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THE FOOD OF SEVENTEEN REELFOOT LAKE FISHES IN 1941¹

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INTRODUCTION

This is a continuation of the study of fish food made by McCormick (1940) during the summer of 1939 and Rice (1941) in 1940.

Eight weeks of the summer 1941 were spent in the study of 17 species of Reelfoot Lake fishes including the young of two large species: Blue-gill, *Helioperca machrochira* (Rafinesque); Bullhead, *Ameiurus*; the adults or young of eight small fishes: Gizzard Shad, *Dorosoma cepedianum* (Le Sueur); Pirate Perch, *Aphredoderus sayanus* (Gilliams); Grass Pike, *Esox vermiculatus* (Le Sueur); Mud Minnow, *Umbra limi* (Kirkland); Chub Sucker, *Erimyzon sucetta oblongus* (Mitchill); Creek Chub, *Semotilus atromaculatus*; Darter, *Microperca proelaris*; Pigmy Sun-fish, *Elassoma zonatum* (Jordan); seven minnows: Glass Minnow, *Menidia audens* (Hay); Silversides, *Labidesthes sicculus* (Cope); Golden Shiner, *Notemigonus crysoleucas* (Rafinesque); Streaked Minnow, *Fundulus notatus olivaceus* (Putnam); Golden Top Minnow, *Fundulus chrysotus* (Holbrook); Common Top Minnow, *Fundulus dispar* (Agassiz); and the Mosquito fish, *Gambusia affinis* (Baird and Girard).

F. dispar and *Gambusia* are repeated in this group in order to compare the food habits of 1941 with 1940.

METHODS

All fish, except the collection of August 7, were caught by means of a dip net, killed at once and placed in a refrigerator as soon as possible. All food material was examined within twenty-four hours. The food of each fish was spread out on a glass slide or placed in a small dish of water, depending upon the size of the fish, and studied under a binocular microscope. An actual count of organisms and an estimate of the volume of each type was made and tabulated for each fish.

¹Contribution from the Reelfoot Lake Biological Station No. 55. The study reported on here was made possible by a grant from the Reelfoot Lake Biological Station of the Tennessee Academy of Science, to whom the author wishes to express her sincere appreciation

Fish were taken from as many different localities in the lake and bayou as possible. Most fish were collected between 9 and 11 a.m. and 3 p.m. This appeared to be particularly important in the Bayou as most of the minnows were most active and fed heaviest when the sun struck the water through the trees.

RESULTS

BLUE-GILL (*Helioperca machrochira*). Both McCormick (1940) and Rice (1941) listed the food of adult Blue-Gills ranging in total length from 86 to 213 mm. but made no mention of the food of the very young.

Between June 26 and August 17, 150 young fish ranging in size from 16 to 36 mm. were taken. An effort was made to collect them from as many different habitats as possible. A sample of 10 or 15 fish was taken at one of the stations at least once a week in order to determine whether the type of food remained constant; to check on the average growth rate during this eight week period and to determine whether it had any influence on the type of food taken.

The young of this fish were abundant in the heavy vegetation of Bayou du Chien and Lake Center and in the shallow water at the south end of the lake near Blue Bank.

Table 1 shows that these fish change their food habits slightly as they increase in growth. Seventy-five smaller fish 16 to 25 mm. (average 20 mm.) in length, showed a preference for Crustacea

TABLE 1. Summary of stomach contents of 125 young Blue-gill (*Helioperca machrochira*) ranging in length from 17 to 25 mm. and 25 to 36 mm. and 50 young Bullheads (*Ameiurus*) 25 to 37 mm. in length

FOOD	75 BLUE-GILL 17-25 MM. LONG		50 BLUE-GILL 25-36 MM. LONG		50 BULLHEADS 25-37 MM. LONG	
	NO. OF STOM.	AVE. % OF FOOD BY VOL.	NO. OF STOM.	AVE. % OF FOOD BY VOL.	NO. OF STOM.	AVE. % OF FOOD BY VOL.
Insects.....	47	10.00	149	70	10	2
Chironomid larvae.....	25	5.00	50	42	10	2
Misc. Diptera larvae.....	12	1.00	25	4		
Misc. Coleoptera larvae.....	2	1.00	10	3		
Lepidoptera larvae.....			20	10		
Misc. Coleoptera adult.....	2	1.00	10	3		
Corixidae adult.....			15	3		
Gerridae, Microvelia.....	5	2.00	15	3		
Neuropteran larvae.....			2	1		
Odonata.....	1	.05	2	1		
Crustacea.....	108	90.00	25	30	100	98
Cladocera.....	70	75.00	6	2		
Copepoda.....	30	10.00	4	1	30	10
Amphipoda.....	10	4.00	13	25	50	85
Ostracoda.....	8	1.00		1	20	3
Shrimp.....			2	1		

