

**A Reconnaissance Inventory  
of  
Aconitum Lake  
(819-2953-01)**

Date of Survey: August 18 - 21, 1996

<b>WATERSHED:</b>	<b>Jennings River</b>
<b>FIELD CREW LEADER:</b>	<b>Gregory Tamblyn</b>
<b>FIELD ASSISTANT:</b>	<b>Lincoln Smith</b>

Prepared by

**SKR Consultants Ltd.**  
Smithers, BC.

for

**BC Environment**  
**Skeena Region**  
Smithers, BC

March 1997

## Executive Summary

Aconitum Lake was one of twenty wilderness lakes within the Cassiar Forest District which was inventoried by SKR Consultants Ltd. between July and September 1996. Aconitum Lake (UTM 9.6588217.352196) is located on the Kawdy Plateau in the extreme north of British Columbia, approximately 135 km northwest of Dease Lake, and 70 km south of the Yukon Border. The lake was reached using a Beaver float plane chartered from Watson Lake, Yukon Territory, 175 km northeast of the lake. Work was funded by the Forest Renewal BC Inventory Program

Aconitum Lake, is within the Jennings River watershed, one of the southern-most extents of the Yukon River watershed. The 187 hectare lake drains an area of 45 km<sup>2</sup> and has a single inlet and outlet (Aconitum Creek). The rectangular lake, located within a sub-alpine habitat at an elevation of 1225 m, is oriented roughly north-south between a ridge to the west and a mountain to the east. One main basin, with a maximum depth of approximately 27 meters was identified near the north end of the lake. The rocky shoreline consisted of cobble and boulders. Riparian vegetation was primarily scrub birch, willows, and subalpine fir. The hillsides were forested with spruce and subalpine fir to the treeline at an elevation of 1450 meters above sea level. No development or land use was visible at the time of survey, with the exceptions of two plywood buildings operated by the local guide outfitter. There are no mineral claims near the lake, and no forestry activity was planned in the area as of January 1997.

Water quality samples were collected at two depths at the deepest part of the lake (27m). All results met both provincial and federal water quality standards. Nutrient concentrations, chlorophyll *a*, and secchi depth indicated that the lake was oligotrophic. A weak thermocline appeared between 14 and 15 meters at the time of the survey. There was no equivalent drop in oxygen concentrations at this depth, and the water remained well oxygenated to the bottom.

The fish populations in Aconitum Lake and Aconitum Creek were sampled using a variety of sampling methods. These included sinking and floating gill nets, minnow traps and angling in the lake and electroshocker in the creek. Gill nets were set perpendicular to shore, with the sinking gill net set in reverse order. Two sets of five GEE minnow traps were set in the littoral zone in an attempt to sample smaller fish. The total fish sample obtained consisted of:

- 64 lake trout (*Salvelinus namaycush*): 34 (sinking net), 22 (floating net), 2 (minnow traps), 6 (in streams),
- 16 round whitefish (*Coregonus cylindraceum*): 16 (sinking gill net), and
- 35 slimy sculpins (*Cottus cognatus*): 2 (minnow traps), 30 (electroshocking).

Samples of both salmonid species were analysed for age distribution, growth and condition. The asymptotic length, allometric condition factor and Fulton's condition factor were estimated for lake trout and round whitefish.

The *Skeena Region Lake Trout Assessment Report Survey Methods* (ND) was used to provide a comparative description of the structure of the Aconitum lake trout population to other lake trout populations in the Skeena Region. These survey methods implied that the lake trout in the lake grew slowly, and that the population was young to moderate in age. According to the survey methods, lake trout below 70 cm were abundant, but above 70 cm, were rare. Survival to maturity appeared to be good, as did survival to age 20.

Fisheries management concerns are minimal due to the limited access to the lake and lack of pending development. However, there may be pressure on the lake trout population from clients of the guide-outfitter operating in the area. It is recommended that BC Environment request the guide submit a record the lake trout caught in the lake in order to provide a general indication of the structure of the lake trout population over time. Should these records indicate a shift in the population structure to younger, smaller fish, precautions may be required to avoid altering the age structure of the lake trout population.

