Swans Lake

An Inventory of Swans Lake and its Inlet and Outlet Streams

by

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Field Work by

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Summary

Swan Lake was surveyed on October 11th and 12th, 1993. A gill net sample from the lake included parr, immature, and mature rainbow trout (*Oncorhynchus mykiss*), one large scale sucker (*Catastomus macrocheilus*), and one longnose sucker (*Catastomus catastomus*). Three age classes and the large catch of rainbow trout indicated good annual recruitment of rainbow trout at Swans Lake.

The one outlet stream of Swan Lake is located at the west end of the lake. There is a large beaver dam approximately 400 m down-stream from the outlet which is partially blocking fish migration. The most suitable stretch of stream for spawning is located between the first and second beaver dam on this outlet stream, and is presently accessable by fish. Minnow traps caught only lake chub (*Couesius plumbeus*), peamouth chub (*Mylocheilus caurinus*), and many large scale suckers (*Catastomus macrocheilus*) in this outlet stream. The forestry map also shows two inlets on the south side of the lake, but the water flow of the inlet streams appeared to be inadequate for sustained use.

A low condition factor of adult rainbow trout was observed and may be related to this stocks reliance on harpacticoids as their primary diet. The absence of other competitors in the gill net sample proposes that it is intra-specific competition that causes the low weight to length ratio of rainbow trout. This complex system requires more detailed work to give conclusive understanding for the future management of this lake's habitat and rainbow trout.

Dead and bloated fish have now been discovered at this lake on two consecutive surveys: May 11th, 1989 and October 11th, 1993. It is recommended that a chemical survey be completed before any enhancement projects are considered at this lake.

Recruitment appears to be stable and consistent enough to maintain the existing number of rainbow trout at this lake. The use of this lake by the sport fishery appears to be limited, but if road access improves it may be useful to consider attempts to increase the quality (condition factor) of rainbow trout that this lake produces. Presently, there seems to be little immediate need for enhancement of the rainbow trout at Swans lake.

1.0 Introduction

Swans 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 rainbows 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

Swans Lake (lat: 54° 33′, long: 126° 21′) is located approximately 11.5 km south of the Topley turn off from Highway 16 and is only accessible by 4WD (for directions see Appendix 1). The lake is primarily shallow with some deeper areas at the east and west ends. Swans Lake drains west as the headwaters of Aitken Creek which drains into the Bulkley River 10 km east of

Houston. Two cleared areas for camping and a steep boat launch for cartoppers only are available at this lake (Figure 1). There were no residences or cabins in the immediate area around this lake.

