BC Environment

Kitwanga River Steelhead: Summary of Current Data and Status Review, 1997

by
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Skeena Fisheries Report SK 101
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Abstract

A review of all information on Kitwanga River steelhead, *(Oncorhynchus mykiss),* available from B.C. Ministry of Environment, Lands and Parks, Skeena Region, Canada Department of Fisheries and Oceans, Repap Inc., native bands and federal and provincial ministry staff was conducted in March, 1997. Kitwanga River was reported as a relatively productive stream which supports a summer run of steelhead. Most steelhead are three or four years old when they leave freshwater and are 6 years old when they first spawn. There were no reports of repeat spawners in the available records for 15 fish. The adult sex ratio was 1.14 males/female. The mean fork length for adults was 69.7 cm and their mean weight was 4.2 kg. Important spawning habitat was identified in the mainstem between Moonlit Creek and Kitwancool Lake as well as near the mouth of the mainstem and in the lower reaches of Kitwancool and Tea creeks. Juvenile rearing habitat was reported throughout most of the system. Adults overwintered in the lower 12 km of the river, in Kitwancool Lake and in the Skeena River off the Kitwanga River mouth. No enhancement attempts were reported and no reliable estimates of adult abundance or trends in abundance were recorded. The 15 steelhead tagged were captured from October 3 to November 23 in 1979. There were no records of any capture efforts at other times. From 1967-68 through to 1995-96, the mean annual catch was 54 steelhead, and the mean annual harvest was 33.8 fish. Over this period, the mean annual number of anglers was 45 while the mean annual number of angler days was 155 and the mean annual catch per unit effort was 0.489 fish/angler day. The majority of anglers were resident in either Region 6 or elsewhere in B.C. No guiding was allowed on the Kitwanga River and no creel census information was available. No fishing for steelhead from January 1 to June 15 and catch and release regulations throughout the year were in effect. Some members of local First Nations implemented a set and drift net fishery in the Skeena River near the Kitwanga River mouth and this fishery likely influenced the Kitwanga River steelhead population. One estimate of minimum escapement required was reported at 1061 adults. Data were insufficient to adequately assess stock status. Management recommendations included maintenance of current regulations, enhanced protection of Kitwanga steelhead holding in the Skeena and correction of culvert problems. Recommendations for future studies are offered.

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1. Introduction

The steelhead (*Oncorhynchus mykiss*) population of Kitwanga River forms a potentially important part of the recreational sport fishing opportunity for residents of the Terrace, Kitwanga and Hazelton areas as well as for visitors from around the world. The Kitwanga is a relatively small but biologically rich river system with good access that offers high quality angling. Kitwancool Lake acts to stabilize the water levels in the mainstem river.

Factors such as easy access throughout most of the year, very limited information on the steelhead resource, and continued forestry development activities in the watershed make it important that the steelhead population and habitat be carefully monitored to allow intervention if there are significant changes. The purpose of this report is to provide a summary of data currently available on Kitwanga River steelhead and to provide suggestions for protection of this resource and for improvements in the information base for fisheries management.

The report covers the following topics:

1. Freshwater and ocean life history
2. Spawning, rearing and overwintering areas
3. Review of past enhancement attempts
4. Review of adult assessments
5. Review of adult run timing
6. Review of harvest, catch and angler effort
7. Review of angling guide activity
8. Review of creel survey information
9. Review of current angling regulations
10. Description of recreational fisheries
11. Review of First Nations uses and harvest
12. Review of minimum escapement requirements
13. Summary of current stock status

Information about steelhead in the Kitwanga River has been collected since at least 1967, however it has not been comprehensively collated and summarized. This literature review involved searching all existing information available as of March, 1997 and summarizing it in the form of a stock status report.

2. Study Area

The Kitwanga River (Watershed Code 40-2200) is a 54 km long, 5th order (1:50,000) stream which runs southerly and enters the Skeena River approximately 180 km above its mouth at Tyee (Figure 1). It drains approximately 800 km^2 (80,000 ha) and has four major tributaries. Tea Creek and Moonlit Creek enter from the east while Deuce Creek and Kitwancool Creek enter from the west. Since coho have been observed spawning at 7.0 km in Moonlit Creek, at 10 km in Kitwancool Creek, at 1.0 km in Deuce Creek, at 0.5 km in Tea Creek and at 53 km in the mainstem, it is likely that steelhead have access to at least these points in the watershed (DFO 1991). Above these four tributaries, the river drains Kitwancool Lake. The only known barrier (Gilchrist *et al.* 1996) on the mainstem is a falls at approximately 53 km, which is above the lake (Figure 1). Species found in the Kitwanga River system include steelhead *(Oncorhynchus mykiss)*, chinook *(O. tshawytscha)* in the lake, sockeye *(O. nerka)* at 44 km in the mainstem, pink *(O. gorbuscha)* in the lake, chum *(O. keta)* to the lake, cutthroat trout (*O. clarki)*, Dolly Varden *(Salvelinus malma)*,rainbow trout *(O. mykiss)* throughout the system, kokanee *(O. nerka)* and mountain whitefish *(Prosopium williamsoni)* (DFO 1991).

3. Methods

All information that was considered potentially relevant to steelhead in Kitwanga River was sought from the B.C. Ministry of Environment, Lands and Parks (MELP), Skeena Region files, the Canada Department of Fisheries and Oceans (DFO), Repap B.C. Inc. and from the Gitwangak and Gitanyow Band Councils.

All tagging and aging data were entered into a Microsoft Access database . The database was then used to search for and remove duplicate entries, to clean the data of spurious entries and to then analyze the data. A parsimonious approach was taken in interpreting all recorded data.

For the purposes of this report, references to rainbow trout were assumed to mean juvenile steelhead, as they are extremely difficult to differentiate.

Although the tagging data refers to a total of 15 steelhead, specific analyses of the data usually involved smaller sample sizes due to the fact that not all fields in the record for a particular fish were complete. For example, analyses of subsets of the population, such as lengths of males, could only utilize the records of fish for which a length was given.

Requests for information on steelhead in the Kitwanga River system were directed to the Gitwangak and Gitanyow Band Councils but no responses were received.

Original data are presented in Appendices B and C.

MELP and DFO are acronyms frequently used in this report. They refer to the Ministry of Environment, Lands and Parks and the Department of Fisheries and Oceans respectively.

Unless stated otherwise, tests of significance are based on the t statistic..

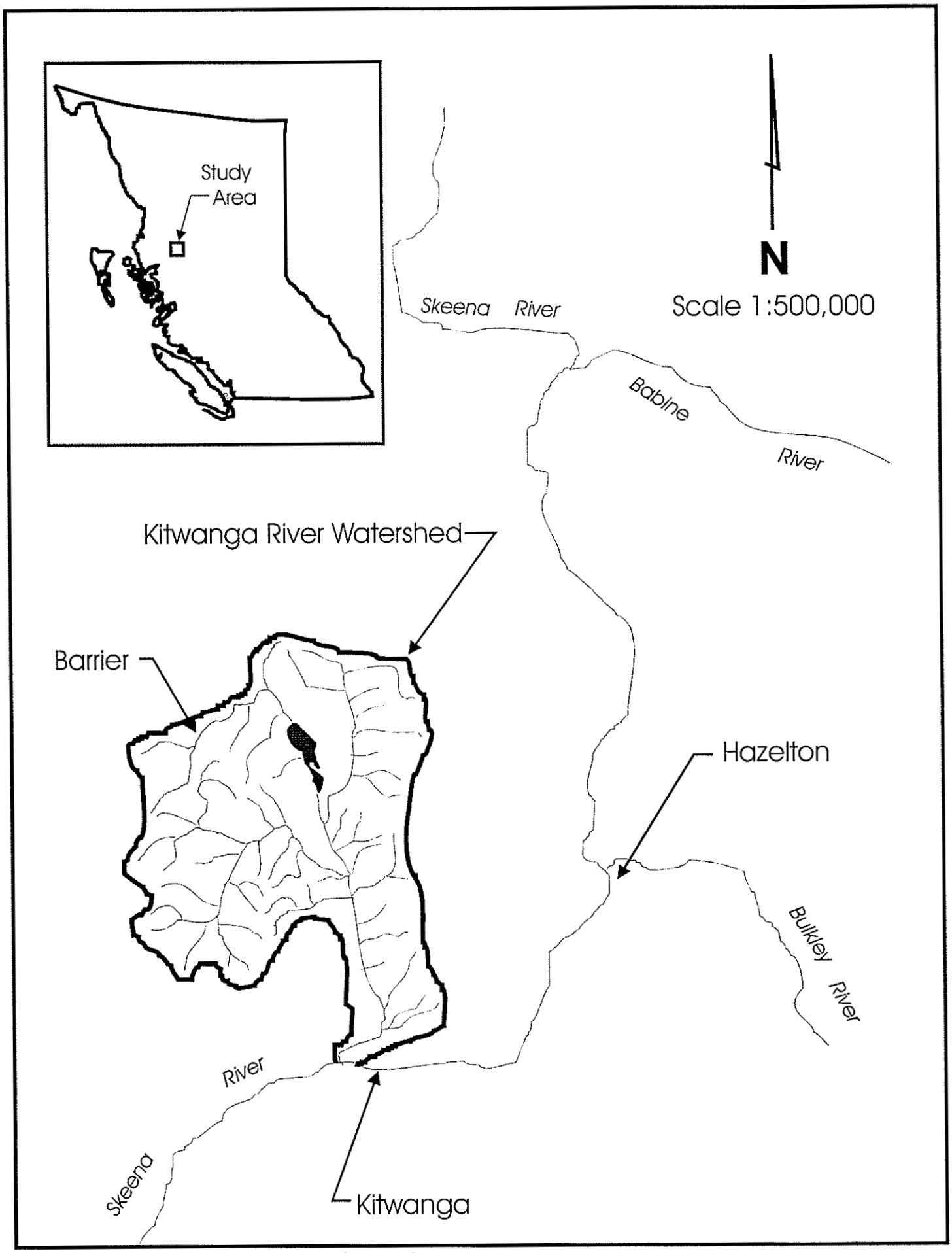

Figure 1. Map showing the location of the study area.

