates).

### Acknowledgments

This project was conducted 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. Chester Kos, a student at the University of Illinois, assisted in the data analysis. The City of Pittsfield provided two summer employees, Grant Tittsworth and Matt Mellon, to assist in the field data collection.

Illustrations were prepared by John Brother and Linda Riggin. Gail Taylor edited the report and Patty Odencrantz and Becky Howard prepared the camera-ready copy.

### Reservoir Location

Lake Pittsfield is located in Pike County, 3 miles northeast of Pittsfield (figure 1). The dam lies at 39° 37' 51" north latitude and 90 44' 46" west longitude in Section 16, Township 5S, Range 3W.

The dam impounds Blue Creek, a tributary to the Illinois River. The watershed is a portion of hydrologic unit 07130011.

### Water Supply History

The first public water supply at Pittsfield was installed in about 1888 and consisted of a well drilled to 2200 feet and several blocks of water main. The water from this system was of very poor quality and was

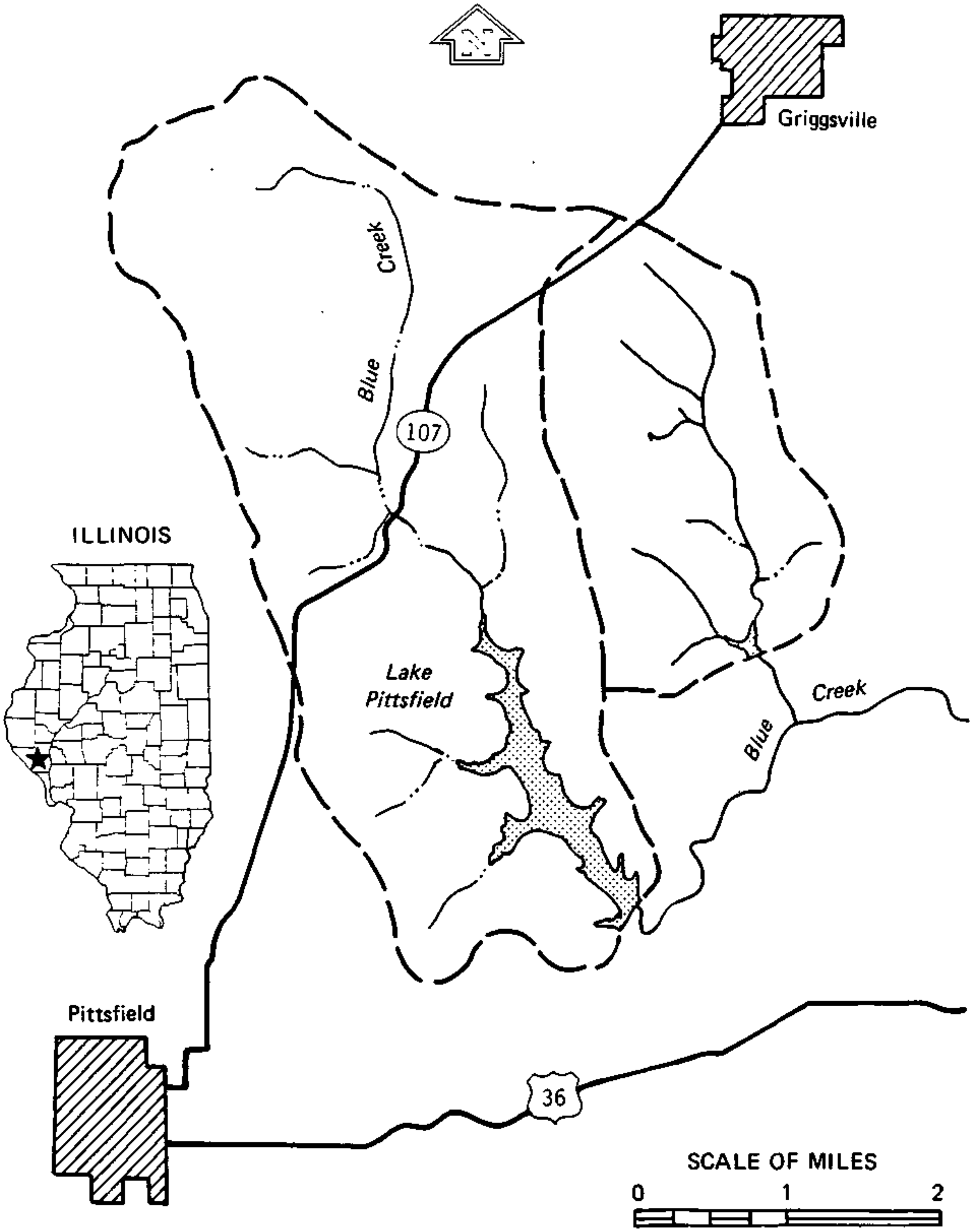


Figure 1. Location of Lake Pittsfield and its watershed

used principally for fire protection and street spraying. A sample of this water collected on July 20, 1918 indicated a mineral content of 3482, a total hardness of 807, and an iron content of 0.4 parts per million. The salt content of this water was 2255 parts per million. A 33-foot-deep dug and drilled well at the M.D. King mill was used as an emergency backup, but the water was also of poor quality.

All water for personal consumption was obtained from private wells. These wells were generally into shallow drift at about 40 feet. A few wells into rock were 100 feet deep or more. These wells generally had lower mineral and hardness values but much higher iron content than the public well.