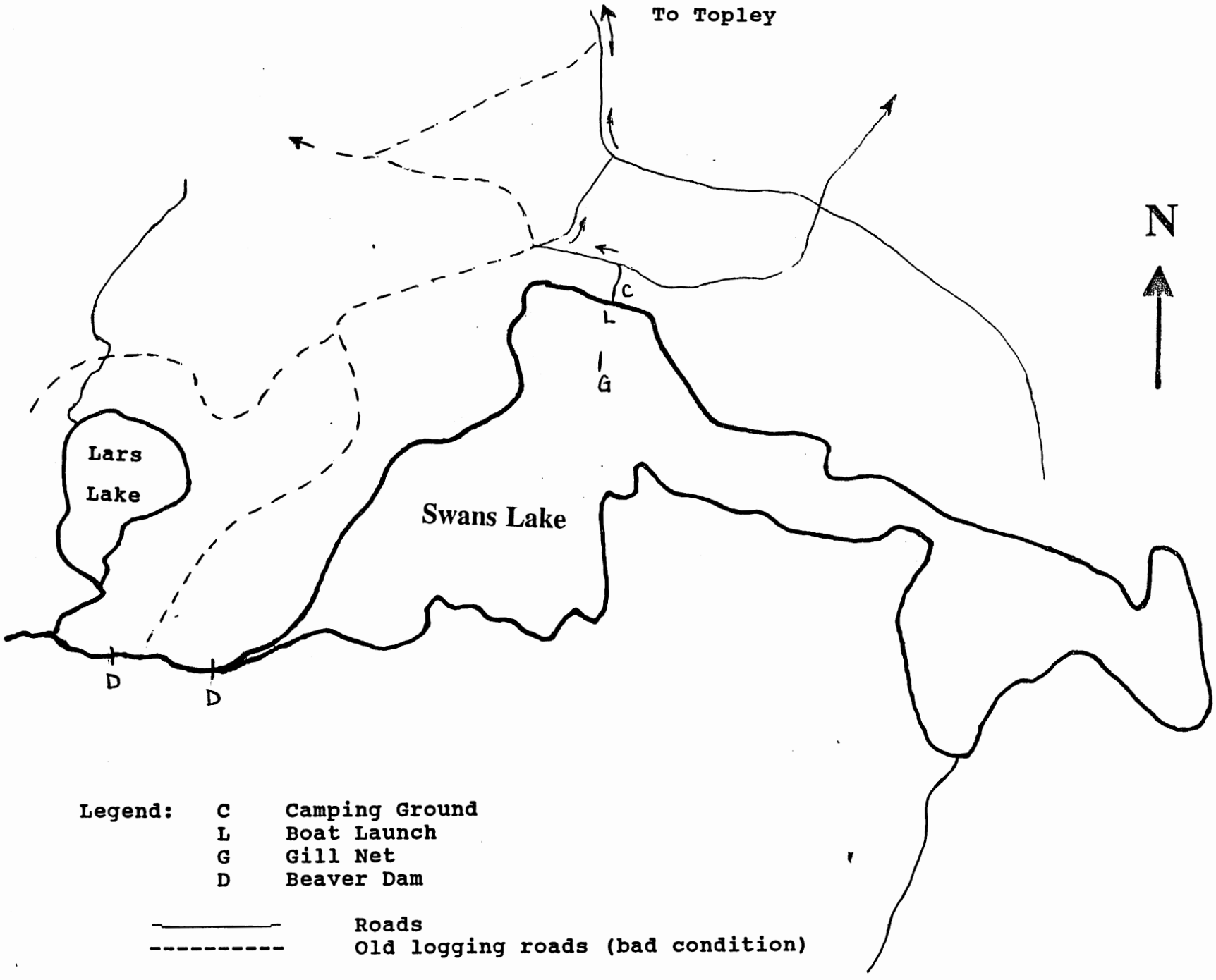
Swans Lake has only one outlet; no significant inlet streams were identified. The outlet of this lake is located on the west end of the lake and drains approximately 3 km into Old Man Lake; the outlet of Old Man Lake is then Aitken Creek.

2.2 Evaluation of Swan Lake

Photographs of the lake were taken to show the general characteristics of the lake. Visual observations were made along the shoreline of the lake and 4 minnow traps (baited with processed cheese) were set near the boat launch to evaluate the presence of any small fish. Fish caught in the minnow traps had were measured to the nearest mm (fork length), and were released. A 30 m gill net (15 m with 30 mm mesh, 15 m with 50 mm mesh) was also set in the lake approximately 250 m from shore where the depth was between 3 and 5 m. Fork lengths of fish captured were measured to the nearest 0.5 cm and were released when possible. Rainbow trout were also weighed when release was not possible.

2.3 Evaluation of outlet

The outlet was surveyed by visual observations from a boat that was drifted down-stream to the first beaver dam. The stream was then observed on foot, past a second beaver dam, to


To Topley
N
C
L
G
Lars
Lake
Swans Lake
D
D
Legend: C Camping Ground
L Boat Launch
G Gill Net
D Beaver Dam
Roads
Old logging roads (bad condition)

the junction with the Lars Lake outlet stream. Photographs were taken to represent the general characteristics of the stream and to illustrate any obstructions to migration. The stream was sampled for the presence of small fish (25-100 mm) by minnow trapping (baited with processed cheese). Fish captured in these minnow traps were measured to the nearest mm (fork length) and released.

3.0 Results

3.1 Swans Lake

Large areas surrounding Swans Lake have been logged in the past 5 to 10 years. However, vegetation has been left surrounding this lake to give some protection from spring run off and erosion (Figure 2). The lake was productive and extremely turbid with the bottom not visible in depths greater than 1 m. The bottom was muddy with a high abundance of lilies (*Nuphar*) and other aquatic macrophytes in the shallow sections of the shorelines.