4. Results

4.1. Freshwater and Ocean Life History

Data from aging of scales taken from adult Kitwanga River steelhead in 1979 are summarized in Table 1 (MELP 1980a,b). The age designators listed along the left hand margin of this table record the number of years spent in freshwater (smolt age) on the left, separated from the saltwater age on the right by a period.

Table 1. Summary of age data for Kitwanga River steelhead. (Source: MELP 1980a,b).

Age Designator	Male	Female	All
3.1	2	0	2
3.2	1	1	2
4.2	1	3	4
5.1	1	0	1
Totals	5	4	9

These data indicated that juveniles remained in freshwater for three to five years (mean = 3.67 years, S.E. = 0.24, n = 9) and that the majority of Kitwanga River juveniles spent three (44.4%) or four (44.4%) years in freshwater. They further showed that steelhead spent one to two years (mean = 1.67 years, S.E. 0.17, n = 9) in the ocean before returning to spawn and that the majority of the juveniles spent two (66.7%) years in salt water. The age before first spawning ranged from four to seven years (mean = 5.33, S.E. = 0.37, n = 9) with the majority being six (44.4%) years old.

4.2. Repeat Spawning

There were no records of repeat spawning for Kitwanga River steelhead.

4.3. Sex Ratio

The sex ratio for Kitwanga River steelhead was 1.14 males for each female (n = 15) (MELP 1980b).

4.4. Size Distribution of Mature Steelhead

There was no significant difference (df = 8, $p>0.9$) in mean fork length between adult steelhead males and females but there was a greater range (86%) of fork lengths in the females sampled (Table 2; MELP 1980b).

Table 2. Summary of fork lengths of adult Kitwanga River steelhead. (Source: MELP 1980b).

	Range (cm)	Mean (cm)	Standard Error	Sample Size
Females	45.7 - 81.3	69.6	6.2	5
Males	62.2 - 81.3	69.8	3.8	5
All Fish	45.7 - 81.3	69.7	4.4	10

There was no significant difference ($df = 13$, $p>0.4$) between the mean weight of adult male and female steelhead. Females exhibited a greater range (228%) of weights than did males (Table 3; MELP 1980b). The heaviest female steelhead was 49% heavier than the heaviest male.

Table 3. Summary of weights of adult Kitwanga River steelhead. (Source: MELP 1980b).

	Range (kg)	Mean (kg)	Standard Error	Sample Size
Females	0.9 - 8.2	4.6	0.8	7
Males	2.3 - 5.5	3.8	0.5	8
All Fish	0.9 - 8.2	4.2	0.5	15

4.5. Length-Weight Relationship

The relationship between the log-transformed fork length and weight for adult Kitwanga River steelhead is shown in Figure 2 (MELP 1980b). The linear regression coefficient indicated slightly positive allometric growth in weight with respect to length. The mean Fulton's condition factor for all steelhead whose records included both length and weight was 1.81 (S.E. = 0.86, n = 10) with a range of from 0.90 to 1.14.

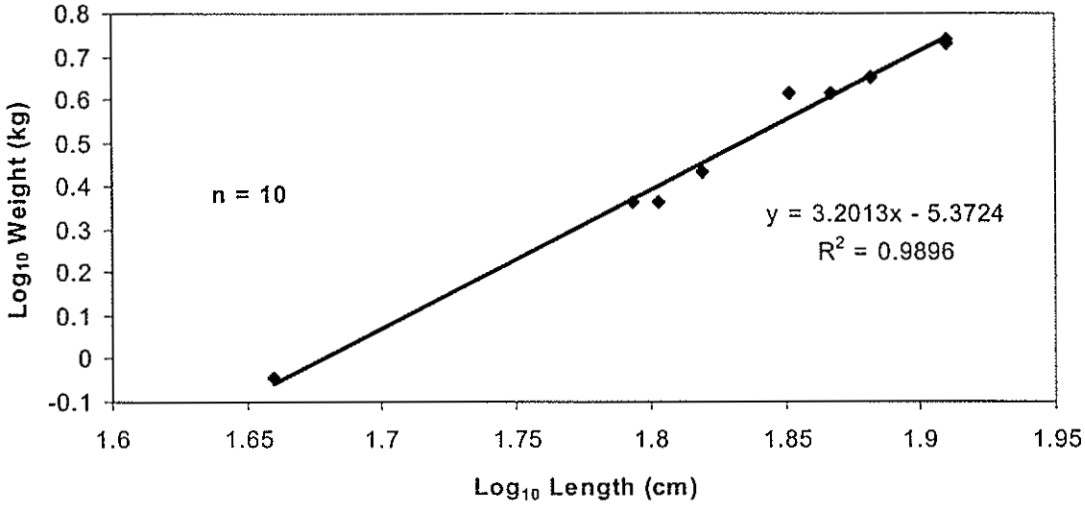

Figure 2. Relationship between log-transformed length and weight for adult Kitwanga River steelhead. (Source: MELP 1980b).

4.6. Spawning, Rearing and Overwintering Areas

4.6.1. Spawning Sites

The locations of documented Kitwanga River steelhead spawning habitats are shown in Figure 3. These are likely based on observations of the presence of adult steelhead during spawning season. The reader should be aware that the observation of an adult steelhead at a particular site does not necessarily mean that it is a spawning site, even though this may be likely.

The documented locations of Kitwanga steelhead spawning habitat are shown in Figure 3. A major steelhead spawning area was reported between Kitwancool Lake and the confluence of Moonlit Creek and the Kitwanga River (B.C. Kitwanga Highway Assessment Team 1975; Lough 1983; Wildstone Resources Ltd. 1995; DFO 1991). Of the 7 fish radio tagged in the 1979 telemetry study (Lough 1983), four steelhead spawned in this area. Two of these tagged fish spawned in the mainstem Kitwanga approximately 3 km upstream from the river mouth.

Three of the main Kitwanga tributaries, Deuce, Kitwancool and Moonlit creeks, were reported to have low fisheries productivity due to steep gradients and lack of spawning habitat (Wildstone Resources Ltd. 1995). Another possible reason given to support the claim that the tributaries are not extensively used for spawning was low temperatures (Lough 1983). However, as noted above, coho were observed spawning at 7 km in Moonlit Creek and at 10 km in Kitwancool Creek (DFO 1991). Therefore, steelhead likely have access to these portions of the tributaries. As these reaches are remote, the lack of steelhead observations in these tributaries may have been related more to lack of observational effort rather than lack of suitable habitat.

A few unnamed creeks that have some limited spawning potential in their lower reaches were reported between Moonlit Creek and Tea Creek (Lough 1983). Tea Creek was reported to offer good spawning and rearing habitat in its upper reaches as well as warmer water. Unfortunately, a culvert at Highway 37 hampered spawners and was a barrier to upstream juvenile migration (Lough 1983). One steelhead was observed at 1.5 km on Kitwancool Creek and another was observed spawning at 0.5 km on Tea Creek (DFO 1991).

4.6.2. Juvenile Rearing Sites

The locations of documented juvenile rearing habitat are shown in Figure 4. The Stream Summary Catalogue (DFO 1991) reported rainbow throughout the system but wasn't more specific regarding location. In juvenile surveys conducted in late August of 1991, 1992 and 1993, fry and parr were electrofished at seven sites distributed from 40 m downstream from the Woodcock Road bridge to just downstream from Kitwancool Lake (Beere 1993; Bustard 1992, 1993).