Several reports were prepared from 1890 to 1920 describing possible alternative water supply and distribution systems. These reports evaluated such sources as springs, shallow wells along Bay Creek, shallow bedrock wells, deep bedrock wells, and eventually surface water impoundments.

In 1922, the city contracted with J. C. Heflin to drill a second deep well. This well was finished at 835 feet but was found to yield even poorer water than the original well. Mineral content of this water was 4512, hardness 816, and iron 2 parts per million, with salt content of 3121 parts per million.

In 1924 a lake was built about a mile northwest of town, and the distribution system was connected in 1925. This lake greatly improved the quality of the city's water supply. Raw water analyses from February 1931 show a mineral content of 110 parts per million, hardness of 103 parts per million, and only a trace of iron.

This reservoir served the city adequately, but with little reserve capacity, from 1925 to 1953. During this time, the spillway was raised twice (1944 and 1951) by a total of 2.5 to 3.0 feet. In 1946, a sedimentation survey by the U.S. Soil Conservation Service found that storage capacity had been reduced by 37% or 1.7% per year. Some sediment was removed from the lake in 1951.

During the 1953-1955 drought, the lake supply was completely exhausted at various times and all water used was hauled in by truck from Louisiana, Missouri. Eventually, the city bought two wells and drilled a third to augment flows into the lake. This system was used until 1961 when the new water treatment plant and new lake were completed.

Lake Pittsfield was constructed as a multiple-purpose reservoir in 1961 under the authority of PL 83-566 (Small Watershed Protection Act). The lake is used for the City of Pittsfield's water supply, for recreation, and as a flood control structure. The major recreational uses of the lake are fishing and boating, with camping and picnicking on the adjacent park grounds. The water treatment plant pumped an average of 440,470 gallons per day from May 1979 to September 1982. This water was used by the 4400 residents of the City of Pittsfield as a domestic public water supply.

## WATERSHED

The watershed of Lake Pittsfield is an 11.15-square-mile (7136-acre) area lying north and west of the lake (figure 1). The western border of the watershed lies along the watershed divide between the Illinois River and the Mississippi River. The following watershed description is taken from Lee et al. (1983).

### Geology

The eastern portion of the Blue Creek watershed had a long and complex erosional history prior to glaciation. An extensive lowland -- the central Illinois peneplain -- was eroded in the weak Pennsylvanian rocks of the Illinois basin; it was bordered on the west and south by uplands, on which remnants of an older erosion surface are extensively preserved. The greater relief and higher elevations are determined by the preglacial uplands, whereas the low plains are characteristic of the central Illinois peneplain.

With the approach of the Nebraskan glacier there probably was a change from erosion to aggradation along major streams as a result of increased sediment load and changes of the drainage areas. Fills in the preglacial valleys were, at most, partially removed during the succeeding Aftonian interglacial stage. The Kansan glaciers which followed buried the area and, because of the diversion of drainage, the deposited fills were not re-excavated during the ensuing Yarmouth interglacial stage. The Illinoian glacier moved across a subdued land surface whose depressions were filled by the drift of the earlier glaciers, and when the Illinoian ice retreated, a relatively smooth till plain was left.

The western portion of the watershed is a dissected plateau partially covered with remnants of Kansan drift, loess, and outwash gravels. The plateau surface is rugged and broken by closely spaced valleys and ridges. Small areas of gently rolling uplands are present along the crest of these ridges. The plateau is underlain by limestone of the lower Valmeyeran series of the Mississippian system. The boundary between the till plain in the east and the dissected uplands in the west is the Illinoian drift border which trends northwest through the watershed. Regionally, the valleys of the Mississippi and Illinois Rivers are broad, deeply alluviated, and terraced, and have steep walls. Most of the minor valleys of the area are narrow, V-shaped, and steeply graded (Leighton et al., 1948).

The bedrock which underlies the watershed consists of layers of shale, coal, limestone, dolomite, and sandstone. These rocks were originally deposited as loose sediments in shallow continental seas but were later buried and consolidated. In the time interval between the deposition of the bedrock formations and glaciation, the area was subject to erosion when tilting and warping of the bedrock layers from their horizontal position occurred.

Underlying the layers of bedrock are ancient granite rocks which form the basement complex (Bergstrom and Zeizel, 1957).

Basin Physiology. Topography, and Drainage

The Blue Creek watershed overlies the boundary of two physiographic provinces: the Galesburg Plain of the Tills Plain Section of the Lowland Physiographic Province to the east, and the Lincoln Hills Section of the Ozark Plateaus Province to the west. The boundary between the provinces coincides closely with the Illinoian drift border (Leighton et al., 1948). A physiographic province is a region in which all parts are similar in geologic structure and which has a unified geomorphic history.

The Galesburg Plain includes the western segment of the Illinoian drift sheet. The till plain is level to undulatory with a few morainic ridges and is in a late youthful stage of erosion. The Illinoian drift is generally thick and is underlain by extensive Kansan and Nebraskan deposits, especially along buried preglacial valleys. Most of the irregularities of the preglacial surface were filled in with older drift, so that only major features of the bedrock topography are reflected in the present landscape.

By contrast the western portion of the watershed is essentially a preglacial land surface whose erosional history continued during the glacial period. During the glacial period the preglacial topography was modified by alluviation of the major valleys and by deposition of loess on the uplands.

