

SC789

**Survey of Bulkley Lake
and its
Inlet and Outlet Streams**

by

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Field Work by

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SUMMARY

Bulkley Lake, its inlet streams, and outlet stream were surveyed on October 23rd and 24th, 1993. The gill net sample from the lake had two size/age classes of rainbow trout (*Oncorhynchus mykiss*) and three size/age classes of mountain whitefish (*Porsopium williamsoni*). Other fish caught in the gill net were northern squawfish (*Ptychocheilus oregonensis*), redbreasted sunfish (*Richardsonius balteatus*) and lake chub (*Couesius plumbeus*). In addition, rainbow trout parr were caught in minnow traps in two inlet streams: Maxan Creek and Upper Bulkley River. Only lake chub and redbreasted sunfish were caught in the Bulkley River near the outlet.

Suitable spawning and rearing habitat for rainbow trout were discovered in both Maxan Creek and in the Upper Bulkley River. The Bulkley River (outlet) also had ideal rainbow trout habitats below a beaver dam, but the dam was impassable by fish at the time of this survey. Two beaver dams also obstructed fish migration up the Upper Bulkley River. However, enhancement of streams at Bulkley Lake are unnecessary since Maxan Creek is unobstructed and has excellent spawning and rearing habitats. The annual recruitment at Bulkley Lake is sufficiently maintaining its rainbow trout stock and there is presently no need to confront the existing beaver activity at this lake.

1.0 Introduction

Bulkley Lake was surveyed as a part of the Burns Lake-Houston small lakes project in which a total of 10 lakes were examined: Sunset, Gilmore, Swans, Lars, Old Man, McBrierie, Elwin, Watson, Day, and Bulkley lakes. Recent reports of serious declines of the rainbow trout sport fishery in this region have created a need for information on the annual recruitment and relative species composition at these lakes. The intent of this project was to survey fish communities, and to report existing conditions at the inlet and outlet streams at each of these 10 lakes. The most recent concern has been an outburst of beaver activities which appear to have affected annual recruitment of rainbow trout by blocking many or all of a lake's streams with impassable dams. The primary focus of this work was on description of inlet and outlet streams as assessments of available rainbow trout spawning sites and to give recommendations for possible habitat enhancements at these small lakes.

2.0 Materials and Methods

2.1 Study Site

Bulkley Lake (lat: 54° 22' 40", long: 126° 06') is located 35 km east of Houston. There are no public campgrounds or boat launches available at this lake, but Fisheries employees can obtain permission to use the private field of the 7-S Ranch at the west end of the lake (Figure 1). This private property

