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Recent Changes in Size and Composition
of the Miramichi River Salmon Run, New Brunswick,
and Resultant Improvement in Juvenile Salmon Populations
Following a Commercial Salmon Fishing Ban

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SUMMARY

A commercial salmon fishing ban and some angling cutbacks were imposed on the Miramichi River, New Brunswick, in 1972. Results of these restrictions, as reflected in estuarial sampling trap catches and juvenile salmon population levels, indicate that large salmon runs to the river have improved significantly during the years of the ban (1972 and 1973) as have salmon fry levels in 1973.

INTRODUCTION

In 1972 Environment Canada imposed a total commercial salmon fishing ban in most areas of New Brunswick, including the Miramichi, Restigouche and St. John River areas. In addition, certain angling season and/or bag limit restrictions were instituted on these three systems. These various restrictions were established because data collected from experimental traps and fences, juvenile salmon population investigations, sport and commercial salmon fisheries, tagging studies etc., demonstrated that spawning escapement to the river systems was critically low.

This paper describes the changes observed since institution of the ban in salmon run size and composition at one estuarial sampling trap in the Miramichi. These changes are considered representative of the changes which took place throughout the system. Changes in juvenile salmon populations in the freshwater reaches of the system in 1973 are also noted.

Adult salmon runs to the Miramichi are monitored using a modified commercial trap net located in the estuary (Figure 1). This arrangement provides the best available information on relative abundance, timing, and stock composition for salmon entering the total system. Juvenile salmon abundance is monitored each year by using electro-seining techniques to determine numbers per 100 square metres at stations located throughout the system.

Run monitoring at the sampling trap begins shortly after the ice clears the river (about mid-May) and continues until the run ceases in late October or early November. Trapping is conducted on a daily basis with one or two lifts, depending on weather and tide conditions, and all salmon are counted and released (a small proportion are tagged or sacrificed for further analysis).

RESULTS

Prior to the 1972 ban on commercial salmon and sport fishing on the Miramichi, sampling trap catches indicated that runs of both 1-sea-winter salmon (grilse) and 2-sea-winter and older salmon (large salmon) had been decreasing (Ruggles and Turner, 1973). The most significant decline began in 1968 for grilse and in 1969 for the large salmon (Figure 2), although large salmon catches had been declining almost constantly since 1961. It can also be clearly seen from Figure 2 that the late-run segment accounted for most of the decline.

When large salmon to grilse ratios at the trap were compared, it was noted (Table 1) that the ratio changed from 50% large salmon to 50% grilse between 1954 and 1962 to 14% large salmon and 86% grilse between 1963 and 1971. It should be noted that the large salmon represent the major proportion of the potential egg deposition in the system as 86% are female while only about 22% of the grilse are females. Large salmon average 4.2Kgm in weight while grilse average 1.5Kgm.

Since the inception of the commercial salmon fishing ban, the catch of large salmon at the sampling trap has improved considerably, particularly the early-run (Figure 2). In 1972, the large salmon catch increased approximately 3-fold over the 1971 catch, from 384 to 1,151. The increase was noted in both the early and late-run, although in terms of total catches, the late-run was still well below long-term average catches. In 1973 the overall catch of large salmon was still significantly higher for years immediately prior to 1972 but a further significant increase in the late-run was noted.

Grilse catches increased slightly in 1972 and 1973 over those observed in 1971 but were still below the 1954 to 1971 yearly average (5790). This result was expected as the commercial fishery for salmon on the Miramichi had harvested mainly large salmon (5" minimum mesh size for nets). In addition to the overall increase in catch of large salmon at

the sampling trap in 1972 and 1973, the percentage of large salmon in the total catch also improved to 31.3 in 1972 and 31.6 in 1973 (Table 1).

In 1973, the Atlantic salmon fry levels in the Miramichi, determined at 80 separate electro-seining stations throughout the river system, were approximately 3 times the 1972 levels, 16.7 vs. 5.3/100 sq. m, respectively. This increase is almost exactly the same as the increase in the 1972 large salmon catch over that of 1971 at the sampling trap. Thus, there is strong evidence that the commercial fishing ban, which began in 1972, contributed significantly and directly to increased spawning escapement, as evidenced by higher fry levels in 1972.