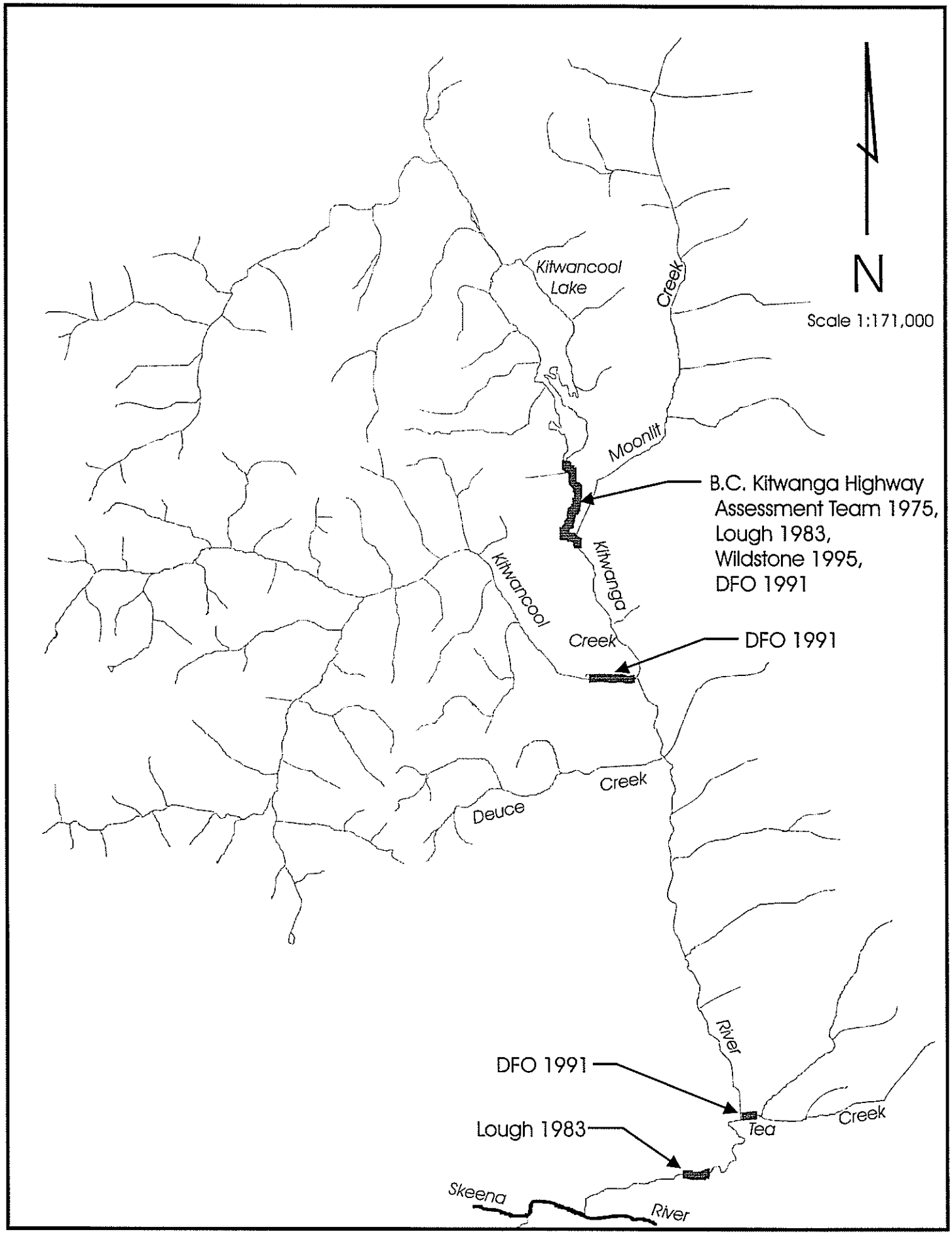

Figure 3. Map of documented spawning habitat in the Kitwanga River system.

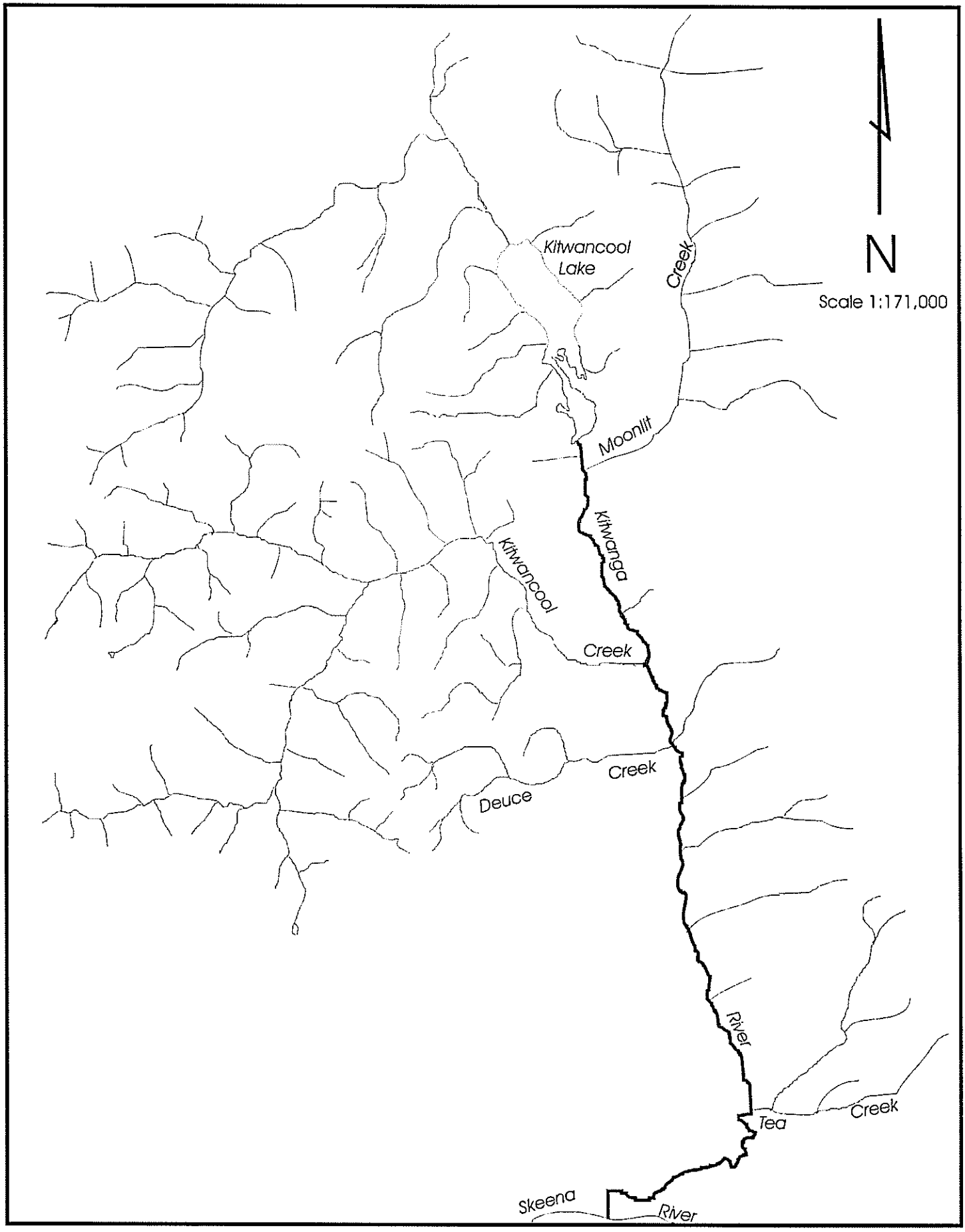

Figure 4. Map showing documented locations of rearing habitat for juvenile Kitwanga River steelhead. (Sources: Beere 1993, Bustard 1992, 1993).

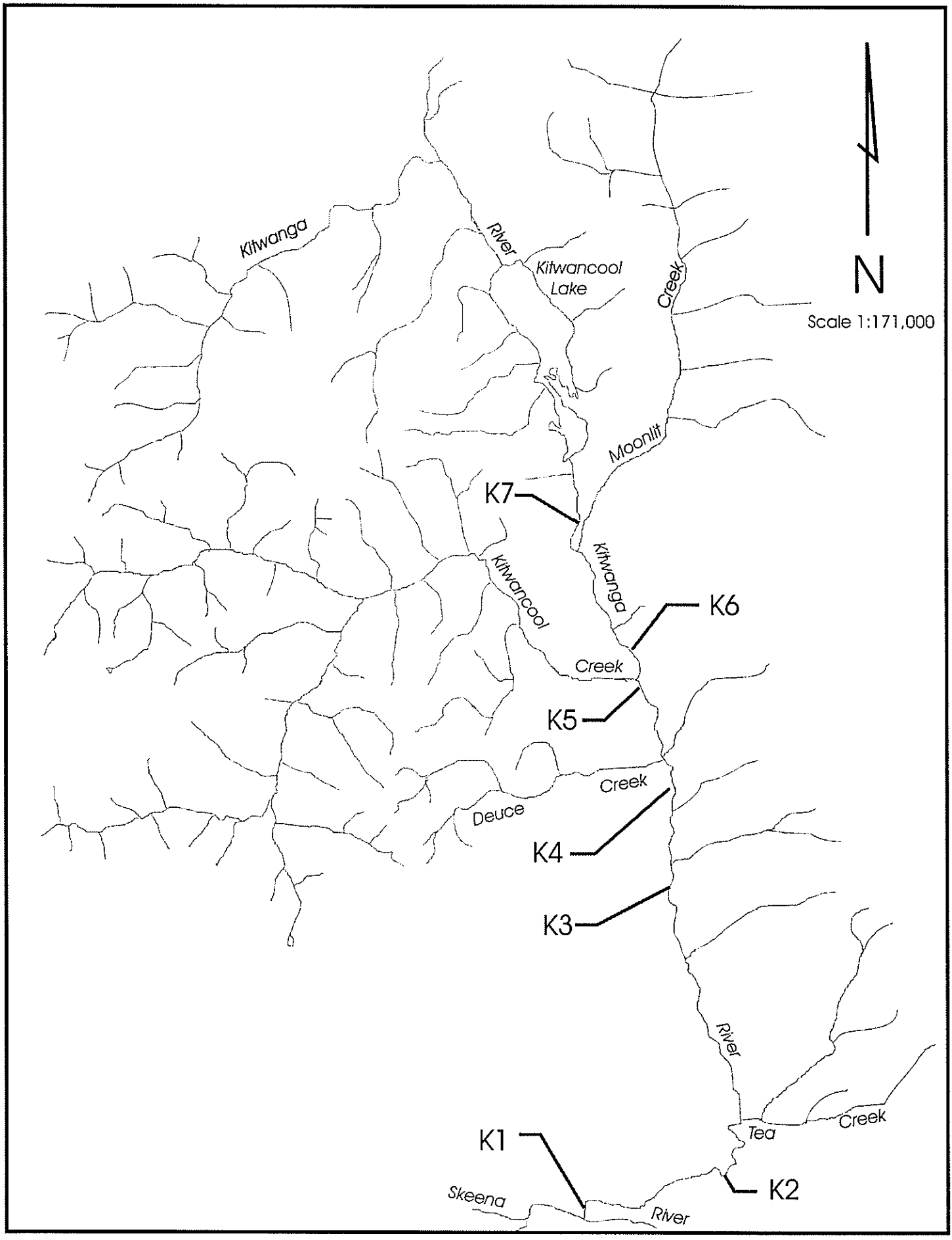

Figure 5. Map showing the locations of juvenile sampling sites in the Kitwanga River. (Sources: Beere 1993; Bustard 1992, 1993).

