MAMIN RIVER STEELHEAD:

A STUDY ON A LIMITED

TAGGING STUDY UNDERTAKEN DURING WINTER, 1984

by

A.D. de LEEUW

British Columbia Ministry of Environment
Fish and Wildlife Branch
Smithers, B.C.

Fisheries Progress Report No. 5K—54
January, 1986

TABLE OF CONTENTS

ABSTRACT

deLeeuw, A.D. 1986. Mamin River steelhead: a study on a limited tagging study undertaken during winter, 1984. Fisheries Progress Report No. SK—54.

During the 1983—84 winter season, 22 steelhead were tagged on the Mamin River, Queen Charlotte Islands, of which 6 or 27% were recaptured. The abundance of steelhead was calculated using multiple sample techniques and estimated from 60 to 102 fish. These results are considered conservative and are estimated to represent approximately 12% of the total run. The majority of steelhead (62%) had spent 4 years in the stream prior to smolting. Seventy—three percent of all fish sampled had spent 3 years in the ocean. Sex ratio favoured females considerably (69%). Average fork length of fish sampled was 73.6 cm, and ranged from 55.5 to 92.0 cm. These results and the sports fishery are discussed relative to other Charlotte streams.

INTRODUCTION

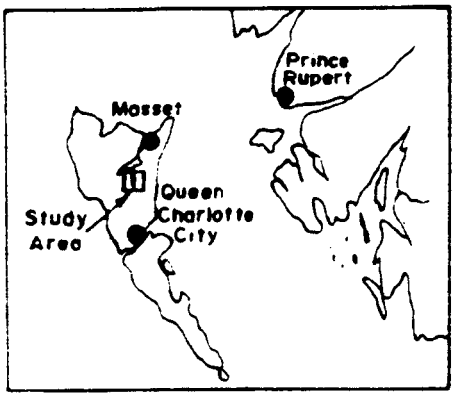
Approximately 40% of all eligible Queen Charlotte Island residents purchase a non—tidal angling licence. Of these, approximately 1/3 to 1/2 also angle for steelhead. Despite the intense angling pressure on steelhead, very little is known regarding the life history of population abundance of this species. In order to increase understanding and therefore better management of Charlotte steelhead, a study was undertaken on Mamin River steelhead during the 1983—84 winter season. The objectives were to

1. Determine steelhead run timing and movement;
2. Describe life history characteristics;
3. Estimate population abundance.

DESCRIPTION OF STUDY AREA AND FISHERY

Located in central Graham Island, Queen Charlotte Islands, the Main River flows in a northerly direction into Juskatla Inlet (Figure 1). With a drainage basin area of 132.6 km^2 and no lakes to stabilize flows, the Mamin River experiences rapid and frequent extremes in discharge. In concert with these variable flows, extensive forest harvesting throughout the drainage has tended to de—stablize this stream, especially in the upper reaches. Temperatures range frost near freezing to 13°C, while the pH is about 6.8. Conductivity measurements have ranged from a low of about 24 ppm in winter to 42 ppm in late summer. In general, therefore, the Mamin River is an infertile and relatively unstable stream.

Fig. 1 Mamin River, Queen Charlotte Islands



Scale 1:125 000

Despite these conditions, the Mamin River continues to support a variety of commercial and sport fish species. In addition to steelhead (Salmo gairdneri) and the coastal cutthroat trout (Salmo clarki), coho salmon (Oncorhynchus kisutch), pink salmon (0. gorbuscha), and Dolly Varden char (Salvelinus malma) frequent the system. Sockeye salmon (Oncorhynchus nerka) have also been reported, and a chinook salmon (Oncorhynchus tshawytscha) was observed during the fall of 1982. The prickly sculpin (Cottus asper) is furthermore found in the lower reaches, while lamprey (Lampetra sp) have been reported.

For additional information on the Mamin River, note Walker et al., 1981.

