

BULKLEY RIVER STEELHEAD TROUT: A REPORT ON ANGLER USE,  
TAGGING, AND LIFE HISTORY STUDIES CONDUCTED IN  
1982 AND 1983.

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O'NEILL, M.J.  
BULKLEY RIVER STEELHEAD  
TROUT: A REPORT ON ANGLER  
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by

M.J. O'Neill  
and  
M.R. Whately

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

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## INTRODUCTION

The Bulkley River and its major tributary, Morice River, support one of the most intense steelhead trout (Salmo gairdneri Richardson) fisheries in British Columbia. Recent mailed questionnaire surveys of steelhead anglers have shown that the Bulkley-Morice system ranked second in 1981-82 and first in 1982-83 in terms of steelhead angler-days expended (Billings, 1982 and 1983).

Although on-river creel surveys have been conducted in recent years on the Morice River (Whately, et al 1978), very little creel data had been collected in the main Bulkley River, where approximately two-thirds of the total steelhead angler effort in the system is directed. Consequently, in 1982, the Fish and Wildlife Branch initiated a creel census on the Bulkley River which, following refinement of technique, was continued in 1983. The objectives of the project were to determine angler effort, catch and success rate as well as angler origin, distribution of effort by time and space, and tackle preference.

In conjunction with the creel census, a steelhead tagging exercise was also carried out, with the objective being to further refine run timing and instream movement information.

This report presents the data collected during the fall of 1983. Analysis will include manipulation of some of the data collected in 1982. Some attempt will be made to compare results with the annual Branch publication "Steelhead Harvest Analysis."

## DESCRIPTION OF THE STUDY AREA AND STEELHEAD FISHERY

The Bulkley River originates approximately 36 kilometers due east of Houston, B.C. (Fig.1). At a point about 6 kilometers north-west of Houston, the Bulkley is joined by the much larger Morice River. The river then flows in a general northwesterly direction for 120 kilometers to its confluence with the Skeena River at Hazelton.

In 1983, the Bulkley creel census operated in the area between Chicken Creek (near Smithers) and the Bulkley-Morice confluence, and included a portion of the lower Morice (Fig.2). Major access points to this portion of the Bulkley are associated with settlements, i.e. Smithers, Telkwa, Quick, Walcott, Barrett and Houston. Access between these points can be difficult due to topography and/or private property. The river within the study area is quite suitable for boat traffic, and this is a popular method of reaching areas not accessible by road. The river downstream of Chicken Creek is less suitable for boat use.

The Bulkley is a relatively stable river, being largely lake-headed (Morice Lake, Bulkley Lake). The portion of the study area above Telkwa (Fig.2) usually remains clear and stable throughout the summer and fall, but below this point the Bulkley tends to be influenced by weather conditions in the upper Telkwa River drainage. The Telkwa is a volatile, glacial stream that can be quite "flashy" and can affect the fishability of the Bulkley during the steelhead season. However, unfishable conditions even below Telkwa, are relatively uncommon (pers. obs.).