The eastern portion of the watershed has gentle rolling hills and a few level ridge tops, while the western portion of the watershed essentially conforms to the preglacial bedrock. The valley is broad and flat with gently sloping valley walls. The gradients of Blue Creek and its tributaries are moderate. Within the drainage area above Lake Pittsfield, elevations range from a maximum of 802 feet msl to a lake elevation of 596 feet msl, so the total relief is 206 feet.

Soils

A major portion of the upland soil in the Blue Creek watershed has developed in moderately thick loess which overlies weathered Illinoian glacial till. Most of the soils of the watershed have developed under timber vegetation, the exception being a small percentage of prairie soils in the northern section. Soils on the steeply sloping areas adjacent to the stream have developed in either weathered glacial till or limestone residue. The latter consists of a relatively thin surface layer concealing the unweathered or partially weathered rock below. Bottom soils are cumulative soils which have developed chiefly from silty deposits derived from erosion of the uplands.

The soils in the watershed may be categorized into four general soil groups:

A) Upland Timber Soils - Light colored, silt loam soils with moderately slow permeability, occurring on slopes ranging from 1 to 15 percent. These soils were developed in 5 feet or more of loess over weathered Illinoian till. A typical soil type within this group is Fayette.

B) Upland Prairie Soils - Dark colored silt loam soils with moderate permeability, occurring on nearly level to gently sloping land. These soils were developed under prairie vegetation in 8 feet or more of loess over weathered Illinois till. Typical Illinois soil types are Muscatine and Tama.

C) Steeply Sloping Timber Soils - This is a heterogeneous group of soils developed on exposures of weathered glacial till, limestone outcrops, or thin loess. A typical type within this group is Hickory.

D) Bottomland Soils - Dark to moderately dark colored silt loam soils with moderate permeability, occurring on nearly level valley floors. Typical soil types are Orin and Lawson.

### Land Use

The predominant land use in the watershed is agriculture. The prevalent crop is corn, though soybeans, wheat, and grasses are also found on the watershed. The various land uses, their acreages, and the percentage of the watershed occupied by each are presented in table 1.

## SEDIMENTATION SURVEYS

Lake Pittsfield has been the subject of three sedimentation surveys since its construction in 1961. The first survey was conducted in 1974 by Benton and Associates, with advice and equipment provided by the Water Survey.

For the second survey, conducted in 1979, the Water Survey supervised a field crew from Benton and Associates and prepared all calculations.

Table 1. Land Use in the Blue Creek Watershed

| Land use | Acres | Percent of watershed |
|---|---|---|
| Cropland | 4030 | 56.5 |
| Farmstead | 111 | 1.5 |
| Pasture/Hayland | 1546 | 21.7 |
| Wildlife | 317 | 4.4 |
| Woodland | 825 | 11.6 |
| Other | 307 | 4.3 |
| Total | 7136 | 100.0 |

Samples of the accumulated sediments were collected and analyzed for unit weight and particle size distribution. A written report was completed in December 1979 (Bogner, 1979).

The 1985 sedimentation survey was conducted by the Water Survey with financial assistance and personnel provided by the city. An expanded program of sediment sampling was included.

All three surveys were conducted in the same general manner. Range lines established by Benton and Associates in 1974 (figure 2) were surveyed by using a 2-inch-diameter aluminum sounding pole for depth measurement and a marked or metered 0.25-inch-diameter polyethylene cable for horizontal control.

Range ends were monumented in 1974 by Benton and Associates, using various iron bars, rods, and posts. In 1985, these cross sections were remonumented with concrete posts. Where the original monumentation was not recovered, the concrete marker was set as nearly as possible on the original line.

The sounding pole used in all surveys was fitted with an 8-inch-diameter sounding shoe in order to better define the upper sediment surface. In practice, the pole was lowered into the water until the shoe could be felt to be resting on the sediment surface. The pole was then manually driven through the accumulated sediments to solid bottom or point of refusal. This is presumed to be the original lake depth. The difference between these two readings represents the depth of sediment accumulation.

All sediment samples were collected by using an Ekman dredge for surface particle size samples and a 2-inch-diameter core sampler for all unit weight and deep particle size samples. In 1979, 12 unit weight and 3 particle size samples were collected. In 1985, 24 unit weight and 20 particle size samples were collected.

## Lake Basin Volumes

The basin volumes for the 1985 survey and the previous surveys were calculated with the FORTRAN program PRIMOID on the University of Illinois Cyber computer. The volumes determined in the two previous surveys as well as the original volume were recalculated to assure consistency in analysis. Minor changes in basin volumes resulted from slight modifications in

