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July 16, 1952

Report No. 1344

PROGRESS REPORT ON A STUDY OF THE BOTTOM FAUNA OF HOUGHTON CREEK

(Sept. 1950--Jan. 1952), TO PARTLY EVALUATE WATERSHED IMPROVEMENT

by

Robert J. Ellis

Abstract

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FISH DIVISION

Early in the summer of 1950 the Lake and Stream Improvement Section of the Fish Division, Department of Conservation, began the physical work on the Rifle River Watershed Development Program. In early September of the same year two employees of the Institute for Fisheries Research of the Fish Division initiated a biological inventory of the streams under development. Howard Gowing was responsible for the studies dealing directly with fish and the writer for the work on ecology of the bottom fauna.

The present research on bottom fauna has been limited to Houghton Creek; it would be impossible to make intensive studies of additional waters during available time. Mr. Gowing has made trout population studies on this stream and fish collections on other tributaries of the Rifle.

The purpose of this study was to ascertain the character and abundance of the bottom fauna of the stream for comparison with similar

studies in later years; this comparison should reveal possible changes in presence, abundance and distribution of species, along with possible changes in fish production.

Quantitative bottom samples were taken at various sites on the stream with a Surber-type stream bottom sampler. These samples were mostly taken from areas which Mr. Gowing and the writer had mapped in considerable detail. The data from the bottom samples are given. Random collections of the bottom organisms and adult aquatic insects were also taken. The selection of the areas to be mapped and bottom sampled was done after the writer had made a walking survey of the entire stream.

The results of a water analysis and a table showing maximum water temperatures for 1951 are presented. Photographs have been taken of all sample sites and of other points of interest. The photographs are in the writer's files.

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Early in the summer of 1950 the Lake and Stream Improvement Section of the Fish Division, Department of Conservation, began the physical work on the Rifle River Watershed Development Program. This work was aimed primarily at (a) checking excessive erosion; (b) stabilizing river flow and reducing surface run-off; and (c) lowering peak summer water temperatures. In early September of the same year two employees of the Institute for Fisheries Research of the Fish Division initiated a biological inventory of the streams under development. Howard Gowing was responsible for the studies dealing directly with fish, and the writer for the work on ecology of the bottom fauna. (Results of the work on the fishes of the area are to appear as a separate report.)

At the outset it was realized that it would be impossible for two men to make an intensive study of all the major trout streams of the area in the available time; consequently it was decided to make an intensive study of only one stream. Houghton Creek was selected for this purpose because in the past it had been subject to the greatest run-off and bank erosion of all the tributaries and therefore was scheduled to receive a major portion of the proposed developmental work. It is also

the largest tributary to the Rifle River in the area under study. From its source in a cedar swamp, about four miles north of Rose City, Houghton Creek runs approximately south for 9.7 miles to join the Rifle River about 0.5 of a mile from its origin at Devoe Lake.

The work on the ecology of the bottom fauna has been confined to Houghton Creek, while some work was carried out by Mr. Gowing on the fishes of all the major trout streams in the area and Houghton Creek in particular.

Major Objectives

The purpose of the study was to ascertain the character and abundance of the bottom fauna of the stream for comparison with similar studies in later years; this comparison should reveal possible changes in species and distribution of species along with possible quantitative changes in bottom fauna and fish production.

Methods

To obtain quantitative as well as qualitative data on the existing bottom fauna, samples were taken with a Surber-type stream bottom sampler, starting on November 28, 1950. These samples were mostly from areas of the stream which had been mapped in considerable detail. The selection of the areas mapped and of the sites for bottom sampling was made after the entire stream had been observed by walking in the channel from mouth to source. Mapping of short sections of the stream was done to obtain data for correlating changes in the physical composition of the bottom material with changes in the bottom fauna. Other physical data such as temperatures, discharge, and stage are to be obtained from other agencies working on the over-all project.

Walking Survey of the Entire Stream

During the period from October 12 to 25, 1950, a rather superficial examination was made of Houghton Creek by walking in the stream channel (as much as was possible) from its junction with the Rifle River to its source. The purpose of this walking survey was to acquaint the writer with the entire stream so as to better select the areas which were to receive intensive study. Notes were taken as to the more obvious and important physical characters of the stream and recorded on maps made by tracing aerial photographs of the area.

Mapping

As an aid in detecting changes in the stream bottom, eleven sections of the stream were mapped in considerable detail. These sections varied in length from 120 feet to 500 feet and were selected to include the most important types of bottom and bank conditions present in the stream.

