1996

TOBOGGAN CREEK STEELHEAD ASSESSMENT

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INTRODUCTION

Prior to 1993, assessment of the steelhead trout population in the Toboggan Creek watershed was limited. Previous work in relation to this stock included incidental documentation of steelhead during fall fence counts of coho salmon, by members of the Smithers chapter of the Steelhead Society of B.C. in the fall of 1978, and by technicians from the Toboggan Creek Salmon and Steelhead Enhancement Society yearly, beginning in 1988. Although local residents and agencies were cognizant of the potential of Toboggan Creek, as an important steelhead producer, other assessment priorities took precedence.

Enhancement of steelhead at Toboggan Creek Hatchery, located approximately 13 kilometers northwest of Smithers, B.C. on Highway 16 West (Fig. 1), began in the spring of 1985. Stocks of steelhead trout, including the Toboggan Creek stock, were enhanced by the planting of hatchery-produced fry. A total of 151,036 steelhead fry from the Toboggan stock, averaging 2.1 grams in weight, were released during the years 1985 through 1987. This stock was not enhanced in 1988, but in 1989 and 1990 the Toboggan stock was used to produce 14,818 and 13,280 steelhead respectively. These later plants were yearling fish which averaged 7.8 grams in 1989 and 23.2 grams in 1990. All stocking of enhanced Toboggan Creek steelhead was done by transplant into steelhead-barren habitat in Trout Creek, an adjacent tributary, and into the mainstem Bulkley River near the confluences of Toboggan Creek and Trout Creek. Enhanced steelhead were never stocked into Toboggan Creek itself.

Assessment of returning hatchery-produced steelhead adults has been very limited as well, although some preliminary work done in 1992 indicated good numbers of adipose-clipped fish holding near the confluence of Toboggan Creek and the Bulkley River in March of that year.

The Toboggan Creek counting fence was operated in the spring of 1993 to assess this steelhead stock for the first time. An estimate of the spawning escapement of steelhead was achieved by sampling 174 steelhead as they migrated up the stream to spawn, all of these fish were spaghetti tagged. Observations of tagged and untagged fish later on, on the spawning redds, indicated an escapement of 400 to 450 steelhead upstream of the counting fence. A second study in spring of 1994, this time using the fence for kelt recapture, indicated a spawning escapement of 237 steelhead upstream of the fence. A total of 133 upstream migrants, and 98 kelts, were sampled in the 1994 study. In 1995, the fence count found 305 steelhead upstream of the fence, from a sample of 200 upstream migrants and 125 downstream-migrating kelts.

Funding from the federal Skeena Green Plan made it possible for this study to be repeated during the spring of 1996. This report summarizes the findings of the 1996 assessment.