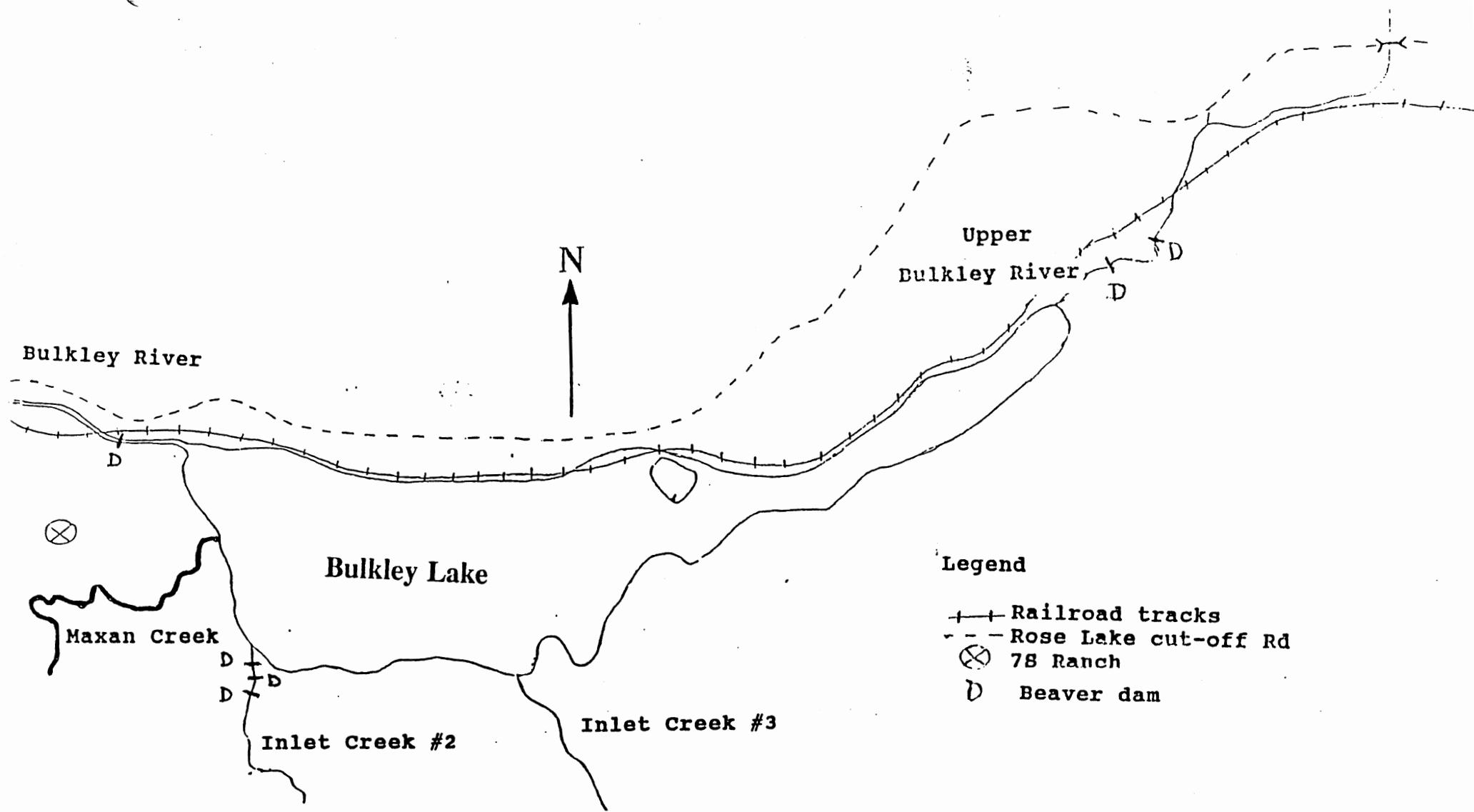


Figure 1. Map of Bulkley Lake and its inlet and outlet streams.

provides vehicle access to the outlet and Maxan Creek inlet. Maxan Creek drains a relatively large area into the south west corner of Bulkley Lake. The Upper Bulkley River drains from the north (Conrad Lake) into Bulkley Lake at its east end. The Bulkley Lake outlet is at the west end of the lake and forms the Bulkley River.

2.2 Evaluation of Bulkley Lake

Photographs of the lake were taken to illustrate its general characteristics. Visual observations by boat were also recorded along the shoreline of the lake. A 30 meter gill net (15 m with 30 mm mesh, 15 m with 50 mm mesh) was set near the Maxan Creek inlet and was attached to shore where the depths ranged from 1 - 5 meters. Captured fish were identified, measured to the nearest mm (fork length), and released when possible. Rainbow trout that were dead at retrieval were also weighed.

2.3 Evaluation of inlets and outlet

The inlets and outlets were surveyed by visual observations while walking along the streams for as far as seemed necessary to assess habitat for spawning and rearing of juvenile rainbow trout. Photographs were taken to represent general characteristics of the streams and to illustrate any obstructions to fish migration. Minnow traps (baited with processed cheese) were set in the main inlet streams (Upper Bulkley River, Maxan Creek) and the outlet stream (Bulkley

River) to take samples of small fish (25 - 100 mm) that were present at the time of survey. Captured fish were identified, measured to the nearest mm (fork length), and released.