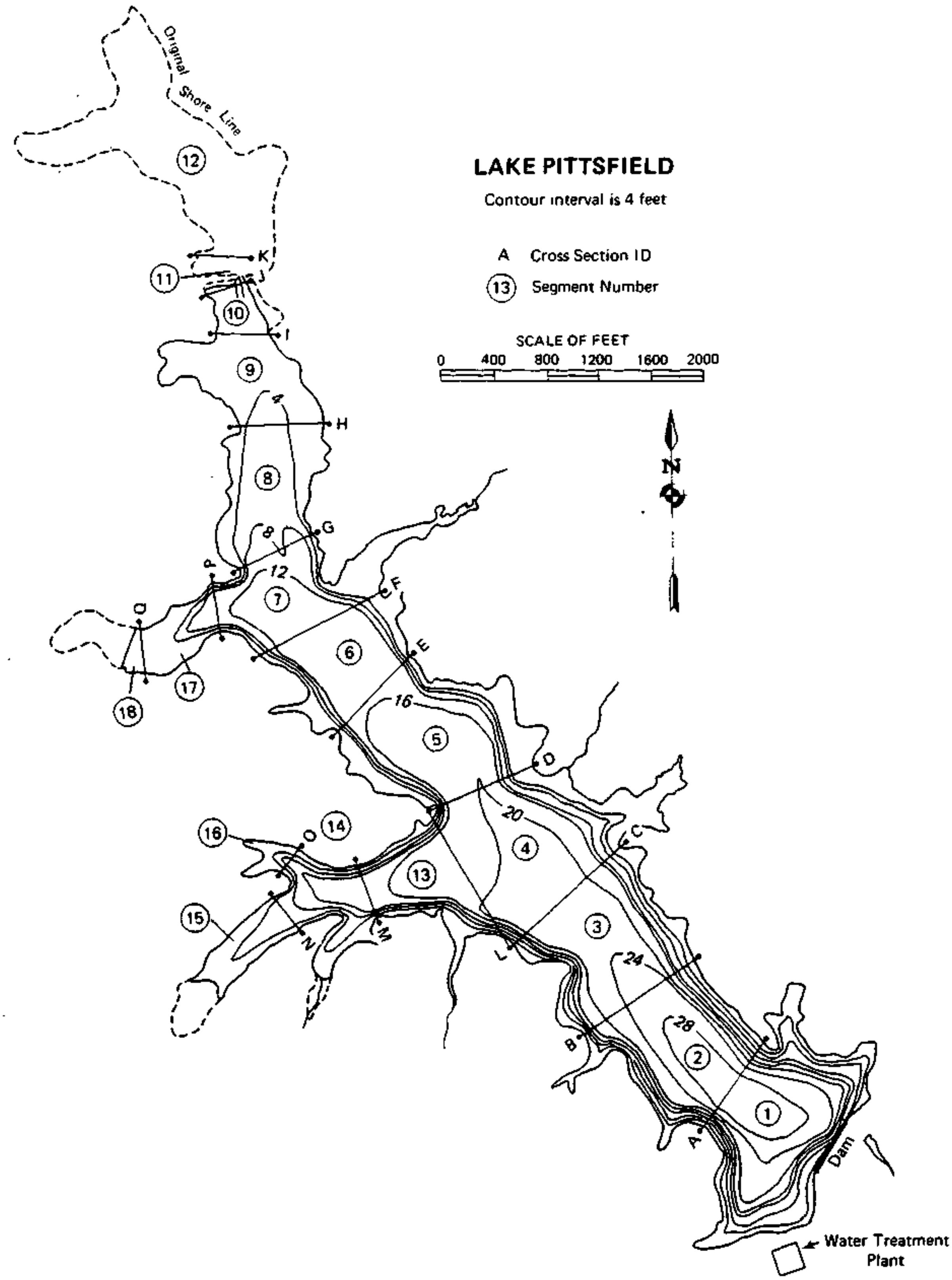


Figure 2. Lake Pittsfield survey plan with 1985 bathymetry

segmental surface areas and range line locations. The overall effect of these recalculations was a 4% increase in total basin volumes for 1961, 1974, and 1979.

A summary of the volumetric analysis is presented in table 2. These results show that the capacity of the lake basin below spillway level (596 feet msl) was reduced from 3580 acre-feet (1170 million gallons) in 1961 to 2760 acre-feet (899 million gallons) in 1985. The 1985 volume represents 77.1% of the 1961 volume.

The bathymetric contours of figure 2 were developed on the basis of the 1985 survey of the lake. Construction of this map required the interpolation of water depths between range lines. This may result in minor inconsistencies between depths shown on the map and lake depths; however, general lake depth patterns can be seen.

The bathymetric lines of figure 2 were used to define the stage vs. volume relationship of the lake. This relationship, presented in figure 3, can be used to determine lake volume for any stage below the spillway elevation. With continued sedimentation, this relationship will change.

## Sediment Distribution

The sediment volumes and tonnages in Lake Pittsfield are summarized in table 3. These data are summarized according to total volume and tonnage that had accumulated in each segment at the time of each survey. The 1985 data are also shown for each segment in terms of average thickness of sediment in feet and average weight in tons per acre of original lake area.

The average accumulation data in table 3 indicate that the major sedimentation impacts are occurring in segments 8-15, 17, and 18 (figure 2). In these segments (except for segments 12, 15, and 18), average sediment thicknesses are 4 feet or greater and tons of sediment per acre of original lake area are 4000 tons or greater. Segments 12, 15, and 18 are included in this grouping because it is assumed that adding in the sediment deposits above the water level would bring them to the 4-foot and 4000-ton thresholds.

The rapid accumulation of sediment in these segments will soon reduce their capacity to trap sediments. This will eventually result in increased impacts to downstream segments (i.e., segments 1 to 7).