(Cladocera, 75 percent; Copepoda, 10 percent; Amphipoda, 2 percent; Ostracoda, 3 percent); chironomid larvae, 5 percent; miscellaneous insect larvae and adults, 5 percent. Fifty slightly larger fish 25 to 36 mm. (30 mm. average) in length, preferred insect larvae and adults (chironomid larvae, 45 percent; miscellaneous Diptera larvae, 10 percent; miscellaneous insects, 10 percent). Crustacea made up 30 percent of the food (with the larger form Amphipoda, 25 percent and the smaller forms, Copepoda, Cladocera, Ostracoda, only 5 percent).

From these data it appears that the food preference changes to a slightly larger form after the young fish passes 25 mm. in length. The average growth increase between June 26 and August 17 was 10 mm. The difference in habitat made no noticeable difference in food preference.

BULLHEAD (*Ameiurus*). Aggregations of young Bullheads may be seen in the shallow water along the shores of the lake, in the bayous and migrating into the small streams draining into the bayous and lake all summer. An observation on an aggregation which had entered a small shallow stream off Bayou du Chien showed them to be feeding on organisms which they stirred up from the bottom by raking their bodies against the mud, then rising and straining out the material. Ten specimens examined out of this aggregation showed these food organisms to be almost 100 percent Ostracoda. They averaged 1000 Ostracoda and 2 small chironomid larvae to a fish. However, this does not mean that they preferred Ostracoda to other Crustacea because collections taken at other times and places in the bayou and lake showed that 50 fish, ranging in size from 25 to 37 mm., took the following food: Amphipoda (present in all stomachs) made up 85 percent of the total bulk; Copepoda, 10 percent; Ostracoda, 3 percent; chironomid larvae, 2 percent. This seems to indicate that they preferred Crustacea. Observations indicated that they will gorge themselves upon the most conspicuous or the most abundant form present.

GIZZARD SHAD (*Dorosoma cepedianum*). The Gizzard or Hickory Shad has been stated by Baker (1937) to be one of the most useful fish in Reelfoot Lake since it offers an almost inexhaustible food supply for game fishes, particularly for the large-mouth black bass, and during the fall may be important as a duck food. A sudden change in temperature benumbs these fish so that they swim feebly or float near the surface of the water.

Although these small fish are abundant in the lake, only a few were examined. Due to the thick-walled muscular stomach (from which it takes its common name, Gizzard) the food is thoroughly ground and therefore difficult to determine. The food from the stomach and intestines of five specimens was floated in a dish of water and appeared to be made up of about 75 percent crustaceans such as,

Cladocera, Copepoda, Amphipoda and Ostracoda, 10 percent miscellaneous insect larvae; the remains of one or two adult beetles; and 15 percent diatoms (Table 2).

Forbes (1903) states that the very young of this fish feeds almost entirely upon Cladocera and *Chironomus* larvae.

PIRATE PERCH (*Aphredoderus sayanus*). Five specimens of this small fish were dipped from Bayou du Chien and from the lily and saw-grass zones of the lake in front of the Biological Station.

The food of these five fish consisted of 98 percent Amphipoda and 2 percent Chironomid larvae. Five fish is a small sample on which to base any definite conclusions of food habits but, when they are taken from different habitats on different dates and the food is similar, it may indicate that they probably take the most conspicuous and abundant food present.

Abbott (1861) applied the name, Pirate Perch, to this fish when he observed it eating small fish in an aquarium. Whether it ever does this in nature is not known. Many collections over a long period of time should be examined to form a more definite knowledge of its true food habits.

GRASS PIKE (*Esox vermiculatus*). This small Pike or Pickrel was seen occasionally in the bayou and channels cut through the cut grass for the passage of boats. Only three fish were taken during the summer. This is scarcely enough to base any definite conclusions on food habits but, since they were taken from different localities, it was thought to be of enough interest to report the food of these three fish at this time. The total volume for the food of the three fish was 98 percent *Gambusia* and 2 percent Crustacea (Copepoda and Ostracoda). One fish was gorged on three medium sized *Gambusia* and the other two had recently swallowed two large *Gambusia*. Therefore it appears that small fish make an important item of diet when available while Crustacea and insect larvae are of minor importance.

MUD-MINNOW (*Umbra limi*). *Umbra limi*, usually spoken of as a minnow is not a minnow. It belongs in a group of pike-like fish. They are fairly common in Bayou du Chien and in the cut-grass and lily zones around Reelfoot Lake. They are rarely seen due to their habit of remaining on or near the bottom.

