

BJCY

mm 28a  
P/FR/SK/7 3  
C.1

P/FR/SK/7  
CHUDYK, W. E.  
SOME NOTES ON THE HABITS  
AND HABITAT OF STEELHEAD  
BJCY c. 1 mm SMITHERS

Some notes on the habits and habitat  
of steelhead trout in Kispiox River  
with particular reference to Cullon Creek

Spring and Summer 1976

W.E. Chudyk & M.R. Whately

January, 1977

76-7

SK-7

P  
FR  
SK  
7  
c. 1 mm

S. P. HATLEVIK

## INTRODUCTION

During the spring and summer of 1976, two investigations funded through the Salmonid Enhancement Program were conducted on the steelhead trout of Kispiox River. The first project, commencing in April and ending in August, was designed to document the numbers and timing of adult steelhead entering Cullon Creek (a Kispiox tributary) to spawn. The second project, running from May through part of September was initially designed for the capture and tagging, with coded wire nose tags, of wild steelhead juveniles. Although this latter objective met with failure in terms of adequate numbers of fish tagged, some of the ancilliary information collected, such as the relative abundance and distribution of juvenile steelhead and other salmonids throughout the system, was beneficial.

The report, then, summarizes the results of these two investigations, whose basic objectives may be said to be:

- 1) To assess the numbers and timing of adult steelhead entering Cullon Creek to spawn, and to document the physical characteristics of the spawning habitat during the critical time.

- 2) To determine macro and micro habitat preferences, relative abundance, and general distribution of juvenile salmonids in Kispiox River, with particular reference to Cullon Creek.

#### METHODS

Juvenile steelhead (rainbow trout) were sampled in Kispiox River (Fig. 1) using "Gee" minnow traps, conventional angling gear, a Smith Roote type V electroshocker, and seine nets. The sampling techniques used were not specific to the capture of rainbow, hence, coho and chinook salmon, cutthroat trout, Dolly Varden char, whitefish and some coarse fish species were incidentally sampled. "Gee" trap sites were located in areas of diverse streamside cover, water depth, flow and substrate. Seine nets were used in stream areas that had homogeneous snag-free substrate and which had vehicle access. Seine nets were set from a 12'6" Avon raft equipped with a 20 horsepower outboard motor. Electroshocked (standard technique explained in Smith Roote operations manual) juvenile rainbow were collected with dip nets from stream areas of good visibility.

Adult steelhead spawners were sampled at a weir constructed on Cullon Creek (Fig. 1) or by electroshocker, or conventional angling equipment. The Cullon Creek weir was located approximately 150 m.

