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"WINTER-KILL" OBSERVED IN CROOKED LAKE, MISSAUKEE COUNTY

by

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Ice went off Crooked Lake, Missaukee County (T. 22, 23 N., R. 8 W., Sec. 32, 33, 3, 4) April 13 and 14, 1941, and as it disappeared many thousand dead fish were washed on shore. Anxiety was felt by interested citizens and officers who notified the Conservation Department of the condition. On April 18-19, the author and Mr. Lee Anderson were sent from the Institute for Fisheries Research to investigate this trouble. Upon our arrival at Lake City, we contacted Conservation Officer Kinsman and a Mr. Brown of Jennings. They explained the lake to us and guided us to the various places where the greatest concentrations of dead fish were found. Many fish were still on the beaches despite the fact that about 4 tons had been removed as fertilizer and that a trench plowed almost the full length of the east shore of the lake had been filled with fish.

The dead fish examined were, in order of abundance, bluegills, rock bass, yellow perch, suckers, bullheads, large- and smallmouth bass (all bass examined were largemouth; smallmouth bass were reported by others) and northern pike. Some common shiners and top minnows were also

seen. Most of the fish were in a rather advanced state of disintegration and thorough examination was not possible. Some of the bluegills may well have been common sunfish.

Crooked Lake is approximately 400 acres in extent. No hydrographic map has been made of this lake, but reliable sources describe it as very shallow (10 - 12 ft. maximum). It has become increasingly shallow during the past few years but the water level is now believed to be rising again. Practically all of the bottom is pulpy peat. It is reported that this lake was covered by about 22 inches of ice during the past winter. Over the ice a blanket of snow from 3 inches to 1.5 feet thick has lain during most of the winter. A combination of the ice, snow cover and shallowness of the lake resulted in the suppression of oxygen producing plants (plankton) which generally maintain winter oxygen under the ice. Disintegration of organic matter in the water and on the bottom and the respiration of aquatic animals and plants soon depleted the oxygen supply to a point where fish could not survive.

From studies on winter-kill and the minimum requirements of various species of fish, it has been shown that bullheads can tolerate oxygen concentrations far below the lethal point for most game fish. On the basis that bullheads were found among the dead fish in rather large numbers, it is assumed that a total kill of the fish population in Crooked Lake occurred. A thorough check should be made later in the spring or summer to determine if such is the case. Netting and seining in this lake should be done by a survey party before a definite statement of the extent of kill can be made.

Rough measurements on bluegills and perch showed a decided trend toward "stunting." Of an estimated 150 fish, only 3 were found to be 6 inches long. All the rest were between 3 and 5 inches in length. This

observation seemed to hold on all fish seen, which numbered thousands. Reports of anglers who fish this lake support the contention that small fish were prevalent. From the standpoint of the yield of legal sized fish to the fisherman, this winter-kill will have depleted the population either completely or to a point where game fish will be less plentiful but will grow faster and be larger than members of the original population.

Stocking of this lake in the future should depend on whether this winter-kill was complete or partial. If complete, introduction of bluegills and largemouth bass is recommended. If only partial, stocking of the two species should be done with care or not at all. Heavy planting will tend to hurry a second condition of "stunting." However, this lake is a designated pike lake and some difficulty in stocking the recommended fish will be encountered unless the designation is changed. It is suggested that the regulations be relaxed in this case or that Crooked Lake status be changed to the "all others" group. Mr. Brown and Officer Kinsman report that this lake has yielded more bass, bluegills and rock bass during the past few years than any other fish. Observations of the dead fish certainly substantiate the above statement. It is said that when the water level was high in this lake, pike were abundant but coincident with the fall in level, the pike population was reduced. Bass, bluegills and rock bass supplanted them. Until such time when the lake level is restored, Crooked Lake might be more efficiently managed as a bass-bluegill lake than as a pike lake.

Future winter-kill on this lake might be avoided by removing snow from the ice. The use of light road equipment to scrape the ice is feasible. It is believed that piling the snow in windrows down the lake would leave sufficient open space to fill the light requirements of the

oxygen-making plants in the water. The danger of winter-kill will also be lessened by an increase in water level. According to reports, the lake level is beginning to rise. If it reaches the original shore line, the lake will be about 2 1/2 feet deeper than it is at present. Such an addition to the lake volume should greatly lessen chances for winter-kill.

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