

OBSERVATIONS ON CUTTHROAT TROUT OF THE LAKELSE RIVER SYSTEM, 1986
AND IMPLICATIONS FOR MANAGEMENT

by

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ABSTRACT

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During 45 sampling days between April 14 and November 6, 1986, 810 cutthroat trout were tagged in the upper Lakelse River near Terrace, B.C. The majority were age four (34.3%) and five (25.4%), followed by three, six and two year olds at 17.6, 4.9 and 3.9% respectively. Repeat spawners comprised 13.7% of the sample. Average fork length of two, three, four, five and six year old cutthroats were 195, 235, 285, 355 and 385 mm respectively. A single seven year old fish was 420 mm. Cutthroat abundance during the study period was roughly estimated at 7000 fish (confidence limits 4977 to 21579). Tentative conclusions, based on both age compositions and abundance estimates obtained during this and earlier studies, suggest a stable cutthroat trout population. A consistent evaluation of the Lakelse Lake and/or River cutthroat trout population should be developed.

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INTRODUCTION

Cutthroat trout (oncorhynchus clarki) contribute substantially to the Lakelse Lake-River sport fishery. In order to improve the information base on which this expanding sport fishery is managed, a tagging study of cutthroat trout was undertaken during the May-November period of 1986 on the upper Lakelse River. Objectives of the study were to:

- 1) determine age and growth characteristics,
- 2) estimate population size, and finally to
- 3) develop recommendations for management.

STUDY AREA

The Lakelse River flows west out of Lakelse Lake into the Skeena River near Terrace (Fig. 1). Drainage area is approximately 389 km², and peaks in discharge occur primarily during the fall and late spring as a function of rain and snow melt respectively (Water Survey of Canada, 1985; Cleugh et al, 1978). The trophic status was classified as both eutrophic (Brett, 1950) and oligomesotrophic (McKean, 1986). The river and lake produce exceptional runs of pacific salmon (Hancock et al, 1983) and trout (Bilton et al, 1955). Not suprisingly, the Lakelse supports about 35 percent of the total Skeena River commercial fishery catch for all species (McKean, 1986).

Additional information regarding the Lakelse drainage is available from Sinclair (1974), Cleugh et al, (1978), McKean, (1986) and Warrington, (1986).

The Lakelse Lake and River sports fishery has been described by Hatlevik et al (1981) and Imbleau (1978). Earlier work in this regard was reported by Bilton et al (1955).

METHODS

Adult cutthroat were seined from the upper river during May to November, 1986. A few fish were angled in April. Fish were tagged with numbered cylindrical anchor (40mm x 2mm) tags. Fork length, sex, date of capture, tag number and capture location were recorded. After removal of a few scales between the dorsal and anal fins and several scale rows above the lateral line, fish were released at the capture site.