Table 2. Lake Pittsfield Volumetric Summary

Total watershed area 11.1 square miles
Net sediment contributing area (excludes reservoir area) 10.7 sq mi

| | Age (years) | Lake area (acres) | Lake volume at 596 msl (acre-ft) | (mil. pal.) | Cappacity to watershed ratio (ac-ft/sq mi) | Percent of original capacity |
|---|---|---|---|---|---|---|
| Constructed 1961 | | 262 | 3580 | 1170 | 323 | 100 |
| Surveyed 1974 | 13 | | 3010 | 981 | 271 | 84.1 |
| Surveyed 1979 | 18 | 236 | 2870 | 935 | 259 | 80.2 |
| Surveyed 1985 | 24 | 233 | 2760 | 899 | 249 | 77.1 |

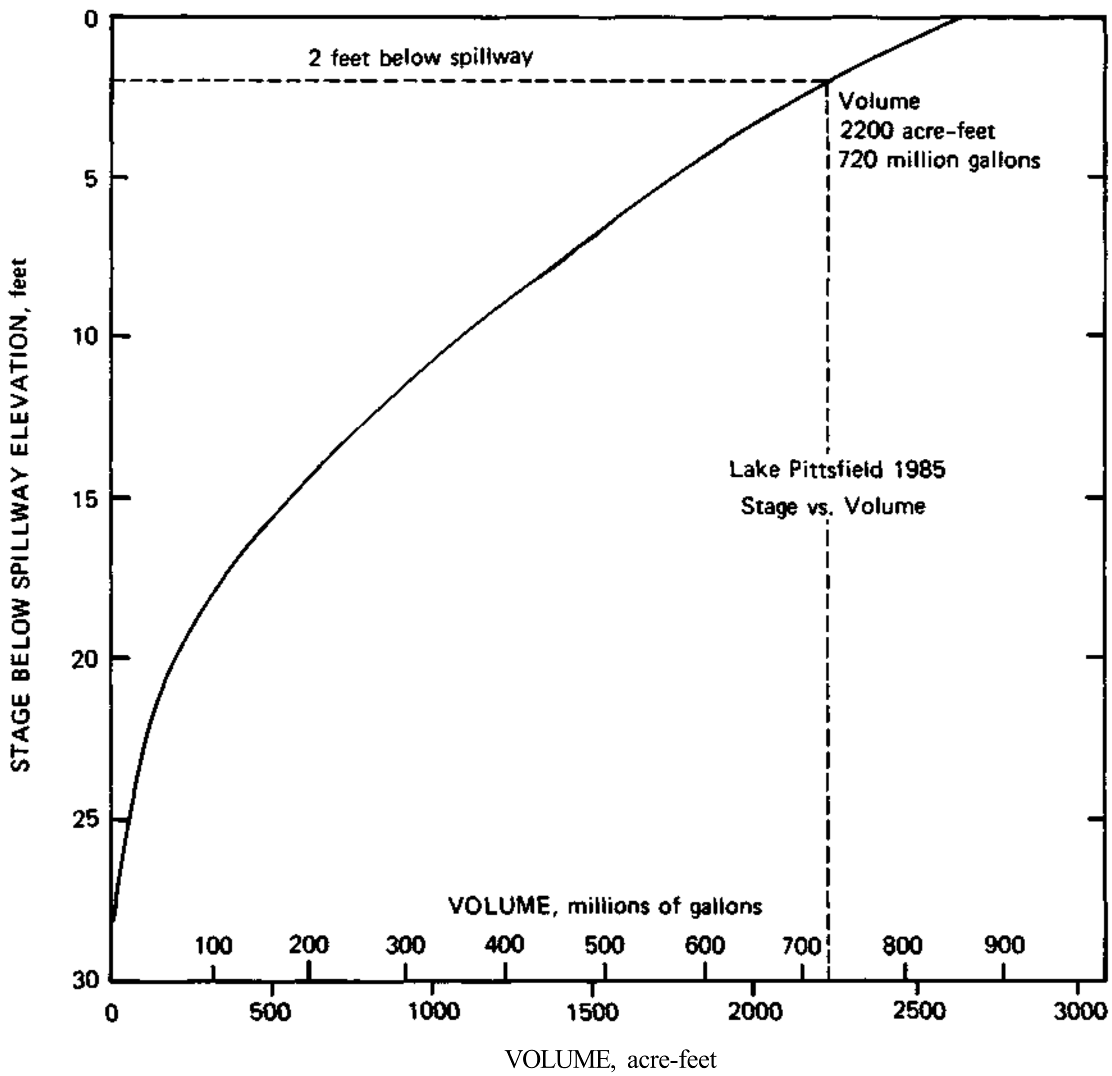


Figure 3. Stage versus volume relationship for Lake Pittsfield (1985)