Four minnow traps were set for 20 hours (overnight) and caught 56 large scale suckers (*Catastomus macrocheilus*) and 2 lake chubs (Couesius plumbeus). Large scale suckers ranged in fork lengths from 50 to 65 mm and the two lake chubs were 45 and 49 mm (Appendix 2).

The gill net was retrieved after a 22 hour setting. The catch consisted of 52 rainbow trout (*Oncorhynchus mykiss*), 1 large scale sucker (*Catastomus. macrocheilus*), and 1 longnose

Figure 2. Swans Lake.

Figure 3. Small inlet stream at south side of Swan Lake.

sucker (*Catastomus catastomus*). The rainbow trout of this sample represented at least three distinct size classes and adults clearly displayed a low condition factor. Fork length measurements of fish caught in the gill net are listed in Appendix 3. Fork length, weight and sex are recorded for 10 adult rainbows that could not be released (Appendix 4). The gut contents of these 10 rainbow trout were primarily harpacticoids, but *Gammarus*, one waterbeetle, and one 12 cm fish (unidentifiable, but not salmonid) were also found.

3.2 Inlet

The inlet stream that was found in this survey was only 60 cm wide, 5 cm deep, and had no noticeable flow of water (Figure 3). This stream was inaccessible by foot due to muddy and unsolid ground surrounding the area and was therefore not observed further up-stream.

3.3 Outlet

Swans Lake gradually narrows into a shallow, narrow outlet stream. The outlet stream is initially 10 - 15 m wide and 50 - 150 cm deep with no recognizable flow. This section of stream has little cover, but the high turbidity of the water may limit bird predation on fish using this habitat. The stream is surrounded by a marshy area down-stream for approximately 400 m where it is largely blocked by a beaver dam that stretches across the stream for 20 m. Well used beaver trails and fresh tree cuts provided evidence of recent use of this dam, however,

this dam had a poorly repaired washout which made it partially passable by fish (Figure 4).

Below the first dam, the outlet stream was narrow (5 m wide), shallow (5 - 30 cm), and water flow increased. Interestingly, there were 4 bloated and rotting suckers found in the first pool below this beaver dam; cause of deaths were unidentified. There was a second beaver dam approximately 200 m down-stream from this first dam. The section between these two dams had continuous transitions from pools to runs and appeared to have suitable spawning sites for rainbow trout; stream bottom was a mixture of rocks, gravel and some sand (Figure 5). In this stretch of stream there was some debris cover and aquatic vegetation in the deeper and slower pools also added to the cover. Several large schools of large scale suckers were observed in these deep pools.

The second dam was approximately 30 m long and was 1 m higher than the present water level (Figure 6). This dam also had evidence of recent beaver activity, but appeared impassable to all fishes at this time. Below this dam the stream slows and ranges in depth from 50 - 100 cm (Figure 7). This lower section of the creek appears less suitable for rainbow trout spawning but may be adequate for the rearing of young.

Two minnow traps were set in the outlet stream between the two beaver dams. Eighty two large scale suckers, two lake chub, and nine peamouth chub were caught in these traps. Measurements of fish caught in these traps are listed in Appendix 5.

Figure 4. Washout at first beaver dam on outlet stream from Swan Lake.

Figure 5. Example of stream characteristics between first and second beaver dams on the Swan Lake outlet stream.

Figure 6. Looking upstream at the second beaver dam in the outlet stream below Swans Lake.

Figure 7. Looking down-stream from the second beaver dam (see above) on the Swan Lake outlet stream.

4.0 Discussion

The gill net sample at Swans Lake caught an overwhelming majority of rainbow trout. There were at least three size and age classes of rainbow trout represented in this sample (parr, immature, mature) which suggests that annual recruitment at this particular lake is relatively stable.

The low condition factor of adult rainbows and the low catch of other species in the gill net implies intra-specific competiton among adult rainbow trout in Swans Lake. However, the gut content of the adults, primarily small harpacticoids, suggests that available food types and/or inter-specific competition may play a role. More detailed work on this lake is required to predict the benefits of any stock or habitat enhancements at Swans Lake. The discovery of dead suckers (*Catastomus*) also warrants further investigation as dead fish were also discovered at the last survey of Swan Lake on May 11th, 1989. The cause of repeated mortality of suckers may also influence the survival of the rainbow trout at this lake.