3.0 Results

3.1 Bulkley Lake

Bulkley Lake is presently well forested on its north and south sides with spruce, aspen and cottonwood. The east end of the lake is the Upper Bulkley River inlet where terrestrial vegetation is primarily willow bushes. The west end of the lake is a hay field. The immediate shoreline of this lake is primarily rocky except at its inlets and outlets (see below). The water of the lake was turbid and deeply stained at the time of the survey. The maximum depth of Bulkley Lake was recorded as 14 m with a mean depth of 7.2 m during the 1974 survey (Tredger & Caw, 1974). The railroad runs along the north shore of the lake and there appear to be no culverts or other provisions for water flow under the dyke built to support the railroad. In fact, the railroad was built through part of the lake and disconnects the northern most bay from the main lake (Figure 1).

The gill net was set in Bulkley Lake for 22 hours. The catch consisted of 6 rainbow trout (*Oncorhynchus mykiss*), 10 northern squawfish (*Ptychocheilus oregonensis*), 4 redbside shiners (*Richardsonius balteatus*), 24 mountain whitefish (*Prosopium williamsoni*), and 62 lake chub (*Couesius plumbeus*).

Rainbow trout, northern squawfish, and lake chub had at least two size classes and mountain whitefish had three distinct age/size classes in this sample which provides evidence of stable recruitment by these fish (Figure 2, Appendix 2). The visual distinction of size/age classes is more difficult among redbside shiners.

The three distinct size/age classes from the gill net sample of mountain whitefish are illustrated in Figure 3. Fish in the larger two size classes of this species were sexually mature and several were ripe. The fish in the smallest size class were immature and would not have spawned for another year or two. It is possible that the high number and proportion of sexually mature whitefish in this sample is due to their congregation near the inlet stream (where the gill net was set).

3.2 Inlet: Upper Bulkley River

The Upper Bulkley River is surrounded by dense willow bushes for the 1 km upstream from the lake that was surveyed (Figure 4). For the initial 400 m upstream to the first beaver dam, the stream was between 4 - 5 m wide, 0.5 - 1.0 m deep, and had no identifiable flow. The substrate was muddy and soft and the water very turbid, with visibility less than 10 cm. The first beaver dam was 5 m long, raised the water level approximately 5 cm, but was partially broken through (Figure 5). The present conditions appeared to make the dam passable for downstream migration by fish. The stream remained relatively the same for the next 250 m upstream to the second beaver dam.