Province of British Columbia

Figure 1

Location of
Lakelse Lake

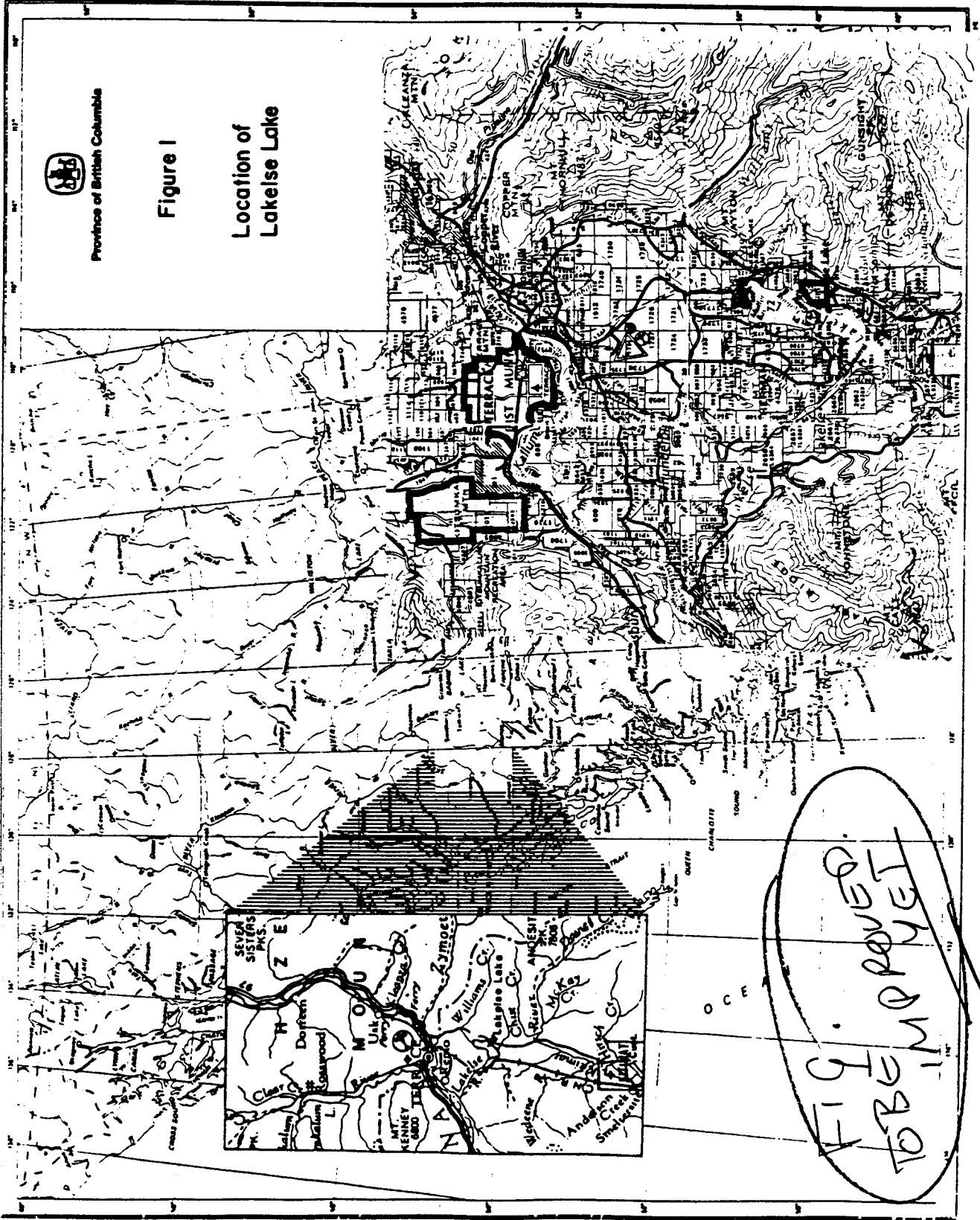


FIG. IMPROVED TO BE IMPROVED

Scales were placed between two glass microscope slides and viewed (magnification of 50x) with a microcom 1600 microfish enlarger.

Aging was conducted according to methods described by Narver, (1975).

The cutthroat population in the upper river was estimated using the Schnable, Schumacher and Schabel-Chapman adjusted multiple census techniques (Ricker, 1975).

All fish captured additional to cutthroat were only enumerated and released.

RESULTS AND DISCUSSION

During 45 sampling days between April 14 and November 6, 1986, 751 cutthroat trout were tagged by seining and 59 (7.3%) by angling primarily in the upper Lakelse River. Of these, forty-six fish were recaptured once, five were taken twice while a further three fish were recaptured three, five and six times respectively for a total of 70 recaptures. Seven fish were recaptured by anglers in the lake.

In addition to cutthroat, a number of other fish were captured and released. These included 7908 Dolly Varden char which were fin clipped (339 recaptures), 967 rainbow trout, 5589 whitefish, 1161 suckers, six squawfish, 11 adult steelhead and 178 adult coho salmon (Table 1). This abundance of fish including cutthroat sampled near the lake outlet was a presumed function of food supply. Numerous salmon spawn in this area in the fall, while during the spring, juvenile sockeye and pink salmon migrate downstream. The marked decline in catch from November 1 to November 6 was a function of stream freshet conditions.

AGE AND GROWTH CHARACTERISTICS

Scales were removed from 108 cutthroat of which 102 were readable. Thirteen age groups were discernable ranging in total age from two to seven years (Table 2). Eighty-six percent (N=88) were maiden fish, while the remaining 14% (N=14) had spawned previously. Within the latter category, eight had spawned only once while four and two had spawned two and three times respectively. The two dominant total ages (combination of multiple spawners +maiden fish) were 4 and 5. These two ages constituted 36 and 29% respectively of the total population aged.