Before the commercial salmon fishing ban and angling restrictions were imposed in 1972, estimates were made of the effects of such a ban on adult escapement and subsequent fry densities. Assuming that 1972 runs to the Miramichi were similar to the 1971 runs (juvenile and smolt population data so indicated) we expected near optimal escapement if the ban were introduced. This increased escapement would be reflected in an approximate 4-fold increase in the large salmon catch at the sampling trap and fry densities close to 23.9/sq. m. As noted above, our expectations were a little optimistic; however, results are still very encouraging.

ACKNOWLEDGEMENT

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REFERENCES

Ruggles, C. P. and G. E. Turner, 1973. Recent changes in stock composition of Atlantic salmon (*Salmo salar*) in the Miramichi River, New Brunswick. J. Fish. Res. Board Can. 30: 779-786.

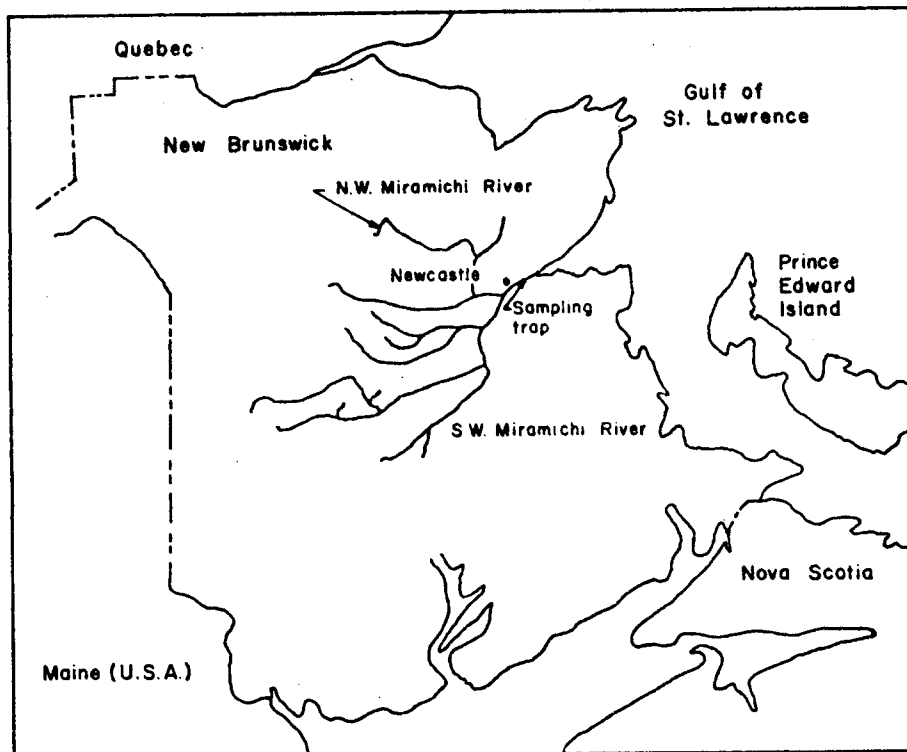


Figure 1. Location of Miramichi River system, New Brunswick, showing site of estuarial sampling trap.

