1994

TOBOGGAN CREEK STEELHEAD ASSESSMENT

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INTRODUCTION

Assessment of the steelhead trout population in the Toboggan Creek watershed has been extremely 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. Small n

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 creek to spawn, all of these fish were spaghetti tagged. Observations of tagged and untagged fish made later on the spawning redds indicated an escapement that was approximately two and a half times larger than the number sampled. There were also quite a few steelhead observed spawning downstream of the counting fence in 1993. This study was conducted through the Toboggan Creek Salmon and Steelhead Enhancement Society as part of the 1993-94 hatchery operations.

Funding from the Skeena Sustainable Fisheries Program made it possible for this study to be repeated in the spring of 1994. This report summarizes the findings of the 1994 assessment.

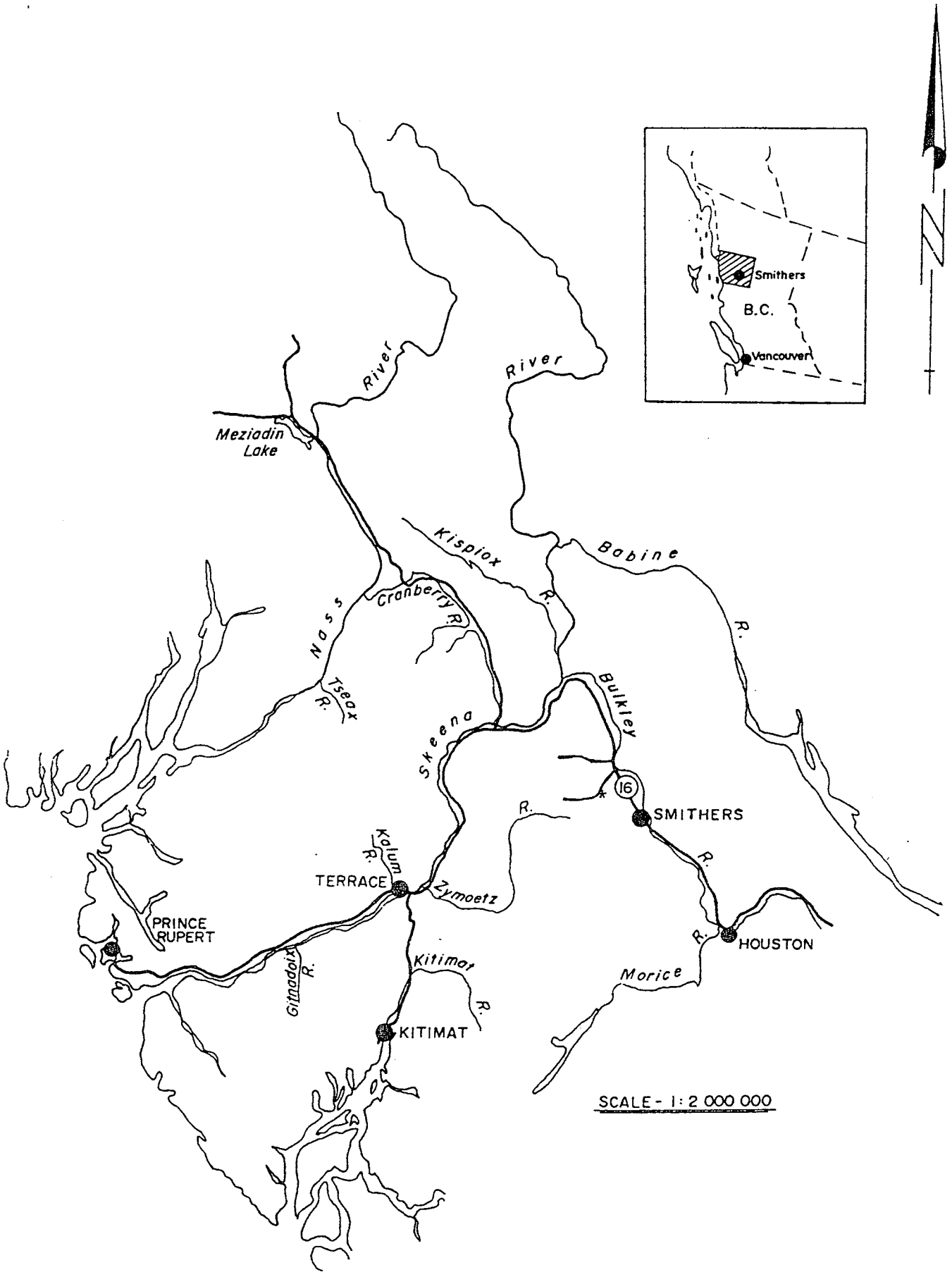


Fig.1 Location of Toboggan Creek Hatchery near Smithers, B.C. *

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).

