



Summary of the South Salmo River Bull Trout Enumeration Project (2000)

Report Prepared For:

Columbia-Kootenay Fisheries Renewal Partnership
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EXECUTIVE SUMMARY

An enumeration fence and traps were installed on the South Salmo River from September 11th to October 24th to enable the capture of post-spawning bull trout emigrating out of the watershed, and to capture five additional bull trout for the ongoing radio telemetry project. During the study period, a total of fifteen bull trout were sampled through the enumeration fence, and five were radio tagged. In total, seven males and eight females were processed through the fence. The average length of males was 58.9 cm, while the average length of females was 52.2 cm. Two bull trout sampled at the fence were originally radio tagged in 1999. One was a male, and one was a female. Over the year the male grew 3.5 cm, and the female grew 4.0 cm. The only other fish caught at the enumeration fence was a 30 cm largescale sucker. We also used the project as an educational tool for local elementary and high school students.

ACKNOWLEDGEMENTS

The successful completion of the project was made possible as a result of the co-operation of a large number of organizations.

Columbia-Kootenay Fisheries Renewal Partnership

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BC Hydro

BC Hydro provided personnel for additional help with this project. Specifically Dean den Biesen and Shawn Ord assisted with setting up the fence, tagging of fish, and project logistics. Ric Olmsted, Gary Birch, and Dave Wilson assisted with project design.

BC Ministry of Environment, Lands and Parks

The Ministry of Environment, Lands and Parks provided assistance and equipment during this project. John Bell assisted with equipment mobilization, fence setup, and provided technical assistance during the educational visit from Salmo Elementary School students. Jay Hammond, Bob Lindsay, Colin Spence, and Albert Chirico assisted with project design.

Salmo Watershed Streamkeepers Society (SWSS)

Members of SWSS assisted with various components of the project. Gerry Nellestijn assisted with fence setup and sampling logistics. The Maloney family assisted with project logistics. Brian Henderson, Keith Davis, Alice Kuzma, and Alice Nellestijn assisted with project logistics.

Community Members

Grant Crooks assisted with fence removal.

Baxter Environmental

Jeremy Baxter and Robyn Roome assisted with data collection.

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INTRODUCTION

The bull trout (*Salvelinus confluentus*) population of the Salmo River watershed has been the focus of recent study and a number of tributaries have been identified as providing critical reproductive habitat for the population (Baxter et al. 1998; Baxter 1999; Baxter and Nellestijn 2000). These studies identified Clearwater Creek, the upper Salmo River, Sheep Creek, and the South Salmo River as major spawning tributaries within the watershed, and as such, focussed stock assessment index programs have been carried within these systems. It has been possible to conduct redd counts from 1997 to 1999 in Clearwater Creek, the upper Salmo River, and Sheep Creek, and these surveys have provided important information on the status the population (Baxter et al. 1998; Baxter 1999). The South Salmo River has proven a more difficult stream to enumerate redds due to limited access and difficult instream viewing conditions, and as such there have been no quantitative estimates of the number of redds or bull trout spawners in this river from 1997-1999.

As part of the ongoing bull trout radio telemetry project in the Salmo River watershed (Baxter and Nellestijn 2000), it was determined that the use of a downstream migration fence, to capture post-spawning bull trout, would be a useful technique to capture five individuals for implantation of radio tags. The South Salmo River was targeted for this additional radio tagging in the summer of 2000 as it was felt that bull trout that spawned in this watershed would have the highest probability of making post-spawning migrations into Seven Mile Reservoir. In addition, it was identified that operating the fence over a longer time period would provide information as to the number of bull trout using the South Salmo River for spawning. As a result, the fence was operated through the fall, and specifically the project objectives were to:

1. capture and tag post-spawning bull trout, and other fish species, at an enumeration fence in order to estimate run size and to provide five suitable fish for radio tagging;
2. collect biological data from all sampled fish; and
3. involve the community and local school children in the project.

STUDY AREA AND BACKGROUND

The South Salmo River is the largest tributary of the Salmo River, and originates in the United States (Figure 1). The river flows in a northwest direction for approximately 30 km where it enters the Salmo River near the junction of Highway 6 and Highway 3. The watershed has two major tributaries, Stagleap Creek and Lost Creek, that flow into the South Salmo River from the north (Figure 1). Highway 3 parallels the South Salmo River for approximately 10 km to Stagleap Creek, and as such, areas of the river have been channelized and impacted by this linear development. Bull trout, rainbow trout (*Oncorhynchus mykiss*), westslope cutthroat trout (*O. clarki lewisi*), longnose dace (*Rhinichthys cataractae*) and slimy sculpin (*Cottus cognatus*) have all been documented in the South Salmo River watershed (Sigma Engineering Ltd. 1996; Baxter et al. 1998).