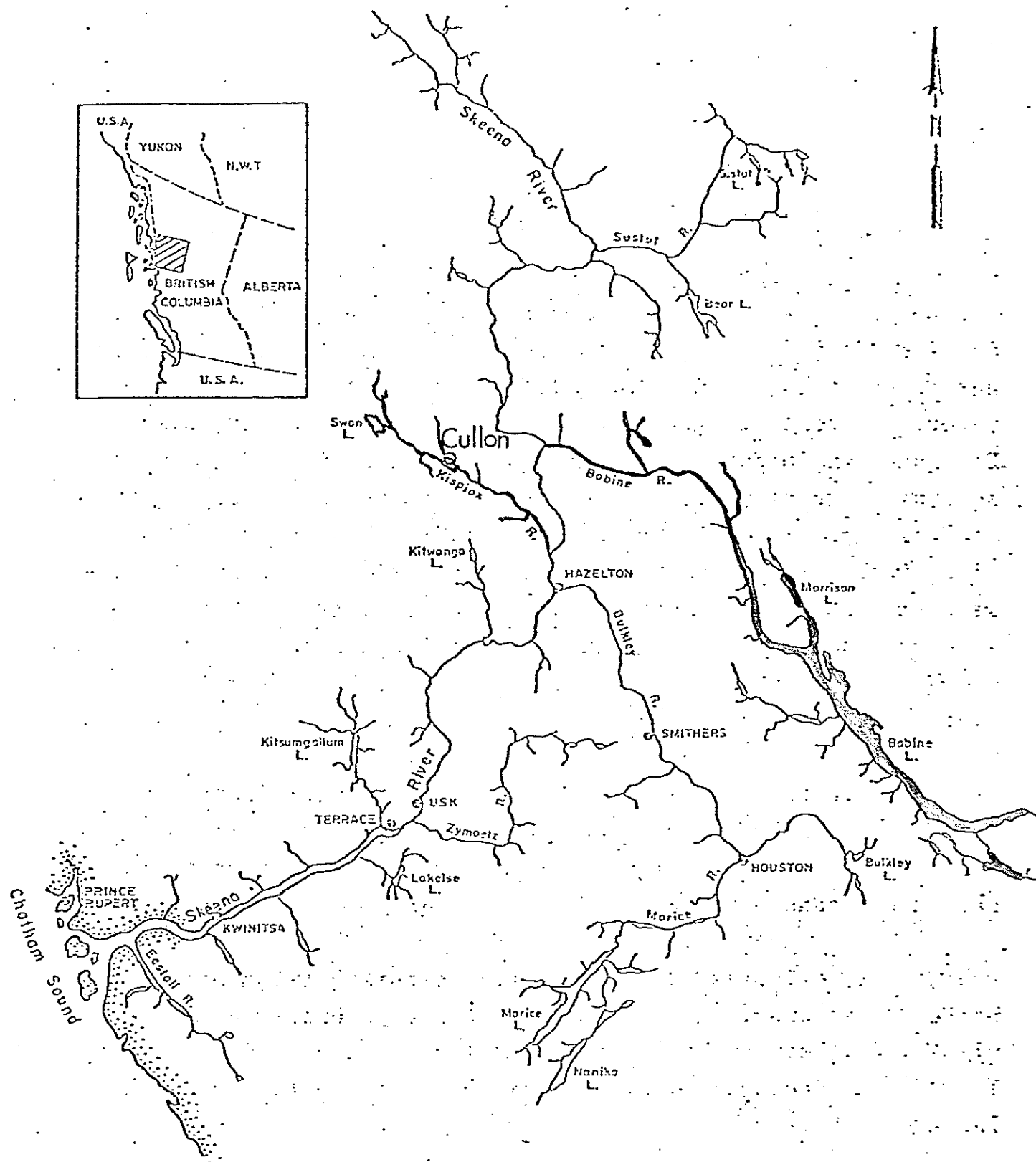
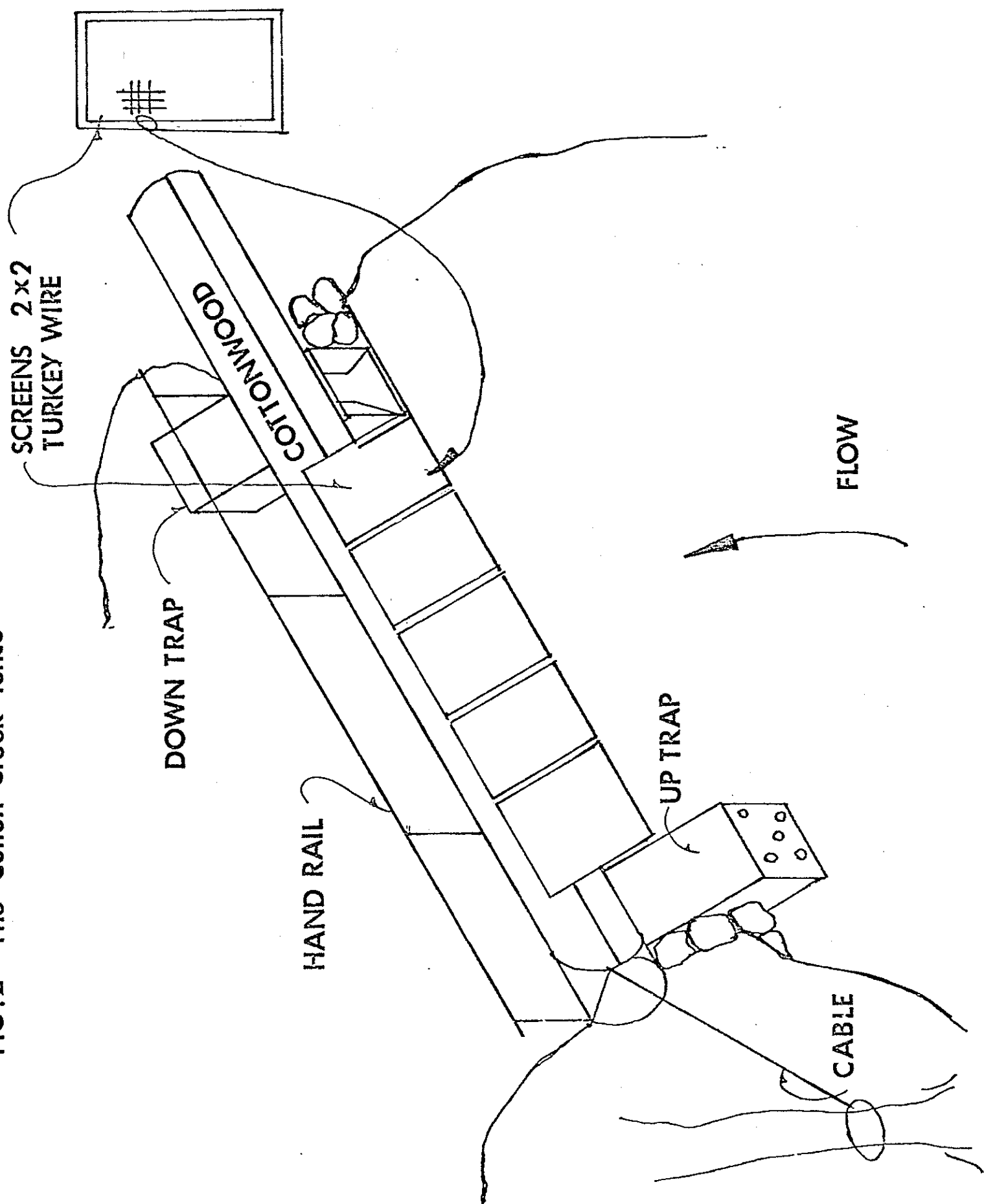