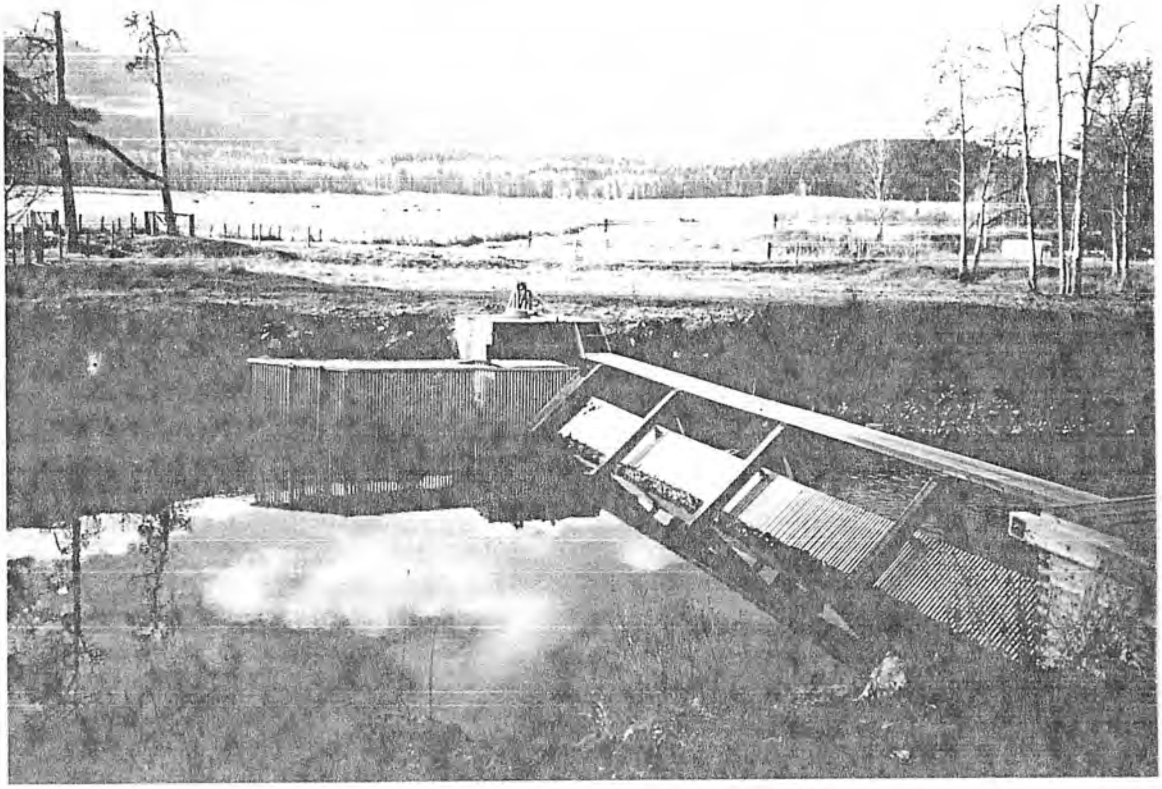
A large majority of steelhead spawning in Toboggan Creek are thought to winter in the mainstem Bulkley River and migrate into the creek to spawn, starting as the creek begins to rise with the snow melt in early to mid April. Data collected from previously tagged fish, recaptured in the 1993 study, support 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. Scales, fork lengths and weights 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). Downstream of the fence, steelhead numbers were estimated by visually counting fish, during a single point sample, at peak spawning and assuming a 50 % observation rate. Given our past experiences with visual population estimates, this method can provide a conservative approximation for this segment of the Toboggan Creek steelhead escapement.

Fig. [illegible] The Toboggan Creek counting fence structure and a spaghetti (anchor) tagged steelhead trout captured at the fence in 1994.



RESULTS AND DISCUSSION

The fence panels were installed on April 18, 1994 and the Toboggan Creek counting fence operated continuously, with the exception of an 18 hour period on May 21, until June 10, 1994 when the panels were laid down. High runoff flows caused by rain and the subsequent acceleration of snow melt caused the May 21 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 April 18, 1994 or during the 18 hour period on May 21.

A total of 133 steelhead trout were sampled on their upstream migration past the Toboggan Creek counting fence (Table I). The first fish were captured on April 21, which is consistent with last year's results, and the last upstream migrants were handled on May 22, 1994. Female steelhead made up over 56.0 % of the fish handled, indicating that we may have missed some of the male spawners which tend to move to the spawning areas before the females. Nine of the steelhead sampled had clipped adipose fins which identified them as being hatchery-produced fish.

