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EXPERIMENTAL PROPAGATION OF THE CREEK CHUB

Tentative Program for 1944 and 1945

by

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Introduction

The creek chub (horned dace) is a hardy minnow, quickly adjusting itself to a wide range of environmental conditions without apparent injury. Because of its hardiness and wide range of distribution (found in all parts of Michigan), it is in much demand by fishermen as bait and is likewise a favorite of bait dealers. Consequently its removal is heavy from minnow streams throughout the State. The creek chub inhabits small to moderate size streams, preferring those which are composed of pools and riffles lined with gravel. They spawn in the spring of the year (April and May) in running water on gravel beds.

Several attempts have been made to propagate this species in ponds, all of which ended in failure; it appears that the prime requisite for natural reproduction is gravelled areas covered with running water. The use of running water over gravel spawning beds in a hatchery pond was tried out by Clarence F. Clark, Fish Management Agent of the Ohio Division of Conservation. He had fair success in the project and published an account of the work in the June 1943 issue of the Ohio Conservation Bulletin; however his data are not adequate to determine the practicability of this method. The available information on controlled natural propagation of

the chub is scarce and further research in this field is needed, as this method of propagation may possibly be applicable to minnow dealers in raising their own bait supply.

For the past three years, as a part of his graduate work at the University of Michigan, the writer has been conducting a series of experiments pertaining to artificial propagation, age, growth, maturity and fecundity of this species. The method employed in propagation consisted of stripping male and female chubs and the hatching of these fertilized eggs in jars and trays. This method of propagation was successful. The results are being compiled for publication later.

Plans for the 1944 propagation project are to prepare a site where adult creek chubs will be allowed to spawn in conditions in an artificial stream similar to those used in nature. Briefly, it is proposed to construct a stream within the basin of a pond and to introduce a certain number of adult chubs. These breeders will be removed to another pond after the spawning season and as soon as the eggs hatch, the pond will be filled with water. In the fall (about October 1) the pond will be drained and the total population of young fish will be determined.

The reason for experimenting with these various methods of propagation is to determine the most practicable one which can be used by bait dealers in raising their own supply of minnows and the number of fish of various sizes which can be produced per unit of area. Ultimately, it is hoped that the results of this experimental work can be put to use by bait raisers, thus alleviating the scarcity of this desirable minnow in certain sections of the country.

Purpose of the 1944 propagation project

One of the main purposes is to determine how successful reproduction will be under natural spawning conditions. This will be accomplished by

the introduction of a given number of known aged breeders and the final count of the young fish produced. In the past experimental work, I have reared a great number of chubs and have available several hundred adults of known age. Many of the mature females have been preserved and total mature egg counts made. In this way the potential reproductive capacity of each female to be introduced in the pond will be known and the percentage of total produced can be determined by the number of young.

Another important purpose of this project is to learn more about the relative growth of this species in a pond where no artificial feeding is anticipated. It is planned to obtain a fish sample from the pond every two weeks for the entire season. By making these collections, specific size ranges can be calculated which will be of great value to minnow dealers as they would be interested to know what sized minnows can be produced in a given length of time.

Spawning area

It is planned to use pond number one (having a surface area of 0.39 acres) at the state fish hatchery at Drayton Plains as a propagation pond. A 150 foot stream is to be constructed, commencing at the inlet and extending into the pond towards the outlet. This stream is to be about a foot wide and will consist of pools and riffles lined with fine gravel (not greater than one-quarter inch screening) to a depth of three inches. The remaining portion of the pond basin, that part between the lower end of the stream and the outlet, will be covered with water by the introduction of sluice boards at the outlet to maintain this level. This basin of water will act as a refuge area for the adult chubs and the first hatched fry. The stream bed will be constructed this fall, probably requiring two or three days to complete the project. Mr. Hughes, Superintendent of the hatchery, has agreed to furnish the gravel and help in repairing the inlet box.

Spawning stock

The adult chubs (two and three years old) will be obtained from the experimental chub pond located on the M. Fuoss farm, one mile east of Saline, Michigan. It is planned to stock the propagation pond with 80 females and 100 males; introduction to be made about the middle of April, 1944. Scale samples and total length of each fish will be taken as soon as the spawning season is over, as these data will be of great value in comparative studies.

These adult chubs will probably begin their spawning activities sometime in the latter part of April (or when the water temperature rises about 51^oF) and should continue into the fore part of May. As soon as the spawning activity ceases, the adults will be removed from the pond, scales and measurements taken, and a few specimens preserved for gonad studies. The remaining stock can be placed in one of the small experimental ponds at the hatchery for holding for future work.

Water level, supply and screens

Both the inlet and the outlet will have to be screened with as fine a screen as possible during the early fry period to prevent as much as possible the escape of fry and the introduction of small river fish. Some experimental work will have to be conducted as to mesh size and total surface areas as a considerable volume of water will be passing through the pond during the egg-incubation period. Larger mesh screen can be used during the breeding season up until the time when the first fry begin to appear, at which time the smaller size mesh will be necessary.

During the spawning season (about April 18 to May 10), there should be a continuous supply of water passing down the constructed stream bed to cover it to a depth of at least two inches. This flow will be maintained until the first fry begin to appear at the base pool (fry are expected to

occur about the middle of May), at which time the pond can be filled and the flow reduced to a minimum; just enough to maintain a constant desired level.

Observations and collections

A few days will be required to make observations and change screens during the fore and latter part of the spawning period. At this time the temperature will be recorded and notes made on general spawning activities. It will be necessary to have someone at the hatchery to make daily checks for the cessation of spawning as at this time the adults should be removed to another pond; this possibly can be accomplished by some of the hatchery personnel or they can contact the Institute as this time approaches. A continuation of daily checks will be necessary until the fry begin to appear in the base pool, at which time the pond can be filled and the flow reduced. Periodic checks, every two weeks, for the entire summer will be necessary in order to obtain fish samples and temperature data. A sample of 25 fish for each two-week period will be ample for growth studies. It is planned to drain the pond about the first week in October and make an accurate count of the young fish. This will probably require two days at the hatchery as a large number of fish will have to be measured. No plan has been made as to the disposal of these fish, but some of them should be held over the winter months for further growth studies.

Future contemplated chub propagation research

In the spring of 1945 the writer plans to use the same pond at Drayton Plains in propagation work. A select number of breeders will be placed in the pond and allowed to spawn in the prepared gravelled stream, the same as that of the spring of 1944. However, the adult chubs will be removed as soon as the spawning season is over and the pond immediately filled with water. The incoming water will then be reduced to a point where it will just maintain a constant desired level. This change in procedure will

somewhat alter incubation conditions found in nature; in place of running water over the gravel beds there will be one to three feet of standing water. It is desirable to know if successful hatching can be achieved by this method. If it proves to be successful, a much smaller pond and consequent capital outlay could be used in producing saleable minnows, as the greatest loss of fish is to be expected by the escape of fry through the outlet screen. This loss would be nearly eliminated because little if any water would be passing from the outlet once the pond was filled.

If propagation of the chub by this method is successful, water temperatures and fish samples will be collected every two weeks throughout the summer and a total population estimate made in the fall.

Some alterations of the 1945 program can be expected as findings from the 1944 project will undoubtedly have some bearing upon the future work.

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