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INVENTORY RESULTS AND HISTORICAL NOTES ON AUSTIN, WEST, LONG, AND GOURDNECK LAKES, KALAMAZOO COUNTY

By

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Abstract

Austin, West, Long, and Gourdneck lakes are closely grouped in south-central Kalamazoo County. Acreages of the respective lakes are 1,050, 335, 575, and 222. Austin and West are shallow, whereas Long Lake has a moderate amount of deep water, and Gourdneck a considerable amount. The predominant bottom soil type for Austin and West is peat; that for Long and Gourdneck is marl. Extremely high water in 1950 was reported for at least Austin Lake, but the level had subsided considerably by the spring of 1953.

The water of these lakes is hard. In July of 1953, sufficient dissolved oxygen for fish life was limited to an extreme depth of 20 feet in Long Lake and 21 feet in Gourdneck. Austin Lake has been subject to winterkill resulting from oxygen depletion. The latest reported die-off here occurred during the winter of 1935-36.

Rooted vegetation is extremely scarce in Austin and West lakes, presumably due to a combination of turbidity and wind action. Long Lake has a moderate amount of vegetation, but Gourdneck has relatively little.

Algae comprised the main cause of turbidity in Austin and West lakes at the time of their inventory in July, 1953. That the turbid condition is not of recent origin is shown by old records.

The lakes contain a wide variety of fishes. The main game species are largemouth bass, bluegill, pumpkinseed, black crappie, and yellow perch. Growth rates of the four last-named species are generally below average in Austin and West lakes, but average in Long Lake. Perch of Gourdneck Lake show above-average growth.

The potential for improvement of fishing in Austin and West lakes appears to be low. No new management practices seem necessary for Long Lake. Provision of brush shelters should be considered for Gourdneck Lake.

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Report No. 1380

INVENTORY RESULTS AND HISTORICAL NOTES ON AUSTIN, WEST, LONG, AND GOURDNECK LAKES, KALAMAZOO COUNTY

By

C. M. Taube

Austin, West, Long, and Gourdneck lakes are closely grouped in Portage, Pavilion, and Schoolcraft townships, in south-central Kalamazoo County. All have been mapped in detail by the Institute for Fisheries Research which is a branch of the Fish Division of the Department of Conservation. They were inventoried by the Institute for their fishery resources during the period of June 30 to July 16, 1953.

There are numerous homes on the shores of these lakes. In so far as is known, there is no public access point on Austin Lake; West Lake has a public beach; there are state-owned public fishing sites on Long and Gourdneck lakes; and the Gourdneck Lake State Game Area includes an appreciable extent of frontage on Gourdneck Lake.

Fishing intensity on Austin, West, and Gourdneck lakes is light, while on Long Lake it is fairly heavy. Excepting Austin, these lakes are used quite a lot for bathing and boating.

Areas of the lakes are as follows: Austin, 1,050 acres; West, 335 acres; Long, 575 acres; Gourdneck, 222 acres. Maximum depths, as shown by the maps of the lakes, are 11, 12, 57, and 52 feet,

respectively. The greater part of Austin Lake is less than 5 feet in depth, while all but a small portion of West is less than 10 feet deep. About 85 percent of Long Lake consists of shoal (water less than 15 feet deep); the percentage of shoal in Gourdneck is about 25 percent. All of the lakes have some sandy bottom near shore, but the predominant bottom soil types are peat for Austin and West lakes and marl for Long and Gourdneck.

Austin Lake has intermittent inlets from West and Long lakes, in either of which there was no flow at the time of the inventory. A dredged ditch from the outlet of Sugarloaf Lake, dug during the 1930's to raise the levels of West and Austin, is the only inlet for West Lake. At the time of the investigation in July, 1953, the gate of the control dam at the head of the ditch was closed and no water was entering the lake. Long Lake has no inlets. The outlets of Sugarloaf and Hogsett lakes enter Gourdneck Lake. Gourdneck Creek is the outlet for Gourdneck Lake, and the intermittent outlet of Austin Lake joins Gourdneck Creek. The latter flows into Sunset Lake, the outflow of which eventually enters Portage River, a tributary of the St. Joseph.