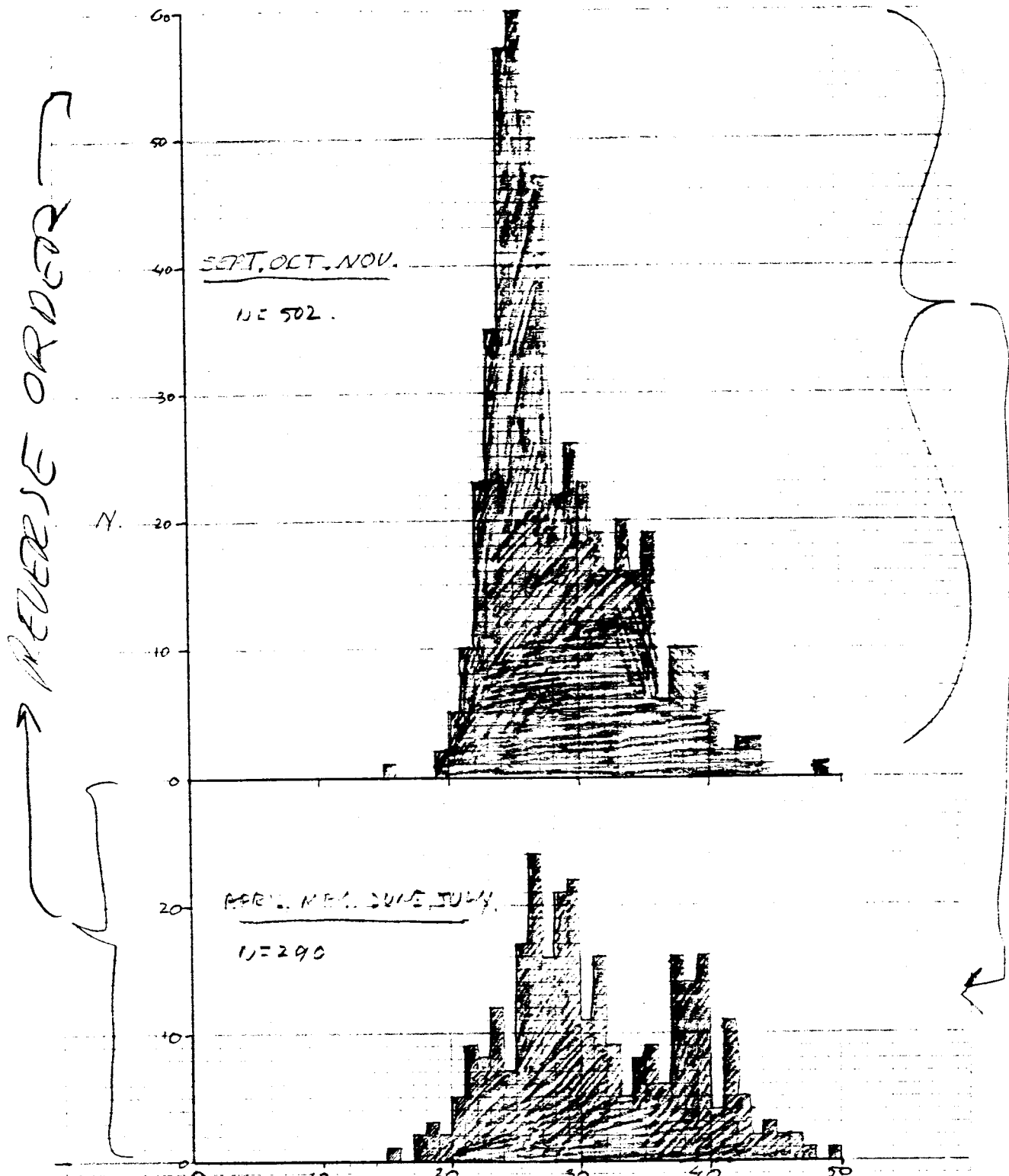


Figure 2 length frequency histogram of rhyphid lake trout cutthroat trout sampled in 1986.

Table 1. Fish captured during beach seining the Upper Lakelse River from Apr. to Nov. 1986.