Fig:1 The Skeena River showing Cullon Creek & The Kispiox River

FIG.2 The Cullon Creek fence



upstream from the Cullon-Kispiox confluence. The weir was engineered as an easily installed, readily removable, temporary structure (Fig. 2). Briefly, the basis of the structure consisted of a cottonwood (3 foot diameter) felled across the creek. The tree supported the "tee" bar and turkey wire matrix of the fence. The cottonwood was fastened to standing trees using 3/8" wire cable. Upstream and downstream traps were installed at opposite ends of the fence.

Redd parameters were documented (observation and estimation) including depth, flow, substrate, location, and design. Fry emergence traps were installed on known redd sites (positive) and on suspected redd sites (probable) the first week in August. The traps were checked for emergent fry every few days.

## RESULTS

### Microhabitat Preference

In order to test microhabitat preference, four "Gee" trap sites were located in Cullon Creek relatively proximate to each other but in differing habitats (Table 1). The relative numbers (Table 2) of chinook, coho salmon, and rainbow trout sampled in each of the four different "habitats" were used to deduce habitat preference. The data shown in Table 2 was influenced by the following variables: the type of bait used (roe or anniseed oil), the availability of bait, and

Table 2. Habitat selection and distribution of anadromous fish sampled in Cullon Creek with "Gee" traps in 1976.

