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Ages at Migration of Atlantic Salmon in the Restigouche River, 1976-78



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Price of Manufacture of Intermediate Goods
and the Manufacturing Index, 1955-76

J. F. Pickett and J. L. Pickett

Director and Assistant Director
General Board
Department of Statistics and Census
Ottawa, Ontario
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CHAPTER 1

The first part of the book discusses the importance of understanding the context in which research is conducted. This includes the social, cultural, and historical factors that can influence the results of a study. It is essential for researchers to be aware of these factors and to take steps to minimize their impact on the research process.

The second part of the book focuses on the design of research studies. This includes the selection of appropriate research methods, the development of research questions and hypotheses, and the implementation of the study. It is important to ensure that the design is rigorous and that the data collected is reliable and valid.

The third part of the book discusses the analysis and interpretation of research data. This includes the use of statistical methods to analyze the data and the interpretation of the results in the context of the research questions and hypotheses. It is important to be transparent about the methods used and to provide a clear and concise summary of the findings.

CHAPTER 2

The first part of the chapter discusses the importance of ethical considerations in research. This includes the need to protect the rights and welfare of research participants and to ensure that the research is conducted in a transparent and accountable manner. It is essential for researchers to obtain informed consent from participants and to follow established ethical guidelines.

The second part of the chapter focuses on the development of research questions and hypotheses. This includes the identification of a research problem, the formulation of research questions, and the development of testable hypotheses. It is important to ensure that the research questions and hypotheses are clear, specific, and relevant to the field of study.

The third part of the chapter discusses the selection of research methods. This includes the identification of appropriate research methods, the development of a research plan, and the implementation of the study. It is important to ensure that the methods used are appropriate for the research questions and hypotheses and that the data collected is reliable and valid.

The fourth part of the chapter discusses the analysis and interpretation of research data. This includes the use of statistical methods to analyze the data and the interpretation of the results in the context of the research questions and hypotheses. It is important to be transparent about the methods used and to provide a clear and concise summary of the findings.

The fifth part of the chapter discusses the importance of reporting research findings. This includes the development of a clear and concise research report, the use of appropriate language and style, and the presentation of the findings in a clear and accessible manner. It is important to ensure that the report is well-organized and easy to read and that the findings are presented in a clear and concise manner.

The sixth part of the chapter discusses the importance of peer review in research. This includes the process of submitting research papers for review, the role of peer reviewers, and the importance of responding to reviewer comments. It is important to ensure that the research is of high quality and that the findings are presented in a clear and concise manner.

ABSTRACT

Pickard, P.R. and J.L. Peppar. 1979. Ages at migration of Atlantic salmon in the Restigouche River, 1976-78. Can. Data Rep. Fish. Aquat. Sci. No. 165. 10 p.

Ages at migration (smoltification and spawning migration) of Atlantic salmon in the Restigouche River, New Brunswick, were obtained from three seasons (1976-78) of scale sampling the ascending adult salmon run. This report presents the final ages assigned to all the scale samples read.

Key words: Atlantic salmon, smolt, grilse, large salmon, spawning migration, scale sample, freshwater age, sea age, Restigouche River.

RÉSUMÉ

Pickard, P.R. and J.L. Peppar. 1979. Ages at migration of Atlantic salmon in the Restigouche River, 1976-78. Can. Data Rep. Fish. Aquat. Sci. No. 165. 10 p.

On a établi l'âge migratoire (avalaison des tacons et montaison) du saumon atlantique remontant la rivière Restigouche (Nouveau-Brunswick) grâce au prélèvement au cours de trois saisons (1976 à 1978) d'échantillons d'écaillés de saumons adultes à la montaison. Le présent rapport donne les âges définitifs attribués à tous les échantillons prélevés.

Mots clés: saumon atlantique, tacon, madeleineau, saumon adulte, montaison, échantillons d'écaillés, âge en eau douce, âge en mer, rivière Restigouche.