Table 3. Sediment Accumulation in Lake Pittsfield

| Segment number | 1974 sediment volume (ac-ft) | 1974 sediment weight (1000 tons) | 1979 sediment volume (ac-ft) | 1979 sediment weight (1000 tons) | 1985 sediment volume (ac-ft) | 1985 sediment weight (1000 tons) | 1985 sediment thickness (feet) | 1985 sediment weight (1000 t/ac) |
|---|---|---|---|---|---|---|---|---|
| 1 | 40 | 25 | 71 | 51 | 76 | 52 | 2.5 | 0.7 |
| 2 | 40 | 28 | 59 | 41 | 65 | 46 | 3.0 | 2.1 |
| 3 | 45 | 36 | 59 | 48 | 69 | 58 | 3.0 | 2.5 |
| 4 | 52 | 40 | 62 | 46 | 69 | 56 | 2.4 | 2.0 |
| 5 | 46 | 43 | 51 | 46 | 58 | 53 | 2.2 | 2.0 |
| 6 | 30 | 29 | 35 | 34 | 43 | 41 | 3.1 | 2.9 |
| 7 | 42 | 50 | 47 | 53 | 57 | 70 | 3.4 | 4.2 |
| 8 | 40 | 49 | 52 | 61 | 65 | 82 | 4.4 | 5.6 |
| 9 | 31 | 41 | 47 | 63 | 61 | 89 | 4.8 | 7.0 |
| 10 | 12 | 18 | 16 | 24 | 21 | 35 | 6.0 | 10.0 |
| 11 | 10 | 15 | 11 | 16 | 13 | 22 | 6.5 | 11.0 |
| 12 | 79 | 111 | 79 | 111 | 82 | 116 | 2.7 | 3.8 |
| 13 | 34 | 37 | 46 | 52 | 52 | 61 | 4.5 | 5.3 |
| 14 | 22 | 25 | 27 | 31 | 34 | 41 | 3.8 | 4.6 |
| 15 | 18 | 25 | 19 | 26 | 21 | 29 | 2.8 | 3.9 |
| 16 | 1 | 1 | 1 | 1 | 1 | 1 | 0.7 | 0.7 |
| 17 | 13 | 19 | 15 | 21 | 21 | 29 | 4.0 | 5.5 |
| 18 | 12 | 18 | 12 | 17 | 13 | 20 | 3.0 | 4.7 |
| Total | 570 | 610 | 710 | 740 | 820 | 900 | 3.1 | 3.4 |

The greater sedimentation impacts in these segments are explained by an analysis of the distribution of sediment particles in the lake. As sediment enters the lake with the waters of Blue Creek, it is dropped from suspension in a pattern related to the size of the particles and the velocity of the inflowing stream.

The maximum particle size transported by a stream is dependent on flow energy and will vary as streamflow changes. As this sediment-water mixture enters the lake, the flow velocity is reduced, also reducing the capacity of the flow to carry sediment. The sediment drops from suspension, with the sand materials dropping immediately and silt materials carried further into the lake. The finest sediment particles remain in suspension and are released more slowly throughout the lake. The release of the clays may occur well after stream inflow has ceased, and the clays will continue to mix into the lake water as in-lake turbulence causes resuspension.

Figure 4 illustrates the effect of particle size on sediment deposition patterns. This figure shows the tonnage of sediment of various particle sizes accumulating in the main lake segments (1-10). The clay particles (smaller than 4 *u*m) are distributed equally throughout the lake. This is indicative of the slow deposition of clay on a continuing basis.

The distribution of the silt fraction (4-16 *u*m and 16-63 *u*m) is indicative of a strong relationship to inflow. The finer silts (4-16 *u*m) are distributed further into the lake than the coarser silt (16-63 *u*m), but both seem to reach a more stable gradient in the lower portion of the lake.

The distribution of sand (larger than 63 *u*m) is limited to areas subject to direct inflow of confined streamflows. Only a small proportion of the Lake Pittsfield sediments are sand-size or larger particles.

Sedimentation Rates

Sediment accumulation rates for Lake Pittsfield are presented in table 4. These rates are presented in terms of volume, weight, and percent of original lake volume.

Sedimentation rates for the period 1979 to 1985 continue to show a distinct reduction from the rates of the 1961 to 1974 period. As a conservative estimate of future sedimentation rates, it is recommended that the historical average rates be used (34 acre feet per year, 1961-1985).