Week Ending	Water Gauge	Maximum Temp. °C	Minimum Temp. °C	Fence Pool			Bridge Backwater			Bridge Edgewater			Bridge Fastwater		
				Rb	Co	Ch	Rb	Co	Ch	Rb	Co	Ch	Rb	Co	Ch
May 9	3.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-
May 16	3.3	4.6	3.3	-	-	-	-	-	-	-	-	-	1	1	-
May 23	3.5	5.1	3.3	-	-	-	-	-	-	-	-	-	1	1	-
May 30	3.0	5.6	4.7	-	-	-	4	30	-	1	-	-	-	2	-
June 6	2.9	7.6	6.1	-	-	-	4	46	-	5	1	-	-	-	-
June 13	2.9	8.3	7.0	3	14	-	5	84	-	6	-	-	7	-	-
June 20	2.7	9.1	7.8	16	48	-	14	113	-	17	2	-	1	1	-
June 27	2.5	9.2	7.7	14	61	-	12	145	-	12	32	-	9	6	-
July 4	2.6	10.8	7.4	3	8	-	2	13	-	4	8	-	3	3	-
July 11	2.5	11.1	9.4	9	22	5	2	112	1	14	15	3	8	10	4
July 18	2.5	11.1	9.7	-	7	1	1	146	6	21	33	7	8	21	3
July 25	2.5	10.8	9.6	5	55	13	2	184	6	19	24	3	5	24	3
Aug. 1	2.4	12.2	10.3	3	48	12	1	171	3	14	75	11	2	23	2
Aug. 8	2.1	15.3	12.6	8	28	2	-	98	3	5	22	-	10	32	2
Aug. 15	2.0	13.9	13.3	1	41	2	-	67	3	1	9	1	3	10	-
Aug. 22	1.9	12.9	12.8	16	64	4	17	139	-	19	36	1	12	24	-
Aug. 29	2.0	11.2	11.2	10	105	2	11	100	2	31	41	-	22	31	1
Sept. 5	2.0	10.3	9.9	15	31	-	22	159	-	4	7	-	37	59	-
				103	532	41	97	1607	24	173	305	26	129	248	14

the quality of bait (roe) used. The rough habitat preferences for the three species are: rainbow prefer edgewater (173) or fastwater (129) to slack back-waters (103 and 97); coho habitat is slack dead-water (532 and 1607) as opposed to edgewater (305) or fastwater (248); chinook salmon prefer slackwater (41 and 24) and edgewater (26) to fastwater (14). The success of the "Gee" traps was dependent on temperature, flow, and the time of year.

The data compiled is of use only as a rough index of preference partially because the size of the juveniles (coho, chinook, and rainbow) was not documented. Chinook and rainbow of different size occupy different habitat (Morill, 1972) at different times of the year. D.W. Chapman and T.C. Bjornn (1969) state that chinook and steelhead associate with water velocities and depths in proportion to body size. For example, as body growth occurs, chinook and steelhead shift to faster and deeper water.

#### Macrohabitat Preference (Stream "Gee" Productivity)

Cullon Creek was the most productive Kispiox tributary for numbers of rainbow trout and coho salmon sampled (Appendix I). This system received most of the "Gee" trapping effort but it also produced more rainbow trout per trap than any other system sampled. Table 3 shows the relative abundance of the five species sampled in the main Kispiox and in the tributary streams. This data shows that juvenile steelhead (rainbow) are abundant in Cullon Creek, the Nangeese River,



Clifford Creek, Skunsnat Creek, Deadmans Creek, and in the main-stem Kispiox (community grounds, 17 mile bridge, and the Forestry recreation site). Unfortunately, the sample success is restricted to the area trapped and may not prove true for the whole tributary sampled. Systems and areas that are good habitat for one species may often have good numbers of other species. For example, the Nangeese River (Table 3) has abundant Dolly Varden char ("+++") and fair ("++") coho and chinook salmon.

Obviously only gross inferences can be drawn from the above data, since precise sample locations in 1973 are not known, and the time of year may be different (habitat that is good for rainbow in June may not be in August due to flow change, and/or change in the habitat requirements of the growing fish). Also, the stream itself may have changed due to logging, farming, or beaver activity.

