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# Juvenile Atlantic Salmon Densities Restigouche River System, New Brunswick, 1972-78

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RESTIGOUCHE RIVER SYSTEM, NEW BRUNSWICK, 1972-78

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## ABSTRACT

Peppar, J.L. and P.R. Pickard. 1979. Juvenile Atlantic salmon densities, Restigouche River System, New Brunswick, 1972-78. Fish. Mar. Serv. Data Rep. No. 117. 22 p.

Over the period 1972-78, electroseining operations were conducted throughout the freshwater reaches of the Restigouche River system, New Brunswick, to determine population densities of juvenile Atlantic salmon. These operations were established, primarily, to determine relative spawning success each year, in relation to increased or decreased escape-ments of adult salmon to the river system. This report summarizes the calculated juvenile densities for all sites sampled.

Key words: Atlantic salmon, juvenile salmon densities, electrofishing, Restigouche River system, sampling sites.

## RESUME

Peppar, J.L. and P.R. Pickard. 1979. Juvenile Atlantic salmon densities, Restigouche River System, New Brunswick, 1972-78. Fish Mar. Serv. Data Rep. No. 117. 22 p.

De 1972 à 1978, on a procédé à des opérations de sennage électrique dans toutes les zones d'eau douce du réseau de la rivière Restigouche (Nouveau-Brunswick) afin de déterminer les densités de population des jeunes saumons de l'Atlantique. Ces opérations visaient avant tout à déterminer quel était, chaque année, la part de succès de la fraie par rapport à l'accroissement ou à la diminution du nombre de saumons adultes ayant réussi à s'échapper et à atteindre les frayères dans le réseau de la rivière. Le présent rapport résume les densités calculées de jeunes saumons pour tous les lieux d'échantillonnage.

Mots clés: Saumon de l'Atlantique, densités des jeunes saumons, pêche à l'électricité, réseau de la rivière Restigouche, lieux d'échantillonnage.





## INTRODUCTION

The Resource Branch's biological investigations in the Restigouche River system of northern New Brunswick were initiated in 1972 to assess the effects of the total, commercial salmon-fishing closure imposed that year, to estimate the magnitude of future runs and to provide advice on lifting of the commercial ban.

Electroseining operations were conducted throughout the freshwater reaches of the system each year, to determine population densities of juvenile Atlantic salmon. These operations were established, primarily, to determine relative spawning success, in relation to increased or decreased escapements of adult salmon to the river system. With this objective in mind, operations each year concentrated on the repetition of sites sampled in previous years, so that consecutive-year comparisons could be drawn.

This report summarizes data obtained from juvenile-salmon population assessments conducted over the period 1972-78. Calculated juvenile densities (numbers/83.6 m<sup>2</sup> or 100 yd<sup>2</sup>) are presented for all sites sampled by the electroseining operations.

## SCOPE OF OPERATIONS

Electroseining operations were conducted on a number of selected streams throughout the Restigouche River system (Fig.). Most of the streams studied were inaccessible for much of their length; thus, sampling sites had to be selected in areas of reasonable access by standard vehicles. Locations of all sites are described (Appendix A).

## METHODS AND PRESENTATION OF DATA

On each stream, sampling sites with similar physical characteristics were selected. Every attempt was made to select sites possessing all three basic kinds of habitat - pool, run and riffle. Barrier nets were employed to fence off areas in the order of 350 square meters. Each sampling site was fenced off with barriers at its upper and lower boundaries, and on one side as well, if the full width of stream could not be covered.

All sites were diagrammed on data sheets (Appendix B) at the time of sampling; indicating their location, habitat and substrate characteristics. For year to year recognition, a permanent object at each site was blazed or marked with red paint, and/or a short piece of pipe was driven into the ground to mark the position of the upper or lower barrier.

All seining was performed with variable DC electrofishing generators. Two units were employed - a portable Dirigo 500 Electrofisher, and/or a larger unit produced by Nova Scotia Armature Works, Halifax. These units produced 350-750 volts, giving

0.6-2.0 amperes (usually held close to 1.0 ampere), stunning the fish but minimizing actual mortality or injury. In addition to the shocker, an apron seine and dip nets were employed.

Estimates of the number of fish within a sample area were obtained by making several uniform coverages. Electro-seining was done back and forth across the area while proceeding from the upper to lower barrier. The elapsed time for the initial "sweep" (complete coverage of an area) was adhered to closely for succeeding sweeps, so that each would approximate a similar unit of effort. Generally, five sweeps were made at each sampling site.

All salmon taken in a sweep were measured (fork length) and sizes were recorded in a length-frequency table. Sizes recorded in this manner allowed the determination of the numbers of fry (under-yearlings), small and large parr (post-yearlings), on the basis of the mode distributions obtained. Numbers obtained were then applied to density/unit area calculations (Appendix C). The tables to follow summarize the calculated juvenile densities obtained for all the individual sites and the mean densities for all streams over the six years of sampling.

## RESULTS

The streams and corresponding numbers of sites where electroseining operations were conducted are summarized (Table 1). The table also indicates total areas sampled each year, and total numbers of juvenile salmon obtained.

Calculated densities of Atlantic salmon juveniles (fry, small parr and large parr) - as determined by the electroseining operations in the Restigouche River system, 1972-78 - are summarized on an individual site basis (Tables 2-4) and as mean densities for each of the streams sampled (Tables 5-7).