## TABLE OF CONTENTS

<b>Executive Summary</b> .....	<b>i</b>
<b>TABLE OF CONTENTS</b> .....	<b>iii</b>
<b>LIST OF TABLES</b> .....	<b>v</b>
<b>LIST OF FIGURES</b> .....	<b>vi</b>
<b>1.0 INTRODUCTION</b> .....	<b>1</b>
<b>2.0 DATA ON FILE</b> .....	<b>3</b>
<b>3.0 GEOGRAPHIC AND MORPHOLOGICAL INFORMATION</b> .....	<b>3</b>
3.1 Location .....	3
3.2 Physical Data .....	4
3.3 Benchmark .....	4
3.4 Lake Drainage .....	4
3.4.1 Stream Surveys .....	6
3.5 Terrain and Vegetation .....	6
3.5.1 Immediate Shoreline.....	6
3.5.2 Surrounding Country.....	7
<b>4.0 ACCESS, DEVELOPMENT AND LAND USE</b> .....	<b>8</b>
4.1 Access .....	8
4.2 Development and Land Use .....	9
4.2.1 Resorts and Campsites.....	9
4.2.2 Mining Claims .....	9
4.2.3 Timber Harvest .....	9
4.2.4 Water Permits .....	9
4.2.5 Waste Permits .....	9
4.2.6 Recreation Resource Inventory.....	9
4.2.7 Special Regulations and Restrictions.....	10
4.2.8 Historic Information.....	10
4.2.9 Comments.....	10
<b>5.0 FISH POPULATION SAMPLING</b> .....	<b>11</b>
5.1 Fish Species Composition .....	11
5.2 Relative Abundance .....	11
5.3 Size, Age, and Growth.....	11
5.3.1 Non-Salmonid Species.....	11
5.3.2 Salmonid Species .....	11
5.4 Sexual Maturity and Condition.....	16

5.5 Lake Trout Assessment.....	18
<b>6.0 LIMNOLOGICAL SAMPLING.....</b>	<b>18</b>
6.1 Stratification.....	20
<b>7.0 OTHER FLORA AND FAUNA.....</b>	<b>21</b>
7.1 Aquatic Plants.....	21
7.2 Wildlife Observations.....	21
7.3 Summary of Rare and Endangered Species.....	21
<b>8.0 MANAGEMENT CONCERNS.....</b>	<b>21</b>
<b>9.0 PHOTOGRAPHS.....</b>	<b>22</b>
<b>10.0 BATHYMETRIC MAP.....</b>	<b>30</b>
<b>11.0 REFERENCES.....</b>	<b>32</b>
<b>APPENDICES.....</b>	<b>33</b>
<b>Appendix 1.</b> Stream survey cards.....	34
<b>Appendix 2.</b> Physical and aging data for salmonids captured in the sinking monofilament gill net.....	41
<b>Appendix 3.</b> Physical and aging data for salmonids captured in the floating monofilament gill net.....	44
<b>Appendix 4.</b> Individual fish data for fish captured in Aconitum Creek.....	44
<b>Appendix 5.</b> Skeena Region Lake Trout Assessment.....	46
<b>Appendix 6.</b> Oxygen and temperature data.....	57
<b>Appendix 7.</b> Water quality data.....	59
<b>Appendix 8.</b> Photodocumentation list.....	64
<b>Appendix 9.</b> Salmon escapement data for the Jennings River.....	66
<b>Appendix 10.</b> List of plants seen near the lake shore of Aconitum Lake.....	68

## LIST OF TABLES

<b>Table 1.</b> Summary of fish sampling methods at Aconitum Lake. ....	12
<b>Table 2.</b> Summary of fish captured at Aconitum Lake.....	13
<b>Table 3.</b> Mean fork length (and standard deviation) for different age classes of the two species of salmonids captured in the sinking and floating gill nets set in Aconitum Lake.....	14
<b>Table 4.</b> Water chemistry summary for Aconitum Lake. ....	19

