INSTITUTE FOR FISHERIES RESEARCH
UNIVERSITY MUSEUMS
UNIVERSITY OF MICHIGAN
ANN ARBOR, MICHIGAN

June 14, 1930

Report No. 16

EXAMINATION OF WOLF LAKE REARING STATION WITH ESPECIAL REFERENCE TO TROUT HATCHING

(First Installment)

On May 26 the Department of Conservation sent the following communication to the Institute:-

"There is some likelihood of undertaking the incubation and feeding of brook trout at Wolf Lake, Van Buren County, with the idea of transferring these fish, during the month of May, for stocking feeding stations in the north-central part of the State, particularly those that are at present administered from the hatchery at Paris.

"The experimental hatching and feeding carried on at Wolf Lake during the present year has been quite satisfactory. Brook trout occur in this stream and some very fine specimens have been observed in both the stream and pond at the head of the springs.

"Before deciding definitely on our course of hatching, we desire to have all the information possible in connection with the same. We would be glad to have the Fisheries Research Institute investigate conditions at this site and will welcome any comments that they have to make on the feasibility of the plan."

On May 30, Director Hubbs and Fish Pathologist Krull made the examinations.

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Water 54°F. (weather clear; air 74°F.; following chilly night).
Dissolved oxygen satisfactorily high (9.5 parts per million).
Dissolved carbon dioxide satisfactorily low (2.5 p.p.m.).
Bicarbonates, 153 p.p.m.
Carbonates, 0.0 p.p.m.

Water moderately alkaline (pH about 8.0; quite satisfactory).

The samples yielding these analyses were taken in duplicate at the outlet of the pond, the head of the main feed line. Two samples from the troughs of the present temporary hatchery gave a similar oxygen analysis.

Nothing unsatisfactory as to the chemical composition of the water is indicated by these analyses.

In physical composition the supply water looks almost perfect. It is exceptionally clear, free of suspended matter. It is said to become a little roily only after sudden, heavy rains.

Owing to the abundance of vegetation (Chara) in the pond, however, we would expect from analyses we have made elsewhere, a considerable drop in dissolved oxygen at night. A series of cloudy days in midsummer, during which little oxygen production by the plants would occur, might even bring the oxygen down to a danger point. A supersaturation of some dissolved gas might result also, under certain conditions, although we think this improbable.

The danger of low oxygen and the possibility of supersaturation makes desirable planning for adequate aeration of the water before use in the proposed hatchery house. Our scheme of spraying the water from fine holes in piping, which has worked well at Wolverine, should accomplish the desired end. In order to allow for this aeration and still have plenty of gravity head, it would be necessary to have the floor of the hatchery house well below the pond level. Placing the hatchery house low in the ravine would also give fine shelter in the winter. Of course adequate room about or under the house would be needed for the creek flow, with enough margin of safety to care for the flood which would result from a break in the dam.

In view of the abundant supply of spring water, it would be possible to provide a number of troughs, each with independent feed, in excess of the usual quota. This ought to help prevent outbreaks of gill disease and other epidemics.

The splendid appearance of the trout in the headwater pond indicates strongly the

satisfactory character of the water. While these trout in the headwater pond appear in fine health, there is no real assurance that they may not be carriers of some disease. The chance of their becoming infected after the hatchery comes into operation, even though they may now be free, is very high. The bacteria or other disease organisms are almost sure to reach the pond, on equipment, utensils, thermometer, boots, hands or perhaps even through the air, even though no fish is allowed to get from the hatchery into the pond. The experience at the Thompson Hatchery (Report 6), in addition to general theory and experience, forces us to call attention to the desirability of having the headwater pond free from fish. We feel sure that the outlook for continued success in the hatching and early rearing of trout here would be decidedly brighter if the fish were removed. Other advantages would result from ability to drain (or almost drain) the upper pond. This might be accomplished by repairing the old culvert under the road, or by building a new drain. In this connection, attention may be directed to a considerable leak either through or about the old culvert. Sometimes leaks of this sort grow bigger.

The large size of the head pond has many advantages, as adequate storage of water and of dissolved oxygen. It also has disadvantages, as the difficulty of draining, and the warming up in warm weather. This warming of the water would probably not interfere with the hatching of the trout, but might cause heavy losses after hatching. During the first three weeks of May, 1930, the temperature rose well toward the danger point for brook-trout fingerlings. After the hatchery has been in operation long enough for the disease germs to become well spread through it, such rises in temperature we would expect to produce heavy losses.

The maximum temperature reading at the outside troughs for each day of May, 1930, until the fingerlings were returned to Benton Harbor, is given in the following tabulation:

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8	63.5	20	57.5
9	60	21	59
10	63	22	64.5 (trout all out)
11	56		
12	60	30	54 (one reading)
13	60		

The three readings were taken at 8:00 A.M., noon and 5:00 P.M. The temperature of the water probably rose on some days to higher figures than those given. Mr. Hall claims he checked the outside trough temperatures against these taken from the same supply inside the house and found the agreement good. Air temperatures are not given, as the readings made were from a thermometer exposed to the direct sunlight.