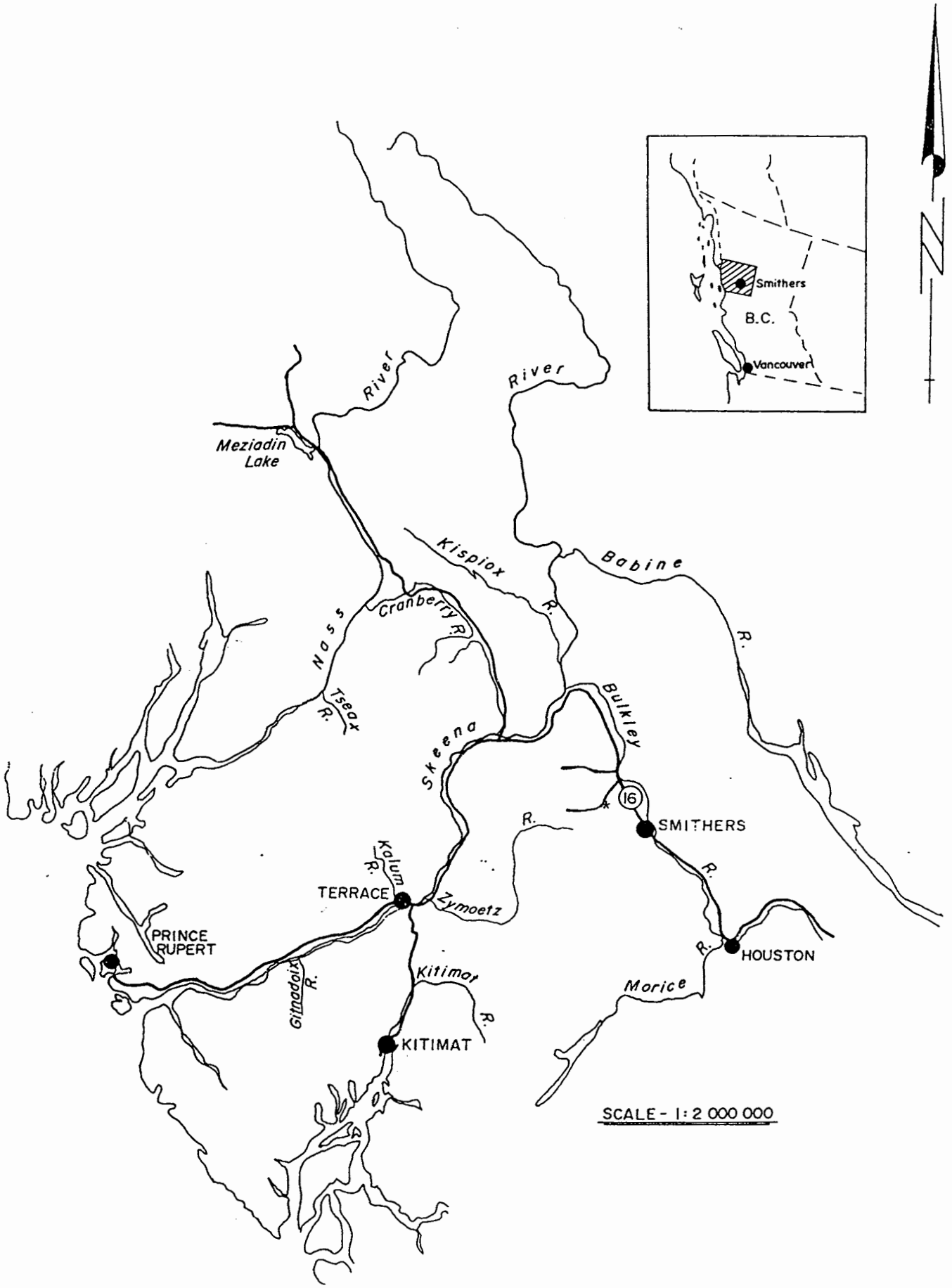

Fig.1 Location of Toboggan Creek Hatchery near Smithers, B.C. *

METHODS

The Toboggan Creek steelhead trout population was assessed by means of a mark and recapture study. This study utilized the Toboggan Creek counting fence as capture point for installing of tags on upstream migrants and for the purposes of stopping downstream migrating steelhead to enable seining of the kelts for recapture documentation (Fig. 2).

A large majority of steelhead spawning in Toboggan Creek are thought to winter in the mainstem Bulkley River and migrate into the creek to spawn, starting as the creek begins to rise with the snow melt in early to mid April. Data collected from previously tagged fish, recaptured at the fence site, support this assumption. As long as the counting fence panels are put in place as soon as the fence sill is ice free, the number of fish that migrate in prior to this should be minimal.

Due to the fact that spring runoff is unpredictable, and that there is the possibility of the fence being inoperable for at least a portion of the spawner migration during peak runoff, it became necessary to utilize a mark and recapture method of determining the total spawning escapement. This assured that the number of steelhead which may migrate into the creek when the fence is inoperable can be accurately quantified.