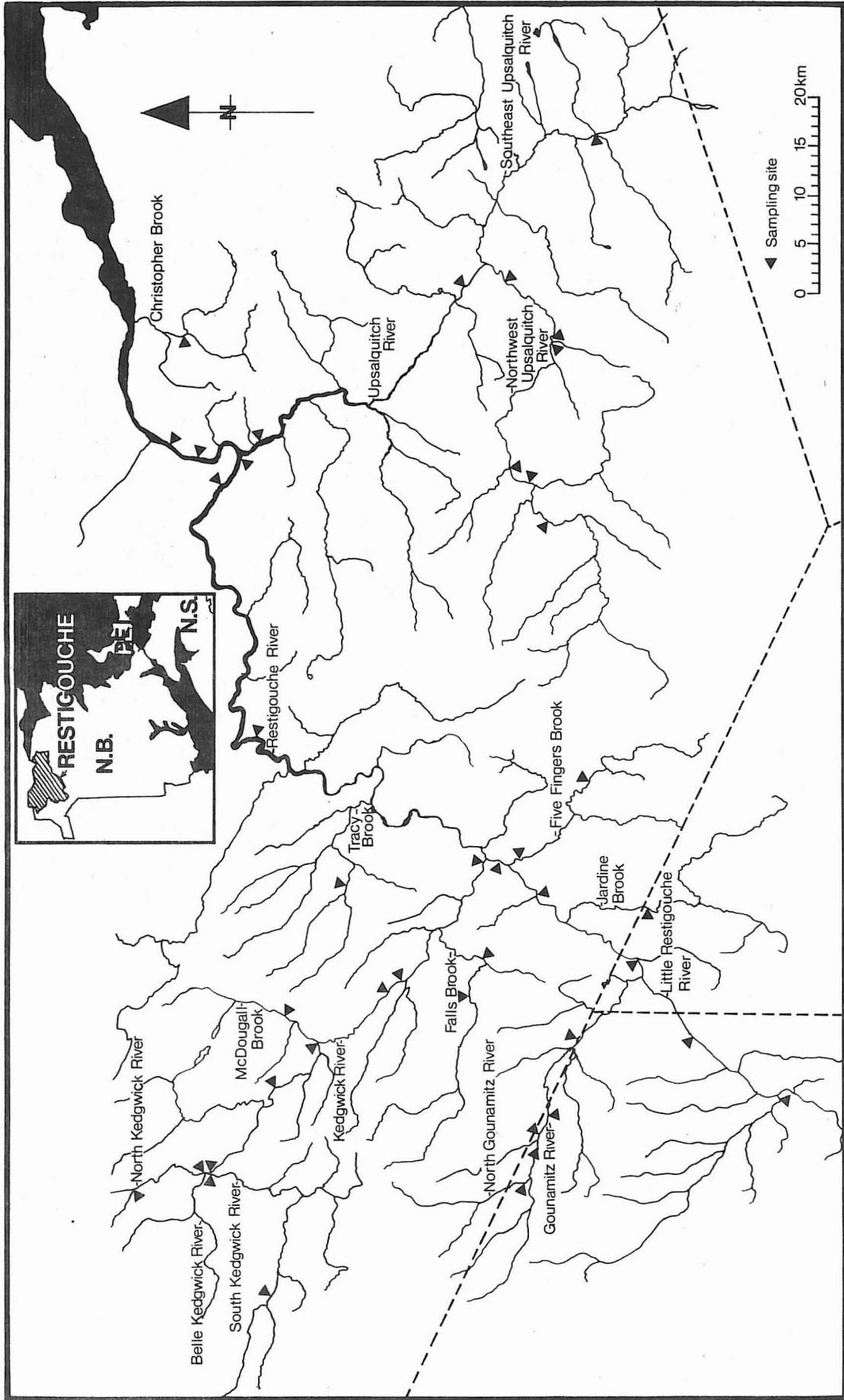


FIG. Restigouche River System, showing the location of electroseining sampling sites.

TABLE 1. Streams and numbers of sites on the Restigouche River system where electroseining operations were conducted, 1972-78.

River or stream	Numbers of sites sampled						
	1972	1973	1974	1975	1976	1977	1978
Main Restigouche River	2	4	4	5	5	5	5
Upsalquitche River	1	4	4	4	3	5	8
Kedgwick River	4	4	5	5	5	5	5
Belle Kedgwick River	1	1	1	1	1	1	1
North Kedgwick River	2	2	2	2	2	2	2
South Kedgwick River	2	2	2	2	2	2	2
Gounamitz River	3	3	3	4	4	4	4
North Gounamitz River	1	1	1	1	1	1	1
Five Fingers Brook	1	1	1	2	2	2	2
Jardine Brook	1	1	1	1	1	1	1
Little Main Restigouche River	2	2	2	3	3	5	5
Christopher Brook	-	-	-	1	1	1	1
Falls Brook	2	-	-	-	-	-	-
Tracy Brook	-	-	-	-	-	-	1
Totals	22	25	26	31	30	34	38
Total area sampled (m <sup>2</sup> )	7,052	7,923	9,088	9,947	9,238	10,517	11,521
Average area per site (m <sup>2</sup> )	321	317	350	321	308	309	303
Total numbers of salmon captured	468	1,440	1,720	4,068	2,159	2,213	3,533

TABLE 2. Calculated densities of Atlantic salmon fry, as determined by electroseining in the Restigouche River system, 1972-78.

