

FISHERIES DIVERSIFICATION PROGRAM

Environmental Awareness and
Conservation Technology

Project Summary: EACT- 6.2001.DFO (FDP 285)

Effects of Catch-and-Release Angling on Atlantic Salmon on the Conne River



INTRODUCTION

Various salmon management strategies were introduced during the 1980s and 1990s in an attempt to rebuild depressed Atlantic Salmon (*Salmo salar*) stocks throughout eastern Canada. As part of the 1984 salmon management plan, anglers in Atlantic Canada were legislated to release all large salmon (63 cm or greater in fork length). Voluntary release of small salmon (under 63 cm) - catch-and-release angling - was actively promoted by salmon angling conservation groups. Fisheries managers viewed catch-and-release as a means of continuing recreational salmon fishing when stocks were low, with little

Catch-and-release as a conservation tool has not been widely accepted in Newfoundland. Many anglers say it causes high mortality, while others disagree with the ethics of it. This is despite several studies in the past decade that indicate that when salmon are handled properly and under suitable water temperature conditions (under 22 C), catch-and-release mortality is generally minimal.

However, the chief concern of many of these earlier studies was the physiological effects of exhaustive exercise on Atlantic salmon; mortality was a secondary concern. Physiological research often took priority over the question of salmon surviving after being caught and released by anglers. While much was learned about the physiological effects of salmon stressed by angling, concerns were raised about extrapolating results to normal catch-and-release situations. Only one study was carried out in Newfoundland. Few studies involved salmon taken by normal angling procedures.

Areas needing further research included the effects of playing time and of water temperatures on the survival of angled salmon. In June-July, 2000, a catch-and-release experiment involving 69 small salmon - 49 angled (the experimental group) and 20 taken from a Fisheries and Oceans fish counting fence trap (the control group) - was conducted on the Conne River in Bay d'Espoir. The primary focus of the experiment was the survival rates of the salmon involved.

MATERIALS AND METHODS

Study Area: The Conne River has a drainage area of 602 km² and flows into Bay d'Espoir on the south coast of Newfoundland. It is primarily a one-sea-winter salmon river, producing grilse averaging approximately 51 cm fork length and 1.4 kg (3.8 lbs) in weight. About 78 per cent of the river's salmon run are females. Historically, the Conne River has been one of the province's most productive rivers for Atlantic salmon anglers. During 1976-1985, it had the third highest recreational catch among all Newfoundland and Labrador rivers, with an average annual catch of 2,194 fish.

Catch and release: DFO's fish counting fence at Conne River began operation for year 2000 on May 22. The first salmon were counted migrating upriver on May 24. Angled salmon (the experimental group) used in the experiment were caught downstream from the counting fence from June 8 to July 4. Control group salmon were collected during June 9-July 3 from the counting fence trap. The 19 anglers who participated in the study were asked to fish, and to handle any salmon they caught, just as they normally would. All 69 salmon used in the experiment were tagged immediately after their capture. Both the angled and the control group fish were transferred in 80 cm x 15 cm water-filled plastic tubes to two 2.4 m x 2.4 m x 1.2 m cages and held in the river until the experiment ended on July 19, 2000. The two cages were situated approximately 300 m apart in the river.

The researchers recorded certain data for each salmon in both the experimental group and the control group: the amount of time fish were held with their gills out of water; the time required to tag and transfer fish to the holding cages; the overall survival time of each fish, in hours, and; bleeding or other evidence of wounds to the fish. In the case of angled salmon, researchers also recorded the time it took to play and land each fish, and the location on the body where the fish was hooked. In general, all of the salmon included in the experiment were treated the same in all respects, except in the manner of their capture - individuals in one group being caught by angling, in the other by removal from a counting fence cage.

Water and air temperatures were noted every time a fish was captured, and a thermograph provided a continuous record of water temperatures throughout the experiment. Data on the river's water flow rate were obtained from an Environment Canada hydrometric monitoring facility located on the main stem of the river about 40 km upstream from the counting fence.