As well as having an anchor tag inserted in the back of each steelhead, adjacent to the right-hand base of the dorsal fin, a small round hole was punched through their right operculum. This was done during the upstream migration to ensure that we could still identify marked steelhead in the event that the anchor tag was dislodged prior to recapture, and could also indicate to what degree tags such as these are removed during the spawning process. Scale samples and fork lengths were taken from each steelhead handled to provide some additional stock-specific information. Also, each fish was identified as to sex, condition and whether they were wild steelhead or of hatchery origin. Previous tags were documented and reported. Population size upstream of the counting fence was arrived at using the Adjusted Petersen Estimate technique (Ricker,1975).

Fig. 2 Toboggan Creek Counting Fence Structure and a Large Adipose - Clipped Steelhead Trout Captured at the Fence in 1996.

RESULTS AND DISCUSSION

The fence panels were installed on March 26, 1996 and the Toboggan Creek counting fence operated continuously, with the exception of a 4 day period from June 2nd thru the 6th, until June 13th when we removed the panels. Runoff flows caused by rain and the subsequent acceleration of snow melt caused this short interruption of sampling. Other than this the counting fence worked very efficiently, and with only minimal problems with fence maintenance and debris accumulation. Any steelhead that were not sampled while migrating upstream of this point would have had to do so prior to March 26, 1996 or during the period beginning at 8:00 a.m. on June 2nd. Very few steelhead above the fence went unsampled, while downstream of the fence there was a heavy spawn of unsampled fish in 1996.

A total of 90 steelhead trout were sampled on their upstream migration past the Toboggan Creek counting fence (Table I). The first fish was captured on May 11th, which is extremely late when compared to other years, and the last steelhead was handled on June 1st, 1996. Female steelhead made up 38.9 % of the fish handled, with the majority of these seen during the peak of this year's migration. Three of the steelhead sampled had clipped adipose fins, which identified them as hatchery-produced fish.

Timing of steelhead migrating upstream past the fence showed a small peak in 1996, from May 14th thru to the 16th, but it did not coincide with increased flows, as it has in previous years (Fig. 3). Flows were consistently low during the time period when steelhead normally migrate into the creek, from the last week in April through to the third week in May. This anomaly may have caused spawners to delay migration until the latest possible moment, as evidenced by the fact that many of the females were totally ripened when handled at the fence.

Steelhead kelts holding upstream of the counting fence were first observed beginning on May 24th and on May 29th a total of 12 kelts were sampled and placed downstream of the fence. A total of 41 steelhead were sampled during their downstream migration as kelts (Table II), male fish accounted for 70.7 % of this total. All steelhead kelts were scrutinized for tags and operculum punches, of these 32 had been marked during the upstream migration past the fence. Of the 32 steelhead which were determined to have been anchor tagged a total of six had lost their tags during spawning, all were large male fish.

In total, 99 different steelhead trout were sampled between May 11 and June 13, 1996 (Table III), with 63.6 % of these being males. Adipose clips made up 4.0 % of the fish sampled, with all four of these being large female fish.

Table I. Summary of upstream migrating steelhead spawners put through the Toboggan Creek counting fence, in spring of 1996.

DATE (1996)	MALE	FEMALE	TOTAL COUNT	ADIPOSE CLIPS
May 11	9	3	12	
May 12	2	0	2	
May 13	2	2	4	
May 14	12	10	22	1 female
May 15	3	3	6	
May 19	11	6	17	2 female
May 20	2	1	3	
May 21	1	1	2	
May 24	4	6	10	
May 25	2	1	3	
May 26	1	0	1	
May 27	1	0	1	
May 31	3	2	5	
Jun 01	2	0	2	
Total Count	55 male	35 female	90 steelhead	3 female

Fig. 3 Timing of Steelhead through Toboggan Creek Counting Fence in 1996.