From the work conducted in 1997, it was suspected, based on the presence of bull trout fry, that migratory bull trout utilized the South Salmo River, Stagleap Creek and Lost Creek for spawning (Baxter et al. 1998). However, adult surveys during the 1997 study, and in 1998 (Baxter 1999), failed to confirm the presence of adult bull trout or redds, but there were further anecdotal reports that suggested large bull trout occurred in the watershed. In 1999, bull trout that were radio tagged in the mainstem Salmo River above the South Salmo River confluence were tracked to locations in the South Salmo River and in Stagleap Creek, confirming the utilization of the watershed for spawning by Salmo River bull trout (Baxter and Nellestijn 2000). In total, four of ten bull trout radio tagged in the mainstem Salmo River made migrations into the South Salmo River watershed in 1999.

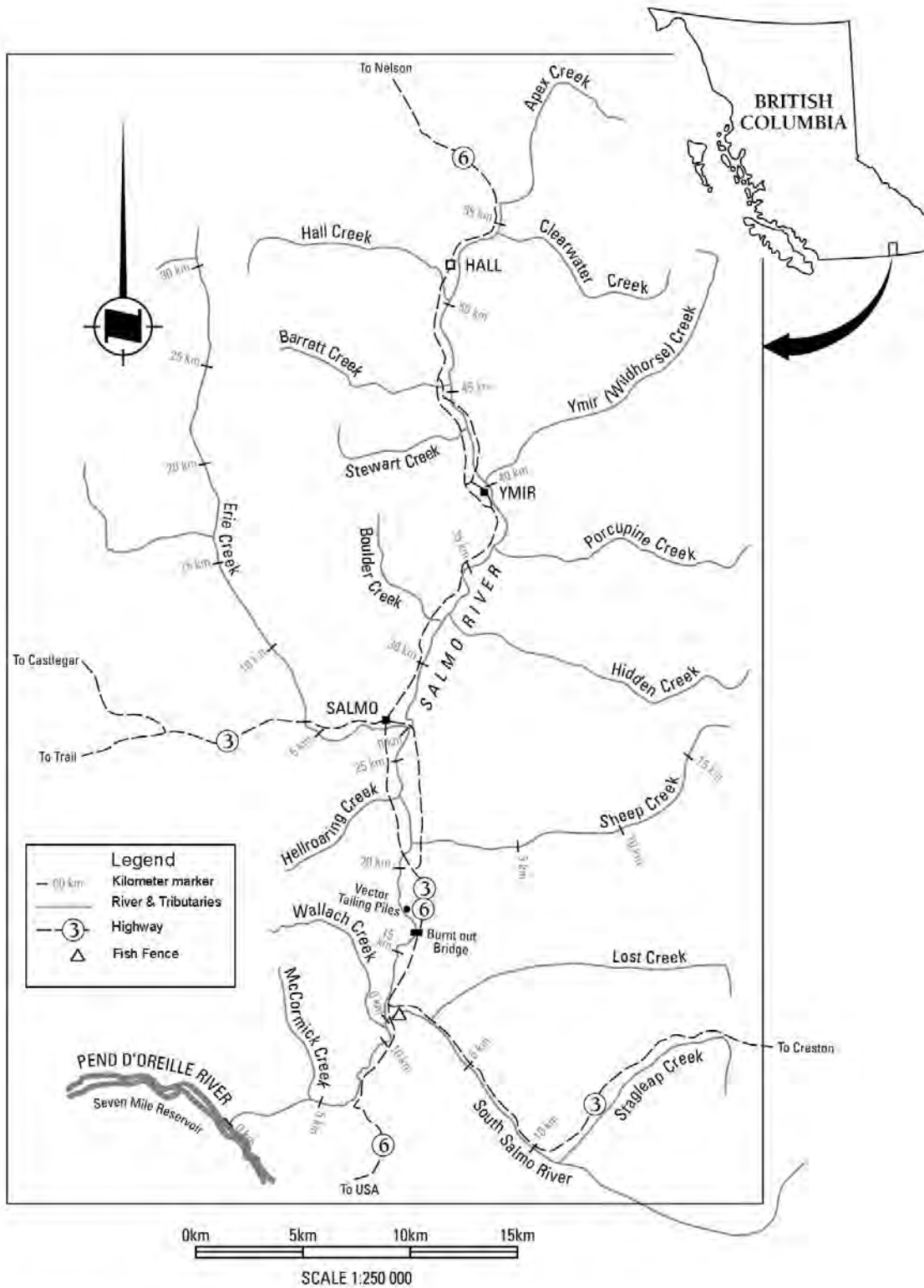


Figure 1. Study area for South Salmo River bull trout enumeration project (note location of fish fence on map).