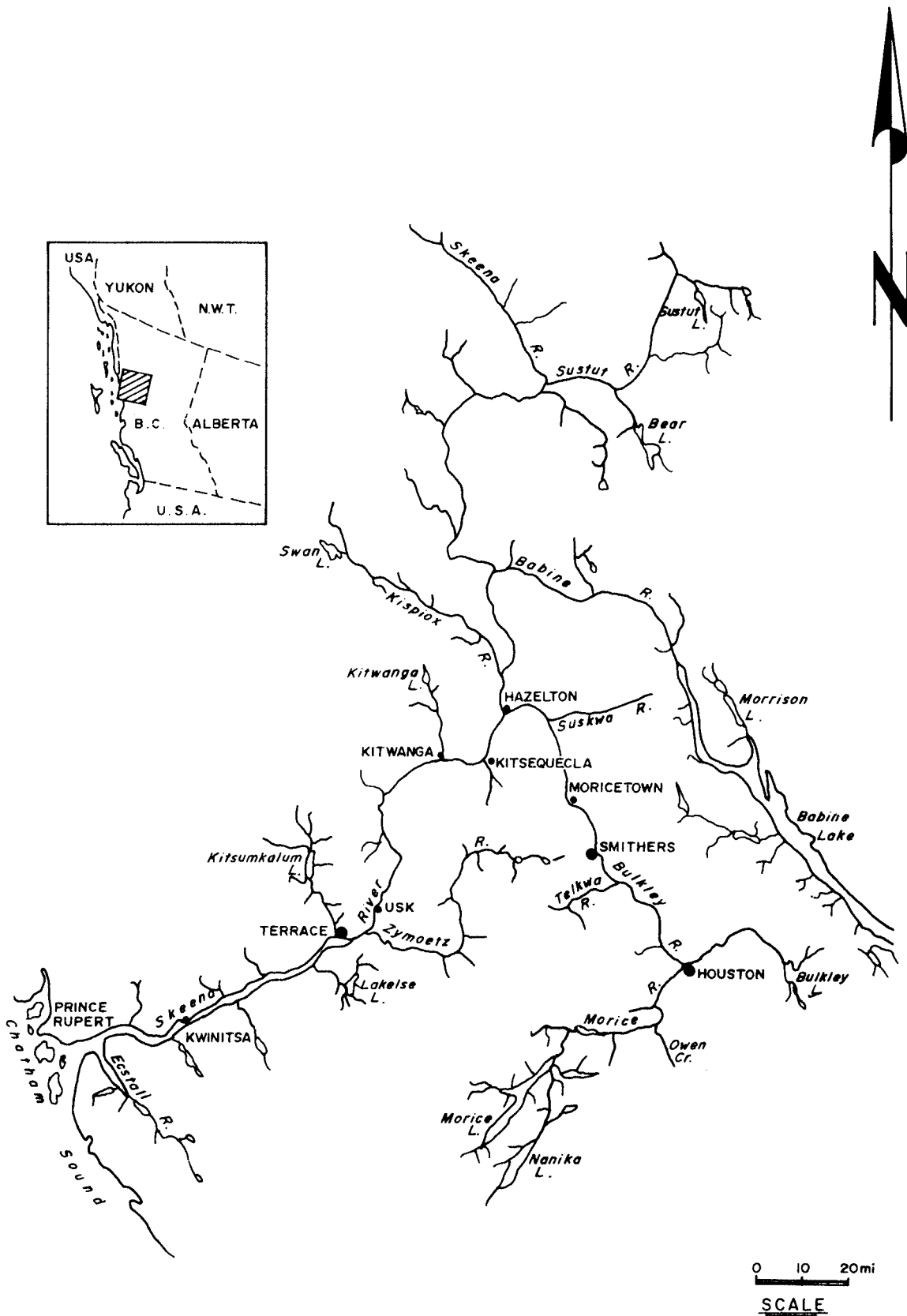


Fig. 1 Skeena River and Main Tributaries

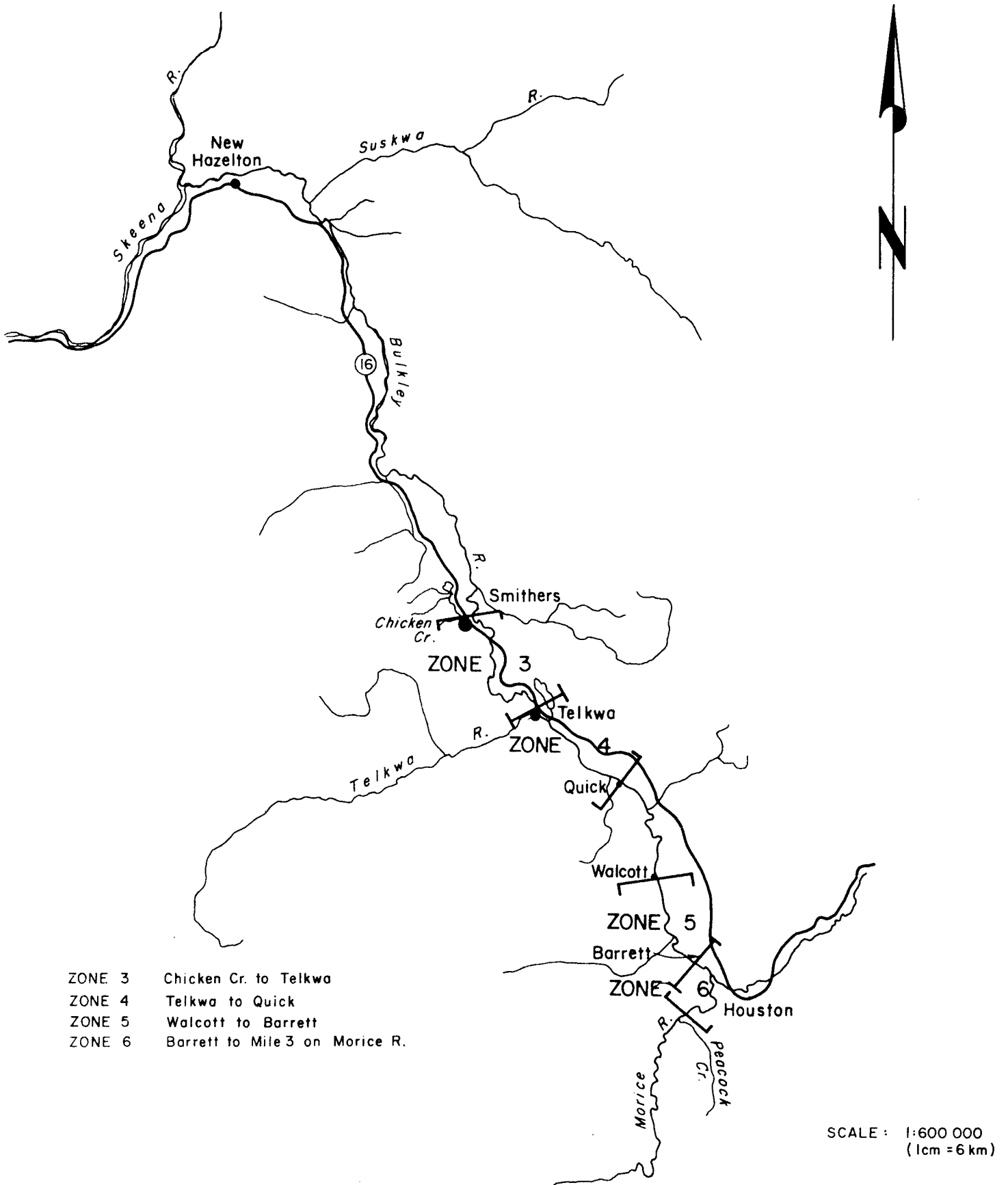


Fig. 2 Bulkley River – Tributaries and Creel Census Zones

Summer-run steelhead destined for the Bulkley-Morice system begin to enter the Skeena River in July and their numbers peak around the second week of August (Lough, M.S. 1981). During this time they are subject to heavy interception in the commercial gillnet fishery for sockeye and pink salmon. As the steelhead progress up the Skeena towards the Bulkley they are also subjected to an intense sport fishery near Terrace and a gauntlet of Indian gillnets at Usk, Kitwanga and Kitsequecla (Fig.1). The first of these steelhead usually enter the Bulkley River in late July (pers. obs.) to face yet another Indian fishery, as well as a concentrated sport fishery, at Moricetown Falls. From late August, Bulkley steelhead are under constant pressure from anglers until the river freezes up, usually in mid to late November.

## METHODS

### Creel Census

The 1983 study area (Smithers to Houston) was divided into four zones, numbered 3 through 6 (Fig.2). These zones, plus zones 1 and 2 (Smithers to Hazelton) were also used during the 1982 census (Fig.3). Manpower constraints forced the elimination of zones 1 and 2 from the 1983 schedule. The section of river between Quick and Walcott was also dropped from the 1983 schedule, since it was identified during 1982 as receiving minimal angler use.