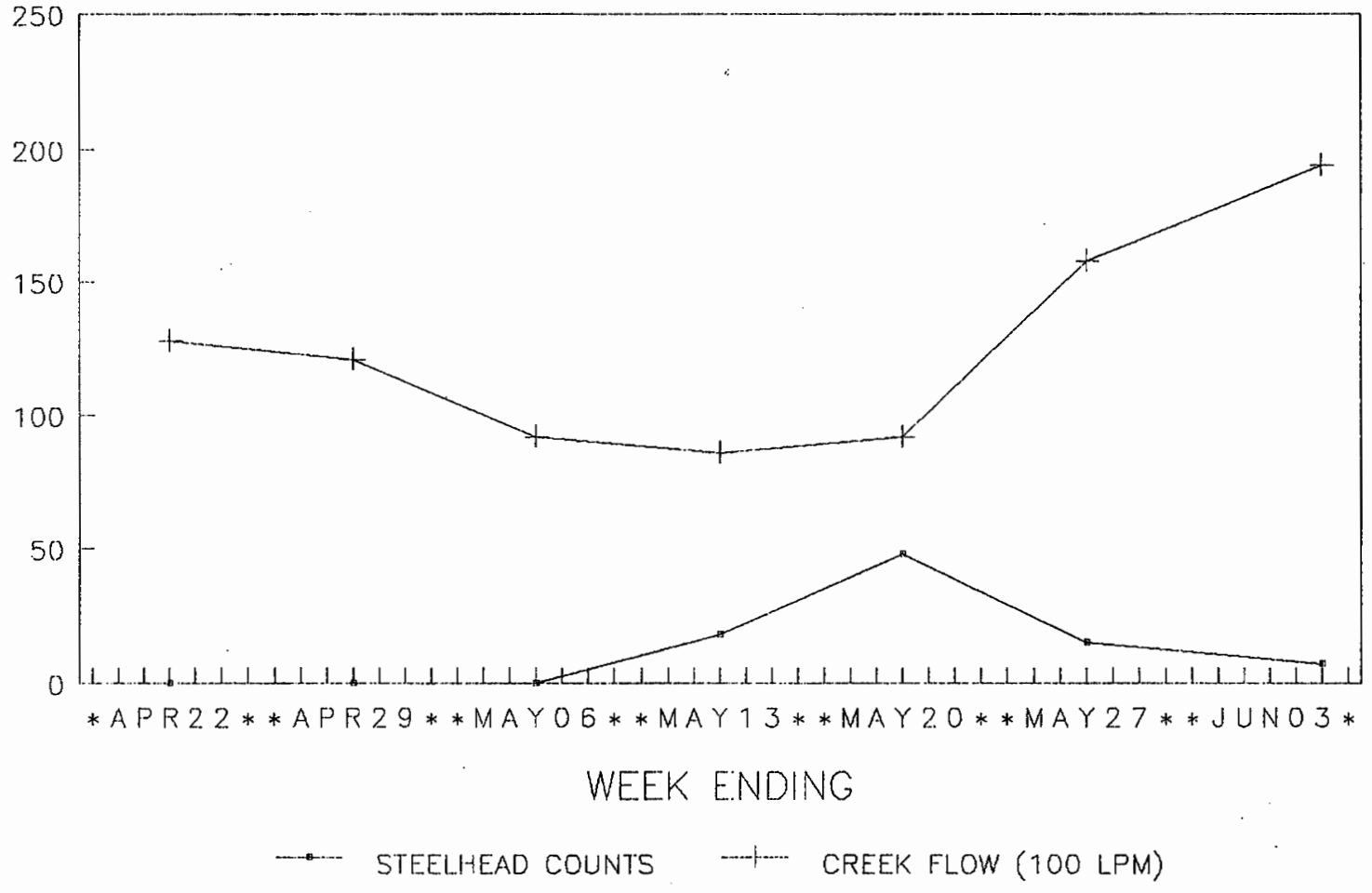

Table II. Summary of downstream migrating steelhead kelts put through the Toboggan Creek counting fence, in spring of 1996.

DATE (1996)	MALE	FEMALE	TOTAL COUNT	FISH PREVIOUSLY MARKED AT FENCE
May 24	1	0	1	1
May 25	1	0	1	1
May 29	8	4	12	10
May 31	5	6	11	9
Jun 02	1	0	1	1
Jun 07	1	0	1	1
Jun 12	12	1	13	9
Jun 13	0	1	1	0
Total Count	29 male	12 female	41 steelhead	32 recaptures

Table III. Summary of all individual steelhead handled during sampling at Toboggan Creek counting fence, in spring of 1996.