METHODS

Trapping

A 5.0 cm square coated wire mesh fish enumeration fence supported by T-bars was installed across the South Salmo River on September 11th, approximately one km upstream of the South Salmo River/Salmo River confluence (Figure 1). The fence was set up during this time of the year in order to primarily capture downstream migrating bull trout kelts and to minimize the effect the fence might have on the reproductive biology of the fish. Upstream and downstream traps constructed of 2.5 cm wire mesh were used in conjunction with the fence to capture and hold bull trout prior to processing (Figure 2). Moveable 2.5 cm mesh wire panels were then hinged to the upstream side of the fence in order to allow debris to be removed.

Each trap was checked a minimum of twice daily by a one or two person crew from September 11th to when the fence was removed on October 24th. Morning checks occurred between 0600 and 0800 hours and evening checks between 2000 and 2400 hours.

Enumeration, Measurement, and Tagging

All captured fish species were anaesthetized using clove at a concentration of 100 PPM (2 mL in 20 L) in a 50 L cooler. Fish were examined for the presence of previous tags and spawning condition. The fish were then identified to species and subsequently measured for fork length (cm), sexed, and finally tagged with a Floy tag placed at the base of the dorsal fin. Floy tags used for this study were Floy FD-94 T-Bar anchor tags, with 1 inch bare monofilament below the tubing, and were inserted with a Mark II super heavy duty tagging gun having a one inch insertion using Mark II long, regular needles (outside diameter = 0.22 cm). Five bull trout were also radio tagged at the fence as part of the broad scale study of bull trout migration patterns in the Salmo River watershed (see Baxter and Nellestijn 2000 for methodology of surgery).

Figure 2. South Salmo River bull trout enumeration fence.

Educational Component

One component of this project was to provide an environment where local elementary and high school students could learn about fisheries resources in the Salmo River watershed (focussing on bull trout). As such, a site visit was arranged for Grade 3 students of Salmo Elementary School, and an essay contest was set up for high school students at Salmo Secondary School with the prize of a helicopter ride to track bull trout.

RESULTS

Trapping

The fence was set up and fishing after approximately two hours of installation time on September 11th. Site conditions experienced during the study period were generally favorable, although the fence was breached for two days from the evening of September 30th to the morning of October 2nd. The fence breach was caused by rain on snow after a cold weather pattern. This resulted in the river level rising rapidly, and the deposition of a large amount of leaves onto the fence with the rise in water levels. A second breach occurred during the day on October 23rd, after which date the fence was removed.

Enumeration, Measurement, and Tagging

During the study period, a total of fifteen bull trout were sampled through the enumeration fence (Appendix I). Of the fifteen fish sampled, five fish had tags (Floy and/or radio) present from previous sampling (see Appendix I). Of the remaining fish, five were tagged with a Floy tag, and five were tagged with both a Floy and radio tag (Appendix I). All fifteen fish that were passed through the fence were captured initially migrating downstream, and there was no peak in outmigration timing (Figure 3). The target of implanting an additional five radio tags in bull trout outmigrating from the South Salmo River was met during this project (see Appendix I).

Length and sex were determined for all of the fifteen bull trout. In total, seven males and eight females were processed through the fence. The average length of males, females, and both sexes combined are presented in Table 1. Two bull trout sampled at the fence were originally radio tagged in 1999. One was a male, and one was a female. Over the year the male grew 3.5 cm, and the female grew 4.0 cm. The only other fish caught at the enumeration fence was a 30 cm largescale sucker (*Catostomus macrocheilus*) captured moving downstream on October 3rd.

