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Atlantic salmon (Salmo salar L.) target spawning requirements and  
status of the Rocky river stock 1983-1991

by

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**Abstract**

Target spawning requirements are calculated for the Rocky River based on 240 eggs/m<sup>2</sup> of river habitat and 7 smolts/ha. of standing water. Percentage of target egg deposition is calculated for the interval since the introduction of anadromous salmon into the system in 1984.

**Résumé**

On calcule le besoin en géniteurs cible pour la rivière Rocky en se fondant sur 240 oeufs par mètre carré d'habitat de rivière et sur sept saumoneaux par hectare d'eau dormante. On calcule également le pourcentage de ponte cible atteint depuis l'introduction de saumons anadromes dans le réseau hydrographique, soit depuis 1984.

## Introduction

St. Mary's Bay salmon enhancement activities began in 1984 and encompassed four rivers in SFA 9: Little Salmonier River; Collinet River; North Harbour River; and, Rocky River (Fig. 1). The objective of this project was to colonize the Rocky River with anadromous Atlantic salmon. This river had a natural obstruction (falls) at the river's mouth that was remedied by fishway construction.

## Background

The Rocky River, prior to enhancement activities, was known to have resident populations of Atlantic salmon, brown trout and brook trout. These populations were not assessed.

This project utilized Little Salmonier River as a brood source to stock Rocky River. Brood was collected from Little Salmonier River and transferred to a control flow spawning channel in the North Harbour River. These brood fish were allowed to spawn naturally. Resultant fry were released into Rocky River at swim up. Fry releases were conducted from 1984-1986.

## Materials and Methods

### Biological characteristics

#### Rocky River

Mean weight of females (2.2 kg.) is based on the weight of 53 specimens sampled at the Rocky River fishway in 1990 and 1991. The percent female and relative fecundity figures are those used by O'Connell and Dempson (1991). All smolt data are based on the Rocky River stock.

#### Little Salmonier River

Mean weight of females (1.9 kg.) is based on 1212 specimens sampled through 1983-1987. The relative fecundity figure used is that of O'Connell and Dempson (1991). Females in this stock account for 92% of escapement (based on data from 1983-1987 entailing 1316 samples).

### Egg depositions

Annual egg deposition was calculated by dividing the no. of fry released by 20% (Sturge, 1968) and using this figure as an estimate of the no. of eggs required to produce those fry. The no. of females transferred was known. This figure was multiplied by the average weight and average fecundity to derive the no. of eggs deposited. In other years the no. of adults through the fishway was multiplied by the percentage female and treated as above to derive the no. of eggs deposited.

### Habitat determinations

Total accessible riverine units (10,823 m<sup>2</sup>) is based on an unpublished survey conducted by the Salmon Association of Eastern Newfoundland in 1983 and the stream survey of Porter et al. (1974). The no. of hectares of accessible standing water (2191 ha.) is from O'Connell and Dempson (1991).

### Target egg requirements

Target egg requirements are based on 240 eggs/m<sup>2</sup> of riverine habitat and 7 smolts/ha. of standing water. The value of 7 smolts per ha. is divided by 1.9% to yield the no. of eggs per ha. as per O'Connell et al. (1991).

## Results and Discussions

Use of fixed parameters such as 240 eggs per unit, 7 smolts per ha. and egg to smolt survival of 1.9% has inherent problems. For discussion on this topic, refer to O'Connell et al. (1991).

The relative fecundity figure of 2066 eggs/kg. (O'Connell and Dempson 1991) used was derived for fish < 63 cm. In the present paper this figure is used for all fish. Since the first returns to Rocky River, fish over 63 cm in length have only accounted for 4% of the escapement to this river. It is highly likely that some of these fish are repeat spawners.

The target egg deposition required for the Rocky River is 3,404,730 eggs with a requirement for 2,597,520 and 807,210 eggs for fluvial and lacustrine habitat respectively. This egg requirement will be met by 881 spawners.

Table 1 details the egg deposition for the Rocky River from 1983 -1991. The colonization phase of this project (1984-1987) encompassed the equivalent of a five year stocking program that saw on average 44% of the target egg deposition met. The returns after the commercial fishery have averaged 32% of target egg deposition. A possible explanation for the low return rate could be lower than average smolt production due to the numbers of resident fish in the system. It is anticipated that due to the fecundity anadromous salmon will eventually displace some of the resident species and lead to anadromous salmon being the predominant species in future years.

Table 2 details the results of smolt enumeration during 1990 and 1991. From this data figures of 0.32% egg to smolt, 1.6% released fry to smolt can be calculated for the 1986 egg deposition. Smolt to adult survival can be calculated to be 2.5% for the 1991 smolt production. The smolt to adult survival is returns to the river. This figure of 2.5% smolt to adult is low and can be accounted for by low marine survival.

## References

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Table 1. Details of egg deposition Rocky River 1983-1991.