Electroshocking for juveniles was conducted repeatedly at seven sites in the mainstem of Kitwanga River in the fall of 1991, 1992 and 1993 (Beere 1993; Bustard 1992, 1993). Although juvenile densities for these three years did correspond to adult return records from the Tyee test fishery for 1990 to 1992, no other clear trends in juvenile population density with respect to time were apparent over this three year period. The overall juvenile density (fry and parr combined) of 0.80 juveniles/m^2 was greater than that found in similar sampling programs in the Morice River system (0.23 juveniles/m^2) and in the Zymoetz River system (0.27 juveniles/m^2) (Beere 1993). Bustard (1992) reported that 64% of the fish captured during the 1991 juvenile electroshocking study in the Kitwanga River mainstem were juvenile steelhead, while in Moonlit Creek they comprised only 9.4%. The results of the three year Kitwanga River juvenile sampling studies, as summarized by Beere (1993), are given in Table 4. Locations of the sample sites are given on the map in Figure 5.

Table 4. Summary of juvenile steelhead density estimates in the Kitwanga River. (Source: Beere 1993).

Sample Site	Fry Density (Fry/m^2)			Parr Density (Parr/m^2)		
	1991	1992	1993	1991	1992	1993
K1	1.28	0.34	0.18	0.01	0.01	0
K2	2.32	0.3	0.49	0.02	0.12	0
K3	1.59	0.03	1.39	0.02	0	0.02
K4	1.55	0.11	0.92	0	0.13	0.02
K5	1.54	0.55	0.65	0	0.01	0
K6	1.42	0.19	0.95	0.01	0.02	0.02
K7	0.32	0.01	0	0.21	0.12	0
Mean	1.43	0.22	0.65	0.04	0.06	0.01

4.6.3. Adult Overwinter Areas

The documented locations of adult steelhead overwintering habitat are shown in Figure 6. In the 1979 radio telemetry study (Lough 1983), most of the tagged fish (five steelhead) overwintered in the mainstem Kitwanga River from one to 12 km above the Skeena. This is an area largely composed of canyons, bedrock outcroppings and pools. One fish from this same study group overwintered off the Kitwanga mouth in the Skeena River. The Stream Summary Catalogue (DFO 1991) indicated that steelhead are found in Kitwancool Lake. Although the 1979 radiotelemetry study (Lough 1983) observed none in this lake, the sample size was small. Kitwancool Lake may be an important overwintering area. The Stream Summary Catalogue (DFO 1991) indicated steelhead at 35 km but intensive angling during the fall telemetry study in 1979 did not produce any fish above 16 km (Lough 1983).

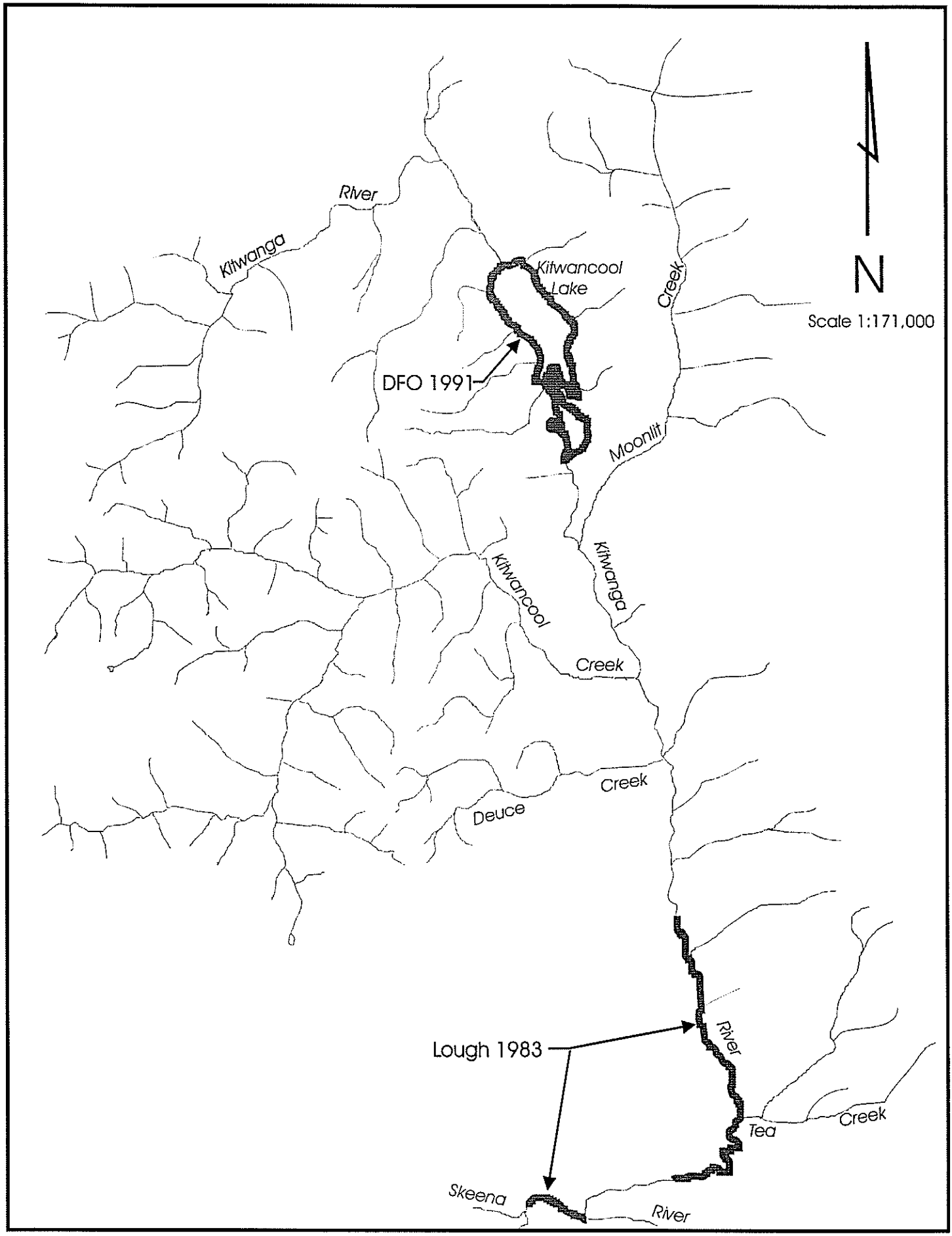

Figure 6. Map showing the locations of documented overwintering habitat for adult Kitwanga River steelhead.

4.7. Past Enhancement Attempts

No information on past enhancement attempts were found. No records of hatchery-raised fish were found in either the tagging database (MELP 1980b) or Steelhead Harvest Analysis database (MELP 1996a).

4.8. Adult Assessments

Stream Summary Catalogue (DFO 1991) records during the years 1963 to 1984 indicated a mean steelhead escapement of 428 fish with a maximum recorded number of 943 adults. Two anonymous reports gave run size estimates of 300 - 400 fish (MELP Undated; B.C. Kitwanga Highway Assessment Team 1975). The results of a count during a helliflight on April 22, 1971 were recorded as 40-50 steelhead between Kitwancool Lake and the Native Reserve (Hawthorn 1971). The annual number of adult steelhead angled in Kitwanga River ranged from 0 to 235 (MELP 1996a).

No reliable estimates of abundance or trends in abundance of adults were available.

4.9. Adult Run Timing

The Stream Summary Catalogue (DFO 1991) indicated an adult migration to Kitwanga River in August through December with spawning in January through March. It was also reported (DFO 1991) that in April and May, at a time determined by water temperature, photoperiod and genetic background, steelhead moved onto spawning sites in the Skeena system (Alexander *et al.* 1996).). In 1979, 15 adult fish were captured, tagged and released from October 3 through November 23 (MELP 1980b). None of the tagged fish were recaptured. These data are presented in Table 5.

Lough (1983) reported that Kitwanga River steelhead moved onto their spawning sites below Kitwancool Lake when the temperature reached 12°C in early May and that spawning activity peaked in mid-May. At the same time, steelhead that overwintered in the Skeena River moved into Kitwanga River and migrated upstream to their spawning sites during high water, when temperatures were between 6 and 9°C and commenced spawning at 9°C (Lough 1983). This radio telemetry study indicated that at the end of May (one fish stayed until June 30) mended spawners, called kelts, left Kitwanga River and returned to the ocean to feed (Lough 1983). Although not necessarily referring to Kitwanga fish, another telemetry study reported that in 1994 approximately 46% of Skeena River steelhead tagged in the ocean mended after spawning and migrated downstream. Most of these kelts arrived in the lower Skeena between late May to mid-June, 1995.

4.10. Catch, Harvest, Angler Effort and Angler Residency

4.10.1. Catch and Harvest

Annual records (MELP 1996a) of anglers' reports of numbers of anglers, angler days, hatchery fish, wild fish, killed and released fish and total catch were kept for the fiscal years from 1967-68 through 1982-83 for Kitwancool Creek and from 1967-68 through 1995-96 for the Kitwanga River (Appendix C). In the following analyses, data for Kitwancool Creek were lumped together with data for Kitwanga River from 1967-68 through 1982-83 (Table 5).

