Original: Fish Division
cc: Institute for Fisheries Research
Education-Game
Dr. J. W. Leonard
Mr. J. T. Wilkinson
Mr. Claude Lydell

INSTITUTE FOR FISHERIES RESEARCH
DIVISION OF FISHERIES
MICHIGAN DEPARTMENT OF CONSERVATION
COOPERATING WITH THE
UNIVERSITY OF MICHIGAN

ALBERT S. HAZZARD, PH.D.
DIRECTOR

ADDRESS
UNIVERSITY MUSEUMS ANNEX
ANN ARBOR, MICHIGAN

August 13, 1948

REPORT NO. 1189

INVESTIGATION OF FISH MORTALITY IN TWIN LAKE, MUSKEGON COUNTY, FOLLOWING APPLICATION OF DDT.

By

Justin W. Leonard*

The following is a preliminary report of an investigation of Twin Lake located in T. 11 N., R. 16 W., Muskegon County, which was conducted on July 30, by J. W. Leonard, L. N. Allison, and J. T. Wilkinson of the Fish Division, and Karl Kidder and Carlton Beckman of the Field Administration Division. This inspection was made in response to interest expressed by the Lansing office of the Conservation Department and by the Ann Arbor office of the Institute for Fisheries Research. It had been reported to both of these offices that a heavy mortality of small bluegills had ensued in Twin Lake following an application of DDT by airplane to Twin Lake, North Lake, West Lake, and the adjacent shore lines. It should be noted that the Field Administration map of Muskegon County is in error in showing Twin Lake as one continuous basin; actually, at present it is divided into Twin Lake and Middle Lake by a shallow spit of sand.

Information was received that on July 8, 9, and 10, DDT, reportedly of 25% concentration, was sprayed in this vicinity by an airplane in

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* This report was dictated by Leonard in the presence of Messrs. Wilkinson, Kidder, and Allison, who concur with the opinions expressed.

response to requests by surrounding property owners. Presumably somewhere within 24 hours following the application of DDT, large numbers of dead bluegills were reported as showing up along the shores of Twin Lake. It was not until near the end of July that this condition was brought to the attention of Fish Division personnel. It was reported that, at this later date, (approximately two weeks following the application of DDT) a second mortality of young bluegills had taken place in Twin Lake.

Through the Regional office at Roscommon, the writer established contact with District Supervisor Kidder at Baldwin, who in turn contacted Conservation Officer Carlton Beckman at Muskegon. Dr. L. N. Allison and Regional Supervisor J. T. Wilkinson joined the party, which reached Twin Lake about one o'clock of July 30.

Some dead fish were still visible around the shore line. The shore line of the lake where the dead fish were found is very shallow and contains a considerable amount of aquatic vegetation. There were some indications that the lake level recently had been at least a foot higher than at present. There was no evidence that the mortality had extended to large size fish and so far as could be determined from the few remains that were visible, the mortality chiefly affected bluegills from 1½ to 4 inches in length. One small largemouth bass was found dead. A trip was made to the Muskegon airport in the hope of locating the plane which did the spraying and inspecting the type of spray apparatus and perhaps estimating the actual rate of DDT application. However, the plane was not present at the field at the time; it will be examined later by Field Administration personnel.

A survey of the affected area has left all the investigators in considerable doubt that the fish mortality can be attributed unquestionably

to the application of DDT. In the first place, it seems rather strange that the mortality of fish should be restricted almost entirely to one species, the bluegill, and to the young, small members of this species. It also seems exceedingly unlikely that a second fish mortality occurring almost two weeks after the application of DDT could be traceable to this original spraying. The investigators observed several schools of young shiners swimming with apparent unconcern in the very area where the bluegills had died. In view of the weedy character of the shallow water of the shore line where the heaviest mortality was observed, it seems an almost equally plausible hypothesis that the fish mortality may have been due to the sudden, temporary removal of the bulk of the dissolved oxygen from these shallow waters during the night, at which time aquatic plants make heavy use of dissolved oxygen. This is a well known phenomenon in shallow, weedy lakes in summer.

It may be noted that a number of bluegills were seen alive when the inspection of the lake was made. Two of these showed some signs of sickness. One fish which had apparently died recently was dissected by Dr. Allison on the spot, and found to contain a heavy infestation of liver parasites. There is, therefore, the third alternative hypothesis that the mortality of bluegills has been due to the action of some disease operating on that particular species.

Local testimony is to the effect that the resident fish population of the affected lake is composed of bluegills, calico bass, largemouth bass, and yellow perch. Local testimony is also to the effect that fishing has not been especially good, due to the taking of excessive numbers of small fish. In view of testimony as to the fishing quality of the lake, we believe that no damage whatever has accrued to the lake

through this mortality of small bluegills; rather, there seems to be a very good chance that the lake is overstocked with bluegills at present and that the removal of some tens of thousands of young fish may improve the quality of those fish remaining.

At the time the inspection was made there were few if any fishermen on the lake, and the development of shoreside resort properties leads one to believe that boating and bathing may be more important recreational uses of this water than fishing.

At this time, we should like to stress the fact that there exists a very real problem in regard to the position of the Department of Conservation in regard the use of DDT for the abatement of noxious insects. It is undoubtedly true that increasing requests will be made for the use of DDT to alleviate mosquito and black fly nuisances by resorters. In the present instance, it appears that a majority of the local property owners around the lake consider the control of mosquitoes to be of greater value than the dubious fishing which they had. It is believed that, at the present time, our laws do not provide a clear-cut statutory basis for proceeding against such use of DDT, and there is ample ground for questioning whether such procedures would be advisable in any case. It should be born in mind that many agricultural agencies, resort owners, public health interests, and the Conservation Department have direct interests in the use of DDT. Since the use of DDT is bound to increase, our need for a clear-cut legal basis covering its use becomes very apparent. At the present time, DDT seems unlikely to have been the sole cause of the fish mortality in Twin Lake; however, even if it could be proved to be the sole cause, we would be in some perplexity as to the exact course to take. It is felt that interested agencies should review existing experimental

evidence on DDT in relation to fish and wildlife, jointly sponsor additional research if necessary, and prepare a code which would specify methods and conditions for the use of DDT applied for mosquito abatement, and which would require licensing or other assurance that operators would follow these approved methods.

In summary, it is the opinion of the investigators that the mortality of bluegills in Twin Lake may well have resulted from causes quite apart from the application of DDT, and that the spraying with DDT and the subsequent mortality of bluegills may have been coincidence rather than cause and effect.

INSTITUTE FOR FISHERIES RESEARCH

Justin W. Leonard
Associate Fisheries Biologist

Report approved by A. S. Hazzard

Report typed by E. L. Preston