A two-man crew did the mapping using a plane table, alidade, compass, and steel tape. The maps were drawn to a scale of 0.25 inch = 1 foot, and indicate the composition and location of the bottom types as well as channel contours at important points.

Bottom Fauna Studies

Square-foot bottom samples were taken as a step in determining the productivity and species composition of the stream.

The first group included quantitative samples from each mapping site and from the three most common habitats in the stream--gravel riffles, shifting sand, and exposed hardpan. No quantitative samples have been taken from deep pools or from areas of vegetation such as filamentous algae, Ranunculus, Anacharis, and Potamogeton.

Data on the individual bottom samples (with volume of organisms in c.c.) are given in the following summary. Sites 1 to 4 are above Rose City, 5 to 13 are below.

Site number	Sample No. I		Sample No. II		Sample No. III	
	Volume in c.c.	Date	Volume in c.c.	Date	Volume in c.c.	Date
1	4.225	Dec. '50	1.275	Mar. '51	1.56	Dec. '51
1a	0.10	Dec. '50				
2	1.250	Dec. '50				
2a	.025	Dec. '50				
3	5.455	Dec. '50				
4	.845	Dec. '50	0.975	Mar. '51	1.575	Dec. '51
4a	1.50	Dec. '50				
4b	.025	Dec. '50				
4c	.075	Dec. '50				
5	5.465	Dec. '50	8.925	Dec. '51		
5a	.125	Dec. '50				
6	5.73	Dec. '50				
6a	.375	Dec. '50				
7	5.925	Dec. '50	1.275	Mar. '51	1.950	Dec. '51
8	1.290	Dec. '50				
8a	trace	Dec. '50				
9	.60	Dec. '50				
10	trace	Dec. '50				
11	1.775	Dec. '50	1.175	Sept. '51		
11a	.025	Dec. '50	.125	Sept. '51		
12	5.350	Mar. '51	1.825	Nov. '51	4.150	Dec. '51
13	0.675	Mar. '51				

No attempt has been made here to treat these quantitative data by statistics, because the sampling has not been extensive enough for such treatment.

Samples from below Rose City in general are thought to reflect the presence of more nutrients in the water due to the discharge of raw sewage into the stream at Rose City. It is believed that increased ecological age of the water would not be sufficient to account for this increased productivity because of the rather steep stream gradient both to and beyond this point.

Table I. Maximum Stream Temperatures for Houghton Creek Watershed, 1951

Station	Aug. 9-16	16-23	23-25	25-27	27-31	Aug 31-Sept. 8.	Sept. 24	Sept. 24-Oct. 12
Houghton - 1	64°	62°	63°	66°	65°	65°	64°	63°
Houghton - 2	63°	60°	61°	65°	64°	63°	60°	59°
Barber - 3	65°	63°	63°	68°	65°	64°	60°	61°
Bixby - 4	63°	61°	60°	65°	62°	Broken	...	...
Sandbach - 5	88°	Broken	...	...	...	...	...	...
Houghton - 6	...	65°	70°	68°	70°	66°	62°	gone
Houghton - 7	...	64°	65°	68°	70°	Broken	...	...
Wilkens - 8	55°	→	50°	51°	58°	55°	53°	54°
Wilkens - 9	53°	→	55°	58°	56°	52°	55°	54°
Wilkens - 10	59°	→	57°	60°	65°	58°	56°	57°
Wilkens - 11	63°	→	60°	63°	64°	62°	Out of water	gone
N. Wilkens - 12	...	→	52°	55°	57°	53°	Out of water	51°
Wilkens - 13	...	61°	61°	Broken	...	...	...	...
Houghton - 14	...	63°	63°	68°	67°	67°	62°	65°
Houghton - 15	66°	63°	63°	66°	stolen	...	...	...

The quantitative samples have been supplemented with random sampling of the bottom organisms with a wire screen scap net. The purpose of this additional sampling is to gain more information as to the species distribution. Also, adult insects have been collected whenever possible to aid in determining by association the species present in the bottom fauna.

Other Activities

Measurements of current velocity with a Bentzel tube and estimates of volume of flow were made at several of the mapping sites to obtain figures for comparisons. These data are retained in the author's files along with the physical description of the bottom material and records on the composition of individual bottom samples.