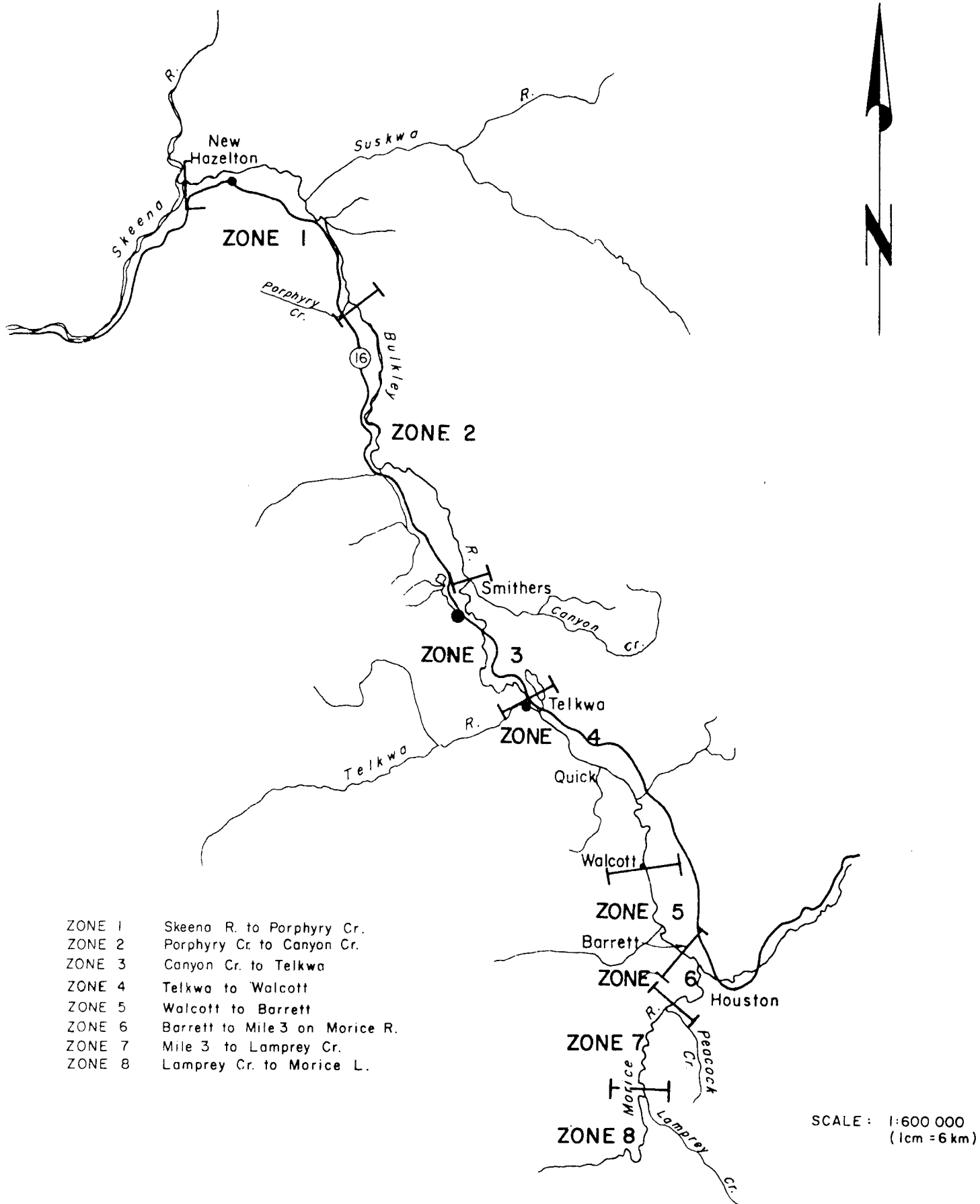


Fig.3 Bulkley River – Tagging Zones



For each zone, creel days were randomly selected to obtain a representation of angling pressure during each month of the season. A distinction was made between weekdays and weekend days<sup>1</sup>, and each zone was sampled on 22 different occasions between August 26 and November 20, 1983 (11 weekdays, 11 weekend days).

On a typical creel day the entire study area was covered by two, 2-man crews. Jet-powered riverboats were used to obtain easy access to anglers. All steelhead anglers encountered were assigned a reference number which was inscribed on the front of their steelhead punchcard. Particulars such as name, residence and gear type were documented by the checkers along with the reference number. During any subsequent checks the angler would be requested to divulge his "number" and specific information regarding that day's catch, plus numbers of days fished and catch since the last check.

Anglers were separated into four residence categories:

Local - B.C. resident living within 100 km of the Bulkley River

B.C. - B.C. resident other than local

N.R.C.- Canadian resident not living in B.C.

N.R.A.- Non-resident of Canada

<sup>1</sup> Weekend days included Labour day, Thanksgiving day and Remembrance day.

## Tagging

Capture of steelhead for the purpose of tagging was accomplished by angling with conventional steelhead gear. After playing and tiring the fish for easier handling a numbered anchor (spaghetti) tag was inserted in the back of the fish after the method described by Whately and Chudyk (1979). Each capture and recapture was recorded as to date, tag number and color, location of capture, plus sex and length of the fish. The location of each capture or recapture was identified using the 1982 zone format (Fig.3).

## Age

Scale samples were collected from as many of the tagged fish as possible, as well as from anglers' creels. Ages were interpreted by regional fisheries technicians after the method described by Narver and Withler (1974).

## RESULTS

### Angler Origin and Effort

A total of 2,676 angler-days were reported during the creel census. Local fishermen accounted for the majority of the angling effort (49.2% of the total number of anglers, 64.6% of the total reported angler-days). The 234 locals checked angled an average of 7.4 days for a total of 1,730 angler-days (Table 1).

Table 1. Numbers of Individual anglers checked and reported effort during the 1983 Bulkley River creel census.

<u>Angler Residence</u>	<u>No. of anglers</u>	<u>Total reported Angler-days (%)</u>	<u>Angler-days per individual</u>
Local	234 (49.2)	1730 (64.6)	7.4
Resident	161 (33.8)	597 (22.3)	3.7
N.R.C.	17 (3.6)	67 (2.5)	3.9
N.R.A.	64 (13.4)	282 (10.6)	4.4
<hr/> Totals	<hr/> 476 (100)	<hr/> 2676 (100.0)	<hr/> 5.6



B.C. residents, other than locals, were responsible for 22.3% of the angler-days reported and accounted for 33.8% of the total number of anglers checked. These "residents" spent a total of 597 angler-days in the study area (an average of 3.7 days for each of the 161 anglers checked).

Anglers from outside of B.C. made up 17.0% of the total number of anglers; 13.4% (64 anglers) were non-residents of Canada, 3.6% (17 anglers) were Canadian residents not living in B.C. These anglers accounted for 10.6% and 2.5%, respectively, of the total reported angler-days.

#### Distribution of Effort

The area between Chicken Creek and Telkwa (Zone 3) accounted for 34.9% (933 angler-days) of the 2,676 angler-days reported (Table 2). The area of second-most popularity was between Barrett and 3 Mile on the Morice (Zone 6) where 31.7% of the angler effort was directed. Zone 4 (Telkwa to Quick) and Zone 5 (Walcott to Barrett) attracted smaller percentages of the total angler effort (20.4% and 13.0% respectively).

Locals represented the vast majority of anglers checked in Zone 3 (56.2%) and Zone 4 (56.1%). In Zones 5 and 6 residents accounted for most of the anglers encountered (43.6% and 45.9% respectively) followed by locals (33.6% and 38.0% respectively). Non B.C. Canadian and non Canadian anglers showed lower representation throughout all four zones of the study area.



Table 2. Angler effort, by residence area, and by zone during the 1983 Bulkley River creel census

ZONE	<u>NUMBERS OF ANGLERS CHECKED</u>				Checked angler- days per zone	reported angler- days per zone (%)
	Local (%)	Resident	(%)	NRC (%)		
3	118 (56.2)	57 (27.1)	8 (3.8)	27 (12.9)	210	933 (34.9)
4	92 (56.1)	37 (22.6)	7 (4.3)	28 (17.0)	164	546 (20.4)
5	37 (33.6)	48 (43.6)	10 (9.1)	15 (13.7)	110	347 (13.0)
6	78 (38.0)	94 (45.9)	5 (2.4)	28 (13.7)	205	850 (31.7)
Total number of anglers checked in study area	325 (47.2)	236 (34.2)	30 (4.4)	98 (14.2)	689	2676 (100.0)





The month of September accounted for 55.7% (1490 angler-days) of the total effort during the creel census (Table 3). October attracted 34.5% and November 9.8% of the total angler effort (the steelhead fishery ended on November 20 due to inclement weather).

#### Catch and Success

Anglers caught a total of 877 steelhead in 2,676 angler-days for an overall success rate of 0.33 fish-per-day (Table 4). Local anglers landed 446 steelhead (50.9%) but had the lowest rate of success at 0.25. Non-Canadian anglers accounted for only 21.0% of the catch but showed the highest success rate (0.65 fish-per-day). Resident anglers landed 223 steelhead (25.4%) while non-resident Canadians caught 24 (2.7%). Success rates for these two groups were 0.37 and 0.36 respectively.

Zones 5 and 6 had the highest success rates in the study area at 0.44 and 0.42 fish-per-day respectively. Zone 4 had a success rate of 0.34 while the lowest rate of success occurred in Zone 3 where anglers landed only 0.20 fish-per-angler-day. Zone 6 also accounted for 40.2% of the total catch (353 steelhead) while the other three zones shared the remainder of the catch fairly evenly.