DATE (1996)	MALE	FEMALE	TOTAL COUNT	ADIPOSE CLIPS
May 11	9	3	12	
May 12	2	0	2	
May 13	2	2	4	
May 14	12	10	22	1 female
May 15	3	3	6	
May 19	11	6	17	2 female
May 20	2	1	3	
May 21	1	1	2	
May 24	4	6	10	
May 25	2	1	3	
May 26	1	0	1	
May 27	1	0	1	
May 29	2	0	2	
May 31	5	2	7	
Jun 01	2	0	2	
Jun 12	4	0	4	
Jun 13	0	1	1	1 female
Total Count	63 male	36 female	99 steelhead	4 female

With the total number of steelhead being marked for the study being 90 fish, the sample for marks being 41 fish, and the number of recaptures observed at 32 fish; the total steelhead spawning escapement was estimated at 115 fish upstream of the counting fence. An estimate of steelhead spawners downstream of the counting fence is difficult to achieve with any degree of accuracy. Many steelhead and many redds were observed when the creek was walked downstream of the fence, and the great majority of the 1996 spawning escapement is believed to have spawned downstream of the counting fence this year.

Observations of steelhead spawning upstream of the Toboggan Creek counting fence indicate a marked to unmarked ratio that is higher than the kelt recapture data. Of the 14 steelhead observed spawning 12 (85.7 %) carried anchor tags (Table IV), as compared to 27 (65.8 %) out of 41 fish sampled as kelts. This may be attributed to the small sample size observed when the fish were spawning, steelhead were very difficult to find anywhere above the fence in 1996 even though we know that the escapement to this section of creek was 115 fish. As well, it was observed that some tags are pulling out of the kelts when they are recaptured during seining upstream of the fence.

In addition to the steelhead which we fitted with anchor tags we handled 6 previously tagged steelhead (Table V). Three of these steelhead were previously handled at the fence in 1994, two were tagged at Moricetown Canyon in 1995, with one fish tagged by an angler at the Toboggan Creek confluence in 1995.

A total of 99 scale samples were taken from steelhead which were captured during the assessment work carried out in 1996. These scale samples will be forwarded to the D.F.O. scale lab in Vancouver for analysis.

SUMMARY AND RECOMMENDATIONS

As a result of sampling done in 1996, an escapement estimate of 115 spawners was achieved for the Toboggan Creek steelhead stock spawning upstream of the counting fence. Total numbers of steelhead utilizing Toboggan Creek are known to be higher.

The counting fence worked well for both the marking and the recapturing of steelhead in Toboggan Creek in 1996. Low flows were a complicating factor in 1996, delaying migration, and forced a larger number of steelhead to spawn below the fence.

Substantial numbers of steelhead are spawning heavily in the lower reaches of Toboggan Creek, and possibly in the Bulkley River mainstem in the vicinity of Toboggan Creek. An accurate estimation of steelhead spawners in this area, incorporating a marking program at the Bulkley confluence, should likely be a priority in future years.

Table IV. Observations made of spawning steelhead upstream of the Toboggan Creek counting fence, during the spring of 1996.

Date	Spaghetti Tagged	Untagged
May 15	3 fish	0 fish
May 19	2 fish	0 fish
May 23	4 fish	1 fish
Jun 06	1 fish	1 fish
Jun 10	2 fish	0 fish
Totals	12 fish	2 fish

Table V. Tagging information from previously tagged steelhead handled at the Toboggan Creek counting fence, spring of 1996.