The food of 20 fish taken at intervals during the summer (Table 2) was made up of 95 percent Ostracoda and 5 percent plants (*Wolfia*, *Spirogyra* and detritus) which indicates that they feed near the bottom.

CHUB SUCKER (*Erimyzon sucetta oblongus*). No adults of this sucker were taken but several schools of young were seen at different periods in Bayou du Chien. The young is beautifully

TABLE 2. Summary of average percentage by volume of food of 11 species of fish

FOOD	DOROSOMA CEPEDIANUM	APIREDODERUS SAYANUS	ESOX VERMICULATUS	UMERA LIMI	ERYNZON OBLONGUS	SEMOTILUS ATROMACULATUS	MICROPERCA PROELARIS	FLASSOMA ZONATUM	MENIDIA AUDENS	LARIDESTHES SICCULUS	NOTEMIGONUS CRYSOLEUCAS
Ave. size in millimeter.....	80	90	60	40	27	33	27	15	62	42	40
Number of specimens.....	5	5	3	20	20	10	20	100	50	50	40
PLANTS.....	15			5		25			95	3	25
Wolfia.....				3							
Diatoms.....	15			1					95	3	25
Filamentous algae.....				1		25					
INSECTS.....	10	2					53	7	5	7	
Chironomid larvae.....	3	2						2	4	4	
Mosquito larvae.....							3	1		3	
Misc. adult insects.....	2										
Misc. insect larvae.....	5								1		
Eph. mayflies.....							50				
CRUSTACEA.....	75	99		95	95		45	93	1	90	25
Cladocera.....	25							35		70	
Copepoda.....	20						35	30		10	
Ostracoda.....	25			95	95		10	10	1		25
Amphipoda.....	5	99						18		10	
FISH.....			98								
VOLVOX.....					5						25
SAND AND DEBRIS.....						75					25

colored. A black band runs along each side, the back is olive green shading into orange and pink toward the black band, the ventral side shades from cream to pink toward the black band. They appear to feed some distance beneath the surface and are very active and hard to catch with a dip net.

The food of 20 fish consisted of Ostracoda, 95 percent; *Volvox*, 5 percent; a trace of *Arcella*. This food indicates that they may feed near the bottom as well as some distance from the bottom.

This fish is of little commercial importance as the adult is small and bony.

CREEK CHUB (*Semotilus atromaculatus*). The Creek Chub or Horned Dace is quite abundant in the streams in the nearby hills and in overflow basins of the lake but is rarely seen in Bayou du Chien. It is of considerable importance as Crappie bait and thousands are seined out of the streams every year for this purpose.

The food contents of 10 young fish brought in by Dr. Schoffman from a stream up in the hills indicate that the young is a bottom feeder. Table 2 shows its food to be filamentous algae, 25 percent, and the scrapings off stones and wood (made-up of diatoms, old plant detritus, and sand), 75 percent of the total volume.

DARTER (*Microperca prolearis*). This is the most common darter in Reelfoot Lake. Twenty were taken while dipping for crayfish and Belostomidae near the fish docks at Samburg.

Their food (Table 2) was 50 percent mayflies, 45 percent Crustacea (Copepoda, 35 percent; Ostracoda, 10 percent), 3 percent mosquito larvae, 2 percent leafhoppers, indicates they may feed near the surface as well as at the bottom.

This darter is of very little, if any, economic importance.

PIGMY SUNFISH (*Elassoma zonatum*). Next to the top minnows *Gambusia* and *Fundulus*, this is probably the most abundant small fish found in Bayou du Chien and the lily and cut-grass zones of the lake during the period from June 26 to August 17.

One hundred fish were taken at different periods during the summer, 50 from the cut-grass area and 50 from the bayou. The food was so similar in the fish from the two types of habitat that it was placed together in Table 2. This table shows considerable variety in this food with Crustacea (93 percent) making up the bulk and miscellaneous insect larvae and adults making up the other 7 percent. They seem to take any small organism such as *Microvelia*, *Plea*, snails, mosquito larvae and chironomid larvae but prefer Crustacea.

This little fish is probably of very little economic importance even as fish food due to its preference for heavy vegetation as a habitat.

GLASS MINNOW (*Menidia audens*). Fifty Glass Minnows were taken in a seine haul at the south end of the lake near Blue Bank on August 7. Examination of the food showed little variety. Ninety-five percent diatoms, 3 percent chironomids, 1 percent miscellaneous larvae, and 1 percent Crustacea. This one collection was not very satisfactory as the extreme activity of this fish would lead one to believe that there should be a high percentage of crustacea in their food.