INTRODUCTION

This report presents data on the ages at migration (smoltification and spawning migration) of Atlantic salmon in the Restigouche River, New Brunswick. Data were obtained from three seasons of sampling the ascending adult salmon run to the Restigouche River system, 1976-78; data derived for the period 1972-75 have been presented (Peppar and Pickard 1975).

Sampling was conducted by means of a stand of four, interconnected, Chaleur Bay spearhead floating traps, set and operated each year in Chaleur Bay about 315 m south of Bon Ami Rocks, Dalhousie, New Brunswick (48°03'N; 66°21'W). This location was chosen because of its position near the head of the Restigouche River estuary, and its past reputation as a good commercial fishing-trap site (Fig.).

The leaders of all four traps were constructed of 15.2-cm mesh, while the three offshore "pounds" were constructed of 8.9-cm mesh and the inshore "pound" of 6.4-cm mesh. The smaller mesh size in the "pounds" allowed capture of both grilse and large salmon components of the ascending adult run.

The sampling operation was conducted by personnel of the Resource Branch, Fisheries and Marine Service, as part of an adult salmon enumeration and tagging program initiated in 1972. The traps were set and fished by the licensed owner of the stand, J.A. Reid Stewart.

METHODS AND PRESENTATION OF DATA

Ages were determined by scale reading. Scale samples were obtained from all salmon tagged, from those scale sampled only, from those sacrificed for further biological analysis and from those found meshed in the traps. Samples of scales were

removed from the left side of each fish, immediately posterior to the base of the dorsal fin and 2-3 scale rows above the lateral line.

Each scale sample was examined under a binocular microscope, and those scales with suitable (entire) centres were subsequently impressed on acetate slides. To read the scales, a microprojector was employed to project the scale image on a white background.

All scale samples were independently read twice; additional readings were made of those samples in which ages disagreed, and final ages were assigned on the basis of majority agreement. Differences in sample sizes recorded in the tables reflect the proportion of scales for which smolt ages could not be determined. Of the 3,134 scale samples read, 4 (0.1%) did not provide suitable centres for determination of freshwater age.

The method used to record data in this report divides total age into two parts - freshwater (smolt) and sea ages; for example, a fish recorded as "3.2" has spent three years in freshwater and all or part of the succeeding two years in the sea. This is commonly referred to as a "two-sea-winter" salmon.

In presenting the age composition data, grilse (fish returning to spawn after spending only one winter at sea) and large salmon (fish returning to spawn after spending two or more winters at sea) are treated separately in the tables. Previously spawned fish are "lumped" in Table 1, regardless of at what age they spawned or how many times they had previously spawned. In Table 2, the previously spawned fish have been separated according to their sea age when entering the river for the first time. Remaining tables present final age (i.e., present age) at year of sampling, irregardless of previous spawning.