#### Steelhead Adults

The weir operation on Cullon Creek was plagued with extreme high water as are all spring fencing operations. Two heavy runoff periods, April 28 - June 3, and June 30 - July 3, prevented use of the fence during critical periods of adult in-migration and out-migration.

Spawning in Cullon Creek apparently occurred between May 31 and June 15 in 1976. This time frame was substantiated by the application of a tag (no. 274) to an unspawned steelhead on June 12 and by subsequent

Table 3. Distribution and relative abundance of juvenile salmonids in the Kispiox River and selected tributaries, sampled with "Gee" traps in 1976

Location or Stream	Type and relative abundance				
	Rb	Co	Ch	D.V.	Ct
Deadman's	+++	+	++	-	+
Kispiox Water Supply	-	+	+	-	-
Tagging Pool	+	-	+	-	+
Community Grounds	+++	+	+++	-	-
17 Mile Bridge	+++	+	+++	+	-
Recreation Site	+++	-	+	-	-
Telegraph Trail	+	÷	+	-	-
Mile 6½	+	+	+	-	-
Murder Creek	++	+++	+	++	+++
Elizabeth South	-	+	-	-	-
Maitland Creek	+	-	-	-	+++
Ironsides Creek	++	+++	+	+++	-
Corral Creek	-	-	-	+	-
Skunsnat	+++	+++	-	++	+++
Clifford Creek	+++	+++	-	+++	-
Sweetin River	+	-	+	+	-
McCully Creek	++	+	+	+	-
Nangeese River	+++	++	++	+++	+
Date Creek	-	-	-	+	-
Cullon Creek	+++	+++	+++	+++	+

+ few  
 ++ fair  
 +++ abundant

Table 4. Relative abundance of Salmonids in Kispiox River  
Tributaries from surveys in 1973 (Harding and  
Erickson) and 1976

Location	Rb.		Co.		Ch.		D.V.		Ct.	
	1976	1973	1976	1973	1976	1973	1976	1973	1976	1973
McCully Creek	++	+++	+	++	+	0	+	+	0	0
Date Creek	0	+++	0	++	0	+	+	+	0	0
Murder Creek	++	0	+++	+++	+	0	++	0	+++	+
Cullon Creek	+++	+++	+++	+++	+++	0	+++	+	+	+
Ironside Creek	++	0	+++	+	+	0	+++	0	0	+
Clifford Creek	+++	0	+++	++	0	0	+++	0	0	+
Nangeese River	+++	0	++	+++	++	0	+++	+	+	+

+ few

++ fair

+++ abundant

recoveries after spawning on June 16 and June 20. Unspawned steelhead were upstreaming in Cullon Creek until June 12 (Table 5). Kelts were sampled and enumerated in Cullon Creek as late as June 30 when the fence was removed for the second time due to flood conditions.

A total of nine adult steelhead were indisputably identified and passed over the Cullon weir (Table 5). A steelhead population projection of twelve pairs would seem in line considering the number of adults observed and captured by electroshocking and angling.

The temperature ( $6.1^{\circ}\text{C}$ ) suggested by Pinsent (1971) as the temperature at which spawning initiates in some lakeheaded Skeena systems may apply to the Kispiox since  $6.1^{\circ}\text{C}$  was the recorded minimum temperature in Cullon Creek on June 6 during the period that spawning was presumed to occur. The temperature theory is somewhat refuted by the capture of a kelt in the Sweetin River at  $3.5^{\circ}\text{C}$ , although this recovery may be a steelhead that spawned in a warmer upstream Sweetin tributary and not a mainstem.

Several flow measurements were taken on Cullon Creek. One on April 22 at a gauge height of 1.7 feet indicated 168 c.f.s., and a second on April 28 at a gauge height of 2.25 feet indicated 627 c.f.s. A rough estimate of flows in Cullon Creek during spawning would range from 1200 to 1500 c.f.s.

Four steelhead were observed in other Kispiox tributaries: the

**S. P. HATLEVIK**

Table 5. Number, sex, location, method of capture, and condition of adult steelhead in Cullon Creek in 1976.