River or stream	Site number	Fry density per 100 yd <sup>2</sup> (83.6 m <sup>2</sup> )						
		1972	1973	1974	1975	1976	1977	1978
Main Restigouche River	26	11.3	21.8	1.9	43.8	21.3	18.5	28.2
	27	4.6	2.7	7.7	26.7	17.9	10.2	4.4
	28	-	9.1	2.6	9.4	10.5	12.6	3.5
	29	-	1.1	4.3	5.2	45.0	8.9	12.0
	34	-	-	-	78.7	29.7	29.3	29.6
Upsalquitch River	A	-	-	-	-	-	54.0	4.8
	B	-	-	-	-	-	-	14.9
	1B	-	-	-	-	-	-	41.3
	C	2.9	-	-	-	-	-	-
	D	-	7.9	16.6	40.4	23.4	17.5	17.3
	E	-	16.5	9.6	48.7	7.6	10.8	30.0
	G	-	12.2	13.0	51.2	27.7	17.1	33.1
	H	-	14.3	6.8	27.3	-	10.5	27.7
L	-	-	-	-	-	-	46.4	
Kedgwick River	1	28.4	30.2	40.1	34.1	8.8	30.4	9.6
	2	<1	15.1	<1	18.9	21.3	18.7	11.1
	3	4.5	18.2	16.1	42.5	22.6	8.4	34.3
	4	6.8	-	-	-	-	-	-
	15	-	<1	<1	<1	4.3	<1	1.5
	31	-	-	13.1	58.5	17.6	29.1	14.0
Belle Kedgwick River	6	2.6	<1	<1	4.1	8.1	1.0	1.2
North Kedgwick River	5	<1	33.3	<1	16.6	25.1	3.9	11.4
	8	7.0	14.4	17.3	48.5	25.1	12.0	5.7
South Kedgwick River	7	<1	8.8	<1	14.4	1.1	<1	2.6
	14	<1	30.7	23.7	52.5	3.0	<1	5.8
Gounamitz River	9	8.4	-	14.5	3.6	2.7	2.4	4.5
	11	6.4	59.1	21.3	22.1	5.6	21.2	9.7
	12	-	24.0	-	3.2	2.9	1.4	1.4
	13	2.7	10.9	2.5	<1	1.0	<1	58.2
North Gounamitz River	23	<1	7.8	<1	<1	<1	<1	1.4
Five Fingers Brook	19	<1	<1	<1	3.1	1.6	9.1	49.2
	32	-	-	-	29.4	5.2	11.9	14.7
Jardine Brook	20	<1	7.7	<1	11.2	<1	3.5	8.1
Little Main Restigouche River	21	1.6	3.6	24.4	18.9	5.8	53.5	14.3
	22	<1	10.8	-	-	-	21.1	27.3
	30	-	-	34.1	27.8	14.7	9.0	62.2
	35	-	-	-	52.5	16.8	82.6	63.6
	36	-	-	-	-	-	27.0	10.9
Christopher Brook	33	-	-	-	15.6	<1	1.7	4.4
Falls Brook	16	<1	-	-	-	-	-	-
	17	<1	-	-	-	-	-	-
Tracy Brook	25	-	-	-	-	-	-	23.0
Overall mean		4.2	14.5	10.5	26.1	12.6	15.9	19.6
Total number of estimates		22	25	26	31	30	34	38

TABLE 3. Calculated densities of Atlantic salmon small parr, as determined by electroseining in the Restigouche River system, 1972-78.

River or stream	Site number	Small-parr density per 100 yd <sup>2</sup> (83.6 m <sup>2</sup> )						
		1972	1973	1974	1975	1976	1977	1978
Main Restigouche River	26	3.1	2.4	1.7	14.4	10.3	9.8	10.1
	27	4.4	2.1	9.2	2.7	1.2	1.0	5.2
	28	-	<1	<1	2.2	1.6	3.4	<1
	29	-	<1	<1	<1	7.7	<1	1.8
	34	-	-	-	31.4	9.4	6.4	14.8
Upsalquitch River	A	-	-	-	-	-	3.2	3.4
	B	-	-	-	-	-	-	13.0
	1B	-	-	-	-	-	-	3.0
	C	<1	-	-	-	-	-	-
	D	-	2.2	10.4	18.4	16.1	13.0	18.3
	E	-	2.9	11.6	10.2	1.4	<1	6.8
	G	-	4.0	5.2	16.8	20.3	7.2	22.0
	H	-	<1	2.3	12.4	-	2.6	6.6
	L	-	-	-	-	-	-	21.5
Kedgwick River	1	<1	1.3	4.4	<1	2.8	4.9	<1
	2	<1	2.3	1.9	5.1	9.2	5.8	3.5
	3	<1	<1	<1	2.8	2.4	<1	1.2
	4	<1	-	-	-	-	-	-
	15	-	2.8	4.4	10.0	8.3	2.7	6.3
	31	-	-	4.2	6.5	1.7	3.4	2.0
Belle Kedgwick River	6	<1	2.0	7.8	2.3	10.7	4.6	7.0
North Kedgwick River	5	1.7	4.0	3.2	3.5	23.9	9.2	9.0
	8	11.8	5.8	19.0	13.7	9.4	6.1	7.1
South Kedgwick River	7	<1	4.5	9.1	4.1	6.9	4.7	7.7
	14	<1	3.5	5.2	8.7	4.4	1.0	3.8
Gounamitz River	9	3.1	-	13.9	9.7	9.2	5.2	9.2
	11	<1	1.0	4.2	<1	1.6	<1	<1
	12	-	<1	-	<1	<1	2.4	5.0
	13	<1	<1	1.5	<1	<1	<1	<1
North Gounamitz River	23	1.6	<1	1.3	<1	<1	<1	<1
Five Fingers Brook	19	2.6	5.9	3.7	<1	1.3	1.5	22.2
	32	-	-	-	31.6	27.1	12.5	14.6
Jardine Brook	20	1.2	1.7	10.6	8.4	<1	1.5	5.6
Little Main Restigouche River	21	<1	<1	12.9	<1	<1	2.0	1.1
	22	<1	<1	-	-	-	2.9	7.1
	30	-	-	5.4	2.9	2.3	<1	6.2
	35	-	-	-	22.0	6.2	1.6	6.2
	36	-	-	-	-	-	1.1	<1
Christopher Brook	33	-	-	-	6.8	12.3	1.5	3.7
Falls Brook	16	<1	-	-	-	-	-	-
	17	<1	-	-	-	-	-	-
Tracy Brook	25	-	-	-	-	-	-	4.8
Overall mean		1.7	2.1	5.9	8.1	7.0	3.7	6.9
Total number of estimates		22	25	26	31	30	34	38

TABLE 4. Calculated densities of Atlantic salmon large parr, as determined by electroseining in the Restigouche River system, 1972-78.