Timing of steelhead migrating upstream past the fence showed two distinct peaks (Fig. 3), during the week ending May 4th and the week ending May 25th. These peak movements coincided with increases in recorded flows of Toboggan Creek at a gauge located near the Toboggan Creek Hatchery.

Steelhead kelts holding upstream of the counting fence were first observed beginning on May 15th and on May 17th a total of 25 kelts were sampled and placed downstream of the fence. A total of 98 steelhead were sampled during their downstream migration as kelts (Table II), male fish accounted for 57.0 % of this total. All 98 steelhead were scrutinized for tags and operculum punches, of these 55 had been sampled during their upstream migration past the fence. Of the 55 steelhead which were determined to have been anchor tagged only two had lost their tags during spawning, less than a 4.0 % loss rate.

In total, 176 different steelhead were sampled between April twenty first and June ninth (Table III), females and males were equally represented. Adipose clips made up around 7.0 % of the steelhead sampled, with nine of these being male.

Table I. Summary of upstream migrating steelhead spawners put through the Toboggan Creek counting fence, in spring of 1994.

DATE (1994)	MALE	FEMALE	TOTAL COUNT	ADIPOSE CLIPS
Apr 21	5	0	5	
Apr 22	1	0	1	
Apr 23	3	0	3	2 males
Apr 24	1	0	1	
Apr 25	1	1	2	
Apr 26	0	1	1	
Apr 27	4	3	7	
Apr 28	6	10	16	
Apr 29	4	2	6	1 female
Apr 30	3	12	15	1 male
May 02	1	5	6	1 female
May 03	3	3	6	
May 05	1	0	1	
May 06	3	4	7	
May 07	0	1	1	
May 08	1	0	1	
May 09	2	3	5	
May 10	1	0	1	
May 11	2	3	5	
May 14	0	1	1	
May 18	2	3	5	1 male / 1 female
May 19	4	6	10	
May 20	4	12	16	1 male
May 21	5	5	10	1 male
May 22	1	0	1	
Total Count	58 male	75 female	133 steelhead	6 male / 3 female

Fig. 3 Timing of Steelhead through Toboggan Creek Counting Fence in 1994.