Overall, anglers killed only 19% of their catch. Non-resident Canadians killed 38% of the fish they landed while non-Canadian anglers killed only 4%. Locals and residents killed 20% and 28% of their catch respectively. Anglers killed a smaller percentage of their catch in Zones 4 (14%) and 6 (18%) than they did in Zones 5 (20%) and 3 (25%).

Table 3. Total reported angler-days per month by zone during the 1983 Bulkley River creel census

ZONE	<u>EFFORT</u>			TOTALS (%)
	Sept (%)	Oct (%)	Nov (%)	
3	504 (54.0)	329 (35.3)	100 (10.7)	933 (100.0)
4	310 (56.7)	196 (35.9)	40 (7.4)	546 (100.0)
5	221 (63.6)	102 (29.5)	24 (6.9)	347 (100.0)
6	455 (53.6)	297 (34.9)	98 (11.5)	850 (100.0)
Total reported angler-days in the study area	1490 (55.7)	924 (34.5)	262 (9.8)	2676 (100.0)

Table 4. Total angler catch, percent kill (in parenthesis) and success by residence area, in each zone of the 1983 Bulkley River creel census.

ZONE	<u>RESIDENCE AREA</u>				
	Locals	Residents	N.R.C.	N.R.A.	All Anglers
3	125(26%)0.17	33(30%)0.27	5(80%)0.21	24(0%)0.57	187(25%)0.20
4	120(13%)0.32	46(20%)0.48	1(100%)0.07	19(5%)0.30	186(14%)0.34
5	33(30%)0.19	63(22%)0.56	14(21%)0.78	41(10%)0.89	151(20%)0.44
6	168(19%)0.38	81(36%)0.31	4(25%)0.36	100(2%)0.76	353(18%)0.42
Entire study area	446(20%)0.25	223(28%)0.37	24(38%)0.36	184(4%)0.65	877(19%)0.33



Local anglers accounted for 53.3% of the total reported kill of 167 steelhead (Table 5). Residents killed 62 steelhead (37.1%) while non-B.C. Canadians and non-Canadians accounted for 5.4% and 5.2% of the total kill respectively.

While the overall catch per individual angler was 1.84 steelhead, non-Canadian anglers (2.89) and locals (1.91) showed the highest catch rates. Residents and non-B.C. Canadians were less successful overall (1.38 and 1.41 fish-per-angler respectively).

Non-Canadian anglers showed the lowest number of kills-per-angler and angler-day (0.11 and 0.02 respectively). Relatively speaking the heaviest kills were attributed to non-B.C. Canadians, who killed 0.52 steelhead per-angler and 0.13 per angler-day. Local and resident anglers showed similar kills-per-angler (0.38) but residents killed twice as many fish per angler-day. Anglers killed an average of 0.35 steelhead per angler and 0.06 steelhead per-angler-day during the 1983 fishery.

#### Tackle Comparisons

Fly fishermen accounted for approximately 57% of the total number of anglers checked and angler-days reported during the creel census (Table 6).

Lure anglers were outnumbered in every zone except Zone 3 where they showed a 2.8% dominance in anglers checked and were responsible for 66% of the angler-days.

Lure anglers were outfished in every zone and accounted for only 24% of the total catch. Fly anglers showed success rates exceeding 0.30 fish-per-day in every zone where as lure anglers could only accomplish this in Zone 6 (0.31).

Table 5. Steelhead kills and catch, per angler and angler day (by residence area), during the 1983 Bulkley River creel census

Residence Area	Kills (%)	Catch per angler	Kills per angler	Kills per angler-day
Local	89 (53.3)	1.91	0.38	0.05
Resident	62 (37.1)	1.38	0.38	0.10
N.R.C.	9 (5.4)	1.41	0.52	0.13
N.R.A.	7 (4.2)	2.89	0.11	0.02
Totals	167 (100.0)	1.84	0.35	0.06

Table 6. Angler effort, catch and success, per terminal tackle, in each zone of the 1983 Bulkley River creel census.

ZONE	LURE ANGLERS					FLY ANGLERS				
	Number of Lure Anglers checked per zone (%)	Angler Days (%)	Total Catch (%)	No. Killed (%)	Success	Number of Fly-Anglers Checked per zone (%)	Angler Days (%)	Total Catch (%)	No. Killed (%)	Success
3	108 (51.4)	611 (66)	80 (43)	30 (38)	0.13	102 (48.6)	322 (34)	107 (57)	16 (15)	0.33
4	64 (39.0)	229 (42)	40 (22)	10 (25)	0.17	100 (61.0)	317 (58)	146 (78)	17 (12)	0.46
5	49 (44.5)	111 (32)	28 (18)	11 (39)	0.25	61 (55.5)	236 (68)	123 (82)	19 (15)	0.52
6	76 (37.1)	193 (23)	61 (17)	23 (38)	0.31	129 (62.9)	657 (77)	292 (83)	41 (14)	0.44
Entire Study Area	297 (43.1)	1144 (43)	209 (24)	74 (35)	0.18	392 (56.9)	1532 (57)	668 (76)	93 (14)	0.44





Fly fishermen killed 14% of their catch and did not kill greater than 15% in any one zone. Lure anglers killed 35% of the steelhead they landed and averaged at least 38% kill in every zone but Zone 4 where they killed 25%. Fly fishermen, however, killed more steelhead than lure anglers, accounting for 93 of the 167 steelhead reported killed (55.7%).

### Life History of Bulkley River Steelhead

Scale samples were collected from 245 steelhead during the 1983 creel census, of which only 10 were unsuitable for use in total age determination. Eight age groups were identified with the most common being 3.1+ (57.9%) (Table 7). The second-most common age group was 3.2+ (23.8%) followed by 4.1+ (10.6%). The 3.1+ fish were male dominant (60.3%) while the 3.2+ steelhead were mostly female (73.2%). Only 2 different fresh water age groups were identified with the vast majority being 3. (85.6%). Repeat spawners, most of which were females, accounted for only 3.4% of the steelhead sampled in 1983.

Preliminary data gathered in 1982 representing 268 readable samples, also showed 8 age groups present (Table 7). The most frequently observed age groups were 3.2+ (56.0%), 3.1+ (34.2%), 4.1+ (3.0%) and 4.2+ (3.0%). All age groups were dominated by female fish with 3.2+ showing the largest proportion of females (64.0%). As in 1983, only 2 different freshwater age groups were represented with the vast majority being 3. (94.0%). Repeat spawners, the majority being females, accounted for only 3.4% of the total sample in 1982.