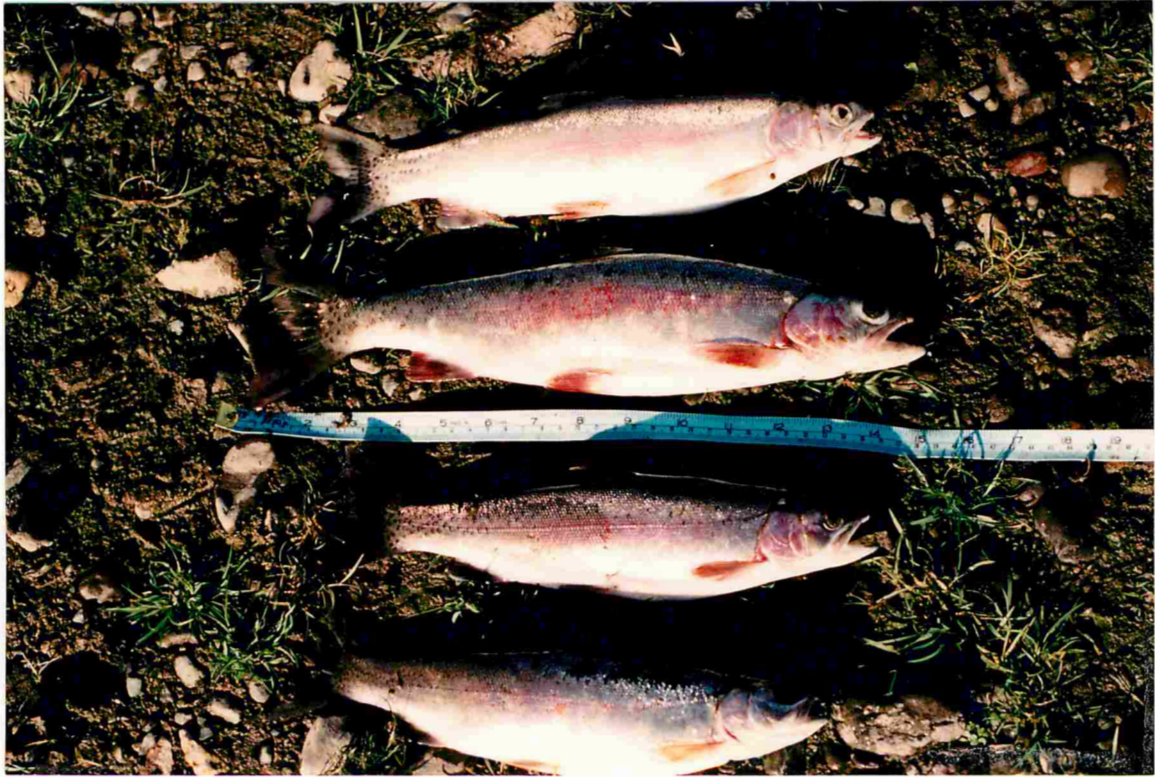


Figure 2. Rainbow trout from gill net sample (see Appendix 1).



Figure 3. Mountain whitefish that were caught in gill net near the Maxan Creek inlet (see Appendix 1).



Figure 4. View of Upper Bulkley River Inlet at East end of Bulkley Lake.



Figure 5. First beaver dam on the Upper Bulkley River.

The second beaver dam was 6 m long and raised the water level 60 cm (Figure 6). Above this dam, the stream widened to 5 - 8 m, and depth was 1.0 - 1.5 m; the substrate remained muddy and extremely soft (Figure 7). Stream flow was only noticeable at overflows at the dams and there was no suitable spawning habitat for rainbow trout in the lower kilometer of this stream.

A short segment of the Upper Bulkley River was also surveyed approximately 2 km upstream from the lake where the road (Rose Lake cut-off Road to Forestdale) crosses the stream. At this location, the gradient is greater and the substrate is 70% small rock, 20% gravel, and 10% sand (Figure 8).

Two baited minnow traps were set in the Upper Bulkley River under the bridge at the Rose Lake cut-off Road for 19 hours (overnight). Two rainbow trout parr (*Oncorhynchus mykiss*) (FL = 69mm, 75 mm) were caught in these two traps, and were released.

3.3 Inlet: Maxan Creek

Maxan Creek forms the largest inlet of Bulkley Lake, and has prime rainbow trout spawning and rearing habitat (Figure 9). The stream was surveyed by walking for 1 km upstream from the lake. For this section and above, the stream consisted of a series of pools, riffles and runs. The width of the pools ranged from 4 - 7 m and depth varied between 1 and 2 m. There was some variation in bottom type between pools. Substrate composition between pool ranged from 80% sand and 20% gravel (Figure 10) to 80% gravel and 20% sand (Figure 11). Runs and



Figure 6. Looking downstream at second beaver dam across the Upper Bulkley River.



Figure 7. Looking upstream from the second beaver dam on the Upper Bulkley River.