Water analyses made at Site No. 4 (located above Rose City) gave the following figures:

Phenolphthalein alkalinity	0.0 ppm.
Methyl orange alkalinity	180.0 ppm.
pH	8.0

The pH of the water was tested with a Helige colorimeter at several points on the stream; it ranged from 7.7 to 8.0.

Photographs have been taken of each site where work was done as well as of many other important points of interest. Many of the photographs have been taken at permanently located sites and it is planned to repeat these photographs later to record changes.

Maximum water temperatures for Houghton Creek and its tributaries, obtained from Frank Snyder of the Soil Conservation Service at Rose City are presented in Table I; the stations are shown in Figure 1.

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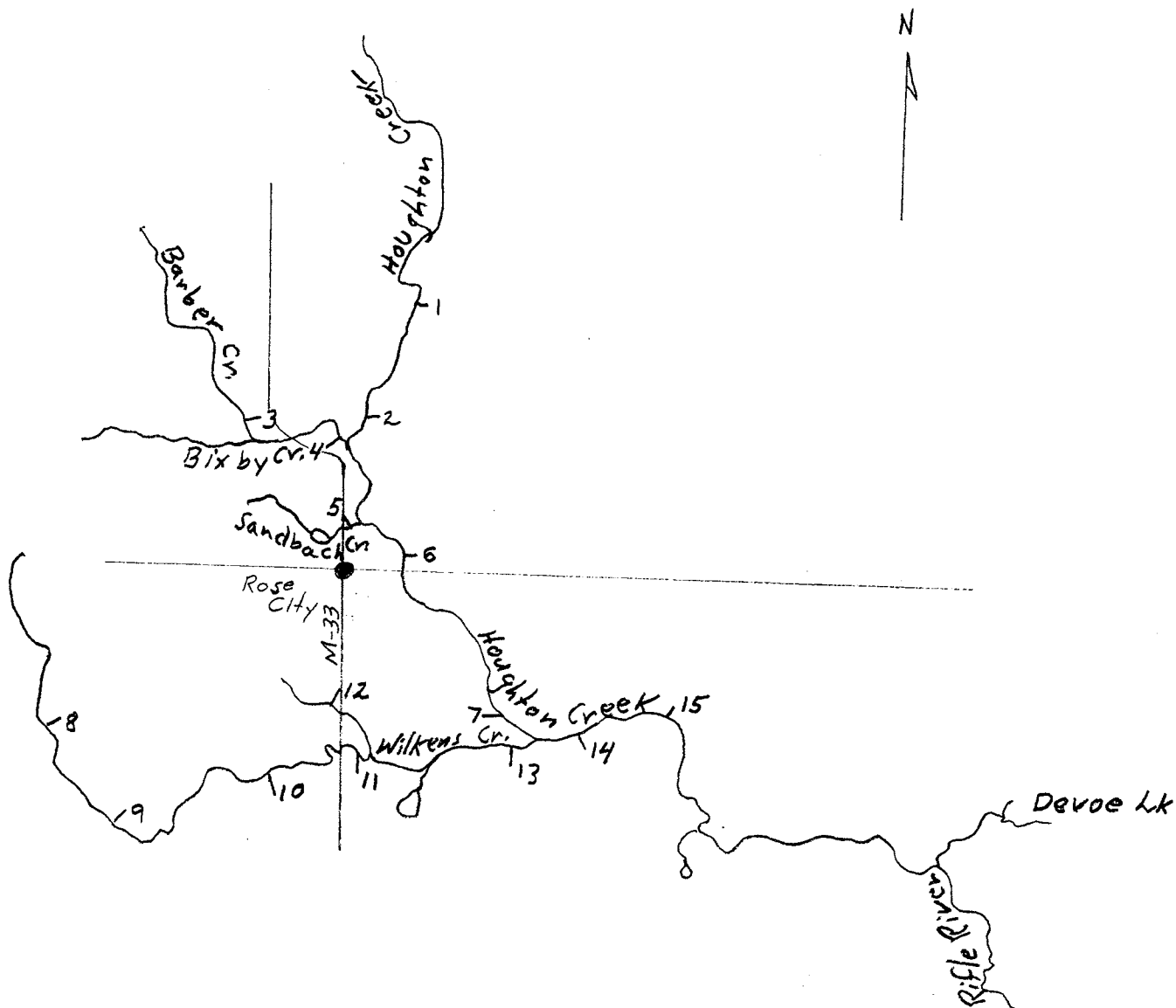


Figure 1. Sketch of Houghton Creek and tributaries showing locations of temperature stations from Table I.