Date	Cut throat	Dolly Varden	Rainbow	White Fish	Suckers	Squaw fish	Steel head	Coho
Apr.								
14	21	0	3	0	40	0	4	0
15	5	8	10	0	22	0	3	0
16	25	5	3	0	17	0	0	0
17	3	0	0	0	0	0	0	0
24	36	3	3	0	0	0	0	0
25	0	4	0	0	0	0	0	0
28	0	58	2	0	38	0	2	0
29	8	2	1	0	2	0	0	0
May								
1	2	0	3	0	0	0	0	0
2	5	0	2	0	0	0	0	0
7	10	6	2	0	0	0	0	0
8	0	6	0	0	0	0	0	0
12	27	20	1	0	152	0	1	0
13	37	36	7	9	97	1	1	0
14	18	70	12	20	68	0	0	0
15	7	49	8	4	58	4	0	0
Jun.								
10	2	0	0	0	569	0	0	0
11	0	0	0	0	79	0	0	0
12	0	0	1	0	0	0	0	0
16	14	0	1	0	0	0	0	0
24	21	0	2	0	0	0	0	0
Oct.								
16	13	53	0	111	16	0	0	33
17	87	307	50	168	0	0	0	0
20	130	1066	107	562	0	0	0	20
21	69	488	44	250	0	1	0	54
22	37	479	71	628	2	0	0	15
23	49	511	71	515	0	0	0	29
27	112	2568	274	916	1	0	0	0
Nov.								
1	13	2124	251	2264	0	0	0	0
6	<u>0</u>	<u>27</u>	<u>38</u>	<u>142</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>
Total	751	7908	967	5589	1161	6	11	780

Fork lengths of all cutthroat sampled (N=792) from the Upper Lakelse River ranged from 15 to 49cm. During the April to July period, a bimodal length frequency distribution was noted, possibly as a function of age four and five fish dominating the sample (Fig. 2). Age 4 fish ranged from 22 to 35cm (ave+28.6cm), while age five fish ranged from 30 to 40cm (ave+34.7cm, Table 2). In late fall, the length frequency histogram assumed a more normal distribution, likely as a function of spring and summer growth increasing size variability.

Table 2. Age and average fork length (cm) of upper Lakelse River cutthroat trout sampled by beach seine May to November, 1986.

Age	N	%	Fork Length (cm)	
			Average	Range
2+	4	3.9	19.5	16-23
3+	18	17.6	23.7	20-27
4+	35	34.3	28.6	22-35
5+	26	25.4	34.7	30-40
6+	5	4.9	37.8	37-40
Subtotal	88	86.3		
2SS	1	1.0	29.0	—
3S	1	1.0	28.0	—
3SSS	1	1.0	49.0	—
4S	3	2.9	37.7	35-42
4SS	2	2.0	41.5	40-43
4SSS	1	1.0	41.0	—
5S	4	3.9	39.5	37-41
Subtotal	14	13.7		
Total	102	100.0		

Percent age composition of the adult population did not change significantly from 1950 to the present study (table 3). Four and five year old fish dominated during each of the three studies although their contribution has ranged from 36.3 to 52.1% for four year old and 29.4 to 35.5% for five year old fish. Based on age composition alone, the cutthroat population of the Lakelse River appears to be stable. Length at age has increased considerably from the 1954 investigations to the present study (Table 4). This growth was furthermore greatest in older ages. During the 1950 to 1954 period, age 3 fish averaged 22cm, while in the present study three year olds were 23.5cm, an increase of 1.5cm. Similarly, age 6 fish averaged 33cm during the early studies, in 1986 these were 38.5cm, an increase of 5.5cm. At age 7, this increase was 6cm.

These comparisons are tenuous however since sample dates and sizes as well as collection methods were different. Precision of cutthroat trout age determination by scale analysis is also often questionable due to difficulty in detecting annuli.

Table 3. Percent age composition of Lakelse River cutthroat trout sampled during three study periods.

Date	Age							N
	2	3	4	5	6	7	8	
1950-1954 ¹		10.5	46.5	35.5	6.0	1.5		2000+
1978 ²		6.7	52.1	34.5	5.0	1.4	0.3	359
1986	3.9	17.6	36.3	29.4	11.8	1.0		102
Mean	3.9	11.6	45.0	33.1	7.6	1.3	0.3	

1. Inferred from graph in Bilton, 1955, and 1 year added to each age (note Imbleau, 1978).
2. Imbleau, 1978.

Table 4. Mean fork length (cm) at capture age of Lakelse River cutthroat trout sampled during three study periods.