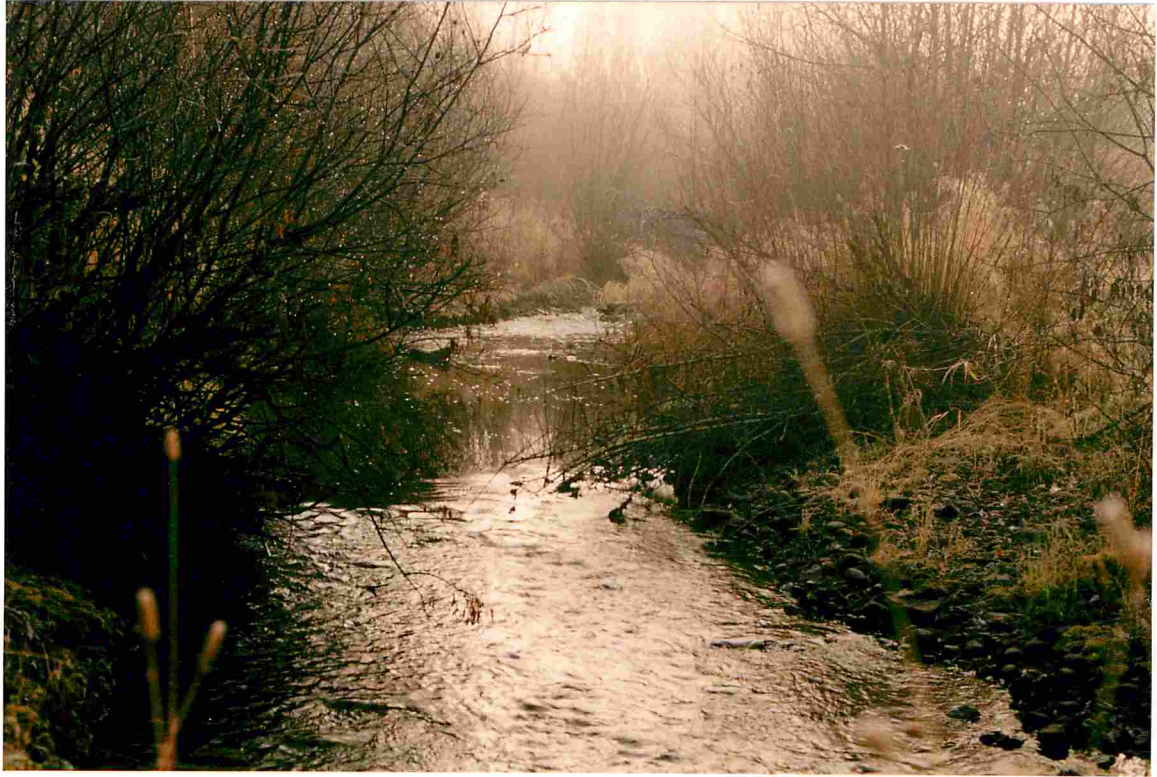


Figure 8. Looking upstream at the Upper Bulkley River from the bridge at the Rose Lake cut-off.



Figure 9. View of the Maxan Creek Inlet at Bulkley Lake.



Figure 10. View of Maxan Creek, looking downstream at Bulkley Lake.