RESULTS

Environmental data: Mean daily water temperatures at the start of the study averaged 12.3 C during June 1 - 7, but increased to 20.1 C by June 14, and averaged 19.0 C for the remainder of the month. The maximum recorded water temperature of 24.6 C occurred on June 23. Maximum daily water temperatures of 22.0 C or higher were recorded on 15 occasions throughout the study. Minimum daily water temperatures averaged 16.9 C during the second half of June and through to the end of the study on July 19.

Air temperatures recorded at the time control group fish were captured was different from that recorded when experimental group fish were captured, but water temperatures were not significantly different. (The angled salmon were caught at various times throughout the day, while most of the control group salmon were taken from the counting fence cage either at 6:00 in the morning 8:00 in the evening, the times when most upstream salmon movements occur in the Conne River.)

Water flow rates on the river were low in June and early July, averaging just 0.58 m³/s (cubic metres per second) from June 1 to July 7. Heavy rains increased flows to an average of 8.18 m³/s for the week of July 8-14 (peaking at 18 m³/s on July 12).

Catch and release: No mortalities occurred in the control group during the study, while four (8.2%) of the 49 angled salmon died. Three died one hour, three hours and four hours, respectively, after being caught. They were angled at water temperatures ranging from 17.9 to 21.4 C. The fourth died 182 hours (just over a week) after it was caught. It was angled in water recorded at 14.3 C. There were no

mortalities among salmon caught in water cooler than 14.0 C. Only one of the 49 experimental group salmon was angled in water warmer than 22 C; it survived.

It took, on average, 34.1 seconds to tag a salmon in the control group, compared to only 19.1 seconds for an angled salmon. On the other hand, the time required to transfer angled salmon to the holding cages, as well as the overall handling times of angled salmon, were significantly higher than those for the control group fish.

Among the angled salmon, there were no significant differences between either the air temperatures or the water temperatures experienced by the 45 salmon that survived and the 4 that died. Similarly, there was no significant difference in the time required to play and land a salmon from either lot - survivors took an average of 145.8 seconds to land, while mortalities took an average of 125.5 seconds. Most of the angled salmon were hooked in either their upper jaw (5 5.6%) or their lower jaw (35.6%, including three of the four that died). Thirty-nine (79.6%) of the angled salmon, including three of those that died, showed no evidence of bleeding from any wounds associated with the angling.

Ninety per cent (44) of the angled salmon, including all four that died, had their gills exposed to air for some period of time when the fish were being released from the hook. However, there was no significant difference in the average air exposure times experienced by the surviving fish (22.2 seconds) and the ones that died (24.8 seconds).

Overall, there were no significant differences between the angled salmon that survived and those that died, in respect of the tagging, transfer and handling times they experienced.

DISCUSSION

The results of this study were consistent with most previous experiments indicating that when salmon are handled properly in suitable water temperature conditions, mortalities are generally low in catch-and-release angling, usually occurring a short time after the angling event.

Only four (8.2%) of the 49 angled salmon died, three within four hours of being caught, and one a week later. All of the 20 control salmon survived. All 69 fish were kept in the holding pens for over two weeks.

It can be speculated that the one delayed mortality was related, in part at least, to the stress of having been angled, but assertions that catch-and-release mortalities commonly occur several weeks after the fish are angled seem unfounded based on results of this experiment. (It must be noted, however, that water temperature conditions on the Conne River were not as extreme as has been observed in some years. It is possible that a similar experiment carried out under significantly different water level and temperature conditions might produce different results with respect to catch-and-release mortality.)

*Summary of a full manuscript by J. B. Dempson, G. Furey and M. Bloom, entitled "Effects of catch and release angling on Atlantic salmon (*Salmo salar*) of the Conne River, Newfoundland", to be published in the scientific journal 'Fisheries Management and Ecology'.*

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The \$10 million Fisheries Diversification Program is part of the \$81.5 million Canada-Newfoundland Agreement respecting the Economic Development Component of the Canadian Fisheries Adjustment and Restructuring Initiative, announced in August, 1999. The main thrust of the Fisheries Diversification Program is industry-wide research and development initiatives that reflect the economic development priorities of the Newfoundland and Labrador fishing industry.

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