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THE GIZZARD SHAD, AND ITS INTRODUCTION INTO WHITMORE LAKE, MICHIGAN
IN AUGUST OF 1935

The Gizzard Shad, The Gizzard Shad, Dorosoma cepedianum (Le Sueur) ranges from
its range and habits Massachusetts southward to Mexico and westward across the
southern fourth of the Great Lakes watershed, to the western
limits of the Mississippi drainage. Due to its superiority as a forage fish it has
been transplanted outside its original range; for instance, in some of the lakes and
reservoirs of the western states. In Michigan waters the shad occurs at present in
lakes Erie and St. Clair, in the southern half of Lake Huron, including Saginaw Bay ,
in the southern end of Lake Michigan, and in some of the larger rivers in the south-
eastern portion of the state. It is rare or absent in the interior lakes of the state.

This shad is a compressed, whitish, soft-rayed, herring-like fish which grows
to a total length of 18 inches, and which inhabits either fresh or brackish water.
Unlike our more important game and pan fishes, it feeds throughout its entire life
upon microscopic organisms, such as phyto and zoo-plankton, very small insect
larvae and vegetable debris, and never upon large animals such as large crayfish or
adult minnows. Due to these peculiar feeding habits it does not compete for food
with the adult game or pan fishes. No instance is known of the shad having an adverse
effect upon post-larval or young warm-water game or pan fishes through food competition,
as there normally appears to be a super-abundance of zoo-plankton in waters inhabited
by the shad.

The species is most prolific, spawning in mid-water in schools, in the spring
when the water temperature is between 50 and 65 degrees F. While in the act of

spawning the fish roll over and about each other as the eggs or milt are emitted. Occasionally a female can be seen, accompanied by a male, pressed closely against each side. The eggs upon being emitted and fertilized, sink slowly to the bottom or else move along with the current to finally sink to the bottom or lodge in the vegetation.

Throughout most of its range the shad is extremely abundant in the larger waters and lakes. This is especially so of the fry and yearlings. The young are excellent forage fishes and where present are quite often the principal food of the more important game and pan fishes. Forbes and Richardson in the "Fishes of Illinois" (Ill. State Nat. Hist. Surv. Div., 1920: 46) state that "This immensely abundant species, although little esteemed as a food fish, is one of the most useful in our (Illinois) waters because of the almost exhaustless food supply which it offers to all the game fishes of our larger rivers and lowland lakes".

Between the years 1928 and 1934 staff members of the Bureau of Scientific Research of the Ohio Division of Conservation conducted considerable research on this important Ohio forage fish. Their conclusions were: that this shad was one of the major foods of the game and pan fishes in the larger streams and inland lakes of Ohio; that in such waters it was the primary factor which was largely responsible for the rapid growth of these game and pan fishes; and that in those inland waters where the shad were extremely abundant, the annual crop of game and pan fish was very large. It was also found that this species offered considerable food for migrating water birds, especially ducks (Trautman, M. B. "The Gizzard Shad as an important food for ducks in the inland lakes and reservoirs of Ohio", Bur. of Sci. Res., Ohio Division of Cons. Bull. # 13).

Throughout the northern portion of its range there is a peculiar condition which effects the young shad of the year. These young are extremely susceptible to rapid declines in water temperature, especially when such a decline is accompanied by high winds and consequent high wave action. During the more rapid declines in temperature thousands of the young of the year are sometimes killed. In spite of these

killings the species is able to maintain itself in great numbers as far north as northern Ohio, Indiana, Illinois and southern Michigan.

Desirability of
introducing shad
into a southern
Michigan lake

As this shad is so desirable a forage fish, the Institute for Fisheries Research decided to import some adults from Ohio and plant them in a southern Michigan lake. This experiment should indicate whether the species would increase sufficiently in numbers so as to become a principal item of game fish food.

Many of the southern Michigan lakes are, and probably always were, deficient in a forage fish supply. Consequently young pan fishes, such as bluegills, must serve as forage fishes for such species as bass, pike and perch. An additional forage fish, such as the gizzard shad, might decrease the drain in numbers now placed on the bluegills and other panfish and result in their ultimate increase.

Whitmore Lake
chosen for the
experiment

Whitmore Lake, in Washtenaw and Livingston counties, Michigan, was selected for the introduction of shad. The reasons for selecting this lake were:

(1) Whitmore Lake has no connecting waters and the species can therefore not escape.

(2) The lake has little wave action: a protection for the young shad.