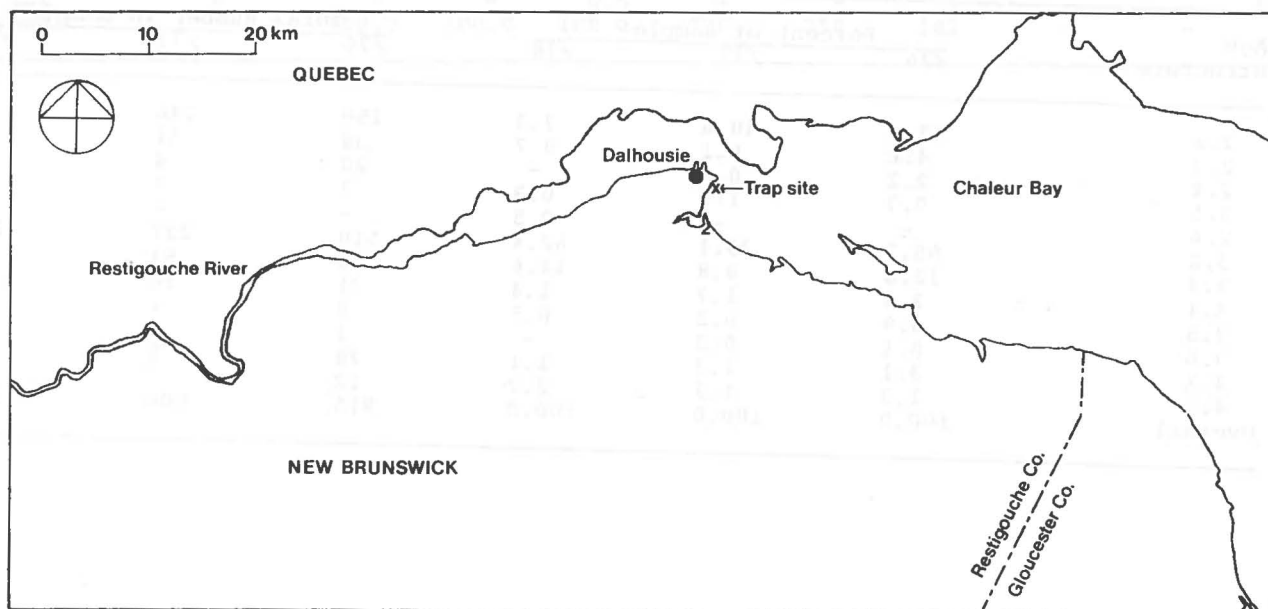


FIG. Location map of salmon trapping site, Restigouche River, 1976-78.

TABLE 1. Percentage composition of sea ages of large salmon caught during successive semi-monthly periods, over the three seasons of sampling, 1976-78.

Semi-monthly period	Percent of sample									Total number in sample		
	Maiden fish			Previous spawners								
	Sea age - 2 yr			Sea age - 3 yr								
	/76	/77	/78	/76	/77	/78	/76	/77	/78	/76	/77	/78
May 16-31	-	25.0	-	-	50.0	-	-	25.0	-	-	8	-
Jun 1-15	53.1	45.2	58.5	30.6	39.8	33.9	16.3	15.1	7.7	147	93	130
16-30	79.0	86.0	72.8	16.2	10.2	23.5	4.8	3.8	3.7	499	315	136
Jul 1-15	81.9	91.4	86.4	12.5	6.5	11.1	5.6	2.2	2.5	216	93	81
16-31	82.6	91.0	70.0	10.9	6.4	30.0	6.5	2.6	-	46	78	20
Aug 1-15	85.7	100.0	-	14.3	-	-	-	-	-	7	19	-
16-31	100.0	100.0	66.7	-	-	33.3	-	-	-	1	2	3
Overall	75.8	80.9	70.5	17.4	13.8	24.9	6.9	5.3	4.6	916	608	370

TABLE 2. Percentage composition of freshwater (smolt) ages in each sea-age group of large salmon over the three seasons of sampling, 1976-78.

Sea age (yr)	Percent of sample									Total number in sample		
	Smolt age - 2 yr			Smolt age - 3 yr			Smolt age - 4 yr					
	/76	/77	/78	/76	/77	/78	/76	/77	/78	/76	/77	/78
1	30.0	14.3	71.4	60.0	85.7	28.6	10.0	-	-	10	7	7
2	24.4	49.5	10.0	71.8	48.9	88.4	3.8	1.6	1.5	735	505	267
3	22.4	39.4	35.4	71.2	53.2	56.3	6.5	7.5	8.3	170	94	96
Overall	24.0	47.5	17.8	71.6	50.0	78.9	4.4	2.5	3.2	915	606	370

TABLE 3. Age composition (age structure) of large salmon over the three seasons of sampling, 1976-78.