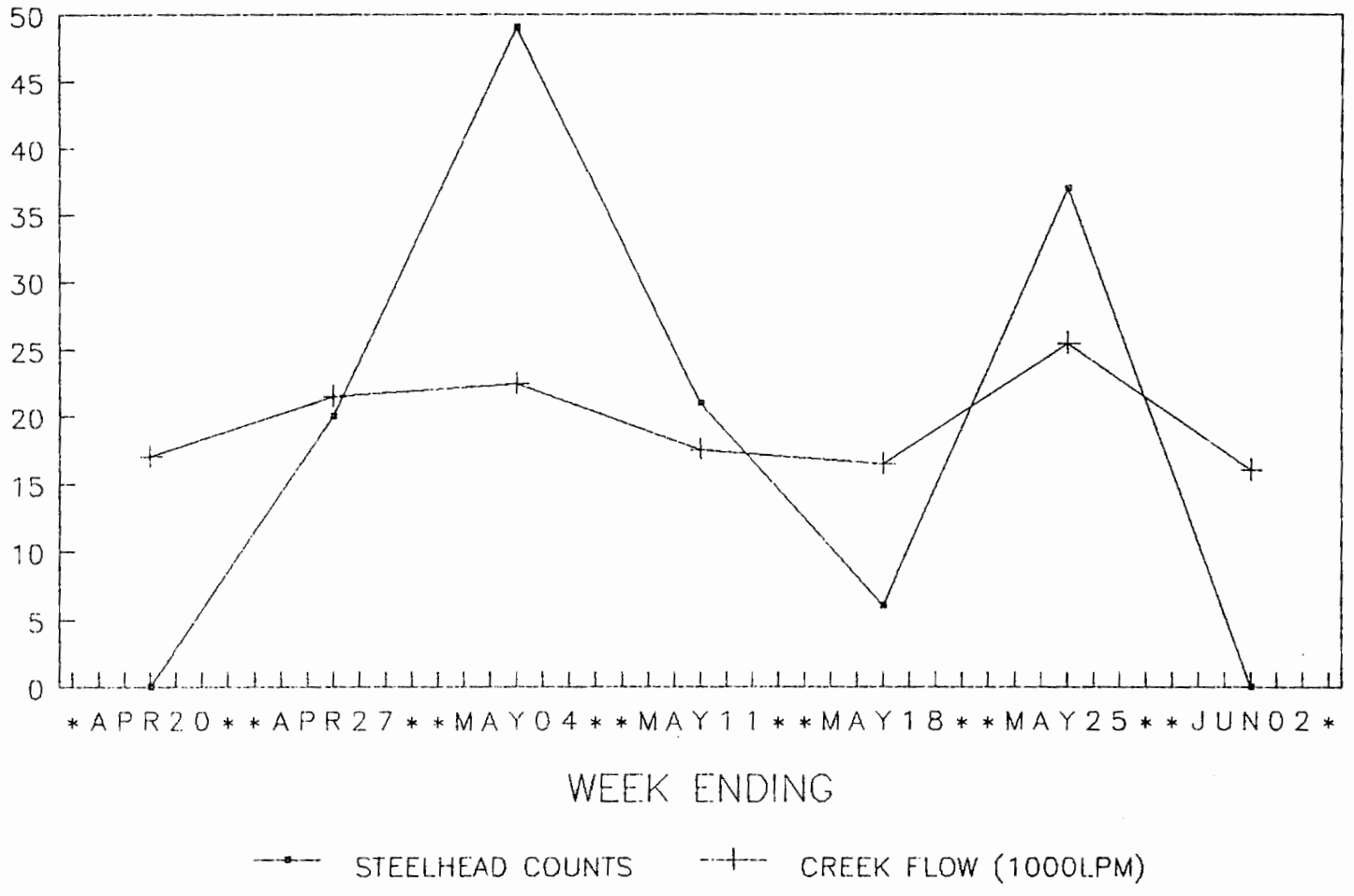


Table II. Summary of downstream migrating steelhead kelts put through the Toboggan Creek counting fence, in spring of 1994.

DATE (1994)	MALE	FEMALE	TOTAL COUNT	FISH PREVIOUSLY MARKED AT FENCE
May 08	1	0	1	0
May 10	0	1	1	0
May 11	1	0	1	1
May 17	10	15	25	13
May 21	2	0	2	1
May 24	0	1	1	1
May 25	1	0	1	1
May 30	1	0	1	1
May 31	12	9	21	12
Jun 01	1	0	1	0
Jun 03	13	11	24	14
Jun 05	0	1	1	0
Jun 06	10	2	12	7
Jun 09	4	2	6	4
Total Count	56 male	42 female	98 steelhead	55 recaptures

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able III. Summary of all individual steelhead handled during ampling at Toboggan Creek counting fence, in spring of 1994.

DATE (1994)	MALE	FEMALE	TOTAL COUNT	ADIPOSE CLIPS
Apr 21	5	0	5	
Apr 22	1	0	1	
Apr 23	3	0	3	2 males
Apr 24	1	0	1	
Apr 25	1	1	2	
Apr 26	0	1	1	
Apr 27	4	3	7	
Apr 28	6	10	16	
Apr 29	4	2	6	1 female
Apr 30	3	12	15	1 male
May 02	1	5	6	1 female
May 03	3	3	6	
May 05	1	0	1	
May 06	3	4	7	
May 07	0	1	1	
May 08	2	0	2	
May 09	2	3	5	
May 10	1	1	2	
May 11	2	3	5	
May 14	0	1	1	
May 17	6	6	12	
May 18	2	3	5	1 male / 1 female
May 19	4	6	10	
May 20	4	12	16	1 male
May 21	6	5	11	1 male
May 22	1	0	1	
May 31	6	3	9	
Jun 01	1	0	1	
Jun 03	8	2	10	
Jun 05	0	1	1	
Jun 06	5	0	5	3 male
Jun 09	2	0	2	
Total Count	88 male	88 female	176 steelhead	9 male / 3 female

With the total number of steelhead being marked for the study being 133 fish, the sample taken for marks at 98 fish and the number of recaptures observed at 55 fish; the total steelhead spawning escapement was estimated at 237 fish upstream of the counting fence. Fifty additional steelhead were estimated to have spawned downstream of the Toboggan Creek counting fence, from an observation of 25 kelts on May 7, 1994. The total estimated steelhead escapement into Toboggan Creek during the spring of 1994 was 287 fish.

Observations of steelhead spawning upstream of the Toboggan Creek counting fence indicate a marked to unmarked ratio that is similar to the kelt recapture data. Of the forty steelhead observed spawning 21 (52.5 %) carried anchor tags (Table IV), as compared to 55 (56.1 %) out of 98 fish sampled as kelts.

In addition to the 149 steelhead which we fitted with anchor tags we handled 19 previously tagged steelhead (Table V). The majority of these steelhead, fifteen in total, were tagged in the fall and early winter of 1993 in the Bulkley River. There was no tagging data for two of the tag numbers and one of the tags was put on in the Area 4 commercial fishery at the mouth of the Skeena River. The remaining tagged fish was an adipose clipped steelhead which we tagged at our fence on May 6, 1993 and which we recaptured at the same fence on April 29, 1994. This female steelhead has returned to Toboggan Creek to spawn in two consecutive years.