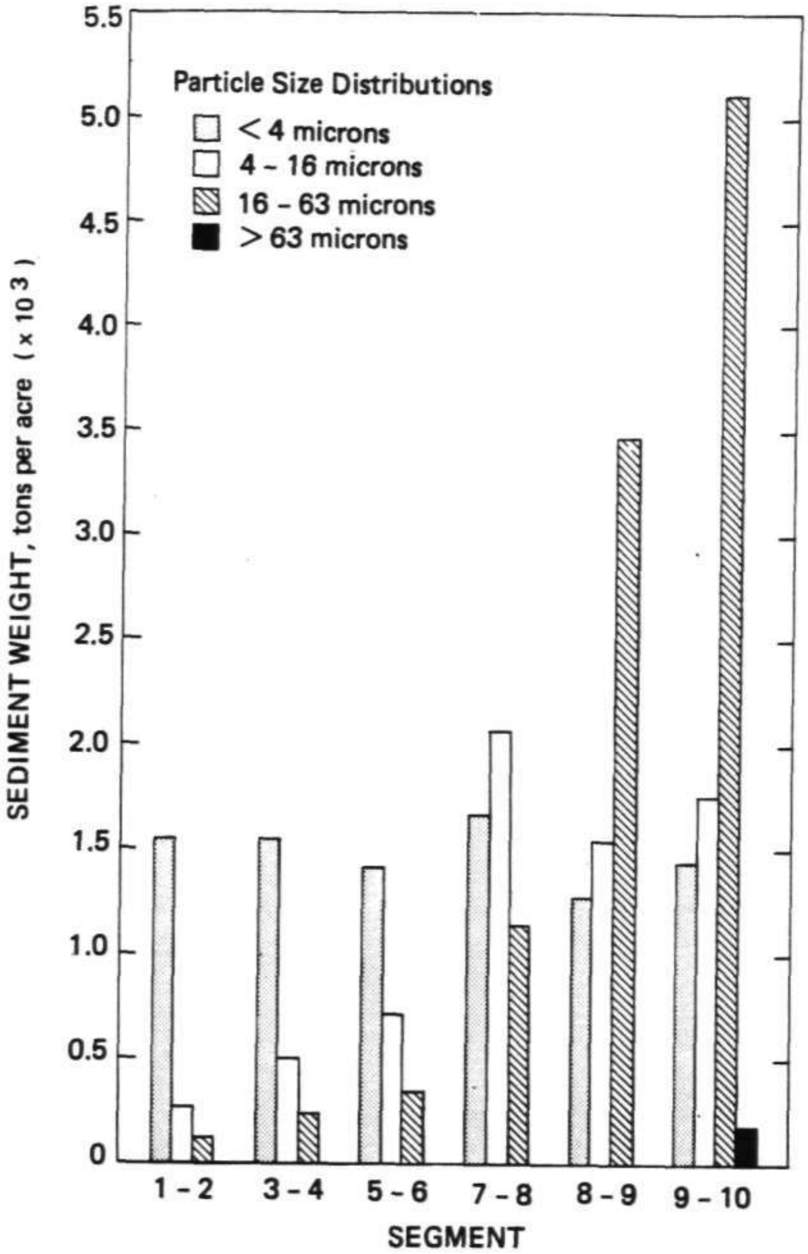


Figure 4. Tonnage of sediment of various particle sizes accumulating in lake segments 1 through 10

On the basis of observations made at the time of the 1979 and 1985 surveys, a part of the apparent sedimentation rate reduction may result from the emphasis of all the surveys on the lake capacity loss. This analysis excludes deposits above water level, which have had significant impact in segments 10, 11, 12, 15, and 18. Figure 5 shows photographs of the downstream view from the bridge in segment 11 in 1979 and 1985. These views show the growth of the delta downstream of the bridge. Upstream of the bridge, a 30-acre ponded area has been reduced to a stream channel with a width of 100 to 125 feet.

The three sedimentation surveys have not effectively evaluated these deposits due to their insignificant impact on water volumes (line K has not been surveyed in any survey, and all volumes for segment 12 have been estimated from other sources). In terms of sediment tonnage, one above-spillway-level foot of sediment deposited on 30 acres (segment 12), weighing 75 pounds per cubic foot, contains 50,000 tons of sediment. Thus since 1974, when segment 12 was effectively filled with sediment, sediment accumulation has possibly been 50,000 tons or more as compared to the estimated 5,000 tons filling the water volume.

Two factors -- the above-spillway-level deposits and the differences in discharge patterns as noted by Bogner (1979) -- have played a major role in the apparent reduction in sedimentation losses of Lake Pittsfield. The discharge history of Bay Creek as presented by Bogner (1979) has been updated for presentation as table 5.

The Bay Creek watershed is located immediately adjacent to the Lake Pittsfield (Blue Creek) watershed and is approximately four times larger. Information on this watershed is presented in this report to indicate natural flow variability for the Lake Pittsfield watershed. The period 1961 to 1974 was a period of extremely high discharges, with 6 of 14 years having a maximum discharge of over 10,000 cubic feet per second (cfs). Prior to 1960, the maximum recorded discharge was 8,300 cfs. The later two sedimentation periods (1975-1979 and 1980-1985) had continued high discharges. However, only one year in each of these periods contained a discharge of over 10,000 cfs.

These high discharges have been significant factors in the sedimentation of Lake Pittsfield. They carry a disproportionately large