## LIST OF FIGURES

<b>Figure 1.</b>	Location of Aconitum Lake approximately 175 km southwest of Watson Lake, YT. Inset map shows the general location of the lake within British Columbia. Map is an excerpt from the Jennings River 1:250000 NTS map (104-O).....	2
<b>Figure 2.</b>	Air photo of Aconitum Lake indicating inventory sites (Air Photo Reference Number BC5676 No. 152, 173, August 13, 1975; average scale of flight line was 1:31680, enlarged 200%). .....	5
<b>Figure 3.</b>	Ford-Walford plots for lake trout (above) and round whitefish (below) captured at Aconitum Lake. The 45° line is included to illustrate a uniform absolute increase in length with age. ....	15
<b>Figure 4.</b>	Length - weight relationship for lake trout (above) and round whitefish (below) that were captured at Aconitum Lake. Both parameters are log <sub>10</sub> transformed. ....	17
<b>Figure 5.</b>	Oxygen and temperature profiles of Aconitum Lake, August 21, 1996 at 08:30 hrs. ....	20
<b>Figure 6.</b>	Panoramic view of the shoreline of Aconitum Lake, looking north (above) and northeast (below).....	23
<b>Figure 7.</b>	Panoramic view of the shoreline of Aconitum Lake, looking east (above) and southeast (below).....	24
<b>Figure 8.</b>	Panoramic view of the shoreline of Aconitum Lake, looking south (above) and southwest (below).....	25
<b>Figure 9.</b>	Panoramic view of the shoreline of Aconitum Lake, looking northwest. ....	26
<b>Figure 10.</b>	Benchmark. Close-up of bench mark (above). Wider perspective showing forested slope (below).....	27
<b>Figure 11.</b>	Forty-five gallon drum found on the east shore of Aconitum Lake (above). Guide-outfitter camp at the southeast corner of the lake (below). ....	28
<b>Figure 12.</b>	Lake trout (above) and round whitefish (below) captured with gill nets at Aconitum Lake. ....	29

## 1.0 INTRODUCTION

A major initiative of Forest Renewal British Columbia (FRBC) is to inventory the fish and wildlife resources within British Columbia. Reconnaissance level lake inventory work is an integral component of this initiative. Lake inventories in the Cassiar Forest District (Prince Rupert Forest Region) were conducted by SKR Consultants Ltd. to provide background information for future management of the fisheries resource in this area. Lake inventory at this scale was designed to provide a general description of the diversity and distribution of fish species in some of the headwater lakes to the Jennings/Teslin, Swift/Teslin, Rancheria/Liard, Dease/Liard, and Tuya/Stikine river watersheds.

Lake inventory in the Cassiar Forest District was funded by FRBC and administered by the Fisheries Branch of BC Environment, Skeena Region. Twenty wilderness lakes were identified by the Skeena Regional office of BC Environment for lake inventory during the 1996 field season. Aconitum Lake, located within the Jennings watershed on the Kawdy Plateau within the Cassiar Mountains (Figure 1), was one of these twenty lakes.

The objectives of the lake inventory at Aconitum Lake were:

- to document physical, chemical and biological characteristics of the lake,
- to inventory fish species present, and briefly describe population attributes for salmonids,
- to inventory inlet and outlet streams, and map inventory sites and initial reach breaks upstream or downstream of the lake,
- to produce a detailed summary report following the outline prepared by the Fisheries Branch of BC Environment,
- to produce a bathymetric map and detailed photodocumentation to accompany the report,
- to analyze data from lake trout captured in gill nets at the lake using *Skeena Region Lake Trout Assessment Report Survey Methods* (MELP), and
- to enter all fisheries information into applicable databases (MS Access: digital Stream card entry tool; Excel 5.0: photodocumentation, lake biophysical data, fish collection data; LakeStat. 1.0: bathymetric information).

Aconitum Lake is located approximately 135 km northwest of Dease Lake. The lake was surveyed by Greg Tamblyn (M.R.M., B.Sc.) and Lincoln Smith between August 18 and 21, 1996. Inventory work followed Resource Inventory Committee (RIC) guidelines, as described in the draft *Lake and Stream Inventory Standards and Procedures* (MELP 1995). The only previous reconnaissance survey conducted on this lake was a water quality study in July 1984 (Dabrowski & Grant 1984).