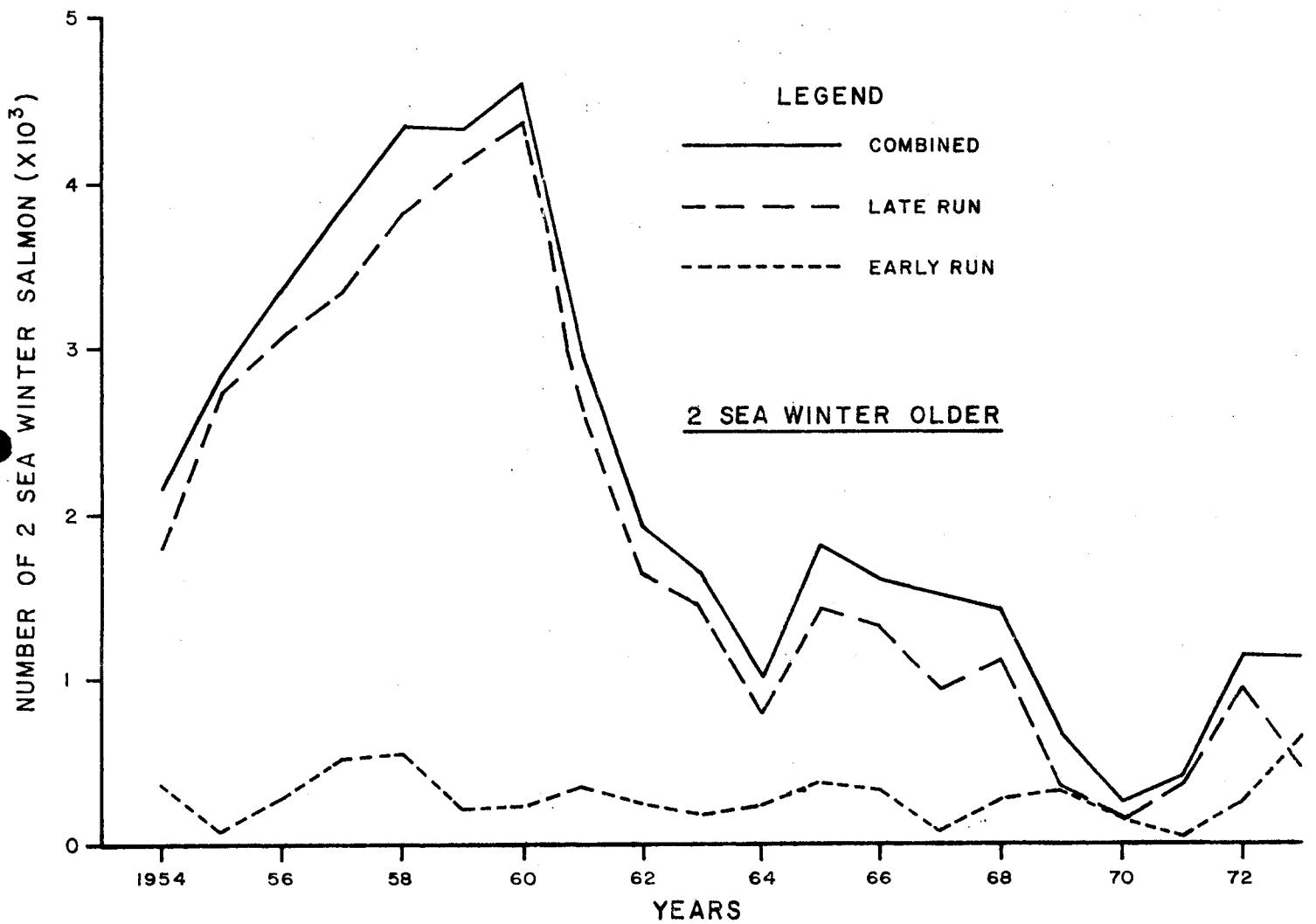
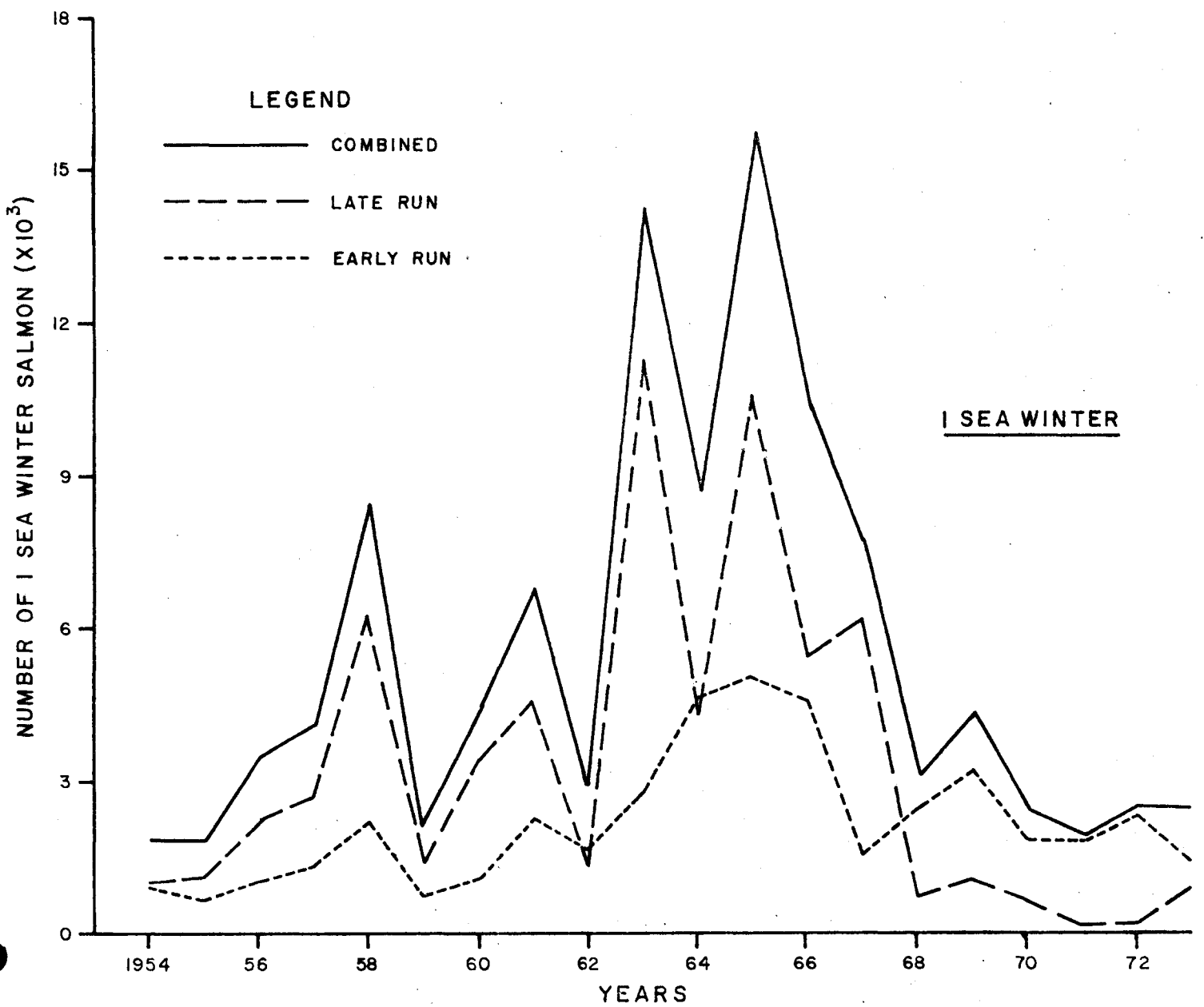