Year	No. Released Fry	Egg Equiv.	Released Adults	Adult to Egg	Fishway count	Adult to Egg	Total Eggs	% Target Egg
1983	0	1538875	0	0	*	*	1538875	45
1984	307775	2172500	0	0	*	*	2172500	64
1985	434500	970000	0	0	*	*	970000	28
1986	194000	1998225	0	0	*	*	1998225	59
1987	399645	0	124	486750	81	312937	799687	23
1988	0	0	0	0	319	1232431	1232431	36
1989	0	0	0	0	177	683825	683825	20
1990	0	0	0	0	418	1614910	1614910	47
1991	0	0	0	0	227	876996	876996	26

\* Indicates no data

**Table 2. Details of smolt enumeration 1990 - 1991.**

Year	Smolt Count	Percentage at age			
		2+	3+	4+	5+
1990	8,287	1%	66%	29%	4%
1991	7,732	16%	70%	13%	1%

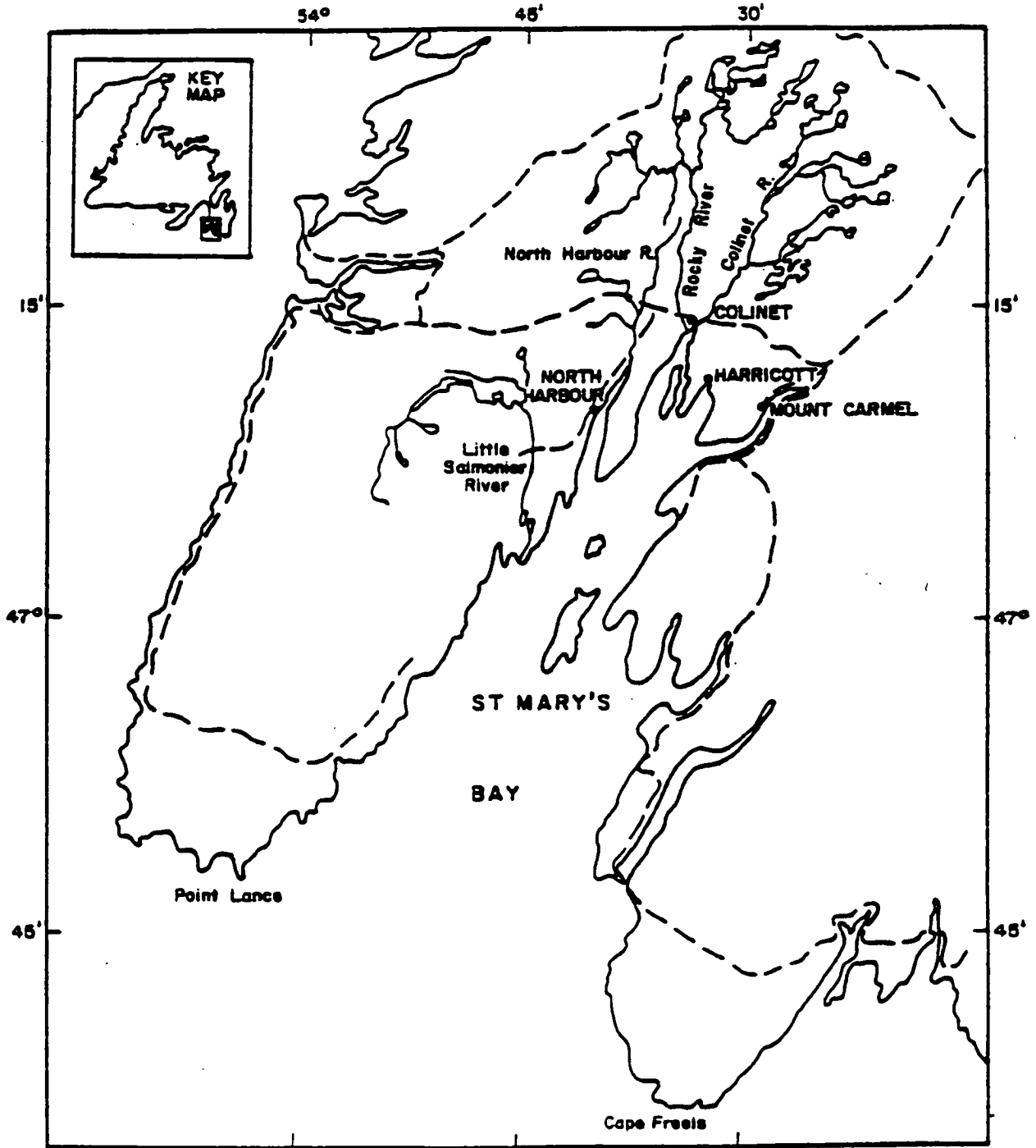


Fig. 1. Map of the St.Mary's Bay area indicating the Rocky River system.