The mean annual catch in the Kitwanga River system was 54 steelhead (S.E. = 12.9, n = 27) with a range of zero, in the three years from 1983-84 through 1986-87 and again in 1989-90, to 235 fish in 1985-86 (MELP 1996a). The reported annual catch generally increased before and declined after the 1985-86 fiscal year (Figure 7).

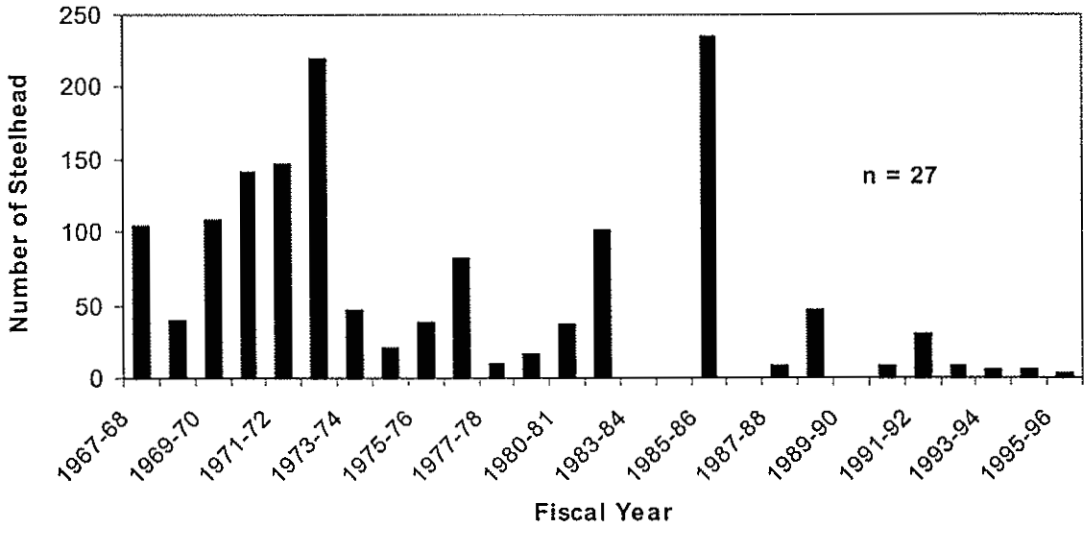

Figure 7. Anglers' reports of the number of steelhead caught in Kitwanga River from fiscal year 1967-68 through 1995-96. (Source: MELP 1996a).

Table 5. Summary of angler effort, catch and harvest for the Kitwanga River system. (Source: MELP 1996a).

Stream Name	Fiscal Year	Anglers	Days Fished	Wild Kept	Wild Released	Hatchery Kept	Hatchery Released	Total Kept	Total Released	Total Catch
Kitwanga R. & Kitwancool Cr.	1967-68	106	299	104	0	0	0	104	0	104
Kitwanga R. & Kitwancool Cr.	1968-69	75	135	40	0	0	0	40	0	40
Kitwanga R. & Kitwancool Cr.	1969-70	120	315	109	0	0	0	109	0	109
Kitwanga R. & Kitwancool Cr.	1970-71	91	679	89	52	0	0	89	52	141
Kitwanga R. & Kitwancool Cr.	1971-72	85	269	108	39	0	0	108	39	147
Kitwanga R. & Kitwancool Cr.	1972-73	130	472	216	4	0	0	216	4	220
Kitwanga R. & Kitwancool Cr.	1973-74	61	166	28	19	0	0	28	19	47
Kitwanga R. & Kitwancool Cr.	1974-75	55	163	15	5	0	0	15	5	20
Kitwanga R. & Kitwancool Cr.	1975-76	41	129	29	10	0	0	29	10	39
Kitwanga R. & Kitwancool Cr.	1976-77	73	223	68	14	0	0	68	14	82
Kitwanga R. & Kitwancool Cr.	1977-78	34	50	6	3	0	0	6	3	9
Kitwanga R. & Kitwancool Cr.	1978-79	73	199	5	12	0	0	5	12	17
Kitwanga R. & Kitwancool Cr.	1980-81	47	294	32	5	0	0	32	5	37
Kitwanga R. & Kitwancool Cr.	1982-83	47	284	42	60	0	0	42	60	102
Kitwanga River	1983-84	25	44	0	0	0	0	0	0	0
Kitwanga River	1984-85	18	70	0	0	0	0	0	0	0
Kitwanga River	1985-86	28	63	14	221	0	0	14	221	235
Kitwanga River	1986-87	17	17	0	0	0	0	0	0	0
Kitwanga River	1987-88	22	135	0	8	0	0	0	8	8
Kitwanga River	1988-89	26	68	8	39	0	0	8	39	47
Kitwanga River	1989-90	10	16	0	0	0	0	0	0	0
Kitwanga River	1990-91	6	15	0	8	0	0	0	8	8
Kitwanga River	1991-92	12	34	0	30	0	0	0	30	30
Kitwanga River	1992-93	4	15	0	8	0	0	0	8	8
Kitwanga River	1993-94	2	4	0	6	0	0	0	6	6
Kitwanga River	1994-95	6	6	0	6	0	0	0	6	6
Kitwanga River	1995-96	12	12	0	3	0	0	0	3	3

The mean annual number of adult steelhead harvested (Figure 8) from the Kitwanga River system from fiscal year 1967-68 through 1995-96 was 33.8 (S.E. = 9.9, n = 27) with a maximum of 216 adults in 1972-1973 and none during the most recent seven years of record (MELP 1996a). The number of adult steelhead released each year generally increased over time from zero prior to 1970 -1971, to a maximum of 221 in 1985-1986, after which it generally declined. The number harvested generally declined after 1972-73. The observed decline in harvest may have been related to changes in angling regulations or changes in angler ethics.

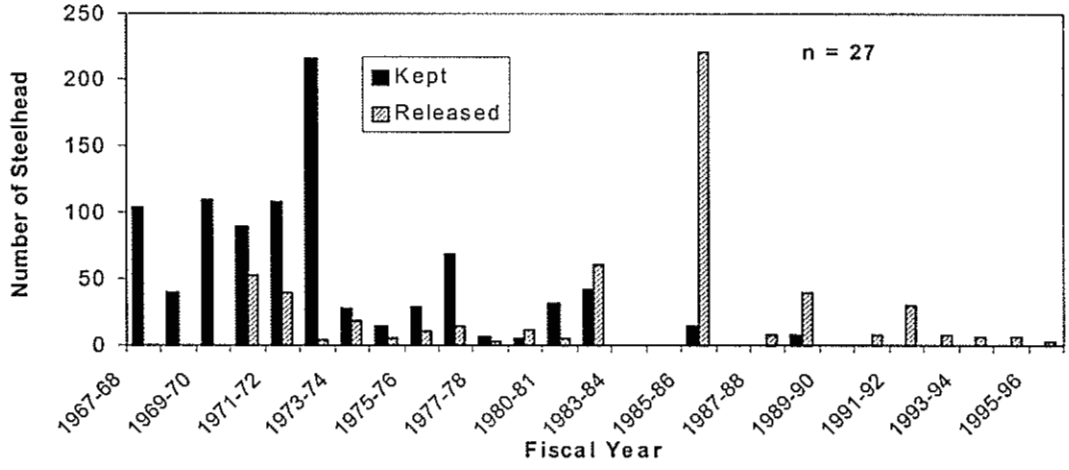

Figure 8. Anglers' reports of the number of steelhead kept and released in Kitwanga River from fiscal year 1967-68 through 1995-96. (Source: MELP 1996a).

The number of adult steelhead harvested each year relative to the total catch (Figure 9) generally declined from 100% to a low of zero after 1988-89 (MELP 1996a).

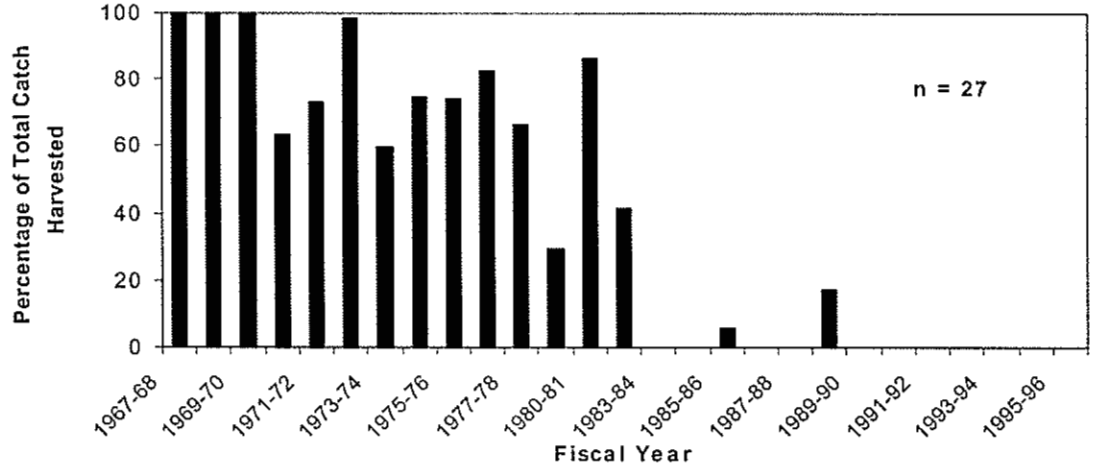

Figure 9. The number of adult Kitwanga River steelhead harvested as a percentage of the total catch for each year from fiscal year 1967-68 through 1995-96. (Source: MELP 1996a).