Table 7. Steelhead trout age groups from the Bulkley River  
 1982 (n = 268), and 1983 (n = 235)

Age Group	Number of Steelhead (%)			Numbers by sex in 1982 (%)		Numbers by sex in 1983 (%)	
	1982	1983	Total	Male	Female	Male	Female
3.1+	92 (34.2)	136 (57.9)	228 (45.3)	42 (45.6)	50 (54.4)	82 (60.3)	54 (39.7)
3.2+	150 (56.0)	56 (23.8)	206 (40.9)	54 (36.0)	96 (64.0)	15 (26.8)	41 (73.2)
3.3+	1 (0.4)	2 (0.9)	3 (0.6)	1 (100.0)	0 (0.0)	1 (50.0)	1 (50.0)
4.1+	8 (3.0)	25 (10.6)	33 (6.6)	3 (37.5)	5 (62.5)	16 (64.0)	9 (36.0)
4.2+	8 (3.0)	8 (3.4)	16 (3.2)	0 (0.0)	8 (100.0)	4 (50.0)	4 (50.0)
3.1S1+	7 (2.6)	5 (2.1)	12 (2.4)	2 (28.6)	5 (71.4)	3 (60.0)	2 (40.0)
3.1S1S1+	1 (0.4)	2 (0.9)	3 (0.6)	0 (0.0)	1 (100.0)	0 (0.0)	2 (100.0)
3.2S1+	1 (0.4)	0 (0.00)	1 (0.2)	0 (0.0)	1 (100.0)	0 (-)	0 (-)
4.2S1+	0 (0.0)	1 (0.4)	1 (0.2)	0 (-)	0 (-)	0 (0.0)	1 (100.0)
<b>Total</b>	<b>268 (100)</b>	<b>235 (100)</b>	<b>503 (100)</b>	<b>102 (38.1)</b>	<b>166 (61.9)</b>	<b>121 (51.5)</b>	<b>114 (48.5)</b>

## Instream Movements of Tagged Steelhead

During the 1982 and 1983 creel surveys 715 steelhead were tagged on the Bulkley-Morice system (complete tagging records are on file, Smithers Fish and Wildlife office). To date 67 tag recaptures have been reported.

Of the 317 steelhead tagged in 1982 there have been 29 recaptures to date (Table 8). Fish recaptured in 1982 showed little or no movement from their tagging sites. Recaptures (of 1982 tagged fish) during the spring of 1983, however, indicate some major movements (#275 and #278 travelled downstream approximately 25 km, #133 migrated upstream almost 50 km). Two steelhead tagged in the fall of 1982 were reported recaptured in the Bulkley River during the fall of 1983 (#55 and #285) which was contrary to the theory that Skeena summer-run steelhead require a full year in the ocean between each spawning migration. Verification of #285 was made by comparing scale samples collected #285 in 1982 with samples from 1983. The latter scales showed evidence of spawning and returning to the ocean after being tagged in 1982. One steelhead kelt (#92) was caught by a commercial gillnetter on June 10, 1983 near the mouth of the Skeena River.

Of the 398 steelhead tagged in 1983 there have been 38 recaptures to date (Table 9). Two steelhead (#299 and #306) travelled over 45 km upstream from their tagging sites. Another fish (#8) tagged on August 20 at the Bulkley-Skeena confluence migrated over 100 km upstream to its recapture site. Other than these 3 fish there was very little movement in evidence. Two steelhead (#120 and #53) were each recaptured twice in close proximity to their tagging sites.

Table 8. Recaptures to date from 1982 steelhead tagging exercise on the Bulkley-Morice system. (n = 317)

Catalog Number	Tag Color and Number	Date Tagged	Zone Tagged	Date Recaptured	Zone Recaptured
1	yellow 00751	Sept. 03, 1982	3	Sept. 20, 1982	3
16	00711	Sept. 16, 1982	1	Sept. 25, 1982	1
28	00716	Sept. 16, 1982	1	Oct. 02, 1982	1
30	00718	Sept. 28, 1982	1	Nov. 13, 1982	1
55	00762	Oct. 02, 1982	4	Oct. 20, 1983	2
63	00109	Oct. 07, 1982	6	Oct. 30, 1982	6
86	00771	Oct. 01, 1982	2	Oct. 06, 1982	2
92	00785	Oct. 03, 1982	2	June 10, 1983	Pacific Ocean
130	00963	Sept. 21, 1982	3	Oct. 31, 1982	3
133	00968	Sept. 24, 1982	3	Mar. 28, 1983	6
137	yellow 00958	Sept. 24, 1982	3	Oct. 29, 1982	4
138	00966	Sept. 24, 1982	3	Oct. 20, 1982	3
266	00490	Nov. 07, 1982	5	April 13, 1983	5
267	00953	Sept. 15, 1982	4	Nov. 07, 1982	5
270	00700	Sept. 24, 1982	8	Sept. 24, 1982	8
275	00434	Oct. 07, 1982	8	Mar. 22, 1983	7
278	00438	Oct. 08, 1982	8	Mar. 22, 1983	7
285	00474	Nov. 10, 1982	6	Nov. 21, 1983	3
305	yellow 00453	Oct. 03, 1982	4	Nov. 11, 1982	6
68	green 00452	Oct. 07, 1982	6	Oct. 16, 1982	6
70	00454	Oct. 07, 1982	6	Oct. 28, 1982	6
155	00652	Oct. 01, 1982	4	Oct. 10, 1982	4
164	00664	Oct. 05, 1982	3	Oct. 30, 1982	4
191	00501	Oct. 18, 1982	4	Oct. 23, 1982	4
208	00684	Oct. 08, 1982	3	Oct. 31, 1982	3
223	00662	Oct. 15, 1982	4	Oct. 21, 1982	4
224	00675	Oct. 15, 1982	4	Oct. 25, 1982	3
231	green 00695	Oct. 23, 1982	3	Oct. 26, 1982	3
168	blue 00107	Oct. 25, 1982	3	Oct. 31, 1982	3

Table 9. Recaptures to date from 1983 steelhead tagging exercise on the Bulkley-Morice system. (n = 398)

Catalog Number	Tag Color and Number	Date Tagged	Zone Tagged	Date Recaptured	Zone Recaptured
10	yellow 00446	Aug. 22, 1983	3	Sept. 12, 1983	3
30	00692	Sept. 08, 1983	3	Oct. 31, 1983	3
34	00658	Sept. 11, 1983	6	Oct. 04, 1983	6
37	00659	Sept. 13, 1983	4	Oct. 17, 1983	4
38	00775	Sept. 13, 1983	4	Oct. 03, 1983	4
41	00774	Sept. 11, 1983	3	Nov. 12, 1983	3
84	00794	Sept. 27, 1983	2	Oct. 21, 1983	2
89	00799	Sept. 28, 1983	4	Nov. 20, 1983	3
114	00462	Oct. 03, 1983	6	Oct. 12, 1983	6
120	yellow 00469	Oct. 04, 1983	4	Oct. 10, 1983 and Nov. 13, 1983	4 4
163	00551	Oct. 10, 1983	5	Oct. 23, 1983	5
164	00552	Oct. 10, 1983	5	Oct. 16, 1983	5
299	00984	Sept. 07, 1983	3	Nov. 15, 1983	6
300	00985	Sept. 07, 1983	3	Sept. 30, 1983	3
306	00681	Sept. 10, 1983	3	Oct. 20, 1983	6
314	00683	Sept. 16, 1983	4	Sept. 25, 1983	3
321	yellow 00684	Sept. 20, 1983	4	Oct. 23, 1983	5
8	green 00847	Aug. 20, 1983	1	Nov. 04, 1983	4
20	00873	Sept. 01, 1983	4	Sept. 28, 1983	4
53	00181	Sept. 13, 1983	6	Sept. 25, 1983 and Oct. 23, 1983	6 6
59	00880	Sept. 14, 1983	3	Nov. 14, 1983	3
93	00507	Sept. 30, 1983	4	Oct. 08, 1983	4
95	00867	Sept. 22, 1983	4	Oct. 23, 1983	4
97	00869	Sept. 28, 1983	4	Oct. 04, 1983	4
129	00517	Oct. 04, 1983	4	Oct. 23, 1983	4
132	00510	Oct. 03, 1983	4	Nov. 05, 1983	4
203	green 00447	Oct. 05, 1983	8	Oct. 25, 1983	8
210	00918	Sept. 25, 1983	8	Oct. 09, 1983	8
270	00519	Sept. 22, 1983	2	Oct. 02, 1983	2
296	00812	Sept. 05, 1983	4	Sept. 13, 1983	3
302	00814	Sept. 07, 1983	3	Sept. 08, 1983	3
319	00828	Sept. 20, 1983	4	Sept. 28, 1983	4
323	00953	Sept. 22, 1983	4	Oct. 15, 1983	4
325	00830	Sept. 23, 1983	4	Nov. 09, 1983	4
340	00965	Oct. 09, 1983	4	Oct. 20, 1983	4
390	green 00835	Sept. 18, 1983	7	Sept. 21, 1983	7
174	pink 00819	Oct. 16, 1983	4	Oct. 27, 1983	5
222	pink 00840	Oct. 20, 1983	4	Nov. 20, 1983	4

