

# BIOLOGICAL BOARD OF CANADA

MANUSCRIPT REPORTS OF THE BIOLOGICAL STATIONS

189D  
No.

Title

PRELIMINARY ACCOUNT OF THE INVESTIGATION ON BURPEE HILL  
STREAM, ACADIAN FOREST RESERVE, N. B.

Author

M. W. Smith.

PRELIMINARY ACCOUNT OF THE INVESTIGATION ON BURPEE  
MILL STREAM, ACADIAN FOREST RESERVE, N. B.

M. W. Smith.

At the request of the Fish Culture Branch of the Department of Fisheries an investigation was made of the physical and biological conditions of Burpee Mill stream and its tributaries from June 22 to 26, 1937. This brook has been selected for stream improvement tests, the proposed improvement being principally the erection of a number of low dams for increased pool formation.

GENERAL CHARACTER OF THE STREAM

For practically all of its course through the Acadian Forest Reserve the stream has a steady gradient, sufficiently steep to give an almost continuous swift water. Still-water pools are few, being most numerous on the lower reaches. Boulders and rubble cover the bottom of the stream for the most part. Finer gravel and sand beds are scattered along the entire course, but, like the still-water pools, become more plentiful at the lower levels. At the summer water level the stream can easily be waded, except for depressions which may drop to a metre or so in depth. At station 1 (see map) the stream averages about twenty feet in width.

The immediate banks of the stream and its tributaries are thickly covered with alders so that it is necessary to wade if the stream is to be followed closely.

The tributaries are largely like the present stream. On Little Burpee Brook, however, fallen logs, etc., have created a number of comparatively deep pools.

**WATER LEVEL**

The stream system has its origin in a number of bogs. On June 22, 1.6 inches of rain fell at the Forest Station. Following this rain the stream rose rapidly, but began to fall equally as fast. From 7:00 p.m., June 22, to evening June 23, the water level fell  $5\frac{1}{2}$  inches, then 5 inches more during the following 24 hours. By 6:30 p.m., June 26, the total fall as measured from June 22 was 13 inches.

**PHYSICAL CONDITIONS OF THE WATER**

Temperature records for station 1 are presented in Table I. A number of other records were made elsewhere and these are given in Table II. On the warmest day of the investigation, June 24, the temperature at station 1 rose from 12.0°C. at 7:33 a.m. to 16.6°C. at 4:27 p.m., a rise of 4.6°C.

TABLE I. Temperature records for station 1.

| Date    | Weather       | Time      | Air °C. | Water °C. |
|---------|---------------|-----------|---------|-----------|
| June 22 | Rain          | 6:33 p.m. | 15.5    | 12.1      |
| 23      | Clear         | 8:14 a.m. | 17.5    | 11.9      |
|         |               | 11:14     |         | 13.45     |
|         | Partly cloudy | 1:07 p.m. | 20.3    | 14.1      |
|         |               | 2:33      |         | 14.7      |
|         | Cloudy        | 3:01      | 21.0    | 14.9      |
|         |               | 5:13      |         | 15.0      |
|         |               | 6:34      |         | 15.0      |
|         |               | 7:33      | 19.4    | 14.75     |
| 24      | Clear         | 7:33      | 17.0    | 12.0      |
|         |               | 10:32     |         | 13.7      |
|         |               | 1:15 p.m. | 25.4    | 15.9      |
|         |               | 4:27      |         | 16.6      |
| 25      | Cloudy        | 9:57 a.m. | 17.0    | 13.5      |
|         | Partly cloudy | 11:25     |         | 14.9      |
|         | Partly cloudy | 6:35 p.m. |         | 17.1      |
| 26      | Partly cloudy | 6:30 p.m. |         | 17.1      |

TABLE II. Temperature records from various stations.

| Station | Location                 | Time               | Water °C. |
|---------|--------------------------|--------------------|-----------|
| 2       | Mouth of Peter brook     | June 23, 8:18 a.m. | 11.8      |
|         |                          | 11:12              | 12.95     |
|         |                          | 1:09 p.m.          | 13.55     |
|         |                          | 2:35               | 14.1      |
|         |                          | 2:58               | 14.2      |
|         |                          | 6:37               | 14.2      |
|         |                          | 24, 7:36 a.m.      | 11.5      |
| 3       | Tributary to Peter brook | 23, 8:30           | 11.5      |
| 4       | Tributary to Burpee      | 9:05               | 13.5      |
| 5       | Tributary to Burpee      | 9:16               | 11.95     |
| 6       | Burpee Mill stream       | 9:34               | 12.5      |
| 7       | Burpee Mill stream       | 10:01              | 12.9      |
| 8       | Little Burpee near mouth | 1:17 p.m.          | 14.0      |
|         |                          | 6:45               | 14.6      |
| 9       | Burpee Mill stream       | 2:12               | 15.0      |

The water is stained a deep brown colour, reflecting the drainage from bog areas.

The determined pH value of the water on June 26 was 5.3 (Brom. Cresol Green). This value also reflects the bog drainage. Probably the usual low-water value is greater since under those conditions the photosynthetic activity of aquatic plants (principally aquatic mosses) would have its maximum effect.