(3) The basic fertility of the lake appears to be very high. The amount of plancton appears to be great and there is an abundance of aquatic vegetation.

(4) The lake is sufficiently near Ann Arbor so that the results can be successfully observed by Institute staff members.

Method of trans-
porting shad

Through the courtesy of Dr. T. H. Langlois, Chief of the Bureau of Fish Propagation of the Ohio Division of Conservation, arrangements were made to obtain a truck load of shad from Lake St. Marys, Ohio. This lake is in Auglaize and Mercer counties, in northwestern Ohio.

On the afternoon of August 22, 1935 a truck, (No. 40) belonging to the Fish Division of the Michigan Conservation Department and equipped with a water spray system for transporting fish, was driven by Mr. A. Moore to Lake St. Marys, Ohio. Accompanying Mr. Moore were Messers. Gerald P. Cooper and Milton B. Trautman of the Institute staff.

Between midnight and 2:00 P.M. of August 23, a load of shad were placed in the truck tanks, the truck leaving Lake St. Marys shortly after 2:00 P.M. and arriving at Whitmore Lake at 8:15 A.M. The distance driven was 162 miles; water temperature in tanks before leaving Lake St. Marys was 77°F., air temperature 55°F.; water temperature in tanks upon arriving at Whitmore Lake 74°F., air temperature 85°F. The latter half of the night was partly cloudy and with no wind. Table 1, immediately following, gives the numbers, sizes and weights of the transported shad, and the remarks.

Table 1

Length of shad (Standard length)	Total shad in size groups	No. planted	No. dead upon arrival	Max.-Min. weight in ozs.	Remarks
1.5 to 3.0 in.	155	9	146	-	Most of these young were dead upon leaving Lake St. Marys. They had been held over in hatchery ponds awaiting our arrival, which may have had a decided weakening effect upon them.
5 in.	1	1	0	-	
3.0 to 9.25 in.	12	0	12	6-10	A few of these shad were in excellent condition upon leaving L. St. Marys though most of the individuals in this size group had been held over in hatchery ponds awaiting our arrival.
12.0 to 15.0 (14.0 to 17.0 in total length)	120	114	6	16-22	Upon arrival at Whitmore L. most of these fish were extremely lively and apparently in splendid condition. When liberated these fish oriented themselves immediately and swam vigorously away into deep water.
Grand total	288	124	164		

Daily examinations of the lake during the first week after the shad's liberation, resulted in the finding of only 2 dead, adult shad. As adult shad are most conspicuous objects when floating about on the lake, or on the shore, it is extremely unlikely that many shad died and escaped noticed.

Probable results
of this plant-
ing

It is problematical whether so small a number as 100 adult shad can successfully spawn in Whitmore Lake. It is possible that these fish, despite their decided schooling habits, will have become so scattered by next spring as to be unable to find each other during the spawning season. It is also possible, that if the adults do successfully spawn, their comparatively few young will be eaten by the numerous game-fish with which this lake is so plentifully supplied, before they can grow large enough to spawn.

Other possible methods
of introducing shad
into Whitmore and
other southern
Michigan lakes

Further suggestions on the planting and introduction of gizzard shad in Whitmore or other southern Michigan lakes are as follows:

(1) Another load of shad might be profitably placed in Whitmore Lake this fall to augment the numbers already there, thereby increasing the possibilities of a sufficient number of fish finding each other at the spring spawning season and so insure a good supply of young:

(2) Early next spring before the shad's spawning season, a truck load or more of these fish might be placed in a large chicken wire pen enclosing a bay of Whitmore Lake and held there until they have spawned. After spawning they can be released. The young would migrate out of the ^{chicken} ~~check~~ wire enclosure into the open lake.

(3) Early next spring before the shad's spawning season, a number of adults might be placed in one or more ponds at one of the state fish hatcheries. The young from these adults could be stocked in the fall or following spring, after they had grown too large for the average game fish to eat them. Gizzard shad have been successfully reared in hatchery ponds in Ohio.

Conclusions

The experiment of transporting shad from Lake St. Marys to Whitmore Lake has demonstrated that:

(1) It is possible to transport adult gizzard shad at night during mid-summer for over 150 miles, with one of the Michigan fish transportation units that is equipped with a circulatory water-spray system.

(2) Observations during and for one week after the planting of shad in Whitmore Lake indicate that about 100 adults survived.

INSTITUTE FOR FISHERIES RESEARCH

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