Tag #	Date Observed	Location of Previous Capture
S00571	May 13/'96	Apr./'94 at Toboggan Fence
SFC26592	May 14/'96	Aug./'95 at Moricetown Falls
FW01490	May 19/'96	Sep./'95 in Bulkley River
SFC25418	May 19/'96	Aug./'95 at Moricetown Falls
S00814	May 19/'96	May /'94 at Toboggan Fence
C03508	Jun 12/'96	Apr./'94 at Toboggan Fence

ACKNOWLEDGEMENTS

Randy Bryce and Bernard Lundy were the personnel responsible for the daily operation and maintenance of the counting fence on at least a twice daily basis, Clint Landrock assisted in the evenings and on weekends. Thanks to their willingness to work an everchanging schedule, as dictated by water flows and steelhead movements, the data collected were representative.

Thanks also to Ev Person, a Society Director who volunteered many hours during kelt sampling, and to the Skeena Green Plan for providing the funding for this year's assessment.

Also, thanks to Ken and Kelly Landrock, owners of the land on which the counting fence structure is located, for the steady monitorring of the counting fence when it is unattended. As well, Ron Tetreau, a provincial Fisheries Technician, helped in tracking down the tagging locations of previously tagged steelhead recaptured during fence operations.

REFERENCES

Ricker, W.E. 1975. Computation and Interpretation of Biological Statistics of Fish Populations. Bulletin 191. Department of the Environment, Fisheries and Marine Service. 382 p.

APPENDICES

Appendix 1. Upstream migrating steelhead spawners put through the Toboggan Creek counting fence, during the spring of 1996.

DATE (1996)	SEX	LENGTH (INS.)	PREVIOUS TAGS	TAG # (OR.)	SCALE #
MAY 11	M	34.0		N04801	65934-R1
	M	33.0		N04802	R2
	M	33.0		N04803	R3
	M	33.0		N04804	R4
	M	34.0		N04805	R5
	M	37.0		N04806	65935-R1
	F	33.0		N04807	R2
	M	34.0		N04808	R3
	F	34.0		N04809	R4
	F	37.0		N04810	R5
	M	29.0		N04811	65936-R1
	M	22.0		N04812	R2
MAY 12	M	32.0		N04813	R3
	M	33.0		N04815	R4
MAY 13	F	26.0		N04816	R5
	M	32.0		NO4817	65937-R1
	M	32.0		N04818	R2
	F	31.5	S00571	N04819	R3
MAY 14	F	25.0		N04820	R4
	M	31.0		N04821	R5
	M	28.0		N04822	65941-R1
	F	28.0		N04823	R2
	M	31.5		N04824	R3
	F	29.5		N04825	R4
	M	34.0		N04826	R5
	M	30.0		N04827	65942-R1
	F	27.0		N04828	R2
	M	21.0		N04829	R3
	M	27.0		N04830	R4
	M	32.5		N04831	R5
	F	25.0		N04832	65943-R1
	F	28.0		N04833	R2
	M	35.0		N04834	R3
	F(Ad)	31.0		N04835	R4
	M	23.5		N04836	R5
	M	20.0		N04837	65944-R1
	M	37.0		N04838	R2
	F	21.0		N04839	R3
	F	24.0	SFC26592	N04841	R4
	F	25.0		N04842	R5
MAY 15	F	29.5		N04843	65945-R1
	M	30.0		N04844	R2
	F	28.5		N04845	R3
	M	31.0		N04846	R4
	F	31.0		N04847	R5

Appendix 2. Downstream migrating steelhead kelts put through the Toboggan Creek counting fence, during the spring of 1996.