A high water level early in 1952 has been reported for Austin Lake. After a dry fall, and a winter with little snow, the level subsided to a considerable extent by the spring of 1953. When the writer visited the lake on May 26, 1953, the reading on the water gage at the dam in the Austin Lake outlet was 0.84. On July 8 following, the reading was 0.46 and on July 10, 0.32. A strong westerly wind on the 8th, by causing some "piling up" of water on this side of the lake, apparently accounted for the difference in the two

latter readings. The 3.00-foot mark on the water gage is reported to represent the legal level of 856 feet above sea level established for Austin Lake in 1925.

Chemical Characteristics

Chemical analyses showed the water of all four lakes to be fairly hard. Methyl orange alkalinity values for Austin, West, Long, and Gourdneck lakes in parts per million of dissolved mineral salts (involving mostly lime) were 99, 105, 145, and 165, respectively. These values show that water of Austin Lake has the least hardness while that of Gourdneck Lake has the most. Water of at least moderate hardness is considered more favorable for fish life than soft water.

Adequate supplies of dissolved oxygen for fish occurred in each of the lakes in July of 1953, although the supply gave out in the deeper parts of Long and Gourdneck. This condition is of common occurrence when deeper lakes stratify during the summer season. Sufficient oxygen for fish life extended to 20 feet in Long Lake on July 3 and to about 21 feet in Gourdneck Lake on July 13. These results show that neither of the two lakes is suited for trout because the cold-water layers in the depths contain insufficient quantities of the vital gas in summer.

Depletion of oxygen in shallow lakes during the winter season sometimes kills many fish. Serious depletion is tied in with heavy cover of ice and snow over an extended period of time. Austin Lake suffered a kill in the winter of 1935-36 when 16 1/2 tons of dead fish were reported removed from the lake. Another kill has been reported for the winter of 1917-18. It is interesting to note that no die-off was recorded from here in 1944-45 or in 1950-51 when several lakes in the Kalamazoo area were affected. Also of interest, is lack of reported kill in West Lake in 1935-36.

Biological Characteristics

Rooted plants are extremely scarce in Austin and West lakes; the main stands of vegetation are water lilies which are found mostly on the upper west side and on the south end of the southwest bay of Austin Lake, and on the upper west side of West Lake. Long Lake has a moderate amount of vegetation, which is mostly of the submergent type. Plant life is relatively scarce in Gourdneck Lake, in part due to limited shoal area, but doubtless also influenced by sand and marl bottom which do not favor good growth of vegetation.

Turbidity quite likely is an important factor relating to scarcity of rooted aquatic plants in Austin and West lakes. Both lakes were very turbid at the time of investigation, and this condition was said to be persistent. A Secchi disk was visible to a maximum depth of only 9 inches in Austin Lake and 14 inches in West Lake. In contrast, visibility in Long Lake extended down to 13 1/2 feet (which is about average for Michigan lakes), while for Gourdneck Lake the reading was 7 1/2 feet. Because sunlight is needed by plants to carry on photosynthesis and to live, continued roiliness of water sharply restricts growth of rooted plants.

Samples of water from Austin and West lakes were centrifuged and the concentrates examined under a microscope. In each sample a heavy concentration of algae was found, and apparently these microscopic plants were mainly responsible for the turbidity in July. On the other hand, an examination of Austin Lake water in November of 1941 had shown a concentration of "particulate organic matter," assumed to have been non-living material. Hence it would appear that the character of the turbidity shows some seasonal variation.

In the summer of 1888, a field crew representing the Michigan Fish Commission (the first agency dealing with the study and conservation of the state's fishery resources) investigated the same four lakes that are the subject of this report. It is of considerable interest that these investigators noted the water of Austin and West lakes as being "muddy" and that of Long and Gourdneck lakes as "clear." However, they observed plant growth to be plentiful in Austin and West at that time. So there is evidence that the turbidity of these waters is not of recent origin, although the degree of turbidity may well have increased in late years. With no specific evidence to rely on, we can only speculate that increased fertility has encouraged growth of plankton forms such as algae, which have contributed to increased roiliness. Wind action probably also is of some importance in these shallow, exposed lakes. Carp are not thought responsible for the condition.

