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REPORT ON THE BIOLOGICAL SURVEY OF CERTAIN STREAMS OF  
RESTIGOUCHE COUNTY, N. B., 1936.

~~Title~~ Author

R. H. M'Gonigle.

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REPORT ON THE BIOLOGICAL SURVEY OF CERTAIN STREAMS  
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by

R. H. M'Gonigle, Pathologist,  
Atlantic Biological Station,  
St. Andrews, N. B.

The purpose of the investigation reported in these pages was to make a survey of certain streams in Restigouche county, and to report upon the findings to the Department of Fisheries, through the Biological Board of Canada, regarding the biological suitability of these streams, for the purpose of establishing the Restigouche county hatchery, now located at Flatlands, N.B., on a better source of water. Instructions to undertake this investigation was received from the Secretary-Treasurer of the Biological Board of Canada.

Accordingly, on October 26, 1936, in company with Mr. Jas. Catt, District Supervisor of Fish Culture, the Black Brook, and the Walker Brook were visited, and certain tests were made to determine their suitability for fish-cultural purposes. On the following day, a third stream, the East Charlo River was visited. This latter is called the South Branch, Charlo River, on the map issued by the Department of the Interior. All examinations were made at one point only, selected by Mr. Catt, with reference to the proposed fish-cultural development.

Quite heavy rains had fallen all morning, October 26, which turned to snow about noon. It became quite cold in the late afternoon, with clearing skies, and remained quite cold for the two following days.

The results of the examinations are set forth in the table below (I):

TABLE I

	Temperature - °C.		pH	Oxygen		Phosphate P <sub>2</sub> O <sub>5</sub> -mgms. per cu.m.	Remarks
	Air	Water		cc.per litre	% sat'n.		
Walker Brook	-1.0°	3.0°	8.4	8.18	87	12.8	Clear, though considerable suspended matter
Black Brook	-1.0	2.8	8.4	8.35	88	13.8	Very muddy.
E. Charlo River	-3.2	zero	7.5	8.98	88	too yellow	Clear, but deeply stained.

In addition to the data secured on the inspection trip, certain temperature (and flowage) data were obtained from Mr. Barrett, Superintendent of the Restigouche county hatchery at Flatlands, N.B.

From these data, the following table was constructed. Under the names of each of the streams, are three columns, headed (a) maximum and minimum weekly temperature, which are the highest and the lowest temperatures recorded in the week shown in the first column. In the second column (b), is shown the variation (between the maximum and minimum) for the week, while in the third column (c), is shown the average temperature for the week, calculated from every temperature recorded for that week, together with the average deviation, another measure of variability, in which the difference of each reading from the average are totalled and averaged. It may be pointed out in this place that there is no significant difference in these deviations between any of these streams, in other words, they are equally variable.

TABLE II.

Week ending No.	Week	Temperatures:-											
		Walker Brook			Black Brook			E. Charlo River.					
		Max.	Min.	Var'n Aver.	Max.	Min.	Var'n Aver.	Max.	Min.	Var'n Aver.			
(a)	(b)	(c)	(a)	(b)	(c)	(a)	(b)	(c)	(c)				
Aug. 22	43							60	52	8	57±3		
29	44				58	68	10	52±4	62	55	7	58±2	
Sept. 5	45				56	48	8	52±3	61	52	9	56±3	
12	46				58	48	10	53±3	61	49	12	54±3	
19	47	58	48	10	53±4	54	46	8	50±2	61	51	10	55±3
26	48	58	47	11	52±3	59	46	13	51±3	58	50	8	54±2
Oct. 3	49	50	44	6	47±4	48	44	4	46±1	58	40	8	52±4

From the above data, it will be obvious that the E. Charlo River is the warmest of the three streams. From these data, and by means of calculation, it would appear that this stream would never reach a dangerously high temperature, that is, above 72°F. Calculation based upon the few temperatures available indicates a high of 63°F. average. Since the temperatures have been below the average in this region since June (Monthly Weather Map, Meteorological Service of Canada), this fact must be taken into consideration. From these maps, for air temperatures, the deviations from the average, for the Bay of Chaleur region are: June +2°F; July -2°F; August -2°F; and September -1°F. October is not yet available. From the five-year averages, maintained in the laboratory of the Atlantic Biological Station for waters (from the weekly hatchery reports), for this same region, the deviations each week from week 43 to, and including week 49, are week 43 -3°F; week 44 -3°F; week 45 -3°F; week 46 -2°F; week 47 -1°F; week 48 -0.5°F; and week 49 -2°F. These weekly deviations, for the waters, were determined from the average weekly maximum. Hence, allowing for the below average temperatures existing for the greater part of the past season, we may estimate an average maximum of about 65°F. for the E. Charlo River. This would be an excellent maximum temperature for fish-cultural purposes, insofar as brook trout and Atlantic salmon are concerned. The same argument could be used for the other streams, but there was so little data for the Walker brook, that no calculation could be made, and that for the Black brook indicated a maximum of 60°, which adjusted as above would indicate 62°F., as the probable average maximum. The variation of temperatures column (b), Table II, is not significantly different for any of these

streams, and does not seem to be unduly great.

Based upon temperature, therefore, the three streams have the following order of suitability for fish-cultural purposes:

1. East Charlo River.
2. Walker Brook.
3. Black Brook.

Based upon oxygen concentration, there is nothing to choose between the three, as shown by one determination each, in the colder period of the year. The slightly low oxygen (% saturation) may be explained by the sharp drop in temperature, and to the lag in becoming saturated at the lower temperatures.

The pH shows an interesting difference. The East Charlo is somewhat lower than the other two. This seems to be associated with the difference in the character of the surrounding terrain. Considerable agricultural development seems to have taken place around both Black brook, and Walker brook. The greater amount of soil getting into the waters of the two latter would account for the greater pH of both Walker and Black brooks, whereas the greater amount of undisturbed vegetation through which the waters of the East Charlo River flow and rise, would account for the lower pH, and the stain mentioned in Table I. The greater phosphate content of the Walker and Black brooks may be also attributed to the same factors. Should extensive clearing and settling develop on the East Charlo, it would be anticipated that pH, and other factors would tend toward those existing on Black and Walker brooks.

Another factor due to the clearing and agricultural influence on the Black brook is the very muddy character of the water following the rains of the 26th. This fact alone, seems to be basis enough for recommending against the Black brook for fish-cultural

cultural purposes, especially when both of the others were so much clearer. However, besides the dirty water, the Black brook was the coldest of the three in each week of record.

The Walker brook must be considered as intermediate between the East Charlo and the Black brook, but much more like the latter than the former.

Since the temperatures are greater for all the weeks of observation in the East Charlo river, and as there is definite evidence of clear, natural waters, unaffected as yet by clearing or agricultural activities, there seems to be no question that from the biological point-of-view, this stream, the East Charlo, is the best for fish-cultural purposes, of the three examined.

In the above discussion, an attempt has been made to assess three streams biologically, based upon a single observation. It will be obvious that such an assessment could have had little value, had the temperature records over a much longer period not been available. Even so, these records were not long enough to give a proper idea of the fluctuations which might occur, though very much better than no records at all! It seems that, if only a single observation is to be made, the biologically critical period of low water, and higher temperatures of early August, or as near that as possible ought to be selected. Three periods of observation, at the end of April, the end of July or early August, and another at the end of October would give an excellent picture of the course of events in any stream, and a much sounder report could be based upon such a series of observations.