River or stream	Site number	Large-parr density per 100 yd <sup>2</sup> (83.6 m <sup>2</sup> )						
		1972	1973	1974	1975	1976	1977	1978
Main Restigouche River	26	<1	<1	<1	1.3	1.2	1.0	<1
	27	<1	<1	<1	<1	<1	<1	<1
	28	-	<1	<1	<1	<1	<1	<1
	29	-	<1	<1	<1	<1	<1	<1
	34	-	-	-	12.7	<1	2.3	1.8
Upsalquitch River	A	-	-	-	-	-	<1	<1
	B	-	-	-	-	-	-	2.5
	1B	-	-	-	-	-	-	<1
	C	<1	-	-	-	-	-	-
	D	-	1.4	1.4	5.6	5.2	4.9	5.1
	E	-	1.6	<1	4.0	<1	<1	<1
	G	-	<1	<1	6.5	1.5	<1	1.3
	H	-	<1	<1	1.7	-	<1	<1
L	-	-	-	-	-	-	4.3	
Kedgwick River	1	<1	<1	<1	<1	<1	1.5	<1
	2	<1	<1	<1	1.2	1.5	1.7	<1
	3	<1	<1	<1	<1	<1	<1	<1
	4	<1	-	-	-	-	-	-
	15	-	1.6	2.4	4.6	6.6	4.1	1.5
	31	-	-	<1	<1	<1	2.1	<1
Belle Kedgwick River	6	<1	<1	<1	1.2	1.3	1.3	2.2
North Kedgwick River	5	2.0	<1	<1	2.3	<1	1.9	<1
	8	6.1	2.4	1.5	7.2	1.5	3.0	<1
South Kedgwick River	7	1.9	2.2	1.2	1.8	1	1.3	2.2
	14	1.3	1.2	<1	1.8	1.5	2.8	1.8
Gounamitz River	9	<1	-	<1	<1	1.8	2.4	1.3
	11	<1	<1	<1	<1	1.0	<1	<1
	12	-	1.1	-	<1	<1	1.1	1.6
	13	<1	<1	<1	<1	<1	<1	<1
North Gounamitz River	23	<1	<1	<1	<1	<1	<1	<1
Five Fingers Brook	19	1.2	<1	1.7	1.4	2.0	<1	4.0
	32	-	-	-	1.0	2.5	<1	1.7
Jardine Brook	20	<1	1.7	<1	2.5	<1	1.9	1.4
Little Main Restigouche River	21	<1	<1	<1	<1	<1	<1	<1
	22	<1	<1	-	-	-	<1	<1
	30	-	-	<1	<1	<1	<1	<1
	35	-	-	-	3.7	1.4	<1	<1
	36	-	-	-	-	-	<1	<1
Christopher Brook	33	-	-	-	3.3	2.8	4.6	1.6
Falls Brook	16	<1	-	-	-	-	-	-
	17	<1	-	-	-	-	-	-
Tracy Brook	25	-	-	-	-	-	-	<1
Overall mean		1.0	<1	<1	2.3	1.3	1.4	1.2
Total number of estimates		22	25	26	31	30	34	38

TABLE 5. Mean densities of Atlantic salmon fry, as determined by electroseining in the Restigouche River system, 1972-78.

River or stream	Fry density per 100 yd <sup>2</sup> (83.6 m <sup>2</sup> )						
	1972	1973	1974	1975	1976	1977	1978
Main Restigouche River	7.9	8.7	4.2	32.8	24.9	15.9	15.5
Upsalquitch River	2.9	12.7	11.5	41.9	19.6	22.0	26.9
Kedgwick River	10.1	16.0	14.1	30.9	14.9	17.4	14.1
Belle Kedgwick River	2.6	<1	<1	4.1	8.1	1.0	1.2
North Kedgwick River	3.7	23.9	8.9	32.5	25.1	7.9	8.5
South Kedgwick River	<1	19.8	12.1	33.4	2.0	<1	4.2
Gounamitz River	5.8	31.3	12.8	7.3	3.1	6.4	18.4
North Gounamitz River	<1	7.8	<1	<1	<1	<1	1.4
Five Fingers Brook	<1	<1	<1	16.2	3.4	10.5	32.0
Jardine Brook	<1	7.7	<1	11.2	<1	3.5	8.1
Little Main Restigouche River	1.0	7.2	29.3	33.1	12.4	38.6	35.6
Christopher Brook	-	-	-	15.6	<1	1.7	4.4
Tracy Brook	-	-	-	-	-	-	23.0
Overall	4.6	14.5	10.5	26.1	12.6	15.9	19.6

TABLE 6. Mean densities of Atlantic salmon small parr, as determined by electroseining in the Restigouche River system, 1972-78.

River or stream	Small parr density per 100 yd <sup>2</sup> (83.6 m <sup>2</sup> )						
	1972	1973	1974	1975	1976	1977	1978
Main Restigouche River	3.8	1.4	3.0	10.2	6.0	4.2	6.5
Upsalquitch River	<1	2.4	7.4	14.5	12.6	5.3	11.8
Kedgwick River	<1	1.7	3.1	5.0	4.9	3.5	2.7
Belle Kedgwick River	<1	2.0	7.8	2.3	10.7	4.6	7.0
North Kedgwick River	6.8	4.9	11.1	8.6	16.6	7.7	8.1
South Kedgwick River	<1	4.0	7.2	6.4	5.7	2.9	5.7
Gounamitz River	1.4	<1	6.5	2.8	2.9	2.2	3.8
North Gounamitz River	1.6	<1	1.3	<1	<1	<1	<1
Five Fingers Brook	2.6	5.9	3.7	16.1	14.2	7.0	18.4
Jardine Brook	1.2	1.7	10.6	8.4	<1	1.5	5.6
Little Main Restigouche River	<1	<1	9.2	8.5	3.0	1.6	4.2
Christopher Brook	-	-	-	6.8	12.3	1.5	3.7
Tracy Brook	-	-	-	-	-	-	4.8
Overall	1.8	2.1	5.9	8.1	7.0	3.7	6.9

TABLE 7. Mean densities of Atlantic salmon large parr, as determined by electroseining in the Restigouche River system, 1972-78.

