RADIO TELEMETRY INVESTIGATIONS OF BABINE RIVER STEELHEAD, SPRING 1990

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Abstract

Fifteen Babine River steelhead (Oncorhynchus mykiss) were radio tagged between 52 and 83 kilometres upstream of the Babine-Skeena River confluence on April 11, 1990. Tagged fish were tracked over a series of four aerial flights to determine time and location of spawning. Eleven of fifteen tagged fish migrated upstream to the Boucher Creek confluence area near the Nilkitkwa Lake outlet.

Acknowledgements

R. Hooton and C. Spence conceived and directed the study, edited the manuscript, and assisted in the capture and tagging of steelhead.

Introduction

The Babine River ranks as one of the best wild steelhead rivers in the world. It is one of British Columbia's five Class I rivers; streams with this classification offer extremely valuable wilderness fishing opportunities. Despite the world-class status of these fish some features of their biology are not well described. Previous studies include investigation of the age and size of steelhead (Narver, 1969), estimation of population size (Pinsent, 1971) and production characteristics of the Babine River and tributaries (Sebastian, 1988).

Aside from Pinsent's brief mention that steelhead spawn proximate to the Department of Fisheries and Oceans (DFO) enumeration facility and Sebastian's listing of suitable spawning areas based on juvenile densities (and observations of suitable spawning substrate) no documentation substantiates these assumptions.

The major assumption from work to date, and in particular Sebastian (1988), is that steelhead spawn throughout the mainstem Babine River. Despite the lack of written documentation the DFO and B.C. Environment fisheries staff have long been aware of a large spawning concentration near Boucher Creek confluence area of the Nilkitkwa Lake outlet.

This investigation was designed to determine where and when spawning occurs by monitoring radio tagged fish as they moved from overwintering areas to spawning destinations.

Study Area

The 97 kilometre long Babine River is located in west central British Columbia and originates at Babine and Nilkitkwa lakes (Figure 1). Babine Lake, the largest natural lake in British Columbia (177 kilometres in length), forms a catch basin for the Babine River in addition to providing a relatively productive environment for juvenile salmonids rearing in the Babine system.

Increased production of sockeye salmon (*Oncorhynchus nerka*) as a result of enhancement activities have also contributed to the productivity of this system. Artificial spawning channels at Pinkut Creek and Fulton River, Babine Lake tributaries, were completed in 1963 and 1967 respectively. The total output of sockeye smolts from the lake is approximately 300 000 000 yearly (M. Jakabouski, DFO Fisheries Technician). The enhanced Babine River sockeye run returns to the Skeena River estuary between the beginning of July and the beginning of August. The commercial fishing effort is escalated at this time to harvest the surplus sockeye salmon but other fishes, including the Babine River steelhead that may enter the Skeena River mainstem between July and September, are also intercepted in these indiscriminate fisheries.

Canadian Water Resources Branch recording station at the outlet of Nilkitkwa Lake shows that extremes in mean monthly discharge occur in March and June at 21.1 and 126 cubic meters per second respectively. Appendix II lists daily water discharges (cubic meters per second) for the study period.

This study took place on the upper 40 kilometres of the Babine River from the Shelagyote River confluence to the Boucher Creek confluence (Figure 1).

Materials and Methods

Wild summer steelhead were captured by project staff using conventional angling gear. River access was provided by raft and helicopter. Fish in good condition and greater than 75 centimetres in length were selected for radio tagging. A radio transmitter was

Figure 1

inserted orally into the stomach with the aid of a hollow fibreglass tube (Hooton and Lirette, 1986). Two numbered anchor tags were placed at the base of the dorsal fin as additional identification. Sex, fork length and general condition were recorded for all fish tagged. No anaesthetic was used during the tagging procedure as fish were relatively docile after being angled.

Radio transmitters (Lotek Engineering, Aurora, Ontario) were equipped with an external whip antenna which protruded from the fish's mouth. Transmitters were cylindrically shaped and of two different sizes (used relative to fish size) and life expectancies. The dimensions of transmitters used were 1.6 x 4.5 centimetres and 2.0 x 7.5 centimetres, corresponding to 4.5 and 5 month battery life expectancies, respectively. Radio transmitters of different pulse rates were used (pulse repetition encoding) to allow more than one tag to transmit on a single frequency and still be individually distinguishable. Scanning efficiency was thereby increased due to the reduced number of frequencies scanned. Radio transmitter frequencies used ranged from 150.024 MHz to 151.533 MHz.