Although the questionnaire—estimated angler effort on the Mamin, both in terms of days fished and number of anglers has increased from 1970—71 to the 1983—84 season, this increase has been sporadic and inconsistent (table 1). For instance, the lowest steelhead angler effort (29 angler days) occurred in the 1978—79 season, which did not correspond with the general steelheading trend for the Charlottes. Equally variable are the catch records for the Mamin which range from 0 to 67 fish kept and 0 to 234 steelhead released during the period of record. The catch per angler day is also variable from year to year and although on the average is slightly better than it is for the Charlottes as a whole, is inconsistent with general Charlotte steelhead angling trends.

Table 1. Mamin River steelhead harvest analysis[1], 1970—71 to 1983—84.

Season	Days Fished	No. of Anglers	Kept	Released	Kept/ Day	Catch/ Day	Charlottes Catch/Day
70—71	66	21	18	7	.27	.38	.36
71—72	66	28	17	16	.26	.50	.52
72—73	169	33	31	49	.18	.47	.31
73—74	98	20	31	37	.32	.69	.33
74—75	130	58	27	18	.21	.35	.27
75—76	117	38	35	34	.30	.59	.47
76—77	63	30	0	0	.00	.00	.37
77—78	133	34	65	44	.49	.82	.48
78—79	24	9	0	4	.00	.17	.41
79—80	86	36	23	19	.27	.49	.48
80—81	106	28	36	25	.34	.58	.79
81—82	71	31	11	108	.15	1.68	.93
82-83	216	72	67	234	.31	1.39	1.23
83—84	269	45	57	110	.21	.62	.57
Mean:	115	35	30	50	.24	.62	.54

[1]Steelhead Harvest Analysis, B.C. Fish and Wildlife Branch annual reports

METHODS

The Mamin River was partitioned into 4 reaches of differing lengths dependant largely on access (Fig. 1). Steelhead were angled with conventional angling gear, then tagged with coloured, numbered anchor (spaghetti) tags.

Weights were generally estimated while fork lengths were measured. Gender, date of capture, tag number and colour as well as location of capture were noted. After the removal of a few scales, fish were released at the capture site.

Scales were viewed using a dissecting microscope, and the two best examples from the sample selected were cleaned and mounted on gummed cards. Impressions of the scales were made on acetate cards by applying heat and pressure. A Leitz Prado projector was then used to examine each scale for freshwater and ocean age determination (Narver and Withler, 1974).

Population size was determined using the Schnabel, Schumacher and Schnabel—Chapman adjusted multiple census techniques (Ricker, 1970).

The formulae were:

Schnabel: $N = \frac{\text{sum Ct M})}{R}$

Schumacher: $N = \frac{1}{N} = \frac{\text{sum (Mt Rt)}}{\text{sum (Ct Mt}^2)}$

Schnabel, Chapman revised: $N = \frac{\text{sum (Ct Mt)}}{R + 1}$

where: t = 5-day time period
Ct = total catch during time t
Mt = total fish tagged and released during time t
M = sum of Mt
Rt = total recapture during time t

R = sum of Rt

RESULTS AND DISCUSSION

The capture of steelhead by angling on the Main River was relatively unsuccessful. Only twenty—six fish were taken, all in January and February, of which 22 were tagged. Of these, 6 were subsequently recaptured.

SPATIAL AND TEMPORAL DISTRIBUTION

Virtually all steelhead except one were taken in Zone 2, approximately 10 km upstream from tide water. The one fish not taken in this area was caught and tagged upstream in Zone 1. Although steelhead are present in the Mamin from November through to May, captures during this study were made in January and February only. Determination of peaks in run timing is therefore difficult. The overall catch favoured females (64%) and males (36%).

Of the six recaptures, 3 were taken within 2 hours of their original capture (note Appendix I and II).

Two other steelhead were recaptured 7 days after their original capture in the same area. One fish, tag #X0006, for which the original capture date and location were not recorded, was recaptured on January 29 in Zone 2. The average time between original capture and recapture was 2.8 days.

AGE AND SIZE

Scales were removed from 22 fish and all were readable. Absorbtion of the fresh water anuli (R) had occurred in only fish.

Almost half of all fish taken (46%) had spent 4 years in the stream prior to spending 3 years in the marine environment (age 4.3, Table 2). A little less than 1/3 had spent 3 years in the stream prior to spending 3 years in the ocean (3.3). The remaining age groups 3.2, 4.2 and 4.1S1, accounted for 9%, 9% and 4.5% of the total, respectively. A 92 cm male had spent 4 years in the ocean prior to first

spawning.