River or stream	Large parr density per 100 yd <sup>2</sup> (83.6 m <sup>2</sup> )						
	1972	1973	1974	1975	1976	1977	1978
Main Restigouche River	<1	<1	<1	3.1	<1	1.0	<1
Upsalquitch River	<1	1.0	<1	4.4	2.4	1.4	1.9
Kedgwick River	<1	<1	<1	1.5	1.9	2.0	<1
Belle Kedgwick River	<1	<1	<1	1.2	1.3	1.3	2.2
North Kedgwick River	4.1	1.5	1.0	4.8	1.0	2.5	<1
South Kedgwick River	1.6	1.7	<1	1.8	1.0	2.1	2.0
Gounamitz River	<1	<1	<1	<1	<1	1.1	1.0
North Gounamitz River	<1	<1	<1	<1	<1	<1	<1
Five Fingers Brook	1.2	<1	1.7	1.2	2.2	<1	2.9
Jardine Brook	<1	1.7	<1	2.5	<1	1.9	1.4
Little Main Restigouche River	<1	<1	<1	1.6	<1	<1	<1
Christopher Brook	-	-	-	3.3	2.8	4.6	1.6
Tracy Brook	-	-	-	-	-	-	<1
Overall	1.0	<1	<1	2.3	1.3	1.4	1.2





## APPENDIX A

LOCATIONS OF RESTIGOUCHE RIVER  
ELECTROSEINING SITES

For simplification, the following six key points will be used to describe distances to sites:

- (K) Kedgwick, New Brunswick: center of the village, main intersection, near church.
- (Q) Saint Quentin, New Brunswick: center of village, intersection of Canada and Martin streets ("flashing lights").
- (A) Montgomery Bridge: crosses Little Main Restigouche River about 8.7 mi (14.0 km) west of Kedgwick (K), and is above the mouth of the Kedgwick River.
- (B) Beginning of Gounamitz Road (Miller Road), about 4.9 mi (7.9 km) in Fraser's Road from point (A).
- (C) Beginning of road to right, just before White's Brook church, and about 6.2 mi (10.0 km) northeast of Kedgwick (K).
- (H) Hailes Brook camp: about 7.7 mi (12.4 km) west of Kedgwick (K), enroute to Montgomery Bridge.

SITE LOCATIONS - listed in the order presented in the preceding tables.

Main Restigouche River

- #26 About 28.7 mi (46.2 km) from Kedgwick, turn left in Wyers Brook Road, which is just before Robinsonville Bridge over Upsalquitch River. Road goes in to Restigouche River and up along the river. Site is beyond Camp Harmony, where road dips down to river, about 1.7 mi (2.7 km) from beginning of Wyers Brook Road.
- #27 From Kedgwick, cross Robinsonville Bridge and turn left in Restigouche River Road about 5.7 mi (9.2 km) from Bridge. Take right fork about 2.2 mi (3.5 km) in, and proceed about 1.8 mi (2.9 km) (or to about 0.5 mi (0.8 km) above Grog Island Camp) to where road runs beside shallower portion of river by a clump of trees. Site is out from trees.
- #28 Take right fork about 2.2 mi (3.5 km) in Restigouche River Road from Highway 17 and proceed about 3.7 mi (6.0 km) (passing to #27) to a point where a culvert (about 2.3 mi (3.7 km) from new Matapedia Bridge) goes under the road, through which flows a fast mountain brook. Site is below culvert.
- #29 Proceed about 5.2 mi (8.4 km) in Wyers Brook Road from Highway 17 (passing #26), then turn right into field.

Proceed about 0.2 mi (0.3 km) across field to grove of seven elms next to the river. Site is at the uppermost elm.

- #34 From Kedgwick, pass point (C) and turn left on Two Brook Road, about 7.3 mi (11.8 km) from point (C). Take left fork about 1.3 mi (2.1 km) in road and proceed about 4.2 mi (6.8 km) to gate (bus). After passing gate, take left fork at "Englands Flat" sign, about 1.6 mi (2.6 km) from gate, and continue about 6.6 mi (10.6 km), bearing left, followed by a right fork, then a left fork at sign "Sharps Landing" to the bottom of hill. Site is through path at bottom of hill, about 75-100 ft (22.5-30.0 m) before private-property gate.

Upsalquitch River

- A. About 28.7 mi (46.2 km) downriver from Kedgwick, turn left in Wyers Brook Road and proceed about 0.1 mi (0.2 km) to Noye's Restaurant, then follow lane (opposite restaurant) out to shore. Continue up along shore about 0.15 mi (0.2 km) (passing under Robinsonville Bridge) to just before bend in the river; site is below bend in river.
- B. Proceed about 19.6 mi (31.6 km) in from point (C), then turn right in road indicated by sign "Camp 22". Keep to right on this road and proceed about 3.2 mi (5.2 km) to a landing at the bottom of a hill. Site is off this landing, about 225-275 ft (68-73 m) below mouth of Burntland Brook.
- 1B. Proceed about 19.6 mi (31.6 km) in from point (C), then turn right in road indicated by sign "Camp 22". Keep to right on this road and proceed about 3.2 mi (5.2 km) to a landing at the bottom of the hill. At landing, turn right and proceed about 2.2 mi (3.5 km) (fording Burntland Brook) to guardian's trailer; site is off bar, about 275-325 ft (83-98 m) below guardian's trailer.
- C. Proceed about 30.5 mi (49.1 km) in from point (C); then turn right in road indicated by sign "9 Mi N.W. Upsalquitch". About 3.7 mi (6.0 km) in this road, turn right in road which goes to 10-mi Pool. About 0.5 mi (0.8 km) in this road, a river ford is reached. Site is at ford area below 10-mi pool.
- D. Turn right at 25-mi fork, which is about 3.7 mi (6.0 km) in from point (C). About 5.8 mi (9.3 km) in this road, turn left at Simpsons Gulch fork and proceed about another 5.7 mi (9.2 km) to mouth of Twenty Five Mile Brook. Site is approximately 300 ft (90 m) above guardian shack.