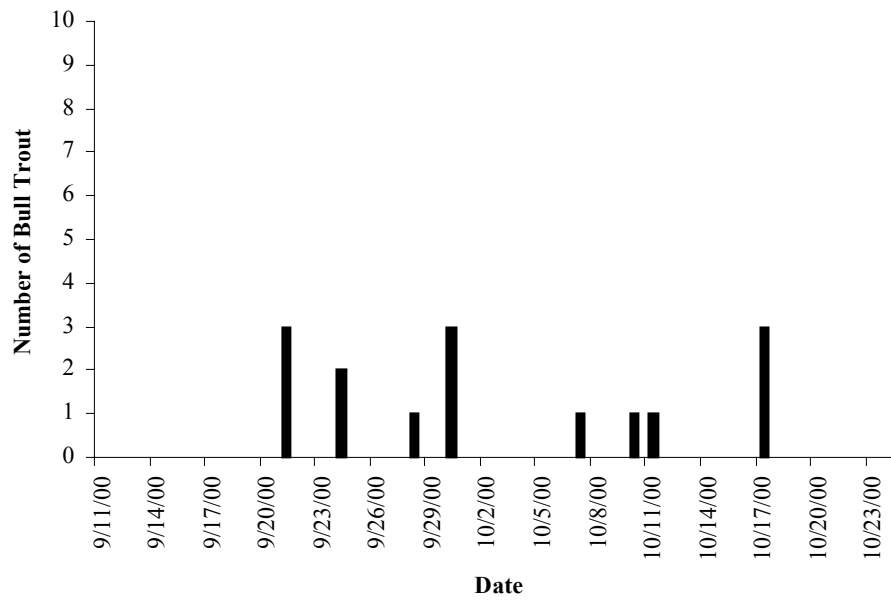


Figure 3. Frequency and timing of bull trout outmigration through the South Salmo River enumeration fence between September 11th and October 24th. The total number of fish captured was 15 individuals.

Table 1. Range and mean fork length of bull trout captured at the South Salmo River enumeration fence between September 11th and October 24th.

	n	Fork Length (cm)	
		Range	Mean
Males	7	47.0-65.5	58.9
Females	8	41.0-63.0	52.2
Combined	15	41.0-65.5	55.3

Educational Component

The elementary school students were bused to the fence location on September 28th, given a short talk on the biology of bull trout, and observed a bull trout being surgically implanted with a radio tag. Parental comments suggested that this field trip was the best one that the class had recently participated in, and students seemed generally interested, attentive and inquisitive (Figures 4, 5, and 6).

The Vice-Principal and teachers of Salmo Secondary School engaged students to write a creative, or fact-based, essay on bull trout in the Salmo River. SWSS members juried the 28 essays received, and decided on two winners to participate on the helicopter tracking flight. Tara MacDonald and Ashley Cormier enjoyed their first flight ever over the Salmo watershed, and were very appreciative of the provided opportunity (Figure 7). Their participation in this project resulted in a bull trout display board being produced at the high school that is still being enjoyed today.

Figure 4. Salmo Elementary School Grade 3 class watching a bull trout surgery.

Figure 5. Salmo Elementary School Grade 3 class learning about radio tracking.

Figure 6. Salmo Elementary School Grade 3 class bull trout field trip.

Figure 7. Salmo Secondary School student essay contest winners.

DISCUSSION

Although a total of 15 bull trout were sampled at the enumeration fence in the fall of 2000, this does not represent a population estimate of bull trout spawners that utilize the South Salmo River watershed. It is known that two radio tagged bull trout migrated past the fence location in the fall of 2000, one previous to the setup of the fence, and one during the fence breach on September 30th. It is also likely that a significant number of bull trout migrated past the fence site during the breach, as the number of bull trout captured at the fence had increased significantly in the two days prior to the breach. Coupled with the number of radio tagged bull trout that made spawning migrations to the South Salmo River watershed during the spawning period (Baxter and Nellestijn 2000), the results suggest a significant number of bull trout spawn in the drainage. It is possibly the most important spawning tributary for Salmo River bull trout, but more assessment needs to be conducted in the system.

The use of enumeration fences has proven a useful technique to monitor bull trout populations in the Kootenay Region (e.g., Baxter and Westover 2000). However, the systems studied have been typically larger than the South Salmo River, and the rivers have been less susceptible to water level increases with small amounts of precipitation. The bull trout population size in these other systems has also been significantly larger than the South Salmo River, and thus the use of an enumeration fence in these situations is an efficient methodology to collect many fish that outmigrate on a nightly basis. It is recommended that further enumeration fence projects on the South Salmo River not be considered due to these concerns, and the fact that a two day snorkel/streamwalk survey would provide better data in a more cost-effective manner. We have utilized a team of a snorkel surveyor and a stream surveyor in combination this year within the Salmo River watershed, and identified significantly more fish than previous surveys where only streamwalks were conducted (Baxter 2001 in preparation). Tentatively we will be conducting such surveys with U.S. personnel in 2001, as they are taking an active interest in South Salmo River bull trout.

The results of the project have demonstrated that the use of the fence was an effective tool in capturing the five additional bull trout for radio tagging in 2000, and the results obtained met all objectives. Of particular interest is the fact that community members and students in the Salmo area took an active role in becoming involved with the project, and in learning more about bull trout in their local area. These small scale projects that are located in easily accessible areas provide a means by which the Columbia-Kootenay Fisheries Renewal Partnership can involve the community in their projects. It is recommended that where possible this community participation in future projects be encouraged by the partnership.