Sixty—two percent of all fish examined had spent 4 years in the stream prior to smolting, while the remaining 38% remained for 3 years in the stream as juveniles Table 3).

The dominant ocean age group was 3 years, and accounted for almost 73% of the total. Those fish which had spent 1, 2 and 4 years in the marine environment prior to their first spawning accounted for 4.5, 18.2 and 4.5% respectively of the total number of fish examined.

Although the number of fish sampled was small, an increase in fork length with an increase in duration of ocean residency was discernable. The largest fish taken, a 92 cm male, was a 4 ocean fish, while the smallest was a 55.5 cm male with only 2 years of ocean residency (Table 5). In the 3 year ocean group, females were marginally larger than the males. Valid comparisons are difficult however due to the small sample size.

Table 2. Steelhead trout age groups from the Mamin River, January and February 1984; n = 22.

Age groups	Males	Females	Total	% of Total (n = 21)
3.2	1	1	2	9.5
3.3	3	3	6	28.5
4.2	2	0	2	9.5
4.3	1	9	10	47.6
4.1S1	0	1	1	4.8
Total	7	14	21	
R.4	1	0	1	4.5

Table 3. Number and percentage of male and female Mamin River steelhead of different fresh water ages, January and February, 1984; n = 21.

Fresh water age	Males	Females	Total	% of Total
3	4	4	8	38
4	3	10	13	62
Total	7	14	21	100

Table 4. Number and percentage of male and female Mamin River steelhead of different ocean ages, prior to first spawning, January and February, 1984; n = 22.

Ocean Age	Males	Females	Total	% of Total
.1	0	1	1	4.5
.2	3	1	4	18.2
.3	4	12	16	72.8
.4	1	0	1	4.5
Total	8	14	22	100.0

Table 5. Fork lengths (cm) of male and female Mamin River Steelhead of different ocean ages, January and February, 1984. Repeat spawners excluded.

Ocean Age	Males			Females			Total		
	N	$\bar{\bar{X}}$	Range	N	$\bar{\bar{X}}$	Range	N	$\bar{\bar{X}}$	Range
1	0	--	--	-	--	--	-	--4	--
2	3	59.3	55.5-63.5	1	69.0	--	4	61.8	55.5-69.0
3	4	74.8	66.0-79.0	12	75.5	71.0-81.0	16	75.3	66.0-81.0
4	1	92.0	--	0	--	--	1	92.0	--
Total	8	71.1	55.5-92.0	13	75.0	69.0-81.0	21	73.6	55.5-92.0

POPULATION ESTIMATION

Since only 22 fish were tagged of which 6 were recaptured, the calculated population estimates are suspect to say the least. Population estimates ranged from 60—102 steelhead, and had relatively narrow confidence limits (Table 6).

Table 6. Mamin River steelhead population estimates January and February, 1984.

Method (Ricker, 1968)	Estimate	95% Confidence Limits Poisson distribution	Normal distribution
N Schnabel	70	27 – 124	38 – 396
N Schumacher	60	77 – 153	
N Chapman	102	25 - 105	37 – 169
	$\bar{\bar{X}}$ = 77		

The estimates themselves therefore are probably accurate for that area of the Mamin River (i.e. Zone 2) during January and February, but cannot be applied to the entire season and river as a whole.

SUMMARY

1. During January and February of 1984, 26 steelhead were captured from the Main River, of which 22 were tagged and 6, or 27% were recaptured.
2. Except for 1 fish, all fish were captured in the middle section of the river, approximately 10 km upstream from tidal influence.
3. Females comprised 64% of the sample.
4. Forty-six percent of the steelhead sampled were age 4.3, and 27% were age 3.3. The remaining 27% were ages 3.2 (9%), 4.2 (9%), 4.1S1 (4.5%) and R.4 (4.5%). Sixty—two percent of the steelhead sampled had spent 4 years as juvenile stream residents, while the remaining 38% were 3 year smolts. Three years of ocean residency dominated and accounted for 73% of the sample. Other ocean ages were .1 (4.5%), .2 (18.2%) and .4 (4.5%).
5. The average fork length of the 22 Mamin River steelhead sampled was 73.6cm and ranged from 55.5 to 92.0 cm.
6. The population estimate of adult steelhead in the study area during the sample period, i.e. January and February, ranged from 60 to 102 fish, and is considered to be a subsample or approximately 12% of the total run. A rough estimate of the Mamin River steelhead run during the 1983—84 winter season therefore is approximately 650 fish.