This project was funded by FRBC and administered by the Fisheries Branch of BC Environment, Skeena Region.



**Figure 1.** Location of Aconitum Lake approximately 175 km southwest of Watson Lake, YT. Inset map shows the general location of the lake within British Columbia. Map is an excerpt from the Jennings River 1:250000 NTS map (104-O).

## 2.0 DATA ON FILE

GAZETTED NAME: Aconitum Lake  
 ALIAS NAME:  
 WATERSHED CODE: 819-2953-01

### DATA ON FILE FOR THIS SURVEY:

Location	<input checked="" type="checkbox"/>	Dissolved Oxygen and Temp. Profile	<input checked="" type="checkbox"/>
Physical Data	<input checked="" type="checkbox"/>	Netting Record	<input checked="" type="checkbox"/>
Bench Mark	<input checked="" type="checkbox"/>	Lake Catch Summary	<input checked="" type="checkbox"/>
Terrain Features	<input checked="" type="checkbox"/>	Individual Fish Data	<input checked="" type="checkbox"/>
Access	<input checked="" type="checkbox"/>	Fish Preserved/DNA samples	<input checked="" type="checkbox"/>
Resorts and Campsites	<input checked="" type="checkbox"/>	Stomach analysis	<input type="checkbox"/>
Other Developments	<input checked="" type="checkbox"/>	Aging	<input checked="" type="checkbox"/>
Obstructions and Pollution	<input checked="" type="checkbox"/>	Location of Inventory Sites	<input checked="" type="checkbox"/>
Special Restrictions	<input checked="" type="checkbox"/>	Photograph Directory/Photos	<input checked="" type="checkbox"/>
Aquatic Plants	<input checked="" type="checkbox"/>	Appendices:	
Wildlife Observations	<input checked="" type="checkbox"/>	A: Water Chemistry Analysis	<input checked="" type="checkbox"/>
Miscellaneous Comments	<input checked="" type="checkbox"/>	B: Bottom Sediment Analysis	<input type="checkbox"/>
Lake Drainage	<input checked="" type="checkbox"/>	C: Fish Tissue Analysis	<input type="checkbox"/>
Fisheries Management Comments	<input checked="" type="checkbox"/>	D: Tributary Stream Data	<input checked="" type="checkbox"/>
History of Previous Surveys	<input checked="" type="checkbox"/>	Bathymetric Map (electronic version)	<input checked="" type="checkbox"/>
Water Chemistry Summary	<input checked="" type="checkbox"/>	Bathymetric Map Reduction	<input checked="" type="checkbox"/>

Historical Information: Dabrowski and Grant, 1984

## 3.0 GEOGRAPHIC AND MORPHOLOGICAL INFORMATION

### 3.1 Location

Location Aconitum Lake is located approximately 135 km northwest of Dease Lake: Cassiar Forest District (Prince Rupert Forest Region), Skeena Environment Region.

Elevation: 1225 m ±  
 Latitude/Longitude: 59°24'29":131°36'24" UTM: 9. 6588217.352196  
 Management Unit: 6-25 NTS Map No.: 104 O/5  
 Date of Survey: August 18-21, 1996 TRIM Map Nos.: 104O.032,042, 043  
 Watershed Name: Jennings  
 Native Land Claim Area: Tahltan, Taku River Tlingit, Teslin - Tlingit  
 Biogeoclimatic Zone: Spruce-Willow-Birch (SWB)

Drainage: Aconitum Creek → Jennings River → Teslin Lake → Teslin River → Big Salmon River → Lewis River → Selkirk River → Yukon River.