They are of some importance as fish food, as bass have been observed feeding on large schools.

BROOK SILVERSIDE (*Labidesthes sicculus*). Several large schools of this minnow were observed several times during the summer in the more open water of Bayou du Chien. Three different times a large bass was observed feeding on one of these schools.

Fifty specimens taken at different times showed these fish had a preference for Crustacea, which made up 90 percent of the food

(Cladocera, 70 percent; Copepoda, 10 percent; Amphipoda 10 percent). The other 10 percent was of a miscellaneous nature such as chironomid larvae, 4 percent; mosquito (Culicine), larvae 3 percent; diatoms, 3 percent.

GOLDEN SHINER (*Notemigonus crysoleucas*). Small schools of the young of this large minnow were quite common in Bayou du Chien all summer and large schools of the very young were observed skipping over the surface of the lake. This skipping habit has led some to call them "skip jacks." They are of considerable importance as crappie, bass and blue-gill food.

The food of 40 fish (36 to 44 mm. in total length) was examined and estimated to be about as follows: 25 percent *Ostracoda*, 25 percent diatoms, 25 percent *Volvox*, and 25 percent sand (Table 2).

Whether the food of the adult at Reelfoot Lake is the same as the above from Bayou du Chien is not known.

STREAKED MINNOW (*Fundulus notatus olivaceus*). Three top minnows were quite abundant in Bayou du Chien and the lake. This one was the least abundant of the three; however, it was seen quite often in the bayou and occasionally in the lake.

Ten specimens were taken during the summer and examination of the food (Table 3) showed 25 percent diatoms, 39 percent miscellaneous insect larvae and adults (with the *Chironomid* larvae and a spiny diptera, Mycetophilidae, leading in abundance), 30 percent Crustacea with Amphipoda, Cladocera, and Copepoda in about equal abundance.

This minnow, like all of the *Fundulus* fish at Reelfoot Lake, feeds near the surface and takes in a considerable amount of plant material with their food. Whether this plant material can be digested is not known. Both the diatoms and *Wolffia* are often found in the lower intestine in about the same state as when swallowed.

GOLDEN TOP MINNOW (*Fundulus chrysotus*). *F. chrysotus* was most abundant in the *Ceratophyllum* beds of the lake. Most of the food (Table 3) came from fish from the lake. The main difference between those taken in the bayou and those taken in the lake was the great number of mites and *Plea* present in the lake minnows but absent in bayou fish.

Of the total food, *Wolffia* made up 40 percent and miscellaneous insects, 6 percent. Mites were found in 30 out of 50 stomachs and made up 25 percent of the total food. Amphipoda and Isopoda made up 25 percent of the 27 percent of Crustacea found in their food.

COMMON TOP MINNOW (*Fundulus dispar*). The food of this minnow was compared with that of *Gambusia* in 1940 (Rice, 1941) and found to be similar in that it was made up of a large number

of mosquito larvae when the fish were taken from the same habitat. It is always worth while and interesting to check several times the food of a form which is thought to be of economic importance.

One hundred fifty specimens of this fish were taken during the summer, 50 from the lake and 100 from Bayou du Chien. A summary of the food (Table 3) shows that there is some difference in the food from the two habitats. Fish from the lake show a high percentage of *Wolffia* and mites and no mosquito larvae or snails, while those from the Bayou show a high percentage of mosquito larvae Amphipoda and snails.

When the food from fish taken in the Bayou was compared with that taken in 1940, there was found to be only a slight difference as follows: less *Wolffia*, less *Anopheles*, more Culicine larvae, more Amphipoda and more snails in 1941. Otherwise, the percentages of the food were about the same.

A glance at Table 3 shows several features in common for the three top minnows when taken from the same habitat.

MOSQUITO FISH (*Gambusia affinis*). The conditions at Reelfoot Lake were quite different from those found in 1940. Due to the lack of rain the water receded from the cut-grass marsh very rapidly leaving isolated pools containing concentrated animal life. Many of these pools dried up entirely after a few days, killing thousands of *Gambusia* and other forms associated with them. Many of these shallow pools were teeming with mosquito larvae. Mr. Don Eyles of the United States Public Health Service brought in 50 *Gambusia* 13 to 22 mm. in length from one of these isolated pools which had a high anopheline population. The food from these fish was as follows: 10 fish contained 5 to 10 mosquito larvae each and this was their entire food; the other 40 fish had eaten only Cladocera and Copepoda.