A total of 136 scale samples were taken from steelhead which were captured during the assessment work carried out in 1994. These scales have been forwarded to the D.F.O. scale lab in Vancouver for analysis.

SUMMARY AND RECOMMENDATIONS

As a result of sampling done in 1994 an escapement estimate of 287 spawners was achieved for the Toboggan Creek steelhead stock. This estimate was based primarily on observations of steelhead marked and recaptured utilizing the Toboggan Creek counting fence.

The counting fence worked well for both the marking and the recapturing of steelhead in Toboggan Creek in 1994. Some work should be done to improve the efficiency of seining steelhead kelts, and to improve estimation techniques below the fence.

During both the 1993 and the 1994 studies, hatchery-produced fish made up approximately 7.0 % of the steelhead escapement into Toboggan Creek. Since no adipose clipped steelhead have ever been planted into Toboggan Creek, and since the hatchery steelhead observed are obviously strays from fry plants into Trout Creek, a proper effort should be made in 1995 to better quantify these substantial returns of adipose clipped fish.

Table IV. Observations made of spawning steelhead upstream of the Toboggan Creek counting fence, during the spring of 1994.

Date	Spaghetti Tagged	Untagged
pr 26	1 male	1 male/1 female
pr 27	1 male	
Apr 28	2 male	2 male/2 female
Apr 29	1 male	1 male
ay 03	1 male	
ay 06	1 male	1 female
ay 09	1 male	
ay 13	2 male	1 female
ay 14	1 male/1 female	2 male
ay 19	1 male/2 female	1 male/3 female
ay 25	2 male/1 female	2 male
ay 27	1 male	1 male
ay 30	2 male	1 female
otals	17 male/4 female	10 male/9 female

Table V. Tagging information from previously tagged steelhead handled at the Toboggan Creek counting fence, spring of 1994.

Tag #	Date Observed	Date and Location of Tagging
S00420	Apr 29\'94	May 06\'93 at Toboggan Fence
S00562	Apr 30\'94	Dec 29\'93 near Smithers
S00563	Apr 27\'94	Dec 29\'93 near Smithers
S00571	Apr 30\'94	Dec 30\'93 near Smithers
S001443	Apr 23\'94	Sep 25\'93 near Smithers
S03211	Apr 28\'94	Oct 05\'93 near Trout Creek
C02971	May 09\'94	Jul 30\'93 in Area 4
Recaptured after tagging near Trout Creek on Oct 11\'93		
C03829	Apr 30\'94	No Tagging Data Available
Recaptured after tagging near Trout Creek on Oct 22\'93		
C03508	Apr 29\'94	No Tagging Data Available
C07977	Apr 27\'94	Dec 04\'93 near Smithers
C07429	May 14\'94	Oct 11\'93 near Trout Creek
C07444	May 18\'94	Oct 23\'93 near Trout Creek
S02435	May 06\'94	Sep 30\'93 near Trout Creek
S02437	Apr 28\'94	Sep 30\'93 near Trout Creek
S02465	Apr 28\'94	Oct 01\'93 near Trout Creek
S02467	May 06\'94	Oct 01\'93 near Trout Creek
S02468	*Jun 06\'94	Oct 03\'93 near Trout Creek
S02470	May 09\'94	Oct 05\'93 near Trout Creek
N03400	*Jun 03\'94	Sep 02\'93 at Moricetown

* Observed during their downstream migration as kelts, all of the other steelhead were observed during upstream migration.

ACKNOWLEDGEMENTS

Randy Bryce, Mike Jacobs and Bernard Lundy were 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, Society Director; Brenda Donas and Tracey Joe, D.F.O. Community Involvement Division; Jeff Lough and Ron Tetreau, Provincial Fisheries Branch and Gord Wadley, D.F.O. Project Advisor, for their assistance during steelhead kelt capture and sampling.

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.

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.

Appendix 1. Upstream migrating steelhead spawners put through the Toboggan Creek counting fence, during the spring of 1994.