### 3.2 Physical Data

Lake Drainage Area <sup>b</sup> :	45 km <sup>2</sup>	Volume <sup>a</sup> :	25 107 330 m <sup>3</sup>
Water Surface Area <sup>a</sup> :	1 873 225 m <sup>2</sup>	Flushing Rate:	no data available
Area above 6 m contour <sup>b</sup> :	248 670 m <sup>2</sup>	Perimeter of Islands <sup>a</sup> :	0 m
Shoreline Perimeter <sup>a</sup> :	6424 m (+/- 10m)	Number of Islands <sup>a</sup> :	0
Maximum Depth <sup>c</sup> :	27 m	Mean Depth <sup>a</sup> :	13.54 m
Filterable Residue (T.D.S.) <sup>c</sup> :	28 mg/L (surface)	Secchi Disk Dept <sup>hc</sup> :	9.1 m
Sounding Device: Lowrance X-16		Elevation Source:	N.T.S. 1040/5

(data sources: a = lakestat 1.0; b = planimeter; c = field measurement)

### 3.3 Benchmark

The benchmark was established on a subalpine fir tree (*Abies lasiocarpa*) located on the northeast shore of the lake (figure 2; UTM = 9.6587920.352480). It consisted of a metal spike wrapped in pink flagging tape driven into the side of the tree, and a fluorescent orange blaze across the trunk of the tree at the level of the spike (Figure 10). The tree was located approximately 1.5 meters from the edge of the rocky shoreline at the base of a forested slope. The lower branches of the tree were removed to increase the visibility of the benchmark. The benchmark was 1.70 meters above the water level at the time of the survey. No previous benchmarks had been established for this lake.

High water mark:

The high water mark was 0.25 meters above the water level at the time of the survey.

### 3.4 Lake Drainage

Aconitum Lake is located in the Jennings River watershed on the Kawdy Plateau. The lake has one inlet and one outlet stream which are different reaches of Aconitum Creek (819-2953). The lake drains a 45 km<sup>2</sup> area of mountains. The outlet located at the north end of the lake, flows north-northwest for about 10 kilometers prior to meeting the Jennings River. No Water Survey of Canada stations exist in the Jennings River watershed (Water Survey of Canada 1989).

Both the inlet and outlet were surveyed during the lake reconnaissance. Stream survey cards for these streams are located in appendix 1. Landscape and habitat features are described in section 3.5.

**Figure 2.** Air photo of Aconitum Lake indicating inventory sites (Air Photo Reference Number BC5676 No. 152, 173, August 13, 1975; average scale of flight line was 1:31680, enlarged 200%).

### 3.4.1 Stream Surveys

Aconitum Creek - lake outlet (System No. 819-2953)(Figure 2: Site 1 & 2)

The initial 450 meters of this outlet downstream of Aconitum Lake was surveyed on foot. The gradient of this third order stream increased with distance from the lake. Two reaches (A and B) were identified based on gradient and confinement. Reach B, consisting of the first 300 meters of the creek downstream of the lake, had a gradient ranging between 1.5 and 2.5% and was located in a wide valley. The lower reach (Reach A) was frequently confined and had an average gradient of 5%.

Some good fish habitat, particularly holding areas behind boulders, was identified in Reach B. Spawning habitat, however, was limited. Fifteen slimy sculpins (*Cottus cognatus*) and three lake trout (*Salvelinus namaycush*) were caught in 229 seconds of electroshocking in this reach.

Aconitum Creek - lake inlet (System No. 819-2953)(Figure 2: Site 3)

This third order inlet has its headwaters in the eastern peaks of the Atsutla Range south of the lake. It was surveyed to the first reach break, 600 meters upstream of Aconitum Lake. The channel was heavily braided due to a 100 meter long beaver dam located at this point. Upstream fish migration within the main stream channel was blocked at by a 2.5 meters high section of this dam (Plate #3, appendix 1). However, fish may have been able to move upstream past the dam through other branches of the creek. This creek contained an abundance of good fish rearing habitat and excellent potential spawning habitat. Four hundred seconds of electroshocking below the dam resulted in the capture of 18 slimy sculpins (*Cottus cognatus*) and three lake trout (*Salvelinus namaycush*)

## 3.5 Terrain and Vegetation

### 3.5.1 Immediate Shoreline

The shoreline was straight and relatively uniform. The entire lake, apart from the inlet delta in the south, was fringed by large cobbles and boulders which extended slightly above the high water mark. Vegetation surrounding the lake consisted of a five to 20 meter wide band of willows (*Salix* spp.), scrub birch (*Betula glandulosa* var. *glandulosa*), grasses (not identified to genus) and lichens (not identified to genus) interspersed with subalpine fir (*Abies lasiocarpa*). In the extreme shallows along the shore, grasses and sedges (*Carex* spp.) were seen.