Fish were collected from the lakes with gill nets and seines, excepting that gill nets were not used in West Lake because of the danger of extensive damage to them from heavy motor boat traffic. To compensate for the lack of this type of collecting, more than the usual amount of seining was done in this lake. Some hook-and-line fishing also was done in Long and Gourdneck lakes.

Listed in a table that follows are the species of fish that were taken in three of the lakes; the take from Gourdneck Lake is not included in this tabulation because the preserved seine collections from this water have not yet been examined. It should be noted that lack of a record for one or two of the lakes of a species collected in another lake does not necessarily means that

the fish is not present. For example, a single carp was captured in West Lake, but none in either Austin or Long, even though the species is reliably reported in the latter two lakes.

Judging from the collecting results, the largemouth bass, bluegill, pumpkinseed, crappie, and perch are the predominant game species in Austin, West, and Long lakes. Excepting bass, apparently the size of these fish is generally small in Austin and West. Some nice-sized largemouths have been taken in the latter two lakes. Long Lake provides fairly good fishing for bluegills. Evidently the perch presently is one of the most important of the game species in Gourdneck Lake, and runs to good size. Largemouth bass, rock bass, and bluegills were also taken here, and walleyes have been reported in the past.

Comparison of gill-netting results obtained by the Fish Commission crew in July of 1888 with those of July, 1953 are of some interest. Similar amounts of netting with nets of similar mesh sizes were done both years. Following is a tabulation of the catch of game fish per 100 feet of net in 1888 and 1953, the figure for 1953 being enclosed in parentheses. In the earlier year, as in 1953, no gill-netting was done in West Lake.

Austin Lake--1.2 (1.7); Long Lake 55.1 (1.3); Gourdneck Lake 1.2 (2.2). Except for Long Lake, it will be noted that the 1953 results do not differ greatly from those of 65 years before. Difference in the figures for Long Lake are largely accounted for by the large number of perch taken in 1888; in the total catch of 735 fish were 622 perch. Outside of there being a much larger population of perch in Long Lake in the earlier year, the makeup of the fish populations in these lakes would appear not much different in 1888 from what they are at the present time.

Table 1. Fishes collected from Austin, West, and Long lakes in July, 1953

	Austin Lake	West Lake	Long Lake
Game Fish			
Grass pickerel		X	X
Northern pike			X
Yellow perch	X	X	X
Largemouth bass	X	X	X
Warmouth	X		X
Green sunfish	X		X
Bluegill	X	X	X
Pumpkinseed	X	X	X
Rock bass			X
Black crappie	X	X	(Note)
Coarse Fish			
Lake chubsucker			X
Brown bullhead			X
Yellow bullhead		X	
Obnoxious Fish			
Spotted gar	X		X
Bowfin	X	X	X
Carp		X	
Forage Fish			
Blacknose shiner			X
Blackchin shiner			X
Sand shiner	X	X	X
Spottail shiner	X		
Golden shiner	X	X	
Bluntnose minnow	X	X	X
Mudminnow			X
Logperch	X		X
Johnny darter	X	X	X
Iowa darter		X	X
Brook silverside	X	X	X

Note--No crappies were taken from Long Lake in 1953, but were previously collected here.

Growth Rates of the Game Fishes

Scale samples were saved from game fish collected in 1953 from the four lakes, and these have been examined microscopically for information on age and growth. The results on the principal species in three of the lakes are summarized in a table that follows. In this table the Roman numerals represent age in years, the unenclosed figures are average total lengths in inches, figures in parentheses indicate the number of fish found in the various age-classes, and at the bottom of each species listing is the average length that evolved for each age-class when growth rates were studies of a large number of fish from various Michigan lakes. The larger samples, of course, give the more reliable information. In making comparisons on growth, it has been customary to regard a range within 1.0 inch on either side of the state average figure as representing average growth in the largemouth bass; the range set up for the bluegill, pumpkinseed, crappie, and perch is 0.5 inch, on either side of the established figure.