Transmitters were tracked by aerial flights (Cessna 206). Telemetry equipment and migration monitoring has been described previously (Spence, 1989).

Results and Discussion

Fifteen wild summer steelhead were captured and radio tagged on April 11, 1990, between kilometre 52 and kilometre 83 of the Babine River (Table 1). Fish ranged in size from 79 to 103 centimetres. An almost equal proportion of males and females (7 ♂, 8 ♀) were chosen for radio tagging (Appendix 1).

Four tracking flights were conducted between May 3, 1990, and May 24, 1990. All Babine tributaries upstream of the initial tagging site were flown in search of radio tagged steelhead. Table 1 lists tagging date, tagging location and position of steelhead on the four tracking flights.

Eleven of fifteen radio tagged steelhead were tracked to the Boucher Creek confluence immediately downstream of the Nilkitkwa Lake outlet. Two steelhead originally tagged at kilometre 52 were detected 27 kilometres upstream (Figure 1). A single fish was tracked to the Hanawald Creek-Babine River junction. Finally, one transmitter was located at the point of deployment (kilometre 52) on three successive flights thus suggesting regurgitation of the transmitter or fish mortality.

All three steelhead that were tagged 83 kilometres upstream of the Babine-Skeena confluence migrated to the Boucher Creek confluence Table 1 area. Eight of 12 steelhead that were tagged between 52 and 58 kilometres upstream of the Babine-Skeena confluence migrated to the Boucher Creek confluence area.

It is interesting to note that a wild summer steelhead, radio tagged at the Skeena River mouth in a separate study, was recaptured during this project. The steelhead, a 94 centimetre male, was initially tagged on August 1, 1990, in the Tyee test fishery six kilometres upstream of the Skeena estuary and was recaptured on April 11, 1990, 68 kilometres upstream of the Babine-Skeena river confluence. This fish was also tracked to the Boucher Creek confluence area and was located there during all four flights.

The importance of the Boucher Creek confluence area as a steelhead spawning ground is indicated by the fact that at least twelve of sixteen (75%) radio tagged fish migrated to this location and concentrations of steelhead were seen in the area between the DFO adult enumeration fence and the Nilkitkwa Lake outlet during all tracking flights. Given that radio tag loss, malfunction, regurgitation or fish mortality are all commonly witnessed to a some degree in telemetry studies (Hooton et al., 1986; Spence, 1989), transmitters that were not tracked to the confluence area may possibly be attributed to these factors. Despite the small number of fish radio tagged (n=15) the data strongly suggests that a very high percentage of all Babine River steelhead spawn at the Boucher Creek confluence area of the Nilkitkwa Lake outlet.

Telemetry flights were not scheduled frequently enough to correlate steelhead movements with changing environmental parameters (such as water temperature and discharge). It can only be assumed that steelhead commenced their spring upstream migration towards their spawning grounds partially due to an increase in water temperature and discharge. Appendix II lists daily water discharge (m^3/s) for the Babine River during the study period.

Time of spawning was not determined precisely (especially for promiscuous male steelhead) but was assumed to have occurred between the last detection at the maximum upstream location and the subsequent disappearance from that area. Two female steelhead were tracked to the Boucher Creek confluence area and presumed to have spawned sometime between May 16 and May 24, 1990. Spawning times for the other ten steelhead that were tracked to this area were not determined.

Recommendations

1. As the Boucher Creek confluence area is a heavily utilized spawning locality for Babine River steelhead, and may represent the single largest and most valuable steelhead spawning area in the entire province of British Columbia, this area must remain inviolate.

References

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Appendix I. Length-frequency distribution of steelhead radio tagged in the Babine River, April 11, 1990.

Appendix II. Daily water discharge (m^3/s) for Babine River at the Nilkitkwa Lake recording station for April, May, and June, 1990.