DATE (1994)	SEX	LENGTH (INS.)	WEIGHT (LBS.)	TAG # (OR.)	SCALE #
Apr 21	M	34.0	15.0	03311	88648-R1
	M	32.0	10.0	03312	R2
	M	30.0	9.0	03313	R3
	M	28.0	7.0	03314	R4
	M	36.0	18.0	03315	R5
Apr 22	M	24.0	5.0	03316	NO SCALES
Apr 23	M	32.0	11.0	*S01443	88649-R1
	M(AD)	35.5	15.0	03317	R2
	M(AD)	32.0	11.0	03318	R3
Apr 24	M	31.0	10.0	03319	R4
Apr 25	F	25.0	7.0	03320	R5
	M	31.0	13.0	03321	88650-R1
Apr 26	F	27.0	7.0	03322	R2
Apr 27	M	29.0	10.0	03323	R3
	M	29.0	10.0	03324	R4
	F	27.5	8.0	*S00563	R5
	M	30.0	11.0	03325	51843-R1
	M	26.0	6.0	*C07977	R2
	F	29.0	8.0	S00701	R3
	F	24.5	5.0	S00702	R4
Apr 28	M	31.5	14.0	*S03211	R5
	M	14.5	1.5	S00703	51844-R1
	F	28.0	7.0	S00704	R2
	F	32.0	10.0	S00705	R3
	F	28.0	8.0	S00706	R4
	F	27.5	7.0	S00707	R5
	F	32.0	12.0	S00708	51845-R1
	M	17.0	4.0	*S02465	R2
	M	27.0	7.0	*S02437	R3
	M	27.5	7.0	S00709	R4
	F	28.0	9.0	S00710	R5
	F	32.0	13.0	S00711	50391-R1
	F	29.0	9.0	S00712	R2
	F	27.0	8.0	S00713	R3
	F	26.5	7.0	S00714	R4
	M	31.0	11.0	S00715	R5
Apr 29	F(AD)	28.0	9.0	*S00420	50392-R1
	M	31.0	10.0	S00716	R2
	M	27.5	7.0	S00717	R3
	M	28.0	8.0	*C03508	R4
	F	31.0	11.0	S00718	R5
	M	29.0	11.0	S00719	50393-R1
Apr 30	F	30.0	11.0	S00720	R2
	F	28.0	8.0	S00721	R3
	M(AD)	33.0	13.0	S00722	R4
	F	28.0	9.0	S00723	R5

Appendix 1. Upstream migrating steelhead spawners put through the Toboggan Creek counting fence, during the spring of 1994.

DATE (1994)	SEX	LENGTH (INS.)	WEIGHT (LBS.)	TAG # (OR.)	SCALE #
Apr 30	F	28.0	8.0	S00724	50394-R1
	F	29.0	10.0	S00725	R2
	M	35.0	17.0	S00726	R3
	F	26.0	7.0	*C03829	R4
	F	30.0	11.0	S00727	R5
	F	26.0	7.0	S00728	50395-R1
	M	29.0	9.0	*S00562	R2
	F	29.0	7.0	S00729	R3
	F	26.0	6.0	S00730	R4
	F	28.0	9.0	*S00571	R5
	F	29.0	9.0	S00731	50396-R1
May 02	F	29.5	8.0	S00732	R2
	M	32.0	10.0	S00733	R3
	F(AD)	28.5	7.0	S00734	R4
	F	31.0	10.0	S00735	R5
	F	28.5	8.0	S00736	50397-R1
	F	28.0	8.0	S00737	R2
May 03	F	28.0	9.0	S00738	R3
	M	23.0	4.0	S00739	R4
	M	34.0	14.0	S00740	R5
	M	25.5	6.0	S00741	50398-R1
	F	25.0	5.0	S00742	R2
	F	28.0	8.0	S00743	R3
May 05	M	24.0	5.0	S00744	R4
May 06	M	21.5	4.0	S00745	R5
	F	28.0	8.0	S00746	50399-R1
	F	28.0	9.0	S00747	R2
	M	32.5	10.0	*S02435	R3
	F	29.0	10.0	*S02467	R4
	F	28.5	9.0	S00748	R5
	M	31.0	10.0	S00749	50400-R1
May 07	F	27.0	7.0	S00750	R2
May 08	M	32.0	11.0	S00751	R3
May 09	M	32.0	11.5	*C02971	R4
	F	29.0	10.0	S00752	R5
	F	28.5	7.5	*S02470	50401-R1
	M	13.5	0.5	S00754	R2
	F	29.0	8.5	S00755	R3
May 10	M	31.0	10.0	S00756	R4
May 11	F	28.0	7.0	S00758	50402-R1
	M	22.0	3.0	S00759	R2
	F	27.0	7.0	S00760	R3
	M	22.0	4.0	S00761	R4
	F	26.0	7.0	S00762	R5
May 14	F	28.0	8.0	*C07429	50403-R1
May 18	F(AD)	29.0	8.0	S00773	50403-R3

Appendix 1. Upstream migrating steelhead spawners put through the Toboggan Creek counting fence, during the spring of 1994.