Determinations of the dissolved oxygen content of the water at station 1 on June 26 at 6:30 p.m. (17.1°C.) showed an average value of 5.75 c.c. per litre (5.75, 5.71, 5.79) or 83 per cent. saturation. This would appear to be a low saturation value for rapidly flowing water.

#### BIOLOGICAL CONDITIONS

##### 1. Plant growth.

Along the upper half of the stream's course two species of aquatic mosses thickly cover the rocks on the stream bed.

## 2. Animal growth.

(a) Bottom fauna -- Attempts were made to obtain quantitative samples of the bottom fauna by collecting the organisms on measured stones. A detailed report on these collections will be made later. Miscellaneous collections were also made at various points.

The bottom fauna may be termed abundant. Caddis fly larvae and pupae, mayfly nymphs and black fly pupae were the most abundant groups. Stone fly nymphs, dragon fly nymphs and other insect larvae were sporadic in their occurrence and were not plentiful. A large proportion of black flies had pupated as indicated by the empty pupal cases, although at certain points, particularly about station 1, many pupae were still in evidence. On the upper reaches the caddis fly larvae and pupae appeared to dominate the fauna and were far more abundant than mayfly nymphs, a situation which did not obtain at lower levels. Seasonal distribution may account for the conditions observed.

An interesting find was a species of crayfish which was easily collected at station 1. Records are few, if any, for the occurrence of crayfish in the southern part of the province.

No mollusks were found. Acid waters may inhibit their occurrence.

(b) Fishes -- the following identifications are tentatively offered until a more thorough study of the specimens is possible.

### Salvelinus fontinalis

Brook trout occur in good numbers, being more plentiful in that part of the stream which is above the Forest Station.

Their size, however, is not large. Of those caught on the fly the average length was about seven inches. There appear to be few fish over ten inches in length. One fry of the year was captured. Spawning conditions should be very good, although freshets may cause some silting as judged from the amount of inorganic material carried in the water at the high level on June 23 and 24.

In 1935, 8,000 number 4 fingerlings were planted in this stream from the Florenceville hatchery. The brook was closed to fishing until 1937. A rod license of one dollar is charged for fishing.

Leucosomus corporalis

The fall fish or silver chub is numerous, especially in any back-waters or pools. It naturally follows that this fish is more abundant in the lower part of the stream. They were, however, taken near the head-waters at station 11. Of a number taken at station 10 the average length was about six inches, although larger individuals are taken.

Catostomus commersonii

The common sucker was seined from a back-water near station 1. The specimens were small, seven inches and less in length.

Rhinichthys atronasus

Black-nosed dace appear to be plentiful along the entire stream. Three inches in length seems to be about the maximum length. It seems to be as plentiful as Leucosomus.

Notropis cornutus

This shiner was taken in seine hauls near station 1 and caught on the fly at station 10. It apparently is less

abundant than the other cyprinids.

Anguilla rostrata

One specimen of eel was seined at the mouth of Peter brook.

Pentromyzon marinus

A badly scarred specimen was noted in a small back-water at station 10. This lamprey is sufficiently common at the spawning season as to be noted by workers at the Forest Station.

Discussion

Pool formation will not necessarily cause increases in the number of trout in Burpee brook, but it will undoubtedly provide good habitats for larger trout than are taken at the present time. Over-fishing would tend to keep the run of trout to a small size, although the writer is not sufficiently acquainted with the history of the stream to state whether this factor has, or is, operating. When the gradient of the stream is taken into consideration the erection of low dams will not form extensive pools. It would seem that the number of such dams would need to be quite large to have an appreciable effect upon the stream as a whole.

In pool formation a number of detrimental as well as beneficial changes may be made. By retarding the flow of water, summer water temperatures will be higher. There is experimental evidence that pool formation diminishes the quantity of bottom organisms. Further the creation of pools will not only provide good habitats for trout but also for such fish as Leucosomus and Catostomus, which in a restricted habitat may be serious competitors of trout, although the young will provide additional food for the carnivorous trout.

To what extent beneficial and detrimental changes will take place in Burpee Mill stream following the stream improvement contemplated can only be ascertained by more extensive investigations before and after dams are built. Valuable information could be obtained by determining the conditions in the pools immediately after they were created and then later, say after a year has elapsed.

Atlantic Biological Station,  
St. Andrews, N. B.,  
July 9, 1937.

TABLE III. Number of trout taken from Burpee Mill stream during June and July, 1937. Data provided by Mr. E. G. Saunders, Superintendent, Acadian Forest Experiment Station.

---

|               |       |
|---------------|-------|
| June 1 to 6   | 38    |
| June 7 to 13  | 28    |
| June 14 to 20 | 43    |
| June 21 to 27 | 173   |
| June 28 to 30 | --    |
| July 1 to 4   | 85    |
| July 5 to 11  | --    |
|               | <hr/> |
|               | 369   |

Note - This is not a complete list as some fishermen did not report the number of fish taken.