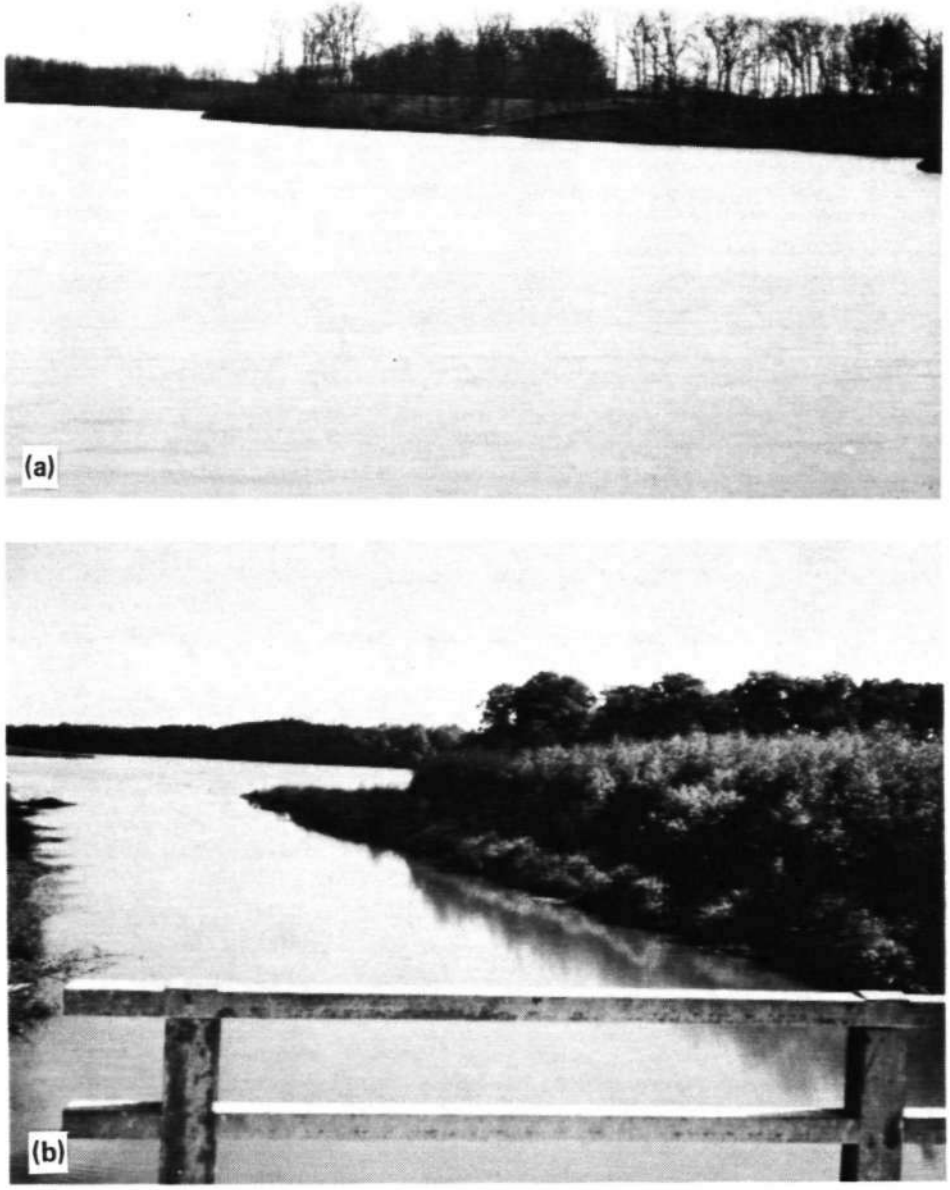


Figure 5. Downstream view from the bridge in lake segment 11 in a) 1979 and b) 1985

Table 5. U.S. Geological Survey Gaging Station 5512500
Bay Creek near Pittsfield, Illinois
• Drainage Area = 39.6 sq mi

| Year | Average annual discharge (cfs) | Instantaneous peak discharge (cfs) |
|---|---|---|
| 1961 | 22.6 | 10,000* |
| 1962 | 35.1 | 6,840 |
| 1963 | 16.1 | 6,150 |
| 1964 | 13.5 | 8,100 |
| 1965 | 37.1 | 12,600* |
| 1966 | 34.7 | 12,200 |
| 1967 | 27.2 | 10,900 |
| 1968 | 25.5 | 5,000 |
| 1969 | 40.2 | 5,020 |
| 1970 | 84.6 | 11,300 |
| 1971 | 18.2 | 1,000 |
| 1972 | 14.4 | 1,830 |
| 1973 | 40.5 | 12,200 |
| 1974 | 47.8 | 6,450 |
| 1975 | 37.0 | 2,260 |
| 1976 | 14.4 | 2,400 |
| 1977 | 14.8 | 9,260 |
| 1978 | 32.2 | 7,290 |
| 1979 | 29.0 | 11,400 |
| 1980 | 8.6 | 1,080 |
| 1981 | 54.6 | 11,800 |
| 1982 | 26.7 | 1,980 |
| 1983 | 29.5 | 4,000 |
| 1984 | 26.1 | 6,270 |
| 1985 | 23.4 | 3,980 |

Flow record

portion of the annual sediment load (Bhowmik et al., 1980). These higher loads are reflected in the high sedimentation rates from 1961 to 1974.

## EVALUATION AND RECOMMENDATIONS

The sedimentation rates determined for Lake Pittsfield are high but do not represent unreasonably high values over the period 1974 to 1985. Sedimentation rates over the period 1961 to 1974 were relatively high but seem to correspond to variations in regional streamflow.

In terms of water supply yield, the sedimentation rate of Lake Pittsfield should not be a limiting factor for 50 to 100 years, depending on future rates. Present water supply needs for Pittsfield are less than 0.5 million gallons per day (mgd). In contrast, estimated yield from Lake Pittsfield for a 40-year recurrence interval drought will be 1.79 mgd in 1986 and 0.87 mgd in 2036. These yields are well over the city's present demand.

In terms of water quality, the present sedimentation rate will be a more significant factor. The organic material and other nutrients washed into the lake will severely detract from the aesthetic condition of the lake. This impact will affect the recreational use of the lake and citizens' perception of the potability of their water supply, and will increase the cost of water treatment.

It is therefore recommended that the city consider an economic analysis of dredging costs and benefits for dredging of segments 8 to 12, 15, and 18. Several options for dredging techniques should be considered including:

- mechanical or dragline dredging
- open water dredging by slurry
- combination of mechanical and slurry dredging

Alternatives which might be considered are water level drawdown to facilitate mechanical dredging and further development of sedimentation basins in the upper end of the lake. A limited drawdown of the lake is possible without seriously endangering the water supply storage for drought contingency. Construction of an additional causeway approximately corresponding to survey line G would further confine inflowing sediments to these upper segments, reducing sedimentation impacts to segments 1 to 7.

## SUMMARY

Sedimentation surveys of Lake Pittsfield in 1974, 1979, and 1985 indicate a reduction in lake capacity from the 1961 volume of 1170 million gallons (mg) to 981 mg in 1974, 935 mg in 1979, and 899 mg in 1985. Overall sedimentation rate (1961 to 1985) has been 0.9 percent per year. This rate has varied from 0.5 percent per year for the period 1979-1985 to 1.2 percent per year for the period 1961-1974.

The water supply potential of Lake Pittsfield will not become a problem for at least 50 years. However, it is recommended that dredging be investigated as a way of improving water quality, recreational benefits, and lake aesthetics.

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