## DISCUSSION

### The Sport Fishery

The data presented represent the reported number of angler-days and steelhead landed. It is assumed that all anglers in the study area were contacted and no correction factor has been used to compensate for any anglers not encountered.

Anglers living in British Columbia accounted for approximately 87% of the angler effort on the Bulkley River. The attraction of the "big fish rivers" such as the Kispiox, Babine and Sustut appear to draw most of the non-B.C. anglers away. Many out-of-province anglers who do frequent the Bulkley tend to do so in the early part of the season and then move to the aforementioned streams in mid to late September (pers. obs.). Local fishermen, taking advantage of the close proximity of the river to the communities of Smithers and Houston, accounted for 65% of the total angler effort. Preliminary data from the 1982 creel census closely resemble these findings (81% of the total angler effort was by B.C. residents, local anglers accounted for 56%) (Appendix I).

Angler success appears to be related to the distance travelled to reach the angling site. Non-Canadian anglers, the most distant angler group, had the highest rate of success while local anglers' success rate was the lowest. Anglers willing to travel a great distance are more serious in their endeavors whereas fishermen local to the area present a real "mixed bag" of anglers (pers. obs.). The 1982 data are consistent with those of 1983 (Appendix I).

Fly fishing is a very popular and successful method of angling on Bulkley River. Fifty-seven percent of the angler effort in 1983 was attributable to fly fishermen who accounted for 76% of the total catch. However, the 1982 data shows that during that year only 46% of the angler effort was expended by fly anglers and who were responsible for 56% of the catch. This difference is probably due to the exclusion in the 1983 creel census of portions of the Bulkley which are dominated by lure anglers (Zones 1 and 2).

The majority of Bulkley anglers appear to be sympathetic to catch and release regulations which is evidenced by the fact that 81% of the steelhead landed were released. Fly fishermen in particular reflected this attitude by releasing 86% of their catch while lure fishermen released 62%. Non-Canadian anglers released 96% of the steelhead they landed.

#### Comparison to Steelhead Harvest Analysis

In 1982 it was estimated there were 3,794 angler-days on the entire Bulkley River<sup>1</sup> (Table 10), which is 65% lower than the estimate given in the Steelhead Harvest Analysis (S.H.A.) for that year. This occurrence is particularly interesting in light of the findings of Caverly (1981) who found an overestimate by the S.H.A. compared to his creel estimate for the Thompson River during the 1980 steelhead fishery. S.H.A. estimates of Thompson River for 1976 through 1980 averaged 62% higher than creel estimates for the same period (Cartwright, 1979).

<sup>1</sup>This includes the lower section of the Morice below 3 Mile and excludes the Bulkley above the Morice confluence.

Table 10. Comparative estimates<sup>1</sup> of data collected during the 1982 and 1983 Bulkley River creel census.

ZONE	<u>CHECKED ANGLER DAYS (%)</u>		Estimated Angler-days 1983 (%)	Estimated Catch (%) 1983 (%)	Estimated Kill (%) 1983 (%)	Estimated Success 1983
	1982	1983				
1	323(8)	223(8)	264(8)	223(17)	42(19)	0.84
2	409(11)	306(11)	364(11)	209(16)	71(34)	0.57
3	998(26)	745(27)	933(28)	187(14)	47(25)	0.20
4	670(18)	510(18)	546(17)	186(14)	26(14)	0.34
5	331(9)	329(12)	347(10)	151(12)	30(20)	0.44
6	1063(28)	670(24)	850(26)	353(27)	64(18)	0.42
Totals	3794(100)	2783(100)	3304(100)	1309(100)	280(21)	0.40

<sup>1</sup>Estimates for zones 1 and 2 in 1983 have been acquired using percentages found to be representative by the 1982 creel census.



In 1983, using the same method of extrapolation as in 1982 (Table 10), it was estimated there were 2,783 angler-days on the Bulkley. It may be assumed that this estimate, as in 1982, will also be 65% lower than the S.H.A. estimate when it is published in 1984. If this is the case it should be expected that 7,950 angler-days will be reported by S.H.A. for the 1983 Bulkley River steelhead fishery.

As a result of acquiring additional information from anglers in 1983 regarding activity not recorded during previous creel-days a more accurate estimate was achieved (Table 10). Estimates indicate fishermen spent 3,304 angler-days on the Bulkley River during the 1983 steelhead fishery, landing 1,309 steelhead (of which they killed only 21%) for a success rate of 0.40. These estimates should more closely resemble those of the S.H.A. than the estimates shown in the preceding paragraph and indicate the sampling procedure used in 1983 was superior to that of 1982.

### Steelhead Life History

The life history data gathered in 1982 and 1983 indicate the most common freshwater age group to be 3. (94.0% and 85.6% respectively). There is, however, a large discrepancy regarding the most common ocean age between the two years. In 1982 59% of the steelhead were .2+, while in 1983 the most common ocean age was .1+ (68.5%) (.2+ fish were only 27% of the total). This discrepancy may be the result of a major flood which occurred in the fall of 1978, which may have accounted for heavy mortality of that years' steelhead fry. Since almost all of the

steelhead in the Bulkley smolt at age 3. it would be expected that repercussions of fry mortality in 1978 would be evidenced by poor returns of four (3.1+) and five year old (3.2+) adults in 1982 and 1983 respectively. This appears to have been the case as in 1982 only 34.9% of the run were four year old fish (52% five year old) whereas in 1983 the run consisted of 54% four year old fish but only 34% fives.

Repeat spawners represented only 3.4% of the steelhead run during both 1982 and 1983. This is indicative of the many perils this population faces as a result of the Bulkley's inland location. Steelhead kelts must run a gauntlet of Indian gill nets while on their downstream migration to the ocean, and once there are susceptible to harvest by commercial fishermen targeting on salmon. On their return migration these fish are then subjected to the full force of the commercial salmon fishery at the mouth of the Skeena, an intense sport fishery in the river itself, as well as the unrelenting Indian "food" fishery.