4.10.2. Angler Effort

The mean number of anglers per year was 45 (S.E. = 7.2, n =27), with a range of two in 1993-1994 to 130 in 1972-1973 (MELP 1996a). This number generally declined over the 27 year period of record (Figure 10). The mean number of angler days per year spent on the Kitwanga River was 154.3 (S.E. = 31.2, n = 27), with a range of four in 1993 -1994 to 679 in 1970-1971 (MELP 1996a). This number also generally declined over the period of record (Figure 10).

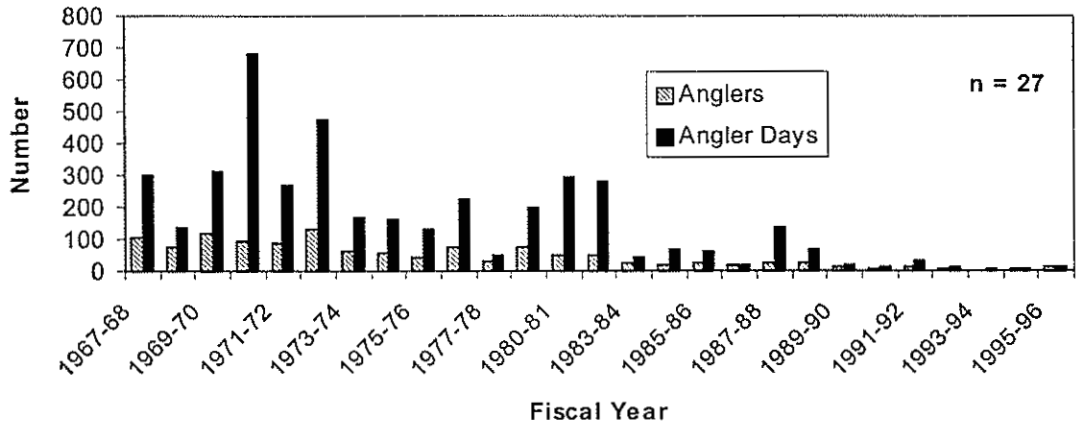

Figure 10. Number of anglers and angler days on the Kitwanga River from fiscal year 1967-68 through 1995-96. (Source: MELP 1996a).

4.10.3. Catch Per Unit Effort

The mean annual catch per unit effort (CPUE), in fish per angler day, was 0.0.489 (S.E. = 0.14, n = 27), with a range of zero, in each of 1983 -1984, 1984-85, 1986-87 and 1989-90, to 3.73 in 1985 -1986 (MELP 1996a). The CPUE generally increased over the time period for which records were kept (Figure 11).

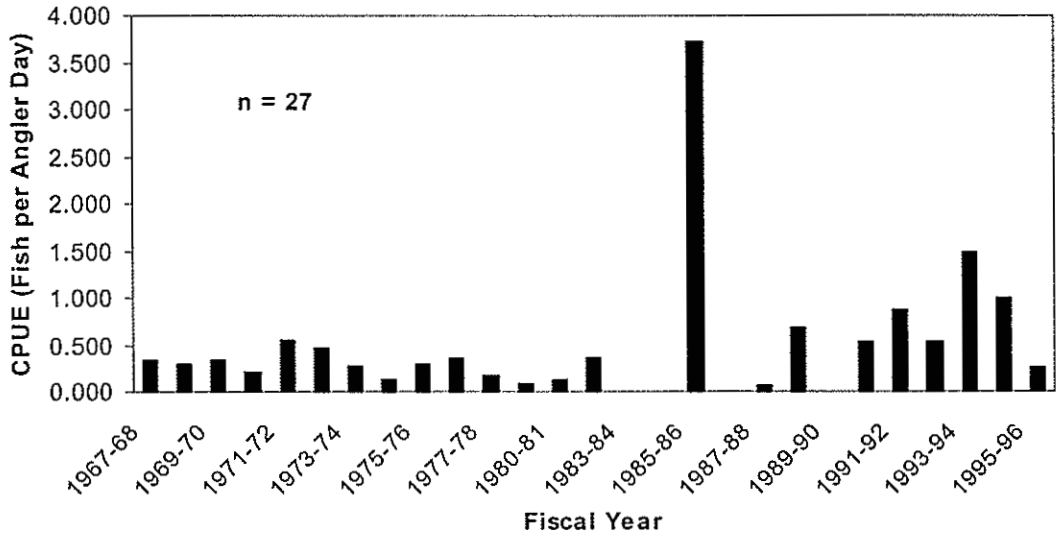

Figure 11. Catch per unit effort (CPUE) for steelhead in the Kitwanga River from fiscal year 1967-68 through 1995-96. (Source: MELP 1996a).

4.10.4. Angler Residency

Records of angler residency and related catch and harvest data (MELP 1996a) were available for Kitwanga River from 1983-84 to 1995-96. During this period, anglers resident in Fish and Wildlife Region 6 or elsewhere in B.C. accounted for a dominant proportion of the number of anglers, angler days, harvest and catch of Kitwanga River steelhead adults (Table 6, Figures 12 through 15). The proportions of activity for each resident group varied widely over the thirteen year period of record. This variation was likely an artifact of the relatively small number of anglers reporting from the Kitwanga system. The maximum number of anglers recorded in any year was 28 in 1985-86, and in 1989-90 and 1993-94 there were no anglers recorded from Region 6.

Table 6. Mean number of anglers, angler days, catch and harvest for Kitwanga River due to residents of Region 6 relative to those statistics due to all residency groups. (Source: MELP 1996a).

	Mean % (S.E., n)	**Minimum % (Year)**	**Maximum % (Year)**
Number of Anglers	42.9 (8.4, 13)	0 (1986-87l; 1989-90)	100 (1992-93)
Number of Angler Days	48.2 (9.5, 13)	0 (1986-87; 1989-90; 1993-94)	100 (1992-93)
Catch	65.0 (16.4, 9)	0 (1987-88; 1993-94; 1995-96)	100 (1990-91; 1991-92; 1992-93; 1994-95)
Harvest	100.0 (0, 2)	100 (1985-86; 1988-89)	100 (1985-86; 1988-89)

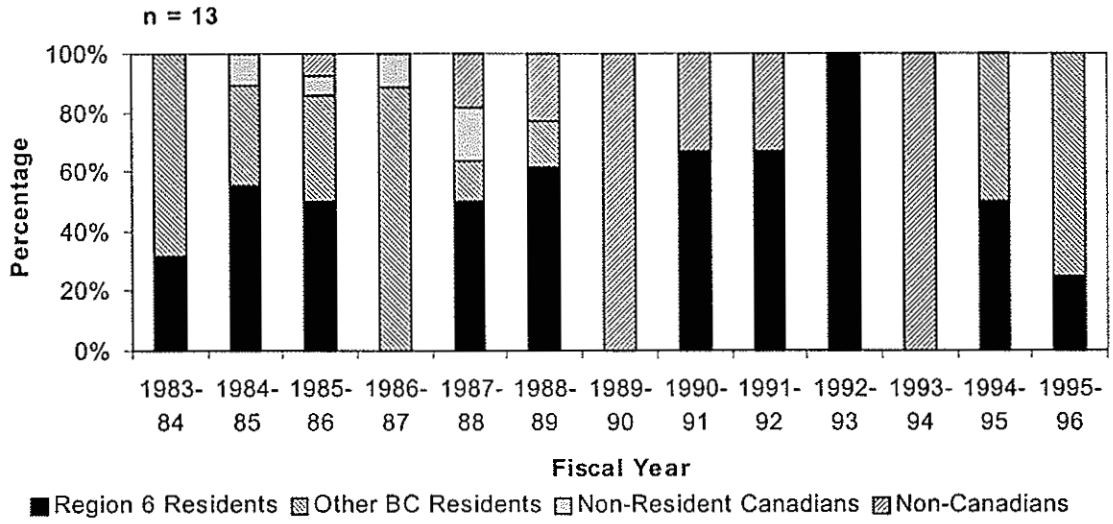

Figure 12. Percentage of anglers by residency group. (Source: MELP 1996a).

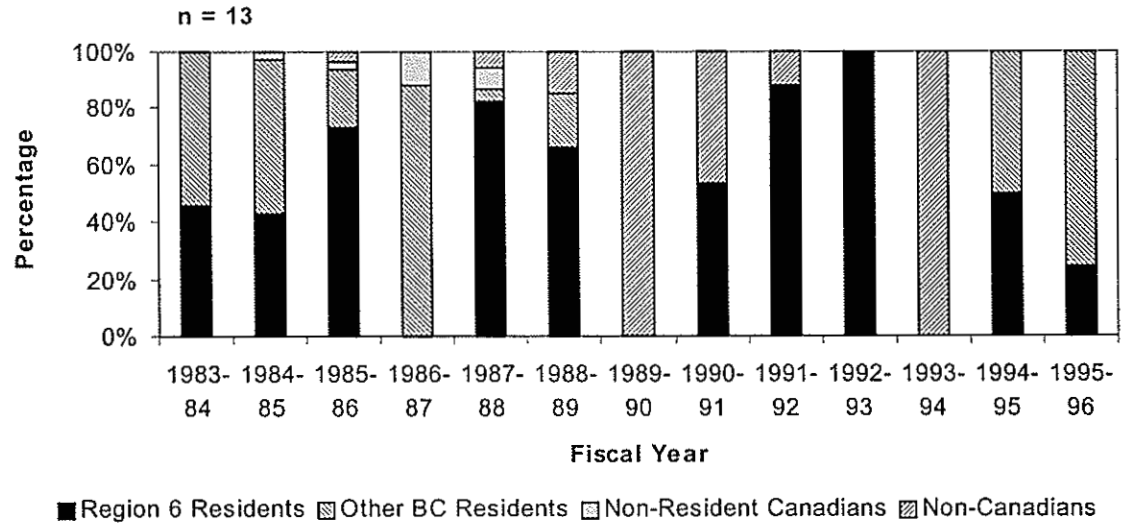

Figure 13. Percentage of angler days by residency group. (Source: MELP 1996a).