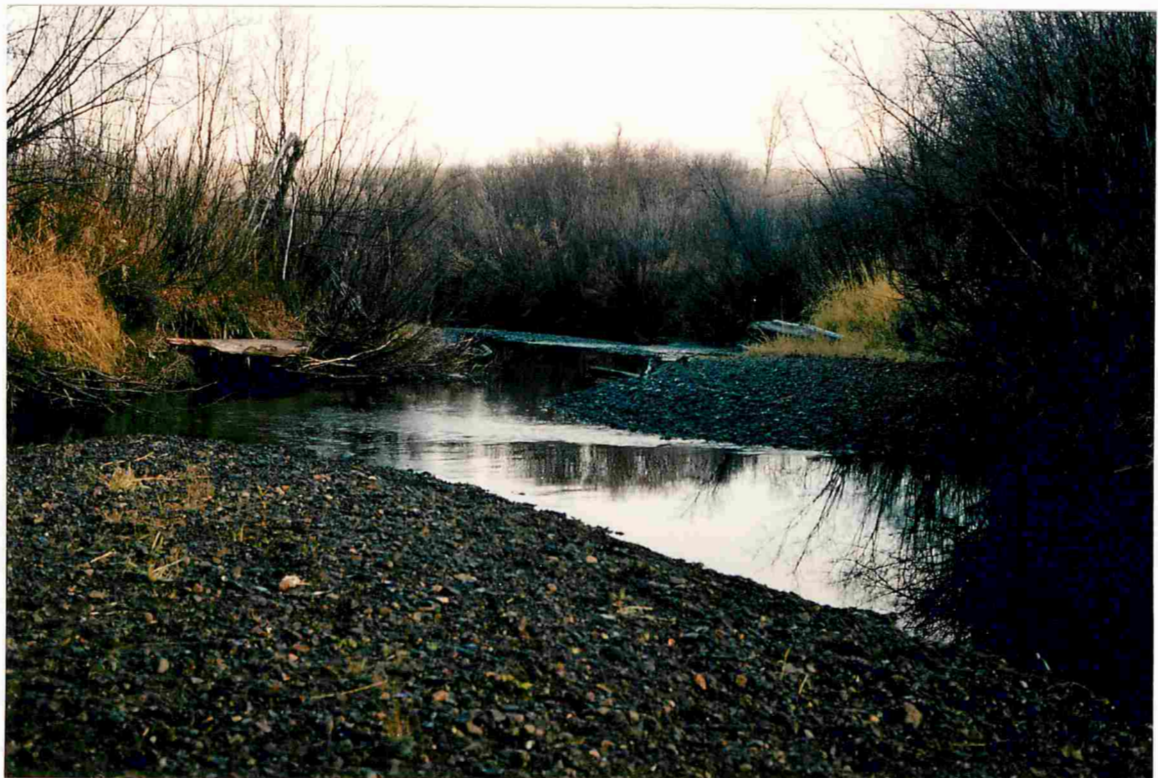


Figure 11. Looking downstream at Maxan Creek, approximately 500 m upstream from Bulkley Lake.

riffles consisted of 80% gravel and 20% rock. The width of runs and riffles ranged between 5 and 10 m. The creek was semi-confined, and banks had signs of high water levels of 1 - 2 m above the present level. Substrate in frequently flooded areas consisted of 60% rock, 20% gravel and 20% sand. Banks on either side of the floodplain were 3 m high. For the first 1 km and beyond the stream flows through a meadow and is likely utilized by cattle for watering. Cattle tracks were frequent along the creek. There is little cover from willows (10%) and organic debris (10%). The water is clear, and there are no barriers to migration.

Two rainbow trout parr (*Oncorhynchus mykiss*) (FL = 62 mm, 69 mm) were caught in the four minnow traps set for 26 hours. A spawning pair of mountain whitefish (*Prosopium williamsoni*) was observed in a Maxan Creek riffle approximately 500 m upstream from the lake. One clutch of fungus-infected eggs (whitefish??) were also found in a shallow pool under an overhanging bank (Figure 12).

3.4 Other inlets

Two smaller inlets on the south side of the lake were also surveyed on October 23rd, 1993, although no traps were set here. One of the small inlet streams surveyed (Inlet #2, Figure 1) was dammed 50 m upstream from the lake (Figure 13). Stream width below the dam ranged between 2 and 3 m and depth was 0.5 - 1 meter; substrate was mud. The beaver dam was 6 m wide and the water level on the upstream side of the dam was 50 cm higher



Figure 12. Photograph of an infected clutch of eggs in a very slow flowing pool in Maxan Creek.



Figure 13. One of three beaver dams that block Inlet Stream #2 on south side of Bulkley Lake.

than that on the downstream side. A large pool was located just above the dam. The pool was approximately 8 m wide, the substrate very muddy and there was no flow. A second beaver dam is located 30 m above the first dam. The second dam is also about 6 m wide and the water level is 50 cm higher on the upstream than on the downstream side. This dam has a leak and may also be passable at higher water levels. Twenty meters above the second dam is a third dam. This third dam is larger than the previous 2, with a width of 25 m. This dam is not passable to fish. The dam is older than the two smaller dams, and it appears to hold back quite a bit of water. The large pool on the upstream side of the dam was 50 cm higher than the water level on the downstream side. The stretch of the inlet stream that was surveyed flows through a marshy area with no distinct banks. Willows and overhanging grass provide about 30% cover. No rainbow trout spawning habitat was observed in this inlet stream.

The other small inlet on the south side of Bulkley lake (Inlet #3, Figure 1), is a temporary drainage. The ditch ranged in width from 0.5 - 1 m, but there was no water, other than a few puddles, at the time of this survey; the substrate consisted primarily of mud. This inlet stream is not suitable for rainbow trout habitat.