Date	Method of Capture	Water Temp. °C	Condition	Tag No.	Number of Steelhead	
					Male	Female
May 31	angling	4.4	ripe	72	1	1
June 4	upstream trap	7.2	ripe & running	55	1	0
June 6	observed	7.8	fungus, poor condition		-	-
June 11	upstream trap	6.7	unspawned	275	1	-
June 12	upstream trap	5.5	unspawned	274	1	0
June 15	observed	7.2	8		? 8	?
June 16	angling	7.8	kelt	218	0	1
June 16	angling	7.8	recapture kelt	274	1	0
June 16	angling	7.8	kelt	219	1	0
June 17	turned with electroshocker	8.9	kelts	-	? 8	?
June 17	released downstream, electroshocked	8.9	kelts	-	1	1
June 18	observed	7.8	-	-	1	0
June 20	downstream trap	8.6	kelts	274	2	0
June 20	dead on bank	8.6	kelt	-	1	0
June 22	downstream trap	9.7	kelt	-	1	0
June 25	downstream trap	8.3	kelt	-	1	0
June 28	downstream trap	10.0	kelt	-	1	0
June 29	observed	10.0	-	-	? 1	?
June 30	Fence pulled due to flood conditions					

Nangeese River (May 31, 3.9°C), a ripe unspawned male; Skunsnat Creek (June 4, 6.1°C), one male kelt and one female kelt; the Sweetin River (June 15, 3.5°C, tag number 073), a female kelt.

#### Redd Construction

A Skunsnat Creek redd located about .5 miles below the forest access road was identified as a positive site (a steelhead pair observed in act of spawning). This was the only positive sighting during the 1976 spawn. The Skunsnat redd was in .61 meters of water, depth covered 1.5 square meters of area and was composed of 1.3 cm. gravel (70%) and 7.6 cm. cobbles (30%). Overhanging vegetation provided cover and shade for spawning adults and escape terrain was readily available.

#### Fry Emergence

Fry emergence traps were set on positive and probable redd sites on August 4 and the week following in Cullon Creek, Skunsnat Creek, and Nangeese River. Assuming that steelhead eggs hatch in approximately 30 days in temperatures of 10°C, we were obviously one to two weeks too late (eggs in Cullon Creek were deposited on or around June 10, 10° temperatures were achieved during the last week in June). The traps set in Nangeese River did not catch fish, therefore, even this coldest of the three tributaries allows egg incubation and hatching prior to July-end.

Future Work

- 1) Standard seine net sets should be used to capture smolt sized juveniles at the mouths of streams labelled as good producers (Cullon Creek) to determine time of smolt outmigration.
- 2) Streams similar to Cullon Creek, notably Steep Canyon Creek, identified as juvenile rainbow producers by Harding and Erickson, must be checked for number of spawning adult steelhead.
- 3) Adult enumeration whenever and wherever possible will help to produce an overall Kispiox River spawning estimate.
- 4) "Gee" trapping is not a realistic way to sample large numbers of juvenile rainbow in the Kispiox River. If juvenile work is to persist, then other new techniques must be developed for juvenile capture.

## ACKNOWLEDGEMENTS

Many thanks to Ron Tetreau and Gord Wadley, who gathered all of the information used in this report. The senior author would like to express appreciation to Leslie Boot who is totally responsible for the typing and punctuation in this report.



## REFERENCES

- Chapman, D.W. and T.C. Bjornn. 1969. Distribution of salmonids in streams with special reference to food and feeding. H.R. MacMillan lectures in Fisheries, 1969. P. 163-176.
- Harding, T. and L. Crickson. 1973. A survey of lower Kispiox River streams. File report, B.C. Fish and Wildlife Branch. 12 p.
- Morill, F.M. 1972. Migration response of juvenile chinook salmon to substrates and temperatures.
- Pinsent, M.E. 1971. Population size and some other characteristics of steelhead in the Babine River, British Columbia. Unpublished report, B.C. Fish and Wildlife Branch.