DATE (1994)	SEX	LENGTH (INS.)	WEIGHT (LBS.)	TAG # (OR.)	SCALE #
May 18	F	27.0	6.0	S00774	50403-R4
	M	31.0	9.0	S00775	R5
	M(AD)	25.0	5.0	S00776	50404-R1
	F	26.0	6.0	*C07444	R2
May 19	F	30.0	9.0	S00777	R4
	F	31.5	8.0	S00778	R5
	F	28.5	9.0	S00779	50405-R1
	M	23.0	5.0	S00780	R2
	M	31.0	10.0	S00781	R3
	F	28.0	7.0	S00782	R4
	M	27.5	6.0	S00783	R5
	M	21.0	3.0	S00784	50406-R1
	F	29.5	10.0	S00786	R2
	F	32.5	11.0	S00787	R3
May 20	F	28.0	8.0	S00788	R4
	F	29.0	8.0	S00789	R5
	F	29.0	8.0	S00790	50407-R1
	F	32.0	11.0	S00791	R2
	F	26.5	9.0	S00792	R3
	F	17.0	3.0	S00793	R4
	M	29.0	8.0	S00795	R5
	F	27.0	7.0	S00794	NO SCALES
	M	30.5	10.0	S00796	50408-R1
	M(AD)	18.0	3.0	S00798	R2
	F	30.0	11.0	S00799	R3
	M	36.0	14.0	S00800	R4
	F	29.5	9.0	S00802	R5
	F	28.0	8.0	S00801	NO SCALES
	F	27.5	9.0	S00803	NO SCALES
	F	29.0	10.0	S00804	50409-R1
May 21	F	29.0	10.0	S00805	R2
	F	22.0	4.0	S00806	R3
	M	23.0	5.0	S00808	R4
	M	22.0	4.0	S00810	R5
	F	26.0	7.0	S00809	NO SCALES
	F	27.5	7.0	S00811	50410-R1
	M	29.0	7.0	S00812	R3
	M(AD)	21.5	3.0	S00813	R4
	F	25 0	5.0	S00814	R5
	M	33.5	14.0	*S00769	NO SCALES
May 22	M	32.0	9.5	S00825	52451-R1

133 upstream migrants; 58 male/75 female; 124 wild/9 hatchery

* - previously tagged recaptures
(AD) - adipose clipped hatchery steelhead

Appendix 2. Downstream migrating steelhead kelts put through the Toboggan Creek counting fence, during the spring of 1994.

DATE (1994)	SEX	LENGTH (INS.)	TAGGED/ PUNCHED	TAG # (OR.)	SCALE #
May 08	M	32.0	N/N	**NO TAG	
May 10	F	26.0	N/N	***S00757	50401-R5
May 11	M	31.0	Y/Y-	**S00756	
May 17	F	29.0	N/N	S00763	
	F	27.0	Y/Y -	S02437	
	M	33.0	N/N	S00764	
	M	32.0	Y/Y-	03312	
	M	34.0	Y/Y-	03311	
	M	32.0	Y/Y -	S00733	50404-R1
	F	27.5	Y/Y -	S00563	
	M	33.5	N/N	S00765	
	F	27.0	N/N	S00766	
	F	28.0	N/N	S00767	
	F	28.0	N/N	S00768	
	M	33.5	N/N	S00769	
	F	25.0	Y/Y -	03320	
	M	21.5	N/N	S00770	
	F	32.0	N/N	S00771	
	F	29.0	Y/Y -	S00731	
	F	27.0	Y/Y -	S00750	
	F	29.0	Y/Y -	S00701	
	F	38.0	N/N	S00772	50403-R2
	F	26.0	Y/Y -	C03829	
	F	26.0	Y/Y -	S00728	
	F	26.0	Y/Y -	S00730	
	M	32.0	N/N	**NO TAG	
	M	34.5	N/N	**NO TAG	
	M	29.0	Y/Y-	**S00709	
May 21	M	29.0	Y/Y-	**S00795	
	M	34.0	N/N	**NO TAG	50410-R2
May 24	F	32.0	Y/Y -	**S00708	
May 25	M	31.0	Y/Y-	*** 03321	52451-R2
May 30	M(AD)	35.5	Y/Y-	*** 03317	
May 31	M	32.0	Y/Y-	S00733	
	M	31.0	N/N	S00815	
	M	16.0	N/N	S00816	
	F	29.0	Y/Y -	S00805	
	F	27.0	Y/Y -	S00774	
	F	26.5	N/N	S00817	
	M	28.0	N/N	S00818	
	M	32.5	Y/Y-	S02435	
	F	29.0	Y/Y -	S00790	
	F	27.0	N/N	S00819	
	M	32.0	Y/Y-	S00825	

Appendix 2. Downstream migrating steelhead kelts put through the Toboggan Creek counting fence, during the spring of 1994.