3.5 Outlet

The outlet of Bulkley Lake is a large bay on the southwestern tip of the lake. The bay was relatively shallow (1 - 2



Figure 14. View of Bulkley Lake outlet (Bulkley River).

m), and had an abundance of water lillies and weeds. The outlet stream itself ranged from 15 - 25 m wide for the first 500 m downstream from the lake (Figure 14). The depth in this upper reach, ranged between 1 and 2 m, and there appeared to remnants of a beaver house under water. The water is fairly turbid and visibility was restricted to 1 m. A large beaver dam, 500 m below the lake, restricted flow of the outlet creek (Figure 15). The beaver dam consisted of two sections, and spanned 10 m on either side of an island in the center of the outlet creek. The water level was 30 cm higher on the upstream side of the dam than on the downstream side, but water flowed through over the dam in some locations. The dam may have been passable for fish

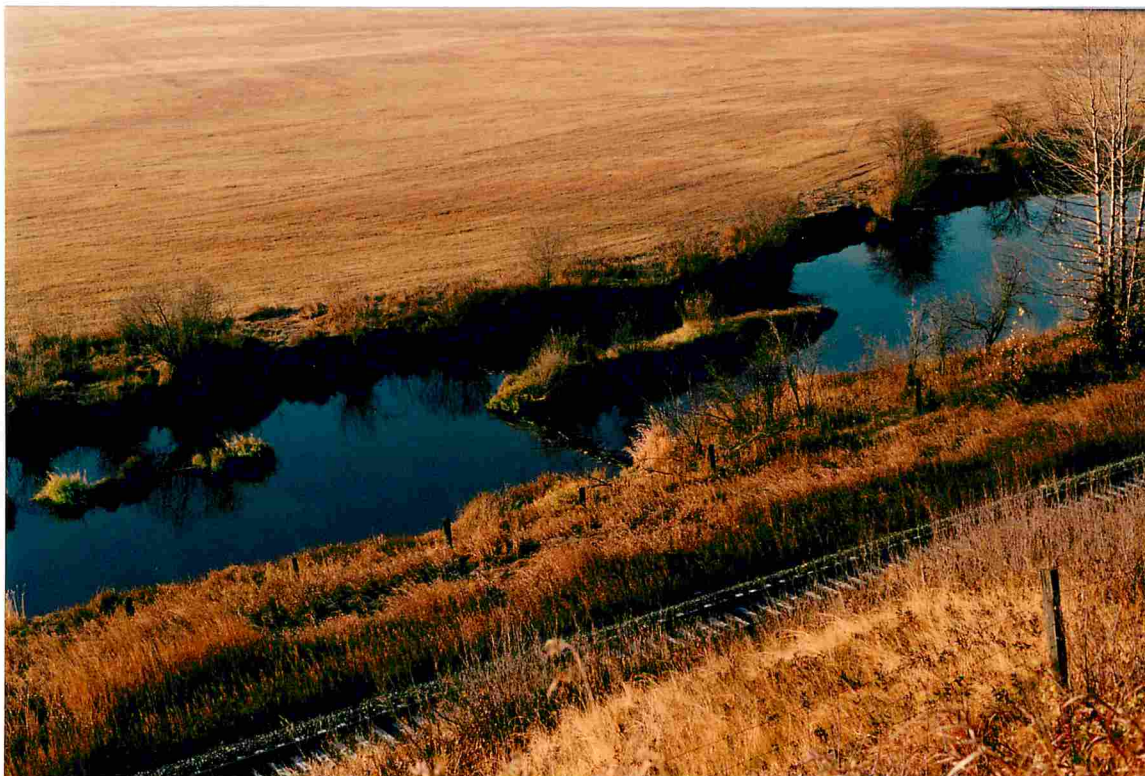


Figure 16. View of the beaver dam that blocks the Bulkley River, 500 m downstream from Bulkley Lake.



Figure 16. View of the Bulkley River, 100 m downstream from the beaver dam. The 7-S Ranch is in the background.

migrating downstream at the time of this survey. Below the dam, the Bulkley River consisted of a series of pools, runs and riffles (Figure 16). The width ranged between 8 and 10 m, and the substrate consisted of a mixture of gravel and sand. There was good flow in several runs, and the depth ranged from 2 - 10 cm for runs and 0.5 - 1.0 m for pools. The Bulkley River had good rainbow trout spawning and rearing sites below the dam.