The lake bottom dropped quickly except in the shoals found at the south end, and along the southeastern shore. The primary substrate material along much of the shoreline was cobble to a depth of four to five meters. Substrate in water beyond this depth could not be seen, but

was suspected to consist chiefly of fines. The substrate in the shoal areas was gravel with some sand and cobbles.

The northern shoreline consisted of a one meter wide stretch of wave washed cobbles and boulders. Riparian vegetation consisted primarily of willows and scrub birch with the occasional stunted subalpine fir. Vegetation changed little with increasing distance from shore as the area was sparsely treed.

The riparian vegetation varied slightly between the northern and southern sections of the eastern shore. Subalpine fir trees extended to the cobble/boulder shoreline along the northern half of this shoreline. Some willow, grasses, moss and scrub birch were also present. Trees were less common in the riparian zone of the southern half of the shoreline. Shrubs including willows and scrub birch were common in this area.

The southern shoreline was primarily gravel with a flat upland. Willow and scrub birch were abundant in the area. The largest shoals in the lake were found at this end of the lake. The 3.0 meter depth contour extended approximately 80 to 90 meters from shore in the southeast and southwest bays of the lake (see bathymetry map in section 10).

A 0.5 meter strip of cobbles and boulders lined the western shore. Willow, scrub birch, and the occasional subalpine fir formed the riparian vegetation. The lake bottom dropped sharply from the shore, except at the southern extent of the western shore.

No blowdowns, snags or other significant aquatic plant development were observed.

A list of plants identified near the lake is in appendix 10.

### **3.5.2 Surrounding Country**

Aconitum Lake is located in a narrow valley with moderately steep hills or mountains on three sides. An 1800 meter peak dominates the east side of the lake, while ridges are present to the south and west. Beyond the ridge to the west is the expanse of the Kawdy Plateau. Rounded peaks of the Atsutla Range rise behind the saddle to the south. Peaks of the Stikine Ranges are also visible in the distance to the north. Between these peaks and the lake is the wide, gently sloped Jennings valley.

The northern shore rises to a height of 10 to 15 meters above the lake prior to sloping down toward the Jennings River to the north. This area is the low point of the saddle between the ridges to the east and west. The vegetation changed little with increasing distance from shore as the area was sparsely treed. Tree density increased with elevation to the east and west along the ridges.

The eastern viewscape is dominated by a single 1800 meter peak whose base runs the entire length of the lake. The slopes of the mountain rise relatively gently from the saddles at both

ends of the lake. Along northern half of the lake, subalpine fir and the occasional deciduous tree extended from the lake to the treeline at 1400 to 1450 meters. Natural clearings in the forest occurred more frequently toward the southern end of the lake.

The southern hillsides consist of gentler terrain, especially within a kilometer of the lake shore. A beaver pond close to a hectare in size was found in this area. Hills rise beyond the pond to form a saddle between the ridges to the east and west. Large clearings consisting of willows and scrub birch line the valley bottom and the ridge tops. Patchy stands of forest are common on the hillsides. Several rounded peaks thrust upward behind the saddle.

The western side of the lake is dominated by one long ridge with an average elevation of 1500 meters above sea level. There were extensive natural clearings both at the top of the ridge and near the edge of the lake. A band of subalpine fir filled the remainder of the viewscape.

Aconitum Lake is located within the “undifferentiated” subzone of the “spruce-willow-birch” biogeoclimatic zone. Areas above the treeline belong to the “undifferentiated” subzone of the “alpine-tundra” biogeoclimatic zone. In order of increasing hierarchy, the ecological classification for the study area is the “Tuya Range” ecosection, “northern mountains and plateaus” ecoregion of the “northern boreal mountain” ecoprovince (sub-arctic highland ecodivision, polar ecodomain)

## **4.0 ACCESS, DEVELOPMENT AND LAND USE**

### **4.1 Access**

Aconitum Lake was accessible by float plane at the time of the survey. The survey crew chartered a Beaver from Watson Lake, Yukon, and flew approximately 175 km (65 minutes) southwest to the lake. At the time of the survey, alternate charter service was available from Dease Lake, B.C.. Aconitum Lake is located approximately 135 km northwest of Dease Lake.