An observation made July 17 along the board walk showed many low places, which had been dry before the light rain of July 3, to have several inches of water in them and teeming with mosquito larvae of both the culicine and anopheline types. Some distance out in the lily zone a school of fifteen *Gambusia* were working their way into one of these shallow depressions. A sample of fish taken from this group contained 100 percent mosquito larvae (25 percent anopheline, and 75 percent culicine).

When the collections from all localities except those mentioned above were tabulated, the percentages of all types of food were so similar that no table was made for them. The percentages of mosquito larvae in the food from 465 stomachs (Rice, 1941) were 8 percent culicine and 5 percent anopheline, while in 1941 the percentages of mosquito larvae in 200 fish were 9 percent culicine and 3 percent anopheline.

TABLE 3. Summary of the food of three top minnows

FOOD	10 F. N. OLIVACEOUS FROM BAYOU DU CHIEN 30 TO 38 MM. LONG		50 F. CHEYSSOTUS FROM LAKE 20 TO 48 MM. LONG		50 F. DISPAR FROM LAKE 20 TO 60 MM. LONG		100 F. DISPAR FROM BAYOU DU CHIEN 20 TO 60 MM. LONG	
	No. of Stom.	Ave. % of Food by Vol.	No. of Stom.	Ave. % of Food by Vol.	No. of Stom.	Ave. % of Food by Vol.	No. of Stom.	Ave. % of Food by Vol.
PLANT.....								
Wolffia.....	3	25	12	40 40	38	56	20	5
Diatoms.....	3	25						
INSECT.....	7	39 15		6	8	1	8 35 5	1 10 2
Chironomid larvae.....								
Culicine larvae.....								
Anopheline larvae.....								
Mycetophilidae (Dip.) larvae and pupae.....	5 4	20 2			25	20	25 5	20 2
Misc. insect larvae.....								
Plecoptera.....			10	2	25	23	3	
Gerridae.....	3	1					15	3
Odonata.....			3 4	2 2 27	3 10	1 13 7	8 4	4 2 26
Eggs.....		30					10	1
CRUSTACEA.....								
Cladocera.....	6	10	4	1				
Copepoda.....			4	1				
Amphipoda.....	6	10	10	13			50	25
Ostracoda.....	6	10	1					
Isopoda.....			10	12	15	7		
MITES.....			30	25	30	10		
MOLUSCS.....	3	6						
SNAILS.....			4	2			50	25

Therefore it appears that during unfavorable years *Gambusia* is still of some value in the control of mosquitoes in a natural habitat such as Reelfoot Lake and its marshes.

SUMMARY

The food of over 700 fish, representing 15 genera and 17 species, was studied during the summer of 1941.

The food of 200 *Gambusia* was compared with that of 400 others studied in 1940.

Fundulus dispar from different habitats showed a slight difference in the type of food they take.

Table 2 summarizes by percentage of total volume the food of 323 fish representing 11 species and shows that *Entomostraca* plays the biggest part as a food for these fish.

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BIBLIOGRAPHY

- Baker, C. L. 1937. The Commercial, Game, and Rough Fishes of Reelfoot Lake. *Jour. Tenn. Acad. Sci.*, 12(1): 9-54.
- Forbes, S. A. 1903. The Food of Fishes. *Bull. Ill. State Lab. Nat. Hist.*, 1(3): 19-70.
- McCormick, E. M. 1940. The Study of the Food of Some Reelfoot Lake Fishes. *Jour. Tenn. Acad. Sci.*, 10(1): 6-75.
- Rice, L. A. 1941. The Food of Six Reelfoot Lake Fishes in 1940. *Jour. Tenn. Acad. Sci.*, 16(1): 22-26.
- Rice, L. A. 1941. *Gambusia Affinis* in Relation to Food Habits from Reelfoot Lake, 1940, With Special Emphasis on Malaria Control. *Jour. Tenn. Acad. Sci.*, 16(1): 77-87.

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BOOK REVIEWS

The Anatomy of Necturus, The Mud Puppy. Pp. 1-28.

The Anatomy of the Cat. Pp. 1-34.

Both by Richard R. Stuart. Price 50 cents each. From Denoyer-Geppert Co., 5235 Ravenswood Avenue, Chicago, Illinois.

Manuals to assist the student in the dissection of these two animals. No instructions for dissection are given; instead careful line drawings of the usual dissections have been made and carefully labeled. There are twenty-seven such figures for *Necturus* and thirty-four for the cat. Both manuals have good indices. It is the reviewer's opinion that these "picture books" will be extremely helpful to the young student in his dissections. All teachers of zoology should seriously consider adopting these manuals for supplementary class use.—Shaver.