The study (when samples of at least four fish are considered) shows that the fish of Austin and West lakes are slow growing, whereas those of Long Lake are developing at average rates. Exceptions to this trend are bluegills (represented by two age classes) and 3-year-old crappies from West Lake, and largemouth bass from Austin Lake--all of which fall within the norm. The lone exception for Long Lake is the sample of 1-year-old bluegills, which is sub-average.

Adequate numbers only of perch were available from the Gourdneck Lake collection for assessment of growth. This species

Table 2. Growth rates of game fish in Austin, West, and Long lakes

	I	II	III	IV	V	VI	VII	VIII
Largemouth bass								
Austin	5.0 (17)	8.2 (2)	...	...	...	...	19.0 (1)	17.3 (1
West	4.4 (13)	7.9 (2)	8.0 (1)	...	...	...	...	...
Long	...	9.0 (2)	10.4 (2)	11.9 (4)	...	...	...	...
State Average	6.1	8.7	10.0	12.1	...	...	16.1	17.7
Bluegill								
Austin	3.0 (2)	3.3 (10)	4.2 (7)	5.1 (17)	5.4 (5)	...	...	...
West	2.8 (11)	3.9 (24)	5.6 (1)	...	...	...	...	...
Long	2.5 (8)	...	...	6.2 (16)	6.2 (1)	...	...	...
State Average	3.1	4.3	5.4	6.6	7.3	...	...	...
Pumpkinseed								
Austin	2.4 (1)	3.1 (7)	4.0 (3)	...	...	...	...	...
West	2.5 (1)	3.5 (12)	4.8 (6)	4.6 (1)	5.8 (2)	...	...	...
Long	2.7 (7)	3.8 (4)	5.6 (3)	...	...	...	...	...
State Average	2.9	4.1	4.9	5.7	6.2	...	...	...
Crappie								
Austin	3.8 (11)	5.1 (2)	6.0 (3)	7.1 (4)	8.1 (5)	8.4 (1)	...	...
West	3.6 (31)	5.3 (4)	...	6.7 (1)	7.6 (1)	8.4 (1)	...	...
Long	...	...	...	...	...	...	...	...
State Average	...	5.9	8.0	9.0	9.9	10.7		
Perch								
Austin	3.2 (3)	4.2 (12)	...	7.5 (1)	7.7 (1)	...	...	...
West	3.3 (14)	4.3 (7)	5.6 (7)	...	...	...	...	...
Long	3.7 (12)	...	...	...	...	...	...	...
State Average	4.1	5.8	6.4	7.5	8.5			

reveals an above-average growth rate here. For example, the sample of 2-year-old fish has a mean length of 6.5 inches as compared to the state average figure of 5.8 inches. Scattered samples of other species from Gourdneck suggest from average to above-average growth, but the numbers of fish available for study were too few to permit definite evaluation.

Slow growth, which makes for predominance of fish of small size, doubtless in large part accounts for limited fishing activity on Austin and West lakes. Turbidity also unquestionably influences the fishing quality of these lakes through reduction of visibility. Excess in numbers of fish over the amount of food available is the common cause of retarded growth. The specific cause or causes of this unbalance often cannot be pointed out, and an explanation for the condition in Austin and West lakes is not available. It is possible that turbidity unduly protects the pan fish from predation.

Fishery Management

The potential for improvement of fishing in Austin and West lakes appears to be low. Practicable means of controlling stunted populations of fish in lakes are unknown at present. Likewise there is no apparent way of reducing the turbidity of these waters. Maintenance of a maximum water level is regarded of benefit, especially on shallow lakes, but it is questionable whether such increase of level as is feasible for Austin and West would encourage appreciable improvement of fishing in these lakes. A high level would be desireable on Austin Lake to forestall winterkill.

Since Long Lake contains an adequate population of fish and provides satisfactory fishing, no new management practices appear necessary here.

Gourdneck Lake appears to be of the low-production type. There are a considerable number of such marl-bottomed lakes in the state. The Institute presently is carrying on an experiment to learn whether the productivity of these waters can be improved by alteration of a part of the bottom. Meanwhile, since natural cover in Gourdneck Lake is scarce, provision of brush shelters should be considered.

INSTITUTE FOR FISHERIES RESEARCH

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