Date	Age							N
	2	3	4	5	6	7	8	
1950-1954 ¹	--	22.0	27.0	29.0	33.0	36.0	--	2000+
1978 ²	--	22.5	27.1	31.3	33.9	37.7	47.6	207
1986	19.5	23.5	28.5	35.5	38.5	42.0	--	102

1. Inferred from graph in Bilton, 1955.
2. Imbleau, 1978.

POPULATION ESTIMATION

The cutthroat population in the upper Lakelse River during the study period was estimated at 7000 fish (table 5). Confidence limits were wide due to low recapture frequency and ranged from 4677 to 21579 fish. Post tagging mortality, tag loss, catchability influences and migration were not accounted for. The estimate was therefore considered a very rough approximation of cutthroat abundance in the area sampled.

Marking experiments during 1950 to 1954 revealed that from 3000 to 5000 cutthroat migrated from the lake into the upper Lakelse River each spring (Bilton et al, 1955). The present results suggest that cutthroat trout abundance has not changed significantly since Bilton's study.

Table 5. Estimates of cutthroat abundance in the upper Lakelse River during the April-November study period, 1986.

Method	Estimates	95% Confidence Limits	
		Poisson Dist.	Normal Dist.
Schnabel	6762	5207- 8782	5328-9254
Chapman	6644	5127- 8608	5264-9004
Schumacher	8089	4977-21579	
Ave.	7165		

RECOMMENDATIONS

A consistent evaluation of the Lakelse lake and/or river cutthroat trout population should be developed. Such an evaluation, repeated every 4 to 5 years, would sample cutthroat trout to determine changes in age, growth and relative population abundance. Sampling could be accomplished by:

- 1) beach seining the upper Lakelse River for one or two days in October, and/or
- 2) gill net sampling the lake for 1 or 2 days also in October.
- 3) inclusion of angler groups to collect scales and lengths of river and lake cutthroat.

REFERENCES

- Bilton, T.H. and M.P. Shepard. 1955. The sports fishery for cutthroat trout at Lakelse Lake, British Columbia. Fish. Res. Bd. Can., Pacific Coast Stat. Progr. Rept. (104):38-42
- Brett, T.R. 1950. The physical limnology of Lakelse Lake, British Columbia. Fish. Res. Bd. Can., 8(2), 82-102.
- Cleugh, T.R., C.C. Graham and R.A. McIndoe. 1978. Chemical, Biological and physical characteristics of Lakelse Lake, B.C. Fish. Mar. Ser. Man. Rep. 1472. Dept of Fisheries and the Environment, Vancouver, B.C.
- Hancock, M.J., A.J. Leaney-East and D.E. Marshall. 1983. Catalogue of salmon streams and spawning escapements of statistical area 4 (lower Skeena River) including coastal streams. Ca. data rept. of fish and aquat. sc. no. 395, 422 pp.
- Hatlevik, S.P., K. Diemart and M.R. Whately. 1981. A creel survey of the Lakelse Lake cutthroat sports fishery, June-August, 1979. Fisheries report No. 79-4, Fish and Wildlife Branch, Province of British Columbia, Smithers, B.C.
- Imbleau, L.G.J. 1978. A creel survey of the Lakelse River cutthroat trout sports fishery: April-May, 1978. Fisheries Report No. 78-1, Fish and Wildlife Branch, Province of British Columbia, Smithers, B.C.
- McKean, C.J.P. 1986. Skeena-Nass area, Lakelse Lake water quality assessment and objectives, Resource Quality Section, Water Management Branch, Ministry of Environment.
- Narver, D.W. 1975. Notes on the ecology of cutthroat trout (salmo clarki) in Great Central Lake, Vancouver Island, British Columbia. Fish. Mar. Serv. Res. Dev. Tech. Rep. 567: 20 pp.
- Ricker, W.E. 1975. Computation and interpretation of biological statistics of fish populations. Bull. Fish. Res. Board Can. 191:382 pp.
- Sinclair, W.F. 1974. The socio-economic importance of maintaining the quality of recreational resources in northern British Columbia. The case of Lakelse Lake. D.O.E., fish. Mar. Ser. Tech. Rep. PAC\T-74-10, 107 pp.
- Warrington, P. 1986. the distribution of aquatic vegetation in Lakelse Lake and the partitioning of nutrients among sediments, water and plant tissue. Typed report, Resource Quality Section, Water Management Branch, Min. of Environment, Victoria, 30 pp.
- Water Survey of Canada. 1985. Historical stream flow summary, B.C. Inland Waters Directorate, Water Resources Branch, Water Survey of Canada, Ottawa, Canada.