DATE (1994)	SEX	LENGTH (INS.)	TAGGED/ PUNCHED	TAG # (OR.)	SCALE #
May 31	M	36.0	Y/Y	S00800	
	M	23.0	N/N	S00820	
	M(AD)	33.0	Y/Y	S00722	
	F	27.0	N/N	S00821	
	M	27.5	N/N	S00822	
	F	28.0	Y/Y	S00801	
	M	22.0	Y/Y	S00761	
	F	29.0	Y/Y	S00712	
	M	32.0	N/N	S00823	
	F	26.0	Y/Y	S00809	
Jun 01	M	34.0	N/N	**NO TAG	
Jun 03	M	30.5	N/Y	**NO TAG	
	M	34.0	N/N	NO TAG	
	F	24.0	N/N	S00824	
	M	32.5	N/N	S00826	
	F	26.0	Y/Y	CO7444	
	M	29.0	N/N	S00827	
	F	32.5	Y/Y	S00787	
	M	36.0	Y/Y	03315	
	M	23.0	N/N	S00828	
	F	27.5	Y/Y	S00811	
	M	29.0	N/N	S00829	
	F	27.0	Y/Y	S00794	
	F	28.0	Y/Y	S00782	
	F	29.0	N/Y	S00830	
	M	34.0	N/N	S00831	
	M	27.0	N/N	S00832	
	F	31.5	Y/Y	S00778	
	F	25.0	Y/N	*N03400	
	M	32.0	Y/Y	S01443	
	M(AD)	25.0	Y/Y	S00776	
	F	28.5	Y/Y	S02470	
	F	29.5	Y/Y	S00786	
	M	33.5	Y/N	S00769	
	M	25.0	N/N	S00833	
Jun 05	F	26.0	N/N	***S00834	52451-R3
Jun 06	M	29.0	Y/Y	03324	
	M	21.0	Y/Y	S00784	
	M	21.5	Y/N	S00745	
	M(AD)	24.0	N/N	NO TAG	52452-R1
	M	24.0	N/N	S00835	
	F	30.0	Y/Y	S00799	
	F	28.0	Y/Y	S00788	
	M	24.0	Y/Y	S00744	

Appendix 2. Downstream migrating steelhead kelts put through the Toboggan Creek counting fence, during the spring of 1994.

DATE (1994)	SEX	LENGTH (INS.)	TAGGED/ PUNCHED	TAG # (OR.)	SCALE #
Jun 06	M(AD)	23.0	N/N	S00838	52451-R4
	M(AD)	23.0	Y/N	*S02468	52451-R5
	M	28.5	N/N	S00839	
	M	17.0	Y/Y	S02465	
Jun 09	M	32.0	N/N	**NO TAG	
	M	29.0	Y/Y	03323	
	F	28.5	Y/Y	S00779	
	M	30.0	Y/Y	03313	
	M	36.0	N/N	S00840	
	F	29.0	Y/Y	S00725	

98 downstream migrants; 56 male/42 female; 92 wild/6 hatchery

* - previously tagged recaptures
** - deadpitched from above fence
*** - livepitched from above fence
(AD) - adipose clipped hatchery steelhead

OF THE 98 STEELHEAD TROUT CAPTURED AND SAMPLED DURING THEIR MIGRATION DOWNSTREAM, 55 HAD BEEN PREVIOUSLY CAPTURED AND MARKED DURING THEIR UPSTREAM MIGRATION. TWO FISH OUT OF THESE 55 HAD LOST THEIR TAG BUT WERE IDENTIFIED AS MARKED BY THEIR OPERCULUM PUNCH. TWO FISH OUT OF THESE 55 WERE TAGGED BUT DID NOT HAVE AN OPERCULUM PUNCH (#S00745 AND #S00769), THESE FISH WERE TWO OF ONLY THREE THAT WERE TAGGED BUT NOT OPERCULUM PUNCHED (#S00746 WAS THE THIRD) DURING UPSTREAM TAGGING. ALL OF THE REMAINING 51 PREVIOUSLY CAPTURED STEELHEAD WERE TAGGED AND PUNCHED.

OF THE 43 STEELHEAD THAT WERE CAPTURED DURING THEIR MIGRATION DOWNSTREAM THAT WERE NOT CAPTURED WHILE MIGRATING UPSTREAM ONLY TWO CARRIED SPAGHETTI TAGS, BOTH OF THESE WERE TAGGED AT OTHER LOCATIONS DURING THE FALL OF 1993. ALL OF THE REMAINING 41 UNMARKED STEELHEAD WERE NEITHER TAGGED OR PUNCHED.