The two steelhead tagged in 1982 and recaptured in 1983, while returning to spawn again, throw a ringer into the current method of aging return spawners from the Bulkley River. It was previously accepted that populations of summer steelhead from inland rivers spend a full year in the ocean after returning from a spawning run. This can no longer be assumed as both of these fish spawned in the spring of 1983, returned to the ocean where they spent only a few months at most, and returned to the Bulkley again in the fall of 1983.

## Steel head Movements

Instream movements of tagged steelhead occupying the Bulkley River show steelhead as being less susceptible to angling when they are travelling. Only 3 of the recaptured steelhead showed any appreciable upstream movement from their tagging sites. This indicates the vast majority of fish tagged had already reached their destination and were occupying holding water.

Run timing information will become available in the summer and fall of 1984 and 1985 when some of the surviving tagged fish are intercepted in the various fisheries they will face on their return migration.

## SUMMARY

1. The vast majority of anglers utilizing the Bulkley River were found to be British Columbia residents (83.0%). The majority of these anglers were locals living within 100 km of the Bulkley (49.2%).
2. Total reported angler-effort expended in the censused area was 2,676 angler-days. Estimated angler-effort for the entire Bulkley River (Skeena confluence to 3 Mile on the Morice) was 3,304 angler-days.
3. The portions of the study area in close proximity to the communities of Smithers and Houston were the most heavily utilized in terms of angler-effort. The Smithers area (Zone 3) accounted for 34.9% of the total reported effort while Zone 6 (near Houston) received 31.7%.
4. Anglers caught a total of 877 steelhead in the study area and had an overall success rate of 0.33 fish-per-day. Estimated catch for the entire Bulkley River was 1,309 steelhead and angler-success was 0.40.
5. Anglers killed only 19% of their catch in the creeled area and an estimated 21% on the entire Bulkley. Non-Canadian anglers had the lowest kill percentage and released 96% of their catch.

6. Fly fishermen accounted for 57% of both anglers censused and total effort expended, and were responsible for 76% of the total catch (of which they released 86%). Fly fishermen were more than twice as successful as lure fishermen, landing 0.44 fish-per-day.
7. Of 503 readable scale samples collected from steelhead on the Bulkley River in 1982 and 1983, 90.3% indicated smolting at age 3. Nine different age groups were identified with the most common being 3.1+ (45.3%), 3.2+ (41.0%), 4.1+ (6.6%) and 4.2+ (3.2%). Repeat spawners accounted for only 3.4% of the sample.
8. The most frequently observed ocean ages were .1+ (53.7%) and .2+ (45.7%). Only 3 steelhead were .3+ (0.6%). Females accounted for 67.1% of the .2+ fish while 54.8% of the .1+ fish were males.
9. The Steelhead Harvest Analysis estimate of effort in the 1982 steelhead fishery on the Bulkley River was 65% higher than the creel estimates for that same year.
10. All Bulkley River steelhead do not spend an entire year in the ocean after returning from a spawning run. Two adult steel head tagged in the Bulkley during the fall of 1982 were recaptured in the fall of 1983 while returning to spawn again.

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## References

- Billings, S.J. 1982. Steelhead Harvest Analysis 1981-82. B.C. Fish and Wildlife Branch, Fish. Tech. Circ. No. 56, 25 pp.
- Billings, S.J. 1983. Steelhead Harvest Analysis 1982-83. B.C. Fish and Wildlife Branch, Fish. Tech. Circ. No. 59, 23 pp.
- Cartwright, J., M.S. 1979. Enhancement and management of mid-Fraser summer-run steelhead-Chilko/Chilcotin and Thompson River systems. Fish and Wildlife Branch. Unpubl. M.S.
- Caverly, A., M.S. 1980. Creel survey of the 1980 Thompson River steelhead fishery and results of marked fish returns. B.C. Fish and Wildlife Branch. 32 pp. Unpubl. M.S.
- Lough, M.J., M.S. 1981. Commercial Interceptions of Steelhead trout in the Skeena River --- Radio telemetry studies of stock identification and rates of migration. B.C. Fish and Wildlife Branch. 33 pp. Unpubl. M.S.
- 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 Service, Nanaimo, B.C. Circ. No. 99, 25 pp.
- Whately, M.R., W.E. Chudyk and M.C. Morris, M.S. 1978. Morice River Steelhead trout: The 1976 and 1977 sport fishery and life history characteristics from anglers' catches. B.C. Fish and Wildlife Branch, Fish. Tech. Circ. No. 36, 26 pp.
- Whately, M.R. and W.E. Chudyk. M.S. 1979. An estimate of the number of steelhead trout spawning in Babine River near Babine Lake. B.C. Fish and Wildlife Branch. 17 pp. Unpubl. M.S.

## APPENDIX I

### Bulkley River Steelhead Angler Survey - 1982

#### Angler effort per zone - (Table 1)

Bulkley River steelhead anglers fished an estimated total of 3,794 angler days, from September through November, in 1982. A total of 701 angler days were actually checked during the census. Zone 6 accounted for 28% of the estimated total angler effort, Zone 3 accounted for 26%.

#### Angler effort by residence - (Table II)

Local anglers made up 56% of the fishermen checked during the creel census. Other B.C. residents accounted for 25% followed by non-resident aliens with 13% and non-resident Canadians with 6% of the total angler effort.

Local anglers accounted for 72% of the angler effort in Zone 3, 53% in Zone 4, 72% in Zone 5, and 56% in Zone 6. Resident anglers made up 34% of the angling effort in Zone 1 and 47% in Zone 2.

#### Angler effort per month - (Table III)

53% of the estimated total angler effort during the creel census occurred in September. The month of October accounted for 42%, and November 5% of the effort.



Angler effort per terminal tackle - (Table IV)

Of the 701 censused anglers 54% were lure fishermen and 46% were fly fishermen. Zones 1 and 2 had 61 and 83% lure anglers respectively, while Zone 5 was 66% lure fishermen. Zones 3 and 4 were equally utilized by both fly and lure anglers, while Zone 6 had fly fishermen comprising 59% of the total effort.

Angler catch, success and kill by residence area - (Table V)

Local anglers landed 39% of the steelhead checked during the creel census. Residents caught 29%, non-resident aliens 26%, and non-resident Canadians 6%. Local anglers caught most of their fish in October, while the rest angled most of their fish in September.

Non-resident alien anglers had the highest success rate at 0.53 fish per angler day. Residents were 0.31, non-resident Canadians 0.29, and local anglers landed 0.18 steelhead per angler day.

Anglers killed 31% of the steelhead they caught on the Bulkley river during the creel census. Non-resident Canadians killed 75% of the fish they landed, while non-resident aliens killed only 8%. Local anglers killed 41% of their catch, residents killed 30%. September and October accounted for 28 kills apiece in the anglers creel. The percentage of landed steelhead killed varied little during the creel census, ranging from 30 to 33%.

Angler catch and success per zone - (Table VI)

One hundred and eighty-five steelhead were checked during the creel census. Twenty-eight per cent of these fish were taken in Zone 6, 19% in Zone 3, and 17% in Zone 1.