SUMMARY AND CONCLUSIONS

1. In total fifteen bull trout were passed through the enumeration fence. Although the fence provided an acceptable method to meet the objectives of this project, the small size of the stream, and extreme water discharge conditions experienced, suggest that the further use of a fish fence to enumerate bull trout in the river is not warranted. It is recommended that snorkel/streamwalk surveys be undertaken in the South Salmo River in 2001 to enumerate bull trout spawners and redds. The combination of these methods, one person snorkeling and one person walking, has proven highly efficient in bull trout enumeration in other Salmo River watershed tributaries in the fall of 2000. The total cost of such work would also be significantly less than the operation of an enumeration fence, unless volunteer labour could be utilized.
2. The use of the fence, and the ongoing radio telemetry project, has identified that a significant number of bull trout use the South Salmo River for spawning. Further effort should be spent documenting the exact locations of bull trout spawning activity in the watershed, particularly in the U.S. portion of the river.
3. This project allowed community and school education regarding fisheries resources of the Salmo River watershed. Future fisheries projects in the watershed should continue this tradition.
4. All bull trout tagged at the fence received a Floy tag that will provide data on population dynamics. A copy of this report will be forwarded to the Ministry of Environment, Lands and Parks (Nelson) to ensure recapture data is collected efficiently.

REFERENCES

- Baxter, J.S. 1999. Bull trout studies in the Salmo River watershed: 1998 and 1999. Consult. Rept. Prep. for BC Hydro, Castlegar.
- Baxter, J.S. 2001. Bull trout studies in the Salmo River watershed: 2000. Consult. Rept. Prep. for BC Hydro, Castlegar (in preparation).
- Baxter, J.S., and W.T. Westover. 2000. An Overview of the Wigwam River Bull Trout Program (1995-1999): Habitat Conservation Trust Fund Final Report. Fisheries Project Report KO 58, vi + 23 p.
- Baxter, J.S., and G. Nellestijn. 2000. Aspects of the biology of bull trout in the Salmo River watershed as identified through radio telemetry. Consult. Rept. Prep. for Columbia-Kootenay Fisheries Renewal Partnership and Columbia Basin Trust, Cranbrook.
- Baxter, J.S., Coughlin, W.D., Pennington, B.M., and G.G. Oliver. 1998. Synoptic bioreconnaissance of bull trout distribution and abundance in the Salmo River watershed. Report to BC Hydro, Environmental Department, Castlegar, B.C. Report by Interior Reforestation Co. Ltd., Cranbrook, B.C. xii + 119 pp + 7 appendices.
- Sigma Engineering Ltd. 1996. Salmo River inventory and assessment. Report to Columbia Basin Fish and Wildlife Compensation Program, Nelson, B.C. Report by Sigma Engineering Ltd., Vancouver, B.C. vii + 79 pp + 11 appendices.

Appendix I. Length, sex and tag number of bull trout captured at the South Salmo River enumeration fence in 2000.

Date	Direction	Species	Sex	Length (cm)	Girth (cm)	Old Floy Tag	Floy Tag	Radio Tag	Frequency	Code
21-Sep-00	D	BT	F	41	24.2	None	B-0422	None		
21-Sep-00	D	BT	F	57.5	26.5	None	B-0424/0423	Yes	149.700	78
21-Sep-00	D	BT	F	48.5	19	None	B-0425	None		
24-Sep-00	D	BT	F	53		None		None		
24-Sep-00	D	BT	M	47	19.5	P-3461	B-0421	None		
28-Sep-00	D	BT	F	63	27	None	B-0401/0402	Yes	149.700	83
29-Sep-00	U	BT	M			P-3461	B-0421	None		
30-Sep-00	D	BT	F	53	21.5	None	B-0403	None		
30-Sep-00	D	BT	M	62	30	None	B-0404	None		
30-Sep-00	D	BT	F	45.5	18.3	None	B-0405	None		
10-Oct-00	D	BT	M	59.5	25.5	None	B-0407/0408	Yes	149.700	82
11-Oct-00	D	BT	M	65.5	27	None	B-0409/0410	Yes	149.700	79
7-Oct-00	D	BT	F	56	27.5	P-24006		Previous	149.520	67
17-Oct-00	D	BT	M	63.5		P-24007		Previous	149.520	56
17-Oct-00	D	BT	M	55.5		P-3938/3939		None		
17-Oct-00	D	BT	M	59.5	26	None	B-0411/0412	Yes	149.700	85