- E. Proceed about 30.5 mi (49.1 km) in from point (C); then turn right in road indicated by "9 Mi N.W. Upsalquitich". About 3.7 mi (6.0 km) in this road, continue past point (C); turn off about 0.7 mi (1.1 km) to river. Site is below lower 9-mi pool.
- G. Proceed about 33.3 mi (53.6 km) in from point (C) to forks indicated by sign "Crooked Rapids". Take right fork for about 0.5 mi (0.8 km), then turn right at sign "Craven Gulch". Continue in this road about 1.8 mi (2.9 km) to river. Site is off landing.
- H. Proceed about 33.3 mi (53.6 km) in from point (C) to forks indicated by sign "Crooked Rapids". Take left fork for about 4.2 mi (6.8 km), passing logging campsite (now ruins) to landing. Site is off landing, below Puncheon Bar Pool.
- I. At St. Quentin, about 11.2 mi (18.0 km) upriver from Kedgwick, turn left in road indicated by flashing light intersection and proceed straight about 4.9 mi (7.9 km), then right about 0.5 mi (0.8 km) to start of I.P.'s new road. Turn left in I.P.'s road and proceed about 10.9 mi (17.5 km), then left in old road. Proceed about 6.5 mi (10.5 km) in old road, (bearing right twice) to forks. Take left fork for about 0.8 mi (1.3 km) to second forks. Take right fork for about 4.6 mi (7.4 km) (crossing East Oxford Brook) to "T" intersection indicated by sign "10 Mi N.W. Upsalquitich". Turn right and proceed about 2.2 mi (3.5 km) to forks. Take right fork for about 4.0 mi (6.4 km) to Jerry Ferguson Brook. After crossing Jerry Ferguson Brook, continue straight about 8.0 mi (12.9 km) to four-way intersection with I.P.'s road, at about Mile 40. Turn right and proceed about 2.8 mi (4.5 km), then left fork for about 2.2 mi (3.5 km) to about Mile 45 of I.P.'s road. Turn left off I.P.'s new road and proceed about 4.7 mi (7.6 km) to old gate area (Ramsay Lodge), then left for about 1.1 mi (1.8 km) to the mouth of Ramsay Brook. Site is about midway between the mouths of Ramsay and Murray brooks.

#### Kedgwick River

- #1 Cross Clearwater Brook about 11.9 mi (19.2 km) in Fraser's Road from point (A), and immediately turn right down to guardian's shack (bus). Site is out from bus.
- #2 Proceed about 14.4 mi (23.2 km) in Fraser's Road from point (A) (passing #1) to where road begins to follow Kedgwick River after a fire shack, which is on a turn at the bottom of a hill. Site is off embankment to right.

- #3 Proceed in to Rapids Depot yard, about 18.8 mi (30.3 km) in Fraser's Road from point (A), and continue to right past hose-drying racks and out to river. Site is where road ends at river's edge.
- #4 About 18.6 mi (29.9 km) in Fraser's Road from point (A), turn left in road indicated by sign "South Kedgwick" (just before Rapids Depot) and continue about 1.9 mi (3.1 km) to Fogs Brook. Immediately after crossing Fogs Brook, turn right in Fraser's Lodge Road and continue about 2.5 mi (4.0 km) to Lodge yard, where river can be reached at canoe launching area. Site is off canoe landing.
- #15 At Rapids Depot, about 18.8 mi (30.3 km) in Fraser's Road from point (A), turn right for about 0.3 mi (0.5 km) to Wetmore Bridge. After crossing bridge, bear left and continue about 2.7 mi (4.3 km) over McDougall Brook and Mann Brook to where McDougall Brook runs beside road. Brook was diverted here in spring of 1971. Site is off embankment to right.
- #31 About 0.3 mi (0.5 km) in Fraser's Road from point (A), turn right in Carter Hall Camp (Fowler's) Road and continue about 0.3 mi (0.5 km) through camp yard and field to left of camp, to the beginning of a grove of trees. Site is at the beginning of the grove of trees.

#### Belle Kedgwick River

- #6 About 18.6 mi (29.9 km) in Fraser's Road from point (A), turn left in road indicated by sign "South Kedgwick" (just before Rapids Depot) and continue about 6.1 mi (9.8 km) (crossing Fogs Brook) to road indicated by sign "Kedgwick Forks". Turn right in road and proceed about 6.2 mi (10.0 km) to ford at Kedgwick Forks. Ford South Kedgwick River and continue up along North Kedgwick River about 0.6 mi (1.0 km) to Belle Kedgwick River. Site is at ford to right, below washed out bridge.

#### North Kedgwick River

- #5 About 18.6 mi (29.9 km) in Fraser's Road from point (A), turn left in road indicated by sign "South Kedgwick" (just before Rapids Depot) and continue about 6.1 mi (9.8 km) (crossing Fogs Brook) to road indicated by sign "Kedgwick Forks". Turn right in road and proceed about 6.2 mi (10.0 km) to ford at Kedgwick Forks. Ford South Kedgwick River and bear right through field, where North and South Kedgwick rivers meet. Site is at mouth of North Kedgwick River.

#8 About 18.6 mi (29.9 km) in Fraser's Road from point (A), turn left in road indicated by sign "South Kedgwick" (just before Rapids Depot) and continue about 6.1 mi (9.8 km) (crossing Fogs Brook) to road indicated by sign "Kedgwick Forks". Turn right in road and proceed about 6.2 mi (10.0 km) to ford at Kedgwick Forks. Ford South Kedgwick River and continue up along North Kedgwick River about 0.6 mi (1.0 km) to Belle Kedgwick River. Ford Belle Kedgwick River to left of washed out bridge, and continue about 3.8 mi (6.1 km) before bearing right after Indian Gulch. After bearing right, continue about 2.0 mi (3.2 km), then turn right in road just before Gin Creek. River is reached about 1.7 mi (2.7 km) in road. Site is near mouth of Gin Creek.