The outlet stream presently displays usable habitat for spawning by rainbow trout and rearing of the fry and parr. However, the first dam above the prime spawning sites is only partially passable, and may be completely blocked in the near future. Without better understanding of the ecology of this lake, it will be difficult to make valid recommendations for rainbow trout enhancement projects.

It is important to recognize that only one gill net sample

was taken from Swans Lake and that only two mesh sizes were used. However, this sample provided interesting information on recruitment and the physical conditions of the rainbow trout at this lake. Due to limited road access and a not very impressive size class of rainbow trout, Swans Lake does not appear to be threatened by the sport fishery. This lake is most threatened by the beaver activity that could have effects on future recruitments.

Swans Lake rainbow trout are presently at a reasonable density and recruitment has obviously been sufficient in the past. There is no obvious need for immediate enhancement of this stock or its spawning habitat. Future work on the quality of this stock may be useful when road access improves and the sport fishery's interest in this specific lake arises.

5.0 Recommendations

5.1 It is recommended that a more detailed study of Swan Lake be done in the near future to assist the management of this lake and its rainbow trout stock. It will be an advantage to better understand and examplify the outcomes of different fish densities and lake communities on rainbow trout growth by conducting a more detailed comparative study of the lakes in this area.

It may be possible to initiate university graduate studies on comparison of invertebrate communities from Swans Lake and a more productive lake (eg. Gilmore Lake) that produces rainbows in significantly better condition. Work on food availability in conjunction with a study on food selection and inter- and intra-specific competition at these lakes will increase our understanding of these lake ecosystems. This information would allow for more reliable decisions on both habitat and stock enhancements.

5.2 It is suggested that investigation be done on the mortality of fish that were found bloated and floating dead at the shoreline in Swan Lake on May 11th, 1989 and in the outlet stream on October 12th, 1993.

Appendix 1. Directions to Swan Lake.

0 km	Turn south off Highway 16 onto Topley Road
2 km	Start of gravel road
3.9	Sunset Lake turnoff - don't turn
5.4	Y intersection - stay left
6.1	Y intersection - stay left
6.7	under power lines
7.5	side road on right - stay left
8.0	Y intersection - stay left
8.6	side road on right - stay left
9.7	side road on left - stay right
12.1	Y intersection - stay right
13.7	Y intersection - stay right
14.7	side road on right - stay left
15.3	stay left
15.5	stay left - going through clear cut
16.5	side road on left - stay right
16.6	Y intersection - u-turn left
16.8	rough campground on right
17.0	turn right to boat launch

Appendix 2. Fork Lengths (mm) of fish caught by minnow traps in Swan Lake.

Large scale suckers (*Catastomus macrocheilus*)
(N = 56)

55 50 58 59 58 56 49 65 47 51

- an additional 46 fish were not measured

Lake chub (*Couesius plumbeus*)
(N = 2)

45 49

Appendix 3. Fork Lengths (cm) of fish caught by gill net in Swan Lake.

Rainbow trout (*Oncorhynchus mykiss*)
(N = 52)

males
42 43 39 36 40 39 40 37 35 35 26
30

females
40 35 41 27 40 37 44 36 31

immature
23 24 23 23 20 21 22 24 25 22 23
22 24 28 23 23 23 25 21 22 24 23
24 23 23 23 22 19 23 22

parr
14

Large scale suckers (*Catastomus macrocheilus*)
(N = 1)
23 cm

Long nose suckers (*Catastomus catastomus*)
(N = 1)
24 cm

Appendix 4. Fork length (cm) and weight (g) of 10 mature rainbow trout from gill net sample.

	Fork Length (cm)	Weight (g)
males		
	40	650
	36.5	500
	35	450
	35	490
	25.5	175
	30	250
females		
	40	675
	37	475
	44	750
	35.5	450

Appendix 5. Fork Lengths (mm) of fish caught by minnow traps in the Swan Lake outlet stream.

Large scale suckers (*Catastomus macrocheilus*)
(N = 82)

130 103 67 66 71 59 60 69 51 53

- in addition 72 fish caught were not measured

Lake chubs (*Couesius plumbeus*)
(N = 2)

109 99

Peamouth chub (*Mylocheilus caurinus*)
(N = 9)

94 72 52 83 79 65 51 64 49