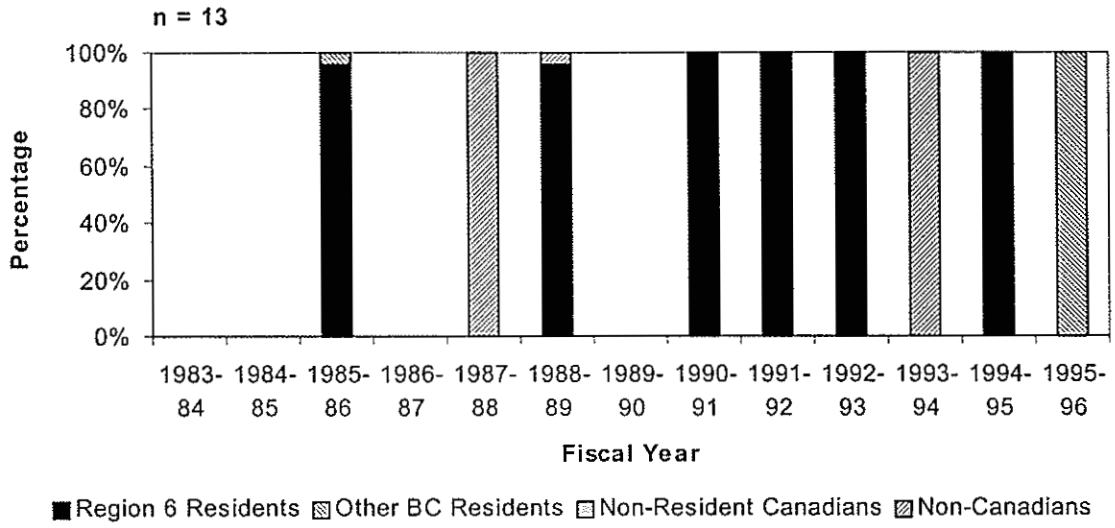

Figure 14. Percentage of catch by residency group. (Source: MELP 1996a).

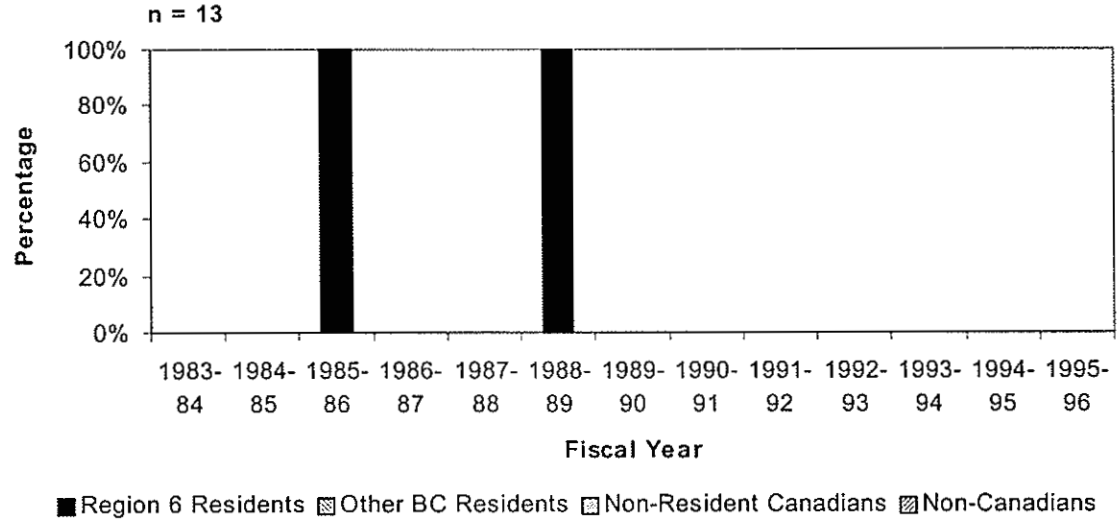

Figure 15. Percentage of harvest by residency group. (Source: MELP 1996a).

4.11. Angling Guide Activity

No guiding was allowed on Kitwanga River. This restriction was applied in the 1990-91 fiscal year because of the suspected small size of the population and the small size of the stream, both of which render the fish susceptible to overfishing (R. Tetreau, pers. comm., 1997).

4.12. Creel Survey Information

No information was available.

4.13. Current Angling Regulations

The effects of laws regulating angling for steelhead in the Kitwanga River and its tributaries included mandatory release of all fish caught throughout the year, no fishing for steelhead from January 1 to June 15 and a special quota change to zero because of low numbers of steelhead (MELP 1996b). Steelhead caught in the Skeena River off the mouth of Kitwanga River, which could include Kitwanga fish, could be kept until November 1, when mandatory release was imposed. A summary of the regulations is given in Table 7.

Table 7. Summary of angling regulations for Kitwanga River during 1996-97. (Source: MELP 1996b).

Area of Application	Summary of Regulation
British Columbia	To fish for steelhead, residents of B.C. over age sixteen require an annual or short term basic fishing license and a steelhead conservation surcharge stamp.
	To fish for steelhead, non-residents (includes Canadian and non-Canadian) over age sixteen require an annual or short term basic fishing license, a steelhead conservation surcharge stamp and a special Class 2 Waters license if angling January 1 to December 31.
Skeena System Regulations	The daily catch quota is 1 steelhead over 50 cm (measured from tip of nose to fork of tail).
	Daily catch quota for steelhead from 30-50 cm is 2.
	Must release any steelhead under 30 cm.
	Must release steelhead from Skeena River watershed above Cedarvale November 1 to December 31.
	Possession quota is two daily quotas.
	Monthly catch quota is 2 steelhead.
	Annual catch quotas for all BC steelhead is 10.
	After catching and retaining the daily quota of steelhead from any waters, the angler must stop fishing. those waters for the remainder of that day.
	Single hook in all streams of region 6, all year.
	No fishing in any stream in the watersheds of the Skeena River above Cedarvale January 1 to June 15.
	The Skeena mainstem above Cedarvale is closed January 1 to May 31.
Kitwanga River	Steelhead catch and release.
	Bait Ban September 1- December 31.
	Class 2 Waters January 1 to December 31.
	Steelhead Quota Changes - special notice in regulations Skeena and Nass steelhead quotas are subject to in-season changes and are likely to be reduced to 0 (catch and release only) beginning July 1 to protect summer run stocks. Anglers must check with their local B.C. Environment office or angling license issuer.

4.14. Recreational Fisheries

There was a substantial sport fishery off the mouth of the Kitwanga River in the mainstem Skeena River from August to November, with the peak catch during the first two weeks of September (Lough 1983). Most of the earlier steelhead were probably not Kitwanga River stocks but other upstream stocks. As these fish moved upstream in the Skeena River there was more impact on Kitwanga fish (Lough 1983). During low water levels Kitwanga steelhead held off its mouth in the Skeena River waiting for freshets. Two steelhead tagged in a radio telemetry study at the Kitwanga mouth remained near their tagging sites throughout the fall and winter, suggesting that in years of low water, during September and October, greater numbers of steelhead remained at the mouth, probably resulting in a heavier harvest (Lough 1983).

Based on radio-tagging data elsewhere in the Skeena River system, sport fishing activities may result in a 0-3% reduction in the spawning population of steelhead due to mortality and premature downstream migration to the ocean (Koski *et al.* 1995).

4.15. First Nations Uses and Harvest

Records for Kitwanga River were not available from the Gitanyow or the Gitwangak Band Councils, but historical estimates of native steelhead harvest from the Skeena River system ranged from approximately four to 11% of the total steelhead catch (Chudyk and Narver 1976). The same report further suggested that the native catch may be as high as 15%. In 1995, four to 19% of the radio tagged steelhead that passed Kitselas on the Skeena River were harvested by natives (Alexander *et al.* 1996).

Lough (1988) commented that the early native fishery, just after ice-out, concentrated on overwintering steelhead in the Skeena River, but that the most intense activity occurred from July 26 until August 8, 1987. Tetreau and Spence (1990) lifted one gillnet set in the Skeena River off the mouth of Kitwanga River between September 10 and 16, 1989, and counted one captured steelhead. This information was used to estimate a harvest of seven steelhead during that week. They also noted evidence that some drift-net fishing had occurred and speculated that 21 steelhead found tied to 'stringers' in the water were the result of two days of drift fishing. They further noted that attendance of nets was poor, with many decaying fish as evidence, and that this fishery probably affected steelhead destined to overwinter in the Skeena River prior to ascending into Kitwanga River the next season more than other stocks. It was noted that this study was done during the latter part of the native food net fishery and that 1989 was a low return year for steelhead, implying that the harvest estimate was likely low.

Beere (1991a) counted five nets set near the mouth of Kitwanga River in the Skeena River between August 8 and September 25, 1990. Four native set-net fishers were interviewed. They reported an average of 1.4 steelhead/net day, with a range of zero to six. Drift-net fishers reported an average of 0.4 steelhead/drift, with additional estimates ranging from 1 steelhead/week to 20 steelhead/drift. A drift was described as the use of a

30 m long gillnet, drifting for approximately 15 minutes and covering a distance of approximately 500 to 750 m.

