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FOOD HABITS OF BURBOT (LOTA LOTA LACUSTRIS) FROM THE EAST BRANCH OF THE BLACK RIVER, MONTMORENCY COUNTY, MICHIGAN

By Marvin J. Whalls and David S. Shetter

The primary purpose of this study was to determine whether burbot in the East Branch of the Black River were eating trout; and, secondarily, to obtain general information on burbot feeding habits.

The East Branch of the Black River originates in east-central Otsego County, flows through the north-western quarter of Montmorency County, and empties into the Black River; the latter flows into Lake Huron via Black Lake and the Cheboygan River in Cheboygan County. Burbot for the present study came from a restricted portion of the East Branch of the Black River Ranch property.

Collecting sites and fish caught for this study are listed in Table 1. The fish were collected on May 22, 1954, with a portable, 230-volt, 11-ampere, direct-current shocker which was transported in a small flat-bottomed boat. Burbot were preserved in 10-percent formalin. Volumetric measurements of stomach contents were made by displacement of 95-percent alcohol by the centrifuge tube-burette method. Material removed from the stomachs was allowed to drain for

30 seconds before being measured. Stomach contents were measured whether nutritious (insects, fish) or not (parasitic roundworms,[1] inorganic debris). Most of the roundworms were concentrated in the intestine just below the pyloric valve, but the most heavily parasitized burbot had some roundworms in the stomach. When in the stomach, roundworms were included as a part of the stomach contents. Small stones (3 to 17 millimeters in diameter) in the stomachs of some of the larger burbot were also included as a part of the stomach contents in volume determinations. Results of the analysis of stomach contents of 38 burbot are presented in Table 2. The burbot were divided into three length groups (4.0-6.9, 7.0-9.9, and 10.0-13.6 inches) to determine if size and occurrence of food items were correlated with size of fish.

The stomachs (17) from the 4.0- to 6.9-inch burbot contained 4.7 ml. of food. This food consisted entirely of invertebrates, with insects and insect remains comprising most of the total volume, and roundworms and insignificant portion. Mayflies were most numerous, and stoneflies contributed the greatest bulk. Midges and caddisflies were numerous, but did not make up much of the volume. Debris consisted of insect remains.

The stomachs (14 with food, 2 empty) from the 7.0- to 9.9-inch burbot contained 6.8 ml. of food, consisting of invertebrates and vertebrates. Invertebrates were insects, annelid worms, and roundworms. The vertebrates were fish. Debris consisted of insect remains and a small amount of plant tissue. Among the insects in the stomachs, mayflies were most numerous but stoneflies made up a greater volume. Parasitic roundworms were plentiful in stomachs from burbot in this size range. Fish (Michigan brook lampreys, one darter), although numerically unimportant, made up about 38 percent of the volume of the food from burbot in this size group.

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[1] Principally Raphidoscaris canadensis.

Stomachs (4 with food, 1 empty) from 10.0- to 13.6-inch burbot had a food volume of 15.6 ml. Adult Michigan brook lampreys made up about 68 percent of the volume, and debris (sand, gravel, organic remains) constituted about 32 percent. Insects, composed entirely of mayflies, were of minor importance.

The progression from small burbot feeding on insects to large individuals eating fish is evident in the summary data in Table 2.

Conclusions in this report are necessarily restricted because the burbot were collected from a limited area and in a single day, but the data indicate that burbot were not feeding on trout at the time of the investigation. Small burbot were feeding on insects, medium-sized burbot and large burbot mostly on fish (Michigan brook lampreys).

The findings of the present study are in agreement with those of Beeton (1956) for burbot from the White River system of Michigan, except that trout were not found in burbot stomachs from the East Branch of the Black River, whereas Beeton noted brown and rainbow trout remains in the stomachs of burbot from the White River.

Literature cited

Beeton, Alfred M.

1956. Food habits of the burbot (Lota lota lacustris) in the White River, a Michigan trout stream. Copeia, 1956, No. 1, pp. 56-60.

INSTITUTE FOR FISHERIES RESEARCH

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Table 1. Sample sites and fish caught, East Branch of Black River, Montmorency County, Michigan,. May 22, 1954

[Range in total length (inches) in parentheses; numbers of legal brook trout in brackets.]

Sample site	Location			Minutes of shocking	Fish caught[1]				
	Town	Range	Section		Burbot	Brook trout	White suckers	Minnows[2]	Others[3]
Farm Bridge (up-stream)	32N.	1E.	4	42	27 (3.0-10.0)	24 [7] (1.6-9.8)	10 (4.5-12.5)	4	3
Wilkins Trail	32N.	1E.	9	22	6 (4.0-8.0)	22 [10] (1.0-9.4)	7 (5.3-9.5)	6	...
Meadow deflector (down-stream)	32N.	1E.	10	10	1	5 [2]	...	...	...
Meadow deflector (up-stream)	32N.	1E.	10	10	4	...	1	...	...
Totals				84	38	51	18	10	3

[1] Lampreys present but not collected.

[2] 2 creek chubs, 5 longnose dace, and 3 blacknose dace.

[3] 2 Cottus sp., 1 mudminnow.

Table 2. Stomach contents of burbot, East Branch of Black River
[Life-history stages in parentheses are as follows: L = larva, N = nymphs, A = adult. Tr indicates volume less than 0.05 percent.]

Item	Total length (inches)					
	4.0 - 6.9		7.0 - 9.9		10.0 - 13.6	
Total volume of stomach contents (ml.)	4.7		6.8		15.6	
Number of stomachs with food	17		14		4	
Number of stomachs empty	0		2		1	
	Percentage of total food					
	Volume	Number	Volume	Number	Volume	Number
Annelida (leeches, worms)	...	...	11.8	3.4	...	...
Insects						
Ephemeroptera (N) (mayflies)[1]	4.3	27.4	4.4	39.7	Tr	7.3
Plecoptera (N) (stoneflies)[2]	17.0	16.4	10.3	12.1	...	...
Odonata (N) (damsel flies)[3]	...	...	2.9	3.4	...	...
Trichoptera (L) (caddis flies)[4]		11.6	Tr	1.7	...	...
Diptera (L) (midges)[5]		17.8	Tr	3.4	...	...
Coleoptera (beetles)[6]	17.0	1.3	...	...	...	...
Homoptera (A) (spittle bug)[7]		0.7	...	...	...	...
Nematoda (parasitic roundworms)		24.8	Tr	32.9	Tr	7.3
Fish						
Michigan brook lamprey (A)[8]	...	...	25.0	1.7	67.9	29.3
Darter	...	...	13.2	1.7	...	...
Debris						
Inorganic (gravel, etc.)	...	...	...	...	12.9	46.3
Plant	...	...	Tr	...	Tr	9.8
Animal (insect and fish)	61.7	...	32.4	...	19.2	...

[1] Including Ephemeridae, Baetidae, and Heptageniidae.
[2] Including Perlidae, and Perlodedae.
[3] Zygoptera, one identifiable Agrion.
[4] One identifiable Helecopsychidae.
[5] Tendipedidae.
[6] Elmidae and Gyrinidae.
[7] Lepyronia sp. (identification by G. R. Gleason, Central Michigan College, Mt. Pleasant.)
[8] Ichthyomyzon fossor (identification by G. P. Cooper).