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Original: Fish Division
cc: Mr. Roy Lamoreaux
Mr. G. P. Cooper
Mr. R. W. Eschmeyer

INSTITUTE FOR FISHERIES RESEARCH
UNIVERSITY MUSEUMS
UNIVERSITY OF MICHIGAN
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WINTER KILL OF FISH IN BATTEESE LAKE, JACKSON COUNTY, MICHIGAN, DURING FEBRUARY, 1936

On February 14, 1936, the Institute for Fisheries Research received word from Mr. F. A. Westerman that fish were dying in Batteese Lake, (Henrietta Township, Jackson County, T. 1 S., R. 1 E., Section 9). On February 15 Messrs. Eschmeyer, Shetter, and Cooper of the Institute contacted District Supervisor Roy V. Lamoreaux of Jackson and this party of four spent the day making an examination of the conditions on Batteese Lake, and making inquiries amongst the local fishermen concerning the kinds of fish and the sequence with which they had been dying.

We were informed by local sportsmen that the first signs of distress which they noticed amongst the fish population of the lake occurred during the week-end of February 8 and 9. According to one fisherman, the first fish to appear were the large-mouthed black bass. During the first part of the next week, February 10 and 12, bluegills and sunfish were affected, and along towards the end of the week, February 13 and 14, the crappies, dog-fish, and bullheads were affected. During this period of fish kill, which was due to the depletion of oxygen in the water, there were approximately two dozen fish shanties on this lake and many of the fishermen had kept their fishing holes in these shanties open. The distressed fish congregated in these holes in great numbers, often to the extent that the usual method of fishing was impossible.

When the Institute party arrived on the lake on February 15 the conditions were deplorable. Examinations of the ice holes in shanties revealed large numbers of live fish congregating about these holes and gasping at the surface, and still greater numbers of dead fish lying on the bottom beneath every hole. Fish which congregated at the

holes to gasp their last breath of air had dropped to the bottom and were likewise congregated on the bottom beneath the shanties.

The fish shanties were located on the southeast, east, and northeast portions of the lake where the water was somewhat less than ten feet in depth. We examined conditions in at least ten shanties, and in addition we observed conditions through four holes (approximately 4 ft. x 10 ft.) cut by local fishermen to aid the fish in obtaining oxygen.

The ice was approximately 20 inches thick and was covered by 8 to 12 inches of snow. The analysis of two water samples taken near the surface in shallow water revealed that dissolved oxygen was almost absent--less than one-half of a part per million, which under normal conditions is not sufficient to sustain fish life.

By means of a spear and a hand dip-net we recovered many of the dead fish from the bottom of the lake and some of the fish at the surface which were nearly dead. We did not see any large-mouthed bass, so we were unable to substantiate the report of one local fisherman that this species had been affected. All bluegills and sunfish which we observed were fish lying on the bottom, having been dead for several days. Of the crappies, chub suckers, golden shiners, mud pickerel, and northern pike, only a small per cent of the individuals which we saw were at the surface and still living. Most of the bullheads and mud-minnows were still alive but were so distressed that one could pick them out of the water with the hands. Thus our observations substantiated those of the local fishermen that, in general, the various species were affected in the following sequence: bluegills, sunfish, warmouth bass, mud pickerel, pike, crappies, golden shiners, chub suckers, dog-fish, perch, bullheads, and mud-minnows.

From our inquiries among the local fishermen, we estimate that approximately 50 per cent of the lake has a depth of less than 10 feet and that part of the remaining 50 per cent of the lake has a depth of 30 feet or more. We are not certain as to what conditions were prevailing in the deep water; possibly oxygen conditions were much better and the fishes remaining in deep water were not severely affected. From our observations we were quite certain that, of the fish which had remained in the shallower waters, practically all of the bluegills, sunfish and crappies, and a large per cent of the other species had died from suffocation. Based on our counts of the number of dead fish on the bottom

beneath holes cut on the day of this examination, it is a conservative estimate that there was at least one dead fish to every square yard of surface over the shallow waters (50 per cent of the lake area). At this rate the dead and dying fish must have numbered into the hundreds of thousands. (1 7800 acres = 40 × 5000 per A = 200,000

It was unfortunate that conservation authorities were not notified sooner relative to the fish dying in Batteese Lake. In this instance most of the more valuable game fishes had died before any recommendations could be made to rectify conditions, assuming that something could be done to decrease the mortality. Local sportsmen on Batteese Lake endured considerable hardship in cutting holes through the ice and in keeping these holes open, and these men should be complimented for their endeavors. It is doubtful, however, if the mere cutting of a few holes helped the situation to any appreciable degree. There are several plausible methods of improving the stagnant conditions which prevail during the period of "winter kill", namely:

(1) Pumping water from one hole and forcing it into the air as a spray and allowing it to fall onto the ice and run back into the lake through an adjacent hole. When sprayed through the air, water readily absorbes oxygen.

(2) Cutting a rectangular hole approximately 3 x 20 feet in the ice and operating an out-board motor on a frame at one end of the hole so that the propellor is about two-thirds under water. The motor should be set in such a position that the current is directed just beneath the ice--not downward toward the bottom. Care should be taken to avoid disturbing the organic debris on the bottom of the lake, for this material takes oxygen from the water by its decomposition. The mechanical agitation of the water at the propellor of the motor will serve to supply the water with oxygen.

(3) Forcing air into the water by means of an air pump and a hose fitted with an air release at its end. The air should be released into the water through a series of fine holes rather than from the single opening at the end of the hose. The equipment necessary for this method would probably be much more expensive and not often as available as the water pump or outboard motor necessary for the first two methods.

(4) A fourth method of improving the conditions of stagnation during "winter kill" would be to remove the snow and slush-ice from the lake. This would allow light to penetrate into the water which would enable the plants, which normally supply the water with oxygen, to carry on their normal processes. This method would require an enormous amount of labor and, under most circumstances, would not be practical.

Mr. R. W. Eschmeyer of the Institute for Fisheries Research is at present testing the effectiveness of some of these methods and he will soon have further suggestions for the treatment of lakes which are experiencing winter kill due to water stagnation.

INSTITUTE FOR FISHERIES RESEARCH

Gerald P. Cooper

By: Gerald P. Cooper