Overall angler success during the creel census was 0.26 fish per angler day. Zones 1 and 2 had success rates of 0.52 and 0.44 fish per day, the catch in Zone 3 was 0.17 fish per angler day.

Angler catch, success and kill per terminal tackle - (Table VII)

Fly fishermen accounted for 56% of the steelhead checked during the creel census while lure anglers caught 44%. Fly anglers landed most of their fish in Zones 6 and 3, lure fishermen angled most of their fish in Zones 2, 6 and 1.

Fly fishermen also out did lure anglers in catch per angler day, 0.32 fish per day for fly anglers compared to 0.22 for lure anglers. Both fly and lure anglers had their best success in Zones 1 and 2.

Lure anglers killed 41 fish during the creel census, which was 50% of their catch. Fly anglers only killed 17 steelhead, 16% of what they landed. Zones 5 and 6 accounted for the highest lure-kill percentages, 67 and 71% respectively. Fly-kill percentages were highest in Zone 5 at 36% and Zone 2 where they killed 22 1 of their catch.

Table I. Angler effort, per zone, during  
1982 Bulkley River creel census

<u>Bulkley River Creel census zone</u>	<u>Total creel angler days per zone</u>	<u>Est. total angler days per zone</u>	<u>% of est. total angler days</u>
1	62	323	8%
2	66	409	11%
3	218	998	26%
4	74	670	18%
5	80	331	9%
6	210	1063	28%
<hr/> Total	<hr/> 701	<hr/> 3794	<hr/> 100%

Table II. Angler Effort, by Residence Area, in each zone of the 1982 Bulkley River creel census.

Bulkley River creel census zone	Residence		Area		Totals (%)
	Local (%)	Resident (%)	NRC (%)	NRA (%)	
1	7 (11)	21 (34)	14 (23)	20 (32)	62 (100)
2	22 (33)	31 (47)	9 (14)	4 (6)	66 (100)
3	157 (72)	32 (15)	3 (1)	26 (12)	218 (100)
4	39 (53)	17 (23)	1 (1)	17 (23)	74 (100)
5	58 (72)	11 (14)	6 (8)	5 (8)	80 (100)
6	112 (56)	62 (31)	9 (4)	18 (9)	201 (100)
<b>Total Angler-days</b>	<b>395 (56)</b>	<b>174 (25)</b>	<b>42 (6)</b>	<b>90 (13)</b>	<b>701 (100)</b>

Residence Area:

local	Fraser Lk --- Hazelton resident
resident	B.C. resident
NRC	Non-resident Canadian
NRA	Non-resident alien

Table III. Estimated total angler-days, per month,  
in each zone of the 1982 Bulkley River creel census

<u>Zone</u>	<u>Effort</u>			<u>Totals (%)</u>
	<u>Sept. (%)</u>	<u>Oct. (%)</u>	<u>Nov. (%)</u>	
1	207 (64)	100 (31)	16 (5)	323 (100)
2	311(76)	86 (21)	12 (3)	409 (100)
3	409(41)	559 (56)	30 (3)	998 (100)
4	315 (47)	355 (53)	0 (0)	670(100)
5	119(36)	176 (53)	36 (11)	331 (100)
6	648 (61)	340 (32)	75 (7)	1063 (100)
<hr/> Total est. angler days	2009 (53)	1616 (42)	169 (5)	3794 (100)

Table IV. Angler effort, per terminal tackle, during the 1982 Bulkley River creel census.

<u>Bulkley River Creel census zone</u>	<u>Total lure-anglers Checked per zone (%)</u>	<u>Total fly-anglers Checked per zone (%)</u>	<u>Totals (%)</u>
1	38 (61)	24 (39)	62 (100)
2	55 (83)	11 (17)	66 (100)
3	110 (50)	108 (50)	218 (100)
4	37 (50)	37 (50)	74 (100)
5	53 (66)	27 (34)	80 (100)
6	83 (41)	118 (59)	201 (100)
<hr/> <u>Total</u>	<hr/> 376 (54)	<hr/> 325 (46)	<hr/> 701 (100)

Table V. Total catch, angler success and percentage of fish killed, by residence, during each month of the 1982 Bulkley River creel census.

Residence Area	September			October			November			Means		
	Catch	Success	No. Killed(%)	Catch	Success	No. Killed(%)	Catch	Success	No. Killed(%)	Catch(%)	Success	No. Killed %)
Local	29	0.19	10 (34)	37	0.16	17 (46)	5	0.31	2 (40)	70 (39)	0.18	29 (41)
Resident	33	0.31	10 (30)	21	0.32	6 (28)	0	0.00	0 (-)	54 (29)	0.31	16 (30)
NRC	7	0.33	6 (86)	5	0.24	3 (60)	0	-	0 (-)	12 (6)	0.29	9 (75)
NRA	25	0.48	2 (8)	23	0.61	2 (9)	0	-	0 (-)	48 (26)	0.53	4 (8)
all anglers	94	0.29	28 (30)	86	0.24	28 (33)	5	0.26	2 (31)	185 (100)	0.26	58 (31)

Table VI. Angler catch and success, per month, in each zone of the 1982 Bulkley River creel census.

<u>creel census zone</u>	<u>Sept.</u>		<u>Oct.</u>		<u>Nov.</u>		<u>Mean</u>	<u>*Total catch(%)</u>
	<u>catch</u>	<u>success</u>	<u>Catch</u>	<u>success</u>	<u>catch</u>	<u>success</u>	<u>success</u>	
1	17	0.50	15	0.60	0	0.00	0.52	32 (17)
2	29	0.53	0	0.00	0	0.00	0.44	29 (16)
3	13	0.16	22	0.16	1	0.33	0.17	36 (19)
4	10	0.23	6	0.20	N/A	N/A	0.22	16 (9)
5	3	0.17	15	0.25	2	1.00	0.25	20 (11)
6	22	0.23	28	0.29	2	0.20	0.26	52 (28)
<hr/>								
Total angler catch and success during creel census.	94	0.29	86	0.24	5	0.25	0.26	185 (100)

\* includes only anglers and fish checked on creel days.



Table VII. Angler success, total catch and percentage of fish killed, per terminal tackle, in each zone of the 1982 Bulkley River creel census.

<u>Bulkley River creel census zone</u>	<u>Lure Anglers</u>			<u>Fly anglers</u>			<u>All anglers</u>		
	Success	Total Catch	No. Killed(%)	Success	Total catch	No. Killed(%)	Success	Total Catch	No. Killed(%)
1	0.42	16	4 (25)	0.67	16	2 (12)	0.52	32	6 (19)
2	0.36	20	8 (40)	0.82	9	2 (22)	0.44	29	10(34)
3	0.12	13	7 (54)	0.21	23	2 (9)	0.17	36	9 (25)
4	0.19	7	4 (57)	0.24	9	1 (11)	0.22	16	5 (31)
5	0.17	9	6 (67)	0.41	11	4 (36)	0.25	20	10 (50)
6	0.20	17	12 (71)	0.30	35	6 (17)	0.26	52	18 (35)
entire Bulkley River	0.22	82 (44%)	41 (50)	0.32	103 (56%)	17 (16)	0.26	185	58 (31)