An Otter cannot safely land at this lake given the lake size and surrounding geography, according to the pilot. However smaller planes and helicopters can be used to access the lake safely. The shoal at the south end of the lake makes float plane access to shore in this area difficult. The rocky shoreline in the remainder of the lake also presents some difficulty for float plane access. The guide-outfitter dock on the southeast shore of the lake provides a good place for a plane to access the shore.

The local guide-outfitter (Russell Cummins) brings his horses in by foot from the Alaska Highway, roughly 70 km to the north.

No roads have been proposed in the vicinity of this lake and there was no access by water.

## **4.2 Development and Land Use**

### **4.2.1 Resorts and Campsites**

Russell Cummins, the local guide-outfitter in the area, operated two small framed, plywood cabins on the southeast shore of the lake (Figure 11). A horse trail encircled the lake. A small aluminum boat was located on the shore near the dock.

The survey crew camped in a small clearing at the north end of the lake, about 20 meters west of the outlet. This area was suitable for camping as it was flat and sheltered by a small stand of subalpine fir.

### **4.2.2 Mining Claims**

No mineral tenures, placer stakes or coal licences have been documented for Aconitum Lake or its surrounding area (Energy and Minerals Division, Ministry of Employment and Investment, mineral tenure records).

### **4.2.3 Timber Harvest**

There is no timber harvest proposed for this area (Wheatley pers. comm.). Harvest in the near future is unlikely due to the lack of roads.

### **4.2.4 Water Permits**

No water permits have been documented for this lake (BC Environment, Water permit files).

### **4.2.5 Waste Permits**

No waste permits have been documented for this lake (BC Environment, Waste permit files).

### **4.2.6 Recreation Resource Inventory**

The Ministry of Forests Recreation Inventory was completed for the Kawdy Plateau in 1995. The information is currently being digitized (Herchmer 1996). No field verification has been conducted for this lake. *(Format of this section has not been finalized by BC Environment).*



#### **4.2.7 Special Regulations and Restrictions**

There are no known special regulations for Aconitum Lake according to the April 1, 1996, to March 31, 1997, *British Columbia Sport Fishing Regulations Synopsis*, other than the normal general regulations and daily catch/possession quotas.

#### **4.2.8 Historic Information**

A cursory water quality study was conducted by Dabrowski and Grant on Aconitum Lake in 1984. This study, conducted on July 20, 1984, included a record of the oxygen and temperature profile of the lake, and some water chemistry analysis. No fish sampling was conducted, and no notes on the surrounding area or lake shoreline were recorded (Dabrowski & Grant 1984).

#### **4.2.9 Comments**

Aconitum Lake is located in Russell Cummins' (Jennings River outfitters, previously High Country Safari) guide and range territory. The surrounding area is in trapline territory 00625T002.

The area surrounding this lake has high scenic value. Mountain peaks can be seen in the distance to the north and south. The mottled nature of the clearings and forest on the hillsides surrounding the lake create a pleasing mixture of greens, turning to a mosaic of colours in the autumn.

The remoteness of the lake limits the angling pressure and provides a wilderness experience to visitors. Quality of the fishing experience was difficult to judge given the limited angling time of 0.75 rod hours. No fish were caught from the boat in this time.

A 45 gallon drum located at the eastern shore (Figure 11) and a piece of plywood in Aconitum Creek, about 400 meters downstream of the lake were the only signs of refuse or pollution in the area. No other sources of pollution or obstruction to fish or boats were noted at the lake.