Beere (1991b) interviewed one set gillnet fisher and counted eight nets in the Skeena near Kitwanga River between July 14 and September 30, 1991. It was reported that the drift-net fishery began in late April or early May and carried on until October or November. No steelhead were reported harvested in this fishery. However, this study estimated a harvest rate of no more than 1 steelhead/net day for the Skeena River from Kitwanga to above the Kispiox River for set nets. For drift nets, the harvest rate was estimated at 0.19 steelhead per drift This was based on reports of three steelhead harvested in drift nets from August 25 to September 2.

4.16. Minimum Escapement Requirements

Based on various predictive models and using Keogh River data as references, the Kitwanga adult production at carrying capacity with no exploitation was determined to be 1061 fish (Tautz *et al.* 1992). To reach this escapement and allow for an exploitation of 665 fish, 396 returning adult steelhead were considered to be necessary to fully seed the Kitwanga River.

4.17. Summary of Current Stock Status

The data were insufficient to adequately assess the current stock status. Estimates of adult population size ranged from 300 (MELP 1973) to 943 steelhead (DFO 1991). Data were insufficient to determine any trends in the population size over time.

The Kitwanga River may be exposed to irregular events of increased angling and native food fishing in both the Kitwanga and the Skeena that may be harmful to this probably small population of steelhead.

5. Management Recommendations

1. Maintain current regulations.
2. More protection is needed for adult steelhead holding off the mouth of the Kitwanga River in the Skeena. A catch and release regulation should be imposed on the portion of the Skeena River where Kitwanga fish hold while waiting for a freshet.
3. Correct the culvert problems on Tea Creek and assess others along Highway 37 and other roads.

6. Future Study Recommendations

1. As there were only 15 fish tagged in one fall season, since only seven of those fish were radio tracked and since age was estimated for nine of those fish an effort to improve the information base by conducting a more extensive radio telemetry tagging study, as well as a conventional tagging and aging study should be considered. The conventional tagging study should include effort from fall through spring. In particular, more reliable indicators of abundance and trends in abundance, more

accurate determinations of the locations of critical spawning and overwintering habitat, more data on steelhead size, age, life history and run timing should be sought.

2. Work with the Gitwangak/Gitanyow Bands to improve the First Nation food fish data.
3. Set and drift gillnets between late April and November in order to calibrate the per net harvest rate for these two native fishing methods, such that future harvest rates could be more accurately determined by net counts.
4. Conduct a creel census on the Skeena River around the confluence of the Kitwanga River. Fish could be tagged here to better estimate the Kitwanga population holding off the mouth.
5. Conduct a juvenile census upstream from currently known limits of habitat use, in the main tributaries and in the watershed above the lake to determine the significance of these extensive areas as rearing habitat. Moonlit, Deuce and Kitwancool creeks and the Kitwanga River above the lake should receive particular attention.
6. Continue the study methodology of Bustard (1992 and 1993) and Beere (1993) to detect changes in juvenile density over time as an indicator of trends in abundance.
7. Assess the juvenile population of salmonids in Tea Creek below and above the culverts under and near Highway 37, before and after the problems have been corrected, in order to determine if the corrective action was successful.

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Appendix A. List of Contacts

- Ron Tetreau, Fisheries Technician, Fisheries Branch, Ministry of Environment, Lands and Parks, 3726 Alfred Ave., Smithers, B.C., V0J 2N0
- Todd Mahon, Repap, Box 2237, Smithers, B.C., V0J 2N0.
- Guy Morgan, Chief Councillor, Gitwangak Band Council, Kitwanga, B.C.
- Harry Daniels, Fisheries Officer, Gitwangak and Gitanyow Band Councils, Kitwanga, B.C.

Appendix B. Tagging and Aging Data

Source: MELP 1980a,b. Blanks in the table indicate no information recorded.

D/M/Y	ID	Sex	Length (cm)	Weight (kg)	Age	Tag #	Location	Comments
03-Oct-79	11	F	0	6.4		1601	Kitwanga Mouth	
04-Oct-79	12	F	0	8.2		1603	Kitwanga Mouth	
20-Nov-79	9	M	62.2	2.3	3.1+	234		
20-Nov-79	7	M	66	2.7	5.1+	235		Black tail
20-Nov-79	6	M	76.2	4.5	4.2+			Bright, Single tag, then recaptured and radio tag
20-Nov-79	2	F	81.3	5.4	4.2+	233		
21-Nov-79	14	M	0	5		1957	Cabin Hole	
21-Nov-79	1	F	76.2	4.5	4.2+	1767	Mile 10 Canyon	Bright
22-Nov-79	20	F	0	3.2		33	Kitwanga River	
22-Nov-79	19	F	73.7	4.1	4.2+	95	Kitwanga River	Bright
22-Nov-79	18	M	63.5	2.3	3+.1+	236	Kitwanga River	
22-Nov-79	16	M	81.3	5.5	3.2+	1659	Lunch Hole	Fresh
22-Nov-79	8	F	71.1	4.1	3.2+	1771	Kitwanga; 1/2 mile below Battle Hill	Head damage
22-Nov-79	3	F	45.7	0.9		93	Kitwanga River	No scales
23-Nov-79	17	M	0	4.5		1773	Above Tea Creek	

Appendix C. Steelhead Harvest Analysis Data

Source: MELP 1996a.

Stream Name	Fiscal Year	Anglers	Days Fished	Wild Kept	Wild Released	Hatchery Kept	Hatchery Released	Total Kept	Total Released	Total Catch
KITWANCOOL CREEK	1967-68	23	52	4	0	0	0	4	0	4
KITWANCOOL CREEK	1968-69	14	14	4	0	0	0	4	0	4
KITWANCOOL CREEK	1969-70	9	14	0	0	0	0	0	0	0
KITWANCOOL CREEK	1970-71	5	111	0	0	0	0	0	0	0
KITWANCOOL CREEK	1971-72	11	23	3	0	0	0	3	0	3
KITWANCOOL CREEK	1972-73	5	5	0	0	0	0	0	0	0
KITWANCOOL CREEK	1973-74	7	23	11	7	0	0	11	7	18
KITWANCOOL CREEK	1974-75	7	16	0	0	0	0	0	0	0
KITWANCOOL CREEK	1975-76	3	14	0	0	0	0	0	0	0
KITWANCOOL CREEK	1976-77	3	3	0	0	0	0	0	0	0
KITWANCOOL CREEK	1977-78	3	15	3	0	0	0	3	0	3
KITWANCOOL CREEK	1978-79	4	20	0	0	0	0	0	0	0
KITWANCOOL CREEK	1980-81	5	11	0	3	0	0	0	3	3
KITWANCOOL CREEK	1982-83	7	137	6	38	0	0	6	38	44
Stream Name	**Fiscal Year**	**Anglers**	**Days Fished**	**Wild Kept**	**Wild Released**	**Hatchery Kept**	**Hatchery Released**	**Total Kept**	**Total Released**	**Total Catch**
KITWANGA RIVER	1967-68	83	247	100	0	0	0	100	0	100
KITWANGA RIVER	1968-69	61	121	36	0	0	0	36	0	36
KITWANGA RIVER	1969-70	111	301	109	0	0	0	109	0	109
KITWANGA RIVER	1970-71	86	568	89	52	0	0	89	52	141
KITWANGA RIVER	1971-72	74	246	105	39	0	0	105	39	144
KITWANGA RIVER	1972-73	125	467	216	4	0	0	216	4	220
KITWANGA RIVER	1973-74	54	143	17	12	0	0	17	12	29
KITWANGA RIVER	1974-75	48	147	15	5	0	0	15	5	20

Stream Name	Fiscal Year	Anglers	Days Fished	Wild Kept	Wild Released	Hatchery Kept	Hatchery Released	Total Kept	Total Released	Total Catch
KITWANGA RIVER	1975-76	38	115	29	10	0	0	29	10	39
KITWANGA RIVER	1976-77	70	220	68	14	0	0	68	14	82
KITWANGA RIVER	1977-78	31	35	3	3	0	0	3	3	6
KITWANGA RIVER	1978-79	69	179	5	12	0	0	5	12	17
KITWANGA RIVER	1979-80	42	283	32	2	0	0	32	2	34
KITWANGA RIVER	1980-81	40	147	36	22	0	0	36	22	58
KITWANGA RIVER	1981-82	31	93	17	0	0	0	17	0	17
KITWANGA RIVER	1982-83	25	140	22	4	0	0	22	4	26
KITWANGA RIVER	1983-84	25	44	0	0	0	0	0	0	0
KITWANGA RIVER	1984-85	18	70	0	0	0	0	0	0	0
KITWANGA RIVER	1985-86	28	63	14	221	0	0	14	221	235
KITWANGA RIVER	1986-87	17	17	0	0	0	0	0	0	0
KITWANGA RIVER	1987-88	22	135	0	8	0	0	0	8	8
KITWANGA RIVER	1988-89	26	68	8	39	0	0	8	39	47
KITWANGA RIVER	1989-90	10	16	0	0	0	0	0	0	0
KITWANGA RIVER	1990-91	6	15	0	8	0	0	0	8	8
KITWANGA RIVER	1991-92	12	34	0	30	0	0	0	30	30
KITWANGA RIVER	1992-93	4	15	0	8	0	0	0	8	8
KITWANGA RIVER	1993-94	2	4	0	6	0	0	0	6	6
KITWANGA RIVER	1994-95	6	6	0	6	0	0	0	6	6
KITWANGA RIVER	1995-96	12	12	0	3	0	0	0	3	3