#### South Kedgwick River

#7 About 18.6 mi (29.9 km) in Fraser's Road from point (A), turn left in road indicated by sign "South Kedgwick" (just before Rapids Depot) and continue about 6.1 mi (9.8 km) (crossing Fogs Brook) to road indicated by sign "Kedgwick Forks". Turn right in road and proceed about 6.2 mi (10.0 km) to ford at Kedgwick Forks. Ford South Kedgwick River and continue through field, cross over road (to Belle Kedgwick River and Gin Creek), and bear left to river. Site is directly in front of approach (old ford) to river.

#14 About 18.6 mi (29.9 km) in Fraser's Road from point (A), turn left in road indicated by sign "South Kedgwick" (just before Rapids Depot) and continue about 6.1 mi (9.8 km) (crossing Fogs Brook) to sign indicating "Kedgwick Forks" turn off. Proceed straight in Fogs Brook Road about 2.4 mi (3.9 km) through Hornes Gulch, then bear left and continue about 8.7 mi (14.0 km) over Union and Portage brooks to forks. Take right fork about 0.3 mi (0.5 km) to bridge (now out). Ford river to left of bridge and cross over road (to 18 Mile Gulch) to landing. Site is off landing below washed out bridge.

#### Gounamitz River

#9 Turn left in Gounamitz Road (Miller Road) from Fraser's Road at point (B), and continue about 8.8 mi (14.2 km) over Fivemile and Bells brooks until road to left, indicated by an old white gatepost, is reached. Turn left and proceed in road about 1.3 mi (2.1 km) to forks. Take left fork about 0.5 mi (0.8 km) to long landing. Site is approximately midway along landing.

#11 Turn left in Gounamitz Road (Miller Road) from Fraser's Road at point (B),

and continue about 14.7 mi (23.7 km), passing #9 turn off and over Big and Benny brooks to Dave Richards Brook. Immediately after brook, turn left to landing. Site is off central area of landing.

#12 Turn left in Gounamitz Road (Miller Road) from Fraser's Road at point (B), and continue about 15.7 mi (25.3 km), passing #11 turn off, until road to left is reached. Turn left to landing and bear right up landing about 0.4 mi (0.6 km). Site is off landing at lower end of first island.

#13 Turn left in Gounamitz Road (Miller Road) from Fraser's Road at point (B), and continue about 16.5 mi (26.6 km) on old road, passing #12 turn off and over Cyr Brook until road to left is reached (new by-pass "1977" from just after Cyr Brook to just after road to left). Turn left to river. Site is in front of approach to river.

#### North Gounamitz River

#23 Turn left in Gounamitz Road (Miller Road) from Fraser's Road at point (B), and continue about 18.6 mi (29.9 km), passing #13 turn off and over Letourneau Brook until road to left (about 0.1 mi (0.2 km) before bridge over North Gounamitz River) indicated by sign "F.C.L." on tree is reached. Turn left to river. Site is in front of approach to river.

#### Five Fingers Brook

#19 About 6.2 mi (10.0 km) from Kedgwick, en route to St. Quentin, turn right in road, which is a short distance before new bridge, and continue about 0.5 mi (0.8 km) through Gerard Roy's fields to end of trail beyond camp yard. Site is down over bank at end of trail. (New bridge, constructed in 1975 and 1976, is about 0.5 (0.8 km) below old closed bridge by Chouinard's Grist Mill.)

#32 En route to Montgomery Bridge from Hailes Brook Camp, continue straight about 0.6 mi (1.0 km) (instead of to right, over Montgomery Bridge) until camptrailer marked "Poacher's Haven" is reached. Turn left and continue about 0.9 mi (1.4 km), then take right fork for about 0.9 mi (1.4 km) to "Blue Spruce Lodge". Site is at end of path leading from right rear of camp.

#### Jardine Brook

#20 At St. Quentin, about 11.2 mi (18.0 km) from Kedgwick, turn right in road indicated by flashing light intersection and proceed straight about 5.3 mi (8.5 km), right about 0.4 mi (0.6 km), then left about 2.9 mi (4.7

km) (bearing right twice) to Jardine Brook. Site is above ford. Note: 4-wheel drive is necessary.

#### Little Main Restigouche River

- #21 About 18.0 mi (29.0 km) beyond St. Quentin from Kedgwick, turn right in Black Brook Depot Road and proceed about 2.5 mi (4.0 km) to Depot Gate, where permission must be obtained. Continue through Depot Yard and beyond for about 1.1 mi (1.8 km) to Ouellette Road. Cross Ouellette Road and proceed about 3.0 mi (4.8 km), then bear left about 6.8 mi (10.9 km) to river just above mouth of Boston Brook. Site is in front of approach to river. Boston Brook Lodge, "Irving's", is just below mouth of brook.
- #22 About 18.0 mi (29.0 km) beyond St. Quentin from Kedgwick, turn right in Black Brook Depot Road and proceed about 2.5 mi (4.0 km) to Depot Gate, where permission must be obtained. Continue through Depot Yard and beyond for about 1.1 mi (1.8 km) to Ouellette Road. Turn left and proceed about 2.5 mi (4.0 km) until road to right indicated by sign "Camp 2" is reached. Turn right and continue straight about 5.1 mi (8.2 km) (passing remains of Camp 2) to river, just above mouth of "small brook". Site on other side of river below mouth of brook. (Mouth of McIntosh Brook is about 130 ft (39 m) above "small brook" on other side of river.)
- #30 En route to Montgomery Bridge from Hailes Brook Camp, continue straight about 0.6 mi (1.0 km) (instead of to right, over Montgomery Bridge) until camptrailer marked "Poacher's Haven" is reached. Turn right and continue about 0.2 mi (0.3 km) bearing left (past a farm house and barn near the river) to clearing by the river beyond the house. Site is off clearing.
- #35 About 1.6 mi (2.6 km) in Fraser's Road from point (A), turn left in Harquil Road, indicated by sign "Truck Check Point", and continue straight about 2.4 mi (3.9 km); then turn right and detour down brook about 0.2 mi (0.3 km) to just beyond washed out bridge. From washed out bridge, proceed about 1.2 mi (1.9 km) to mouth of Upper Four Mile Brook. Site is below mouth of brook. Note: 4-wheel drive is necessary.
- #36 About 18.0 mi (29.0 km) beyond St. Quentin from Kedgwick, turn right in Black Brook Depot Road and proceed about 2.5 mi (4.0 km) to Depot Gate, where permission must be obtained. Continue through Depot Yard and beyond for about 1.1 mi (1.8 km) to Ouellette Road. Turn left and proceed about 6.4 mi (10.3 km) (passing #22 turn off), then bear right for about 2.9 mi (4.7 km) (crossing Wagansis Brook) to