DATE (1996)	SEX	LENGTH (INS.)	TAGGED/ PUNCHED	TAG # (OR.)	SCALE #
MAY 24	M	32.5	Y/Y	N04831	*
MAY 25	M	37.0	Y/Y	N04838	*
MAY 29	F	25.0	Y/Y	N04842	*
	F	24.0	Y/Y	N04841	*
	M	31.5	N/N	N04886	65203-R4
	M	34.0	N/Y	N04887	*
	M	33.0	Y/Y	NO4874	*
	M	30.5	N/Y	N04888	*
	M	34.0	Y/Y	N04848	*
	F	28.5	Y/Y	N04845	*
	M	22.5	N/N	N04889	65203-R5
	M	31.0	N/Y	N04890	*
	F	25.0	Y/Y	N04832	*
	M	22.0	Y/Y	N04812	*
MAY 31	M	33.5	N/Y	NO4894	*
	M	21.0	N/N	N04895	65204-R4
	M	27.0	Y/Y	N04830	*
	M	30.0	Y/Y	N04830	*
	F	29.0	Y/Y	NO4862	*
	M	33.0	Y/Y	N04804	*
	F(Ad)	32.0	Y/Y	N04852	*
	F	29.0	Y/Y	N04871	*
	F	27.5	Y/Y	N04860	*
	M	22.5	N/N	N04896	65204-R5
	F	32.5	Y/Y	N04869	*
JUN 02	M	35.0	Y/Y	N04859	*
JUN 07	M	32.0	Y/Y	N04817	*
JUN 12	M	37.0	Y/Y	N04853	*
	M	29.5	Y/Y	N04854	*
	M	33.0	Y/Y	N04863	*
	M	22.0	Y/Y	N04881	*
	M	29.0	N/N	N04901	65206-R1
	M	34.0	Y/N	**C03508	65206-R2
	M	22.0	N/N	N04902	65206-R3
	M	31.0	Y/Y	N04891	*
	M	23.0	Y/Y	N04870	*
	M	20.5	N/N	N09103	65206-R4
	F	28.0	Y/Y	N04893	*
	M	22.0	N/Y	N09104	*
	M	33.0	N/Y	DEAD	*
JUN 13	F(Ad)	29.0	N/N	N04905	65206-R5

(Ad) - ADIPOSE CLIPPED HATCHERY STEELHEAD
* - SCALE SAMPLE ALREADY TAKEN DURING UPSTREAM SAMPLING
** - PREVIOUSLY TAGGED AT ANOTHER LOCATION

Appendix 1. Upstream migrating steelhead spawners put through the Toboggan Creek counting fence, during the spring of 1996.

DATE (1996)	SEX	LENGTH (INS.)	PREVIOUS TAGS	TAG # (OR.)	SCALE #
MAY 15	M	34.0		N04848	65946-R1
MAY 19	M	32.0		N04849	R2
	F	31.0		N04850	R3
	F	28.0		N04851	R4
	F(Ad)	32.0		N04852	R5
	M	37.0	FW01490	N04853	65947-R1
	M	29.5	SFC25418	N04854	R2
	M	33.5	SOO814	N04855	R3
	M	30.5		N04856	R4
	M	31.5		N04857	R5
	M	31.5		N04858	65948-R1
	M	35.0		N04859	R2
	F	27.5		NO4860	R3
	M	23.0		N04861	R4
	F	29.0		N04862	R5
	M	33.0		N04863	65949-R1
	F(Ad)	28.5		N04864	R2
	M	32.0		N04865	R3
MAY 20	F	21.0		N04866	R4
	M	29.0		N04867	R5
	M	25.0		N04868	65950-R1
MAY 21	F	32.5		N04869	R2
	M	23.0		N04870	R3
MAY 24	F	29.0		N04871	R4
	F	28.5		N04872	R5
	F	28.5		N04873	65201-R1
	M	33.0		N04874	R2
	M	31.5		N04875	R3
	F	26.5		N04876	R4
	M	21.0		N04877	R5
	M	29.5		N04878	65202-R1
	F	26.0		N04879	R2
	F	22.5		N04880	R3
MAY 25	M	22.0		N04881	R4
	F	28.0		N04882	R5
	M	20.0		N04883	65203-R1
MAY 26	M	24.0		N04884	R2
MAY 27	M	22.0		N04885	R3
MAY 31	M	31.0		N04891	65204-R1
	M	22.0		N04892	R2
	F	28.0		N04893	R3
	F	31.0		N04897	65205-R1
	F	29.0		N04898	R2
JUN 01	M	21.0		NO4899	R3
	M	30.0		NO4900	R4