

THERMAL STRATIFICATION OF THE WATER OF TWO ARTIFICIAL IMPOUNDMENTS OF SOUTHERN ILLINOIS

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It has long been known that natural bodies of standing water may stratify thermally. The effects of this phenomenon upon the biological productivity of lakes have been great. Studies on artificial impoundments have shown that thermal stratification also may occur in these waters if certain physical conditions are present. More information on thermal stratification in artificial impoundments, particularly small reservoirs and ponds, is needed. Some studies on southern Illinois waters have been made. The present paper adds to these observations.

Elder (1951) reported on Little Grassy Lake and Lake Murphysboro. He stated that thermal stratification occurred in these lakes in July. The thermocline began at a depth of about 12 feet in both lakes. The range in temperature in Little Grassy Lake was from 25°C. at the surface to 12°C. at a depth of 30 feet. At Lake Murphysboro the range was from 26°C. at the surface to 9°C. at the bottom, with a drop of 6°C. between 12 and 15 feet. West (1950) presented data indicating that a thermocline was forming in Thompson Lake in May.

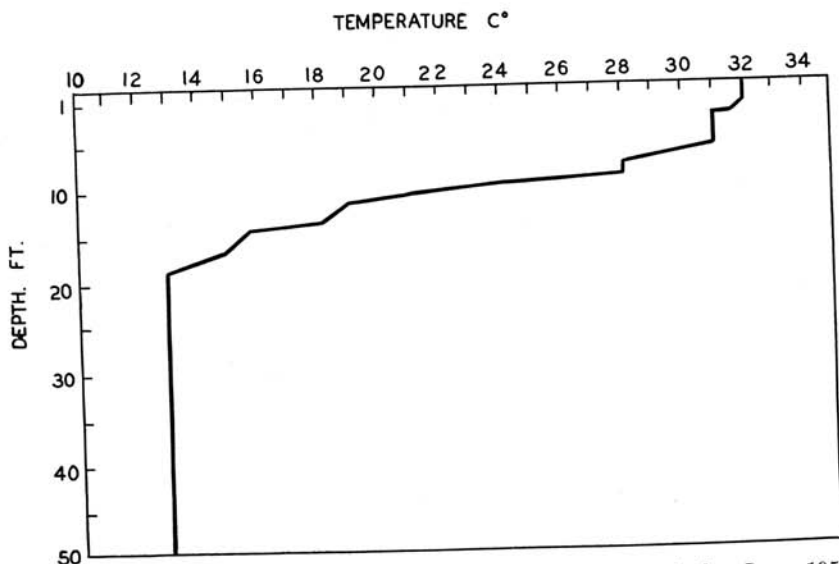


FIG. 1.—Vertical distribution of temperatures in Little Grassy Lake, June, 1952.

Lewis and Peters (1954) have demonstrated that well-developed thermal stratification of water occurs in various strip mine impoundments near Pyatt and Elkhaville (Perry County) in southern Illinois.

The present report is on Little Grassy Lake and Thompson Lake and is a result of class studies made in June, 1952.

Little Grassy Lake is an artificial impoundment located approximately ten miles southeast of Carbondale, Williamson County, Illinois. The lake was constructed as a flood control basin to Crab Orchard Lake. Its recreational use is primarily that of bass fishing. However, a limited amount of other fishing is evident. The lake is well-protected from wind action, and its depth and precipitous drop-offs on the sides prevent the growth of aquatic vegetation.

The lake was completed in 1946 and has a surface area of about 1,000 acres. Its maximum depth at

spillway level is approximately 60 feet, with an average depth of 25 feet.

On June 28, the range in temperature was from 32°C. at the surface to 13°C. at a depth of 50 feet. A very definite drop in temperature began at a depth of 8 feet and continued to a depth of 18 feet, after which the temperature remained constant at all other depths sampled (Fig. 1). The epilimnion extended from the surface to a depth of approximately eight feet. The water below 18 feet is in the hypolimnion.

Dissolved oxygen content was 5.3 parts per million near the surface, 5.0 at 10 feet, 2.7 at 30 feet, and 1.3 at 47 feet.

Thompson Lake is located in Jackson County, Illinois, in Township 9 S Range 1 W, Section 28. It was created by damming a small stream about 60 years ago. The remains of the old stream can still be seen in the ravine below the dam. Today

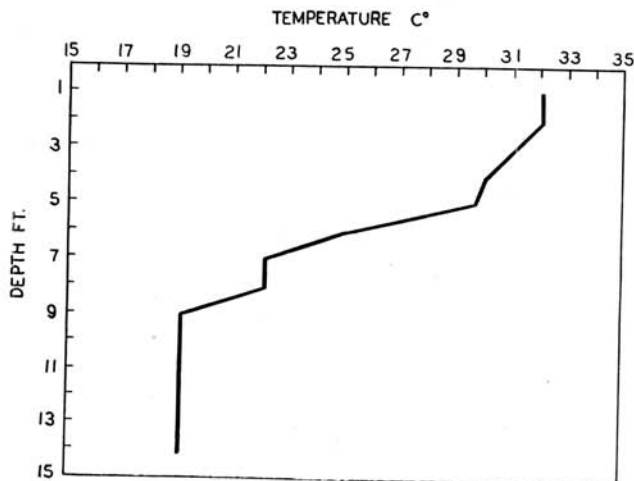


FIG. 2.—Vertical distribution of temperatures in Thompson's Lake, June, 1952.

the lake's principal water supply is from the surface runoff of its watershed.

The lake's surface is approximately 40 acres and its maximum present depth is 19 feet. At the time of the original impoundment the maximum depth was approximately 30 feet. The shoreline of the lake is irregular with a number of fingers running in various directions. The watershed is well-covered with all types of vegetation. There is much organic matter on the bottom.

On June 24, 1952, our studies on Thompson Lake showed a variation ranging from 32°C. at the surface to 19°C. at 9 feet in depth. There was a well-defined break in the temperature beginning at a depth of six feet (Fig. 2). The epilimnion extended from the surface to approximately six feet in depth. The thermocline was approximately three feet in thickness (6-9 feet).

Dissolved oxygen content at the surface was 8.3 p.p.m. No dissolved oxygen was found below six feet in depth.

LITERATURE CITED

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