bridge over Little Main Restigouche River. Site is below bridge and above bend in the river.

#### Christopher Brook

- #33 About 40.2 mi (64.7 km) from Kedgwick, turn right from Highway 17 in road to St. Arthur, and proceed about 0.7 mi (1.1 km) to where a bridge crosses the brook. Turn left to brook immediately before bridge. Site is below power lines which cross brook.

#### Falls Brook

- #16 About 8.1 mi (13.0 km) in Fraser's Road from point (A), turn left in Falls Brook Road and continue about 2.2 mi (3.5 km); then turn left in long landing (about 0.6 mi (1.0 km) before Burnt Hill Brook). Site is at upper end of landing.
- #17 Cross bridge over Falls Brook about 6.5 mi (10.5 km) in Fraser's Road from point (A). Site originally where new bridge now crosses the brook.

#### Tracy Brook

- #25 About 1.6 mi (2.6 km) in Fraser's Road from point (A), turn right in road opposite Harquil Road indicated by sign "Truck Check Point", and continue about 1.1 mi (1.8 km) to bridge over Kedgwick River. Cross bridge and proceed about 0.2 mi (0.3 km), then turn left in old road. Continue about 7.4 mi (11.9 km) in old road to clearing, then bear right about 3.2 mi (5.2 km) (fording branch of Otter Brook) to ford over South Branch Tracy Brook. Site is just above ford. Note: 4-wheel drive is necessary.

APPENDIX B

BIO-15

RESOURCE DEVELOPMENT BRANCH

A-

ELECTROSEINING DATA

SYSTEM

STATION

RECORDER

DATE

SWEEP #	TIME	1	2	3	4	5	6
		MIN	MIN	MIN	MIN	MIN	MIN
SPECIES							
TOTAL							
SPECIES							
TOTAL							
SPECIES							
TOTAL							
SPECIES							
TOTAL							
SPECIES							
TOTAL							
SPECIES							
TOTAL							
SPECIES							
TOTAL							

THIS SHEET TO BE USED ONLY WHEN CATCH/EFFORT CALCULATIONS WISH TO BE MADE - NOT SUITABLE FOR SCHNABEL METHOD. CALCULATIONS FOUND ON BIO-16--

BIO - 15

RESOURCE DEVELOPMENT BRANCH

B-

LENGTHS		WIDTHS		RATE of FLOW	DEPTHS (IN INCHES)						
LEFT BANK		LR BARRIER			1	UPPER BARRIER	+	+	+	+	0
				2		+	+	+	+	0	=
				3		+	+	+	+	0	=
				4		+	+	+	+	0	=
				AVERAGE		+	+	+	+	0	=
RIGHT BANK		UP BARRIER			LOWER BARRIER	+	+	+	+	0	=
AVERAGE					MAXIMUM DEPTH						TOTAL
x		=		SQ. YARDS	IN.	→ ÷ n =					IN.

SKETCH and/or NOTES - pools, % riffle, bottom type, cover, banks.

CREW		MACHINE #	
	PROBE	AIR TEMPERATURE	✓
	DIP	H <sub>2</sub> O TEMPERATURE	✓
		pH	✓
		SPECIFIC COND.	
		WEATHER	✓
		BARRIERS USED	
		LOAD	
		VOLTS	AMPS
		1	
		2	
		3	
		4	
		5	
		6	

REMARKS

APPENDIX C



Environment Canada  
Fisheries

Environnement Canada  
Pêches

B10 - 16	A-
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## ELECTROSEINING CALCULATIONS

STREAM						STATION						DATE	
SPECIES						SPECIES							
n	UNMARKED CAUGHT U	MARKED IN AREA OR REMOVED $\frac{M}{X}U$	$U^2$	$X^2$	UX	n	UNMARKED CAUGHT U	MARKED IN AREA OR REMOVED $\frac{M}{X}U$	$U^2$	$X^2$	UX		
1						1							
2						2							
3						3							
4						4							
5						5							
6						6							
(n)	$\Sigma U$	$\Sigma X$	$\Sigma U^2$	$\Sigma X^2$	$\Sigma UX$	(n)	$\Sigma U$	$\Sigma X$	$\Sigma U^2$	$\Sigma X^2$	$\Sigma UX$		
	$(\Sigma U)^2$	$(\Sigma X)^2$		$\Sigma U \Sigma X$			$(\Sigma U)^2$	$(\Sigma X)^2$		$\Sigma U \Sigma X$			

	$A = n \Sigma UX - \Sigma U \Sigma X$	
	$B = n \Sigma X^2 - (\Sigma X)^2$	
	$\hat{k} = -A/B$	
	$\hat{kN} = (\Sigma U + \hat{k} \Sigma X) / n$	
	$\hat{N} = \hat{kN} / \hat{k}$ POPULATION ESTIMATE	
	ACTUAL CATCH = $\Sigma U$	
	ESTIMATE DENSITY / SQ. YD.	





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