Age structure	Percent of sample			Total number in sample		
	/76	/77	/78	/76	/77	/78
2.2	17.4	40.6	7.3	159	246	27
2.3	4.2	5.1	9.7	38	31	36
2.4	2.2	0.7	-	20	4	-
2.5	0.3	1.2	0.3	3	7	1
2.6	-	-	0.5	-	-	2
3.2	55.7	39.1	62.4	510	237	231
3.3	12.6	8.8	14.6	115	53	54
3.4	2.3	1.7	1.4	21	10	5
3.5	0.9	0.2	0.5	8	1	2
3.6	0.1	0.3	-	1	2	-
4.2	3.1	1.3	1.1	28	8	4
4.3	1.3	1.2	2.2	12	7	8
Overall	100.0	100.0	100.0	915	606	370

TABLE 4. Age composition (total age in years) of large salmon over the three seasons of sampling, 1976-78.

Total age (yr)	Percent of sample			Total number in sample			From spawning of		
	/76	/77	/78	/76	/77	/78	/76	/77	/78
4	17.4	40.6	7.3	159	246	27	1971	1972	1973
5	59.9	44.2	72.2	548	268	267	1970	1971	1972
6	17.8	10.7	15.7	163	65	58	1969	1970	1971
7	3.9	4.0	3.8	36	24	14	1968	1969	1970
8	0.9	0.2	1.1	8	1	4	1967	1968	1969
9	0.1	0.3	-	1	2	-	1966	1967	-
Overall	100.0	100.0	100.0	915	606	370	-	-	-

TABLE 5. Percentage composition of freshwater (smolt) ages in grilse over the three seasons of sampling, 1976-78.

Sea age (yr)	Percent of sample												Total number in sample		
	Smolt age - 2 yr			Smolt age - 3 yr			Smolt age - 4 yr			Smolt age - 5 yr					
	/76	/77	/78	/76	/77	/78	/76	/77	/78	/76	/77	/78	/76	/77	/78
1	37.4	14.0	11.8	59.6	84.9	78.9	3.1	1.1	8.7	-	-	0.6	720	358	161
Overall	37.4	14.0	11.8	59.6	84.9	78.9	3.1	1.1	8.7	-	-	0.6	720	358	161

TABLE 6. Age composition (structure and total age in years) of grilse over the three seasons of sampling, 1976-78.

Age structure	Total age (yr)	Percent of sample			Total number in sample			From spawning of		
		/76	/77	/78	/76	/77	/78	/76	/77	/78
2.1	3	37.4	14.0	11.8	269	50	19	1972	1973	1974
3.1	4	59.6	84.9	78.9	429	304	127	1971	1972	1973
4.1	5	3.1	1.1	8.7	22	4	14	1970	1971	1972
5.1	6	-	-	0.6	-	-	1	-	-	1971
Overall		100.0	100.0	100.0	720	358	161	-	-	-

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2. The second part of the document outlines the specific requirements for record-keeping, including the need to maintain original documents and to keep copies of all supporting documents. It also discusses the importance of ensuring that records are accessible and retrievable at all times.

3. The third part of the document discusses the consequences of failing to maintain accurate records, including the potential for financial loss and the risk of legal action. It also discusses the importance of training staff on proper record-keeping procedures and the need for regular audits to ensure compliance.

4. The fourth part of the document discusses the importance of maintaining accurate records of all transactions, including the need to maintain original documents and to keep copies of all supporting documents. It also discusses the importance of ensuring that records are accessible and retrievable at all times.

5. The fifth part of the document discusses the consequences of failing to maintain accurate records, including the potential for financial loss and the risk of legal action. It also discusses the importance of training staff on proper record-keeping procedures and the need for regular audits to ensure compliance.

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REFERENCE

J.L. Peppar and P.R. Pickard. 1975. Ages at migration of Atlantic salmon in the Restigouche River. Resource Development Branch, Fisheries and Marine Service, Dept. of the Environment, Maritimes Region, Halifax, Nova Scotia. Data Record Series No. MAR/D-75-8, 7 p.