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Preliminary Comparison of Tag Return Rates
for Hatchery-Reared Atlantic Salmon (*Salmo salar*)
Released as Fall Yearling Parr
and 2-Year Smolts



by

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SUMMARY

Deterioration of the fins and general condition of yearling Atlantic salmon parr during the cold winter period in some of the hatcheries in the Maritime Provinces has led to the consideration of liberating all or a part of their production as fall yearling parr rather than 2-year smolts. Because of this consideration tagging investigations were conducted at two hatcheries to determine the relative merits of fall parr versus spring smolt stocking practices. The results from these investigations favour the spring stocking, as the 2-year smolts produced four times the adult return rate recorded for the fall yearling parr. The higher return rate was produced by the smolts in spite of the deterioration in quality they underwent while in the rearing facilities overwinter. The results of these investigations, although preliminary at this time, indicate that a fall distribution scheme is not an acceptable solution to overwintering problems present in some of our hatcheries.

INTRODUCTION

Within hatcheries operated in the Maritime Provinces of Canada it has been observed that fins of yearling Atlantic salmon parr deteriorate during the second or final winter of rearing. Although deterioration of fins occurs during the cold period at all hatcheries, it has been most severe at those stations with the longest and coldest overwintering period. While yearling parr usually enter the winter showing only minor fin rot or erosion, by the following spring many of these fish exhibit severe active fin rot with 50% or more of the dorsal, paired and caudal fin material missing. One

alternative that has been considered to circumvent this problem is to release all or part of the production from these hatcheries as yearling parr in the fall. It was speculated that the stocked parr would not deteriorate in quality while overwintering in the natural stream environment, and consequently it was expected that their survival to the adult stage would be higher than had they spent the winter in hatchery rearing ponds. To test this hypothesis, comparable tagged groups of yearling parr and 2-year smolts were released in the fall and spring, respectively. Preliminary results from releases made by two hatcheries are reported in this paper.

METHODS AND MATERIALS

The first of these tests was carried out at Charlo, our northernmost hatchery, situated in northeastern New Brunswick. The fall release group from this hatchery comprised 10,000 tagged yearling parr of Restigouche River origin. These marked fish were distributed among several different release sites on the Restigouche River system in New Brunswick in early November, 1974. A comparable tagged group was distributed amongst the same sites as 2-year smolts in late May, 1975. All distribution sites were far upriver from the head of tide.

The second test was carried out with production from Cobequid Hatchery, situated in central Nova Scotia. In this particular comparison, 4,000 yearling parr and 4,000 2-year smolts were stocked in their native stream, the LaHave River, Nova Scotia, in fall, 1975, and spring, 1976, respectively. Treatment of these groups of salmon was similar to that described for the Charlo Hatchery groups, with the fall and spring groups being released in early November and mid-May, respectively.

The type of tag used in these comparisons was the modified Carlin tag (Saunders 1968). Tag recaptures were obtained from distant and home commercial fisheries, angling fisheries and in the case of the LaHave River releases, a government operated fishway trap.

RESULTS AND DISCUSSION

The preliminary results from the fall versus spring releases significantly ($P < 0.001$) favour spring stocking as smolts (Table 1). When data for the two hatcheries are combined, the 2-year smolts released in the spring yielded four times the adult tag return rate of the fall yearling parr. This higher return rate was produced by the smolts in spite of the deterioration in quality they underwent while in the rearing facilities overwinter.

TABLE 1. Comparison of tag return data for comparable groups of Atlantic salmon stocked as fall yearling parr and spring 2-year smolts. Tag returns are from adult fish recaptured prior to July 31, 1977.

Hatchery	Release site	Smolt year	Release period	Number released	Recaptures	
					No.	%
Charlo	Restigouche R., N.B.	1975	fall	10,000	10	0.10
			spring	10,000	67	0.67
Cobequid	LaHave R., N.S.	1976	fall	4,000	19	0.48
			spring	4,000	52	1.30

Assuming that the survivors from the fall releases were as viable at migration the following spring as their counterparts retained in the hatchery facilities overwinter, the freshwater mortality between stocking as parr in the fall and migration as smolts was 76%. A higher freshwater mortality is probable, as it is likely that the survivors of the fall releases were more viable at migration than the salmon retained in hatchery facilities overwinter and stocked in the spring as smolts. A loss of this magnitude was not expected, even though Elson (1962) has suggested a 60% mortality rate between the large parr and smolt stage in natural salmon populations. Elson's figures were intended for the period extending from summer to the next spring, as compared to the shorter period of time the fall stocked yearling parr, in our investigations, resided in the river.

Seven incidental tag returns from the fall release group stocked in the Restigouche River system point towards predation as one of the causes for its low return rate. These seven tags were reported as having been found amongst stomach contents from merganser ducks. Mammalian and other avian predators could also have taken their toll, particularly if fall release groups did not disperse quickly from the distribution sites.

Although the results of the investigations cited in this paper are preliminary, they do suggest that low adult return rates can be expected from future fall distributions of yearling parr. At this time a fall distribution scheme is not an acceptable solution to overwintering problems in our "coldwinter" hatcheries.

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