ACKNOWLEDGEMENTS

This study was largely the result of volunteer work by the Port Clements Rod and Gun Club. Their help in this project was invaluable and is greatly appreciated. Interpretations of scales collected were accomplished by R. Tetreau and G. Schultze of the Fish and Wildlife Branch. M. Lough, also of the Fish and Wildlife Branch, calculated the population estimates.

The study was funded as a Public Participation Project by the Salmonid Enhancement Program.

REFERENCES

Narver, D.W. and F.C. Withler, 1974. Steelhead of the Nanaimo River, aspects of their biology and the fishery from three years of anglers' catches. Fisheries and Marine Services, Nanaimo, B.C., Cir. No. 99, 25 pp.

Ricker, W.E. 1970. Handbook of computations for biological statistics of fish populations. Bulletin #119, Fisheries Research Brd., Canada.

Steelhead Harvest Analysis. 1970—71 through to 1981—82, Fish and Wildlife Branch, Victoria, B.C.

Walker, C.E., W.H.B. Girard and R.F. Brown. 1971. Catalogue of salmon spawning streams and escapement populations. Statistical area No. 1, Pacific region, Dept. of Fisheries and Forestry, Vancouver, B.C., 91 pp.

APPENDICES

APPENDIX I. Original steelhead captures from Mamin River during the 1983–84 winter season.

Fish No	Date	Sex	Length (cm)	Weight (kg)	Tag No. Colour	Area	Remarks	Age
1	Jan 3	M	59.0	--	white 00044	2	--	4.2
2	"	F	75.0	--	" 00045	2	--	4.3
3	"	F	74.0	--	" 00031	2	--	3.3
4	"	M	79.0	--	" 00032	2	--	3.3
5	"	F	81.0	--	" 00042	2	--	3.3
6	"	M	75.0	--	" 00043	2	--	3.3
7	Jan 10	M	92.0	--	" 00035	2	--	R.4
8	"	F	77.0	--	" 00034	2	--	4.3
9	"	F	78.5	--	" 00033	2	--	4.3
10	"	F	75.0	--	" 00036	2	--	4.1S1
11	Feb 4	F	74.0	--	orange 06931	2	Bright	4.3
12	"	F	71.0	--	" 03933	2	--	3.3
13	"	F	74.0	--	" 03175	2	Coloured	4.3
14	"	F	71.0	--	" 03174	2	--	4.3
15	"	F	69.0	--	" 06932	2	--	3.2
16	"	M	79.0	--	" 03173	2	Dark scar	3.3
17	"	F	76.0	--	" 03171	2	--	4.3
18	"	F	76.0	--	" 03172	2	Bright	4.3
19	"	F	79.0	--	" 06972	2	Bright	4.3
20	"	M	55.5	--	" 03170	2	--	3.2
21	Feb 6	M	63.5	--	white 000201	1	--	4.2
22	"	M	66.0	--	" 000221	2	Dark	4.3
23	Jan 3	-	--	--	" --	2	--	--
24	Jan 10	-	--	--	" --	-	--	--
25	Jan 29	-	--	--	" --	-	--	--
26	Jan 29	-	--	--	" --	-	--	--

APPENDIX II. Steelhead recaptures from the Mamin River during the 1983–84 winter season.

Fish No.	Date	Length (cm)	Weight (kg)	Tag No. & Colour	Area	Remarks
5	Jan 3/84	-	-	white 00042	2	Recap. 2 hours later
6	Jan 10	-	-	" 00043	2	--
1	Jan 10	-	-	white 00044	2	--
8	Jan 10	-	-	white 00034	2	Recap. 2 hours later
-	Jan 29	-	-	" x0006	2	--

13	Feb 4	-	-	orange	03176	2	Recap. 2 hours later