Figure 2. Miramichi sampling trap catches of one- and two-sea-winter or older Atlantic salmon between 1954 and 1973, inclusive.

TABLE 1. Sampling trap catches of 1 and 2-sea-winter or older salmon in the Miramichi River estuary, Millbank, New Brunswick

Year	1-sea-w		2-sea-winter & older		Total catch		Percent run composition	
	early-run	late-run	early-run	late-run	1-sea-w	2-sea-w	1-sea-w	2-sea-w
1954	906	927	347	1,783	1,833	2,130	46.4	53.6
55	646	1,161	99	2,747	1,807	2,846	38.9	61.1
56	1,143	2,290	263	3,098	3,433	3,361	50.5	49.5
57	1,335	2,706	520	3,345	4,041	3,865	51.1	48.9
58	2,152	6,250	549	3,821	8,402	4,370	65.8	34.2
59	702	1,400	207	4,114	2,102	4,321	32.7	67.3
60	1,075	3,425	216	4,386	4,500	4,602	49.4	50.6
61	2,213	4,639	355	2,634	6,852	2,989	69.6	30.4
62	1,576	1,399	254	1,661	2,975	1,915	60.8	39.2
63	2,765	11,343	184	1,455	14,108	1,639	89.6	10.4
64	4,603	4,270	210	797	8,873	1,007	89.6	10.2
65	5,022	10,559	399	1,402	15,581	1,801	89.6	10.4
66	4,563	5,426	309	1,323	9,989	1,632	86.0	14.0
67	1,505	6,215	72	928	7,720	1,000	88.5	11.5
68	2,489	725	292	1,122	3,214	1,414	69.4	32.6
69	3,224	1,116	339	328	4,340	667	86.7	13.3
70	1,826	658	125	120	2,484	245	90.8	9.2
71	1,849	113	370	24	1,962	394	83.5	16.5
72	2,377	166	934	217	2,543	1,151	68.7	31.3
73	1,490	960	478	654	2,450	1,132	68.4	31.6