Presented at North American Wildlife Conference.
For annual report of sea lamprey committee.

Original: North American Wildlife Conference
cc: Fish Division
Education - Game
Institute for Fisheries Research
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(2) Intro in Hearing before Sub Comm of Merchant Marine & Fisheries at Washington, D.C. March 9, 1949.

Report No. 1214

February 28, 1949

(6)

SUMMARY OF SEA LAMPREY INVESTIGATIONS CONDUCTED BY THE MICHIGAN DEPARTMENT OF CONSERVATION IN 1947 AND 1948

By

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Investigations of the sea lamprey undertaken by the Michigan Department of Conservation during the past two calendar years fall into three general categories: (1) location and distribution of spawning runs in Michigan streams, (2) biological life history studies, and (3) sea lamprey trapping operations and the testing of some control measures which arose in conjunction with the studies made in item 2 above.

(1) Distribution of spawning streams in Michigan. An inventory of sea lamprey spawning streams was conducted in 1947 and 1948 with the cooperation of field personnel of the Fish Division, conservation officers, sportsmen's groups, etc, and the general public. Considerable publicity accompanied the program in both years and many reports were received. These were directed to, and investigated by, competent field personnel who determined if the species was present when reported and, when possible, the size of the run. In 1948, several special surveys were made of the streams in certain areas of the state.

Combining the reports received in both years, the presence of migrating or spawning sea lampreys was verified in 92 Michigan streams.

Reports of their presence in 16 additional streams are considered very reliable (Total: 108 streams). The presence of spawning runs has now been demonstrated in every major Michigan watershed in the Lake Michigan basin, and in every major watershed north of Saginaw Bay in the Lake Huron basin. The establishment of the sea lamprey in Lake Superior is now well verified. Spawning, spent or migrating sea lampreys have now been recovered from, or observed in three Lake Superior tributaries; reports of their presence in two additional streams are considered reliable. The species is now established in two large, inland Michigan lakes and certain reports received in 1948 suggest that they may be established in several additional inland lakes.

(2) Life history studies. Intensive life history studies have been conducted since February, 1947, by one full-time investigator assisted by a variable number of seasonal assistants. The results of certain of these investigations will appear in publications during the current year.

Briefly, the essential features of the life history as determined from our studies are as follows: Spawning runs of sexually mature adults enter streams from the Great Lakes during the period from April to July. The peak of migration occurs during late May and early June. Little or no upstream migration occurs at water temperatures below 40° F. The peak of migratory activity occurs at temperatures of 50° F. or higher. Sea lamprey spawning in the Ocqueoc River, Michigan, began at a temperature of 53° F. but peak spawning activity only occurred at temperatures of 58° F. or higher. It was concluded from a two year study of a spawning run of approximately 10,000 individuals in a river of diversified physical characteristics that there are two essential physical requirements for successful sea lamprey spawning other than suitable water temperatures.

The presence of at least some small gravel and some current of a unidirectional nature passing consistently over the nesting site are these requirements. In the absence of either or both, spawning was never observed to occur. Where minimal quantities of either existed, the success of spawning was found to be low. It was determined that the adults die after the completion of spawning.

Egg production varies from 24,000 to 107,000 eggs. The average size female (17.4 inches) produces an average of 62,500 eggs. Larvae production from the redds is very low, being less than one percent of the reproductive potential of the female.

The eggs hatch in 20-21 days and the larvae make their way out of the gravel and sand of the nest rim and drift downstream until quiet water is reached. Here they dive and burrow into the bottom if it is of mud or silt. The larval cycle, spent in burrows in these silt banks, evidently is of four year duration. During the last larval year, transformation may begin as early as August. Departure from the silt beds and downstream migration begins in the last week in October. This downstream migration began after the water temperature fell below 40° F. The initial peak of downstream movement drops off when the water approaches 32° F. However, at least a few individuals migrate downstream, under the ice, every day during the winter months. Current field studies and prior observations indicate that the bulk of the downstream migrants will come downstream with the first breakup of the ice in the spring. It is known that this downstream movement of newly transformed individuals will overlap the upstream movement of sexually mature adults.

After entrance into the lake, it appears from data now on hand that the actively feeding, parasitic phase is of approximately 17 month's

duration with a few individuals spending an additional 12 months in the lake before attaining sexual maturity. The growth potential during the parasitic phase is very great.

Based on these studies, it is concluded that the life cycle is from 5 1/2 to 6 1/2 years in duration.

(3) Trapping operations and experimentation with control devices. A sea lamprey weir and trap has been operated in Carp Creek, Presque Isle County, for two years, and the entire sea lamprey spawning run captured in both years. In 1947, 1,617 sea lampreys were taken and in 1948, 2,936 individuals were trapped.

A dam and inclined-screen type downstream trap was constructed in the Carp Lake River, Emmet County, for the capture of downstream migrants. Preliminary experiments were conducted in 1948 with a chute and barrel type trap below this dam for capturing spawning migrants.

Currently, two traps are in operation during the winter months for the capture of newly transformed downstream migrants. One of these is the inclined-screen trap mentioned just previously. The other is the Ocqueoc River sea lamprey weir, constructed and completed by the U. S. Fish and Wildlife Service in September, 1948, which is now operated and maintained by the Michigan Conservation Department.

During 1949, the three weirs detailed above will be operated; the Ocqueoc River and Carp Lake River structures for both upstream and downstream migrants and the Carp Creek weir for upstream migrants only.

It appears at the moment that the most feasible method of attempting control of the sea lamprey is by trapping the spawning runs. Weirs and traps if properly constructed and accorded continual attendance and maintenance will capture entire spawning runs. However, the cost of

construction and of operation over a seven year period is excessively high. It remains to be demonstrated if the cost of a program of weir and trap construction and operation for the destruction of spawning populations is justified in view of the value of the fisheries involved and the uncertainty of their effectiveness in creating a measurable improvement in the fishery for the species most affected by the sea lampreys.

Extensive tests with electrical shocking devices demonstrated that although very effective for making scientific collections of larval lampreys, their utility as a control device for destroying the larvae in their beds was negligible and highly impractical. All dredging and screening techniques attempted were likewise impractical for large scale practice.

Experiments with an organic poison, rotenone, for killing the larvae while in the stream were entirely negative.

Careful study of extensive sea lamprey spawning grounds indicate that destruction of the nests and spawning redds during the spawning season by mechanical devices would be ineffective, if not impossible to perform.

Poisoning of spawning populations has not been attempted and is not recommended as it would be necessary to render a stream lethal to all fish life for a four month period at the expense of the spawning activities of many food and game fishes.

Plans for 1949.

In addition to the operation of the three sea lamprey weirs, as previously mentioned, further studies will be made of certain aspects

of the life history of the species. These studies will be particularly concerned with the possibility of sea lampreys spawning in the Great Lakes proper and with the fate of migrants blocked from stream spawning grounds by barrier dams. Tagging experiments are to be undertaken to determine distribution and growth during the parasitic phase and to verify age data now based on periodic sampling. An experiment on the feeding habits and growth of sea lampreys held in large aquaria is now in progress and will be continued throughout the present year.

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