On some years the temperature of the water would doubtless go higher than in 1930× May of 1930 was indeed rather warm, but not unusually so. We hope to make a comparison between the May temperature of 1930 with those of previous years, using weather records for the station nearest Wolf Lake, in order to arrive at a better estimate of how high the temperature of the supply water may rise. The result of this comparison will be sent to the department as a supplement to this report.

One way to avoid the danger of high temperatures will be to take either an emergency supply or the regular supply, for the hatchery house, from a pipe heading below the surface of the pond. If this should be done, then the device for aerating all

the water supply for the hatchery house would be doubly advisable, for the oxygen content of the pond below the surface is probably reduced. If the lower intake were used, it would also be doubly important to locate the floor of the hatchery house at a low level, to permit of the aeration of the water supply coming from a reduced elevation.

We regard it as important to determine the depth variation in oxygen content and in temperature in the ponds. This we hope to be able to do this month. The results of the analyses will be sent the Department as a supplement to this report.

Remarks on the bass and bluegill ponds

A cursory examination of the ponds at the Wolf Lake Rearing Station was made at the time of our visit. The general layout of the ponds stikes us as very good. The topography of the region is especially favorable. The clean sand (Plainfield sand) in which the upper ponds are dug is easy to work, but is not very satisfactory in some respects. It is not very productive of natural food for the fry and fingerlings. In the newer ponds, this fact has been recognized, and some muck from across the highway is being hauled to these ponds to give them a lining of better soil. A sample of this muck was sent to Prof. J. O. Veatch of the State College for advice as to its productive qualities. It seemed to us that the amount of muck put into the ponds was too meager. When Prof. Veatch reports on the muck, it may be possible to give a better estimate of the amount needed. If this muck should prove promising, it would appear wise to line

all of the dug-out ponds with this soil. This could readily be done after the ponds are drained in the late fall.

We noted a considerable number of ducks about the ponds. It is quite possible that some parasite of the bass or sunfish will find its last host in the duck. If so, the ducks might be harmed, and the parasite spread and increased through the fish. It seems doubtful to us whether the advantages gained from using the ponds for the ducks offset this danger. The ducks may also compete with the fish for food, or destroy the vegetation which produces food for the fish.

We saw quite a number of very badly fungused shiners in the uppermost pond, and observed that the outflow from this pond was allowed to flow through two bass ponds. The main supply of these two ponds comes from another intake, so that it is not necessary to allow this minnow pond to discharge into the others. Furthermore, the minnow pond has another outlet directly into the creek. It would be much safer to allow this pond to discharge that way. The badly fungused minnows are shedding fungus spores now into the bass ponds, where they are available for infecting any weakened or injured bass. In this connection, we recall that Mr. Hall tried to winter his brood stock of bass in this pond, and that most of them developed fungus over the winter and died in the spring.

We noticed a very large amount of the cold spring water being forced into some of the bass ponds, and learned that this excess supply held down the temperature of the ponds. Mr. Hall explained that the leakage in the ponds (through the sand bottom or sides) was so great as to demand this inflow--in order to avoid the lowering of the pond level. Whether it would pay to puddle the ponds with clay to avoid this leakage we are not prepared to say.

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The trout in the experimental trial this Spring apparently made satisfactory growth. Mr. Hall thought that the growth was better than that of any of the lots retained at the Benton Harbor hatchery. We did not examine these fish, except for two specimens retained by Mr. Hall as an example of their size at the end of the feeding at Wolf Lake. One of these two we noted had only a stub of the dorsal fin, indicating that some fin disease had been prevalent. Mr. Hall did not know whether many of the fish were so infected; in fact he had not seen the indication of disease in his preserved specimen.

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Earl L. Hubbs

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"Certainly the water itself should carry a fairly high amount of calcium bicarbonate and should not be turbid. The Chara as you know, is very weakly attached to the bottom so that it is doubtful whether it draws any nutrients directly from the bottom soil through roots. On the basis of observation I would say that a sand clay or marl bottom is more favorable than peat.

"The muck is a high lime muck, and would be classed as relatively high in fertility for this class of soils. The marl apparently has no objectionable chemical properties and is about 85 percent calcium carbonate, the chief impurities being very fine quartz sand and organic matter."

It is clear that entirely too little is known about the treatment of fish ponds with soils. We think it would be very advisable to take four of the Wolf

Lake ponds as nearly alike as possible in size, position and water supply, and give the first a fairly heavy coat of muck; the second a coat of marl; the third a mixture of the two soils, and the fourth no treatment. We also suggest that the same experiment be tried in the new Almena project, and that in both places accurate records of the experiment be kept.

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