The four minnow traps were set on the upstream side of the dam for 23 hours. The only fish caught were two redbside shiners (*Richardsonius balteatus*) and one lake chub (*Couesius plumbeus*). The fork lengths of these fish are summarized in Appendix 3.

4.0 Discussion

Bulkley Lake supports a relatively diverse fish community including rainbow trout. Maxan Creek and Bulkley River (outlet) below the first beaver dam offer good rainbow trout spawning and rearing habitat. The Upper Bulkley River (inlet) has good spawning and rearing habitat at the crossing of the Rose Lake cut off Road, but it is unclear whether Bulkley Lake rainbow trout are able to access this section of the river due to beaver dams. It is possible that the rainbow trout parr caught in the Upper Bulkley River originated from Conrad Lake, rather than the Bulkley Lake stock.

The presence of two distinct size classes of rainbow trout in the gill net sample indicates that recruitment is relatively consistent. The mountain whitefish stock of this lake also

appears to be healthy with three distinct size/age classes. Maxan Creek is the prime spawning habitat for salmonids of Bulkley Lake, and there is presently no need to enhance its habitat.

The only access to the lake is private. There are no provisions for public access through roads or trails at this lake. The only location where launching of boats is possible is from the meadow of the 7-S Ranch. Enhancement of this location to improve sports fishing would therefore only benefit habitants of the immediate area, and not the general public. Recruitment of Bulkley Lake rainbow trout is presently sufficient to maintain the stock.

5.0 Recommendations

5.1 It is recommended that Maxan Creek be annually surveyed to insure adequate conservation of the existing fish fauna in Bulkley Lake. Rainbow trout, mountain whitefish, and lake chub depend on lake inlet streams for reproduction and Maxan Creek has suitable spawning and rearing habitats. It may be possible to receive annual, volunteer assessments of Maxan Creek if local residents are notified of this necessity. If beaver dams are found in Maxan Creek, volunteer programs should be further organized to either remove or alter beaver dams to maintain suitable fish habitats.

References

Tredger, D. and Caw. 1974. The Bulkley Lake survey data.
Ministry of Environment, Fisheries Branch, Smithers, B.C.,
on file.

Appendix 1. Fork Lengths (mm) of fish caught in gill net that was set in Bulkley Lake for 20 hours. Weight (g) was also recorded for rainbow trout that could not be released.

Mountain whitefish (*Prosopium williamsoni*) (N = 24)

30 mm mesh: 310 290 121 126
 50 mm mesh: 290 350 284 296 290 273 260 242 266
 250 258 236 266 265 274 255 231 233
 226 223

Northern squawfish (*Ptychocheilus oregonensis*) (N = 10)

30 mm mesh: 345 295
 50 mm mesh: 470 460 440 340 370 290 290 285

Redside shiner (*Richardsonius balteatus*) (N = 4)

30 mm mesh: 115 103 105 109

Lake chub (*Couesius plumbeus*) (N = 62)

30 mm mesh: 195 120 166 155 135 124 149 128 118
 126 144 122 127 125 129 134 119

- an additional 19 fish were not measured

50 mm mesh: 281 218 244 222 226 221 228 220 220
 212 210 200 201 200

- an additional 10 fish were not measured

Rainbow trout (*Oncorhynchus mykiss*) (N = 6)

30 mm mesh: 330 mm (M) 295 mm (F) - both released

50 mm mesh:

females (F)		males (M)	
Fork length (mm)	Weight (g)	Fork length (mm)	Weight (g)
315	300	356	440
276	190	279	200

Appendix 2. Fork lengths of fish captured in minnow traps that were set in the Upper Bulkley River (inlet stream to Bulkley Lake) for 16 hours.

Rainbow trout (*Oncorhynchus mykiss*) (N = 2)

69 mm 75 mm

Appendix 3. Fork lengths of fish captured in minnow traps that were set in Maxan Creek (largest inlet stream to Bulkley Lake) for 24 hours.

Rainbow trout parr (*Oncorhynchus mykiss*) (N = 2)

62 mm 69 mm