## **5.0 FISH POPULATION SAMPLING**

### **5.1 Fish Species Composition**

Aconitum Lake was sampled using a combination of a sinking and a floating monofilament gill net, minnow traps, and angling. Aconitum Creek, comprising the lake's only inlet and outlet was sampled using an electroshocker. Lake trout (*Salvelinus namaycush*), round whitefish (*Coregonus cylindraceum*) and slimy sculpins (*Cottus cognatus*) were captured in the lake. Lake trout and slimy sculpins were also captured in the streams which were sampled.

### **5.2 Relative Abundance**

Table 1 summarizes fish sampling methods and effort in the lake, while table 2 shows the relative catch by all sampling techniques including two gill nets, ten GEE minnow traps and 0.75 hrs angling in the lake, and electroshocking in the streams. During the lake inventory, lake trout were the most abundant species of fish caught (64), followed by slimy sculpin (33) and round whitefish (16). No fish were caught spin casting and trolling lures from a boat.

### **5.3 Size, Age, and Growth**

#### **5.3.1 Non-Salmonid Species**

Slimy sculpin was the only non-salmonid species captured in Aconitum Lake during this reconnaissance survey. Physical measurement for this species was limited to fork length. Slimy sculpin captured at the lake and stream ranged in length from 39 to 90 mm (Table 2).

#### **5.3.2 Salmonid Species**

Two species in the Family Salmonidae were captured at Aconitum Lake: lake trout and round whitefish. Both species were captured in the sinking gill net, while only lake trout were caught in the floating net. Lake trout were also caught in minnow traps set along the lake shore and by electroshocking in streams.

Structures for aging were collected for all round whitefish and lake trout. For whitefish, scale samples were collected. For trout, pelvic fins were clipped from fish that were released during net retrieval; otoliths were dissected from the remaining fish. No aging structures were obtained from fish caught in the minnow traps or by electroshocking. Aging of scales was conducted by Matthew Jessop and Ron Saimoto (SKR Consultants Ltd.), and aging of fin rays and otoliths was performed by N/S Consulting (Winnipeg, MB; BC Environment sanctioned). DNA samples were not required for the species caught at this lake.

**Table 1.** Summary of fish sampling methods at Aconitum Lake.

---

NETTING RECORD:

Mesh sizes experimental order: 25mm, 76mm, 51mm, 89mm, 38mm, 64mm.

**Netting Site #1:**

Type: **Sinking monofilament gill net**  
Date Set: August 18, 1996 Time: 21:15 hrs  
Date Lifted: August 19, 1996 Time: 10:00 hrs (soak time = 12 hrs 45 mins)

Net Dimensions: Length: 91.4 m; Depth: 2.4 m

Shallow end mesh size: 64mm Depth: 5m  
Substrate: fines, some cobbles and boulders  
Deep end mesh size: 25mm Depth: 17m  
Substrate: fines (assumed)

Comments: Gill net was set in reverse order (i.e. small mesh at deep end) to conform with Skeena Region lake trout standards. Data analysis for lake trout is summarized in Appendix 5.

**Netting Site #2:**

Type: **Floating monofilament gill net**  
Date Set: August 18, 1996 Time: 21:30 hrs  
Date Lifted: August 19, 1996 Time: 07:30 hrs (soak time = 10 hrs)

Net Dimensions: Length: 91.4 m; Depth: 2.4 m

Shallow end mesh size: 64mm Depth: 4 m  
Substrate: fines with some cobbles and boulders  
Deep end mesh size: 25mm Depth: 16 m  
Substrate: fines (assumed)

Comments: None

**Minnow Traps:**

Type: GEE minnow traps baited with roe -- 5 traps in each of two locations (Figure 2) within littoral zone

Location 1: North end of lake, west of the outlet in 0.4 to 0.8 m water. Substrates included cobble and boulders.

Date Set: August 19, 1996 Time: 19:30 hrs  
Date Lifted: August 20, 1996 Time: 11:30 hrs (soak time = 16 hrs)

Location 2: Shoal area at south end of lake in 0.4 to 1.0 m water, 1, 6, and 25 m from shore. Substrate was sand in some locations and cobble in others.

Date Set: August 19, 1996 Time: 19:50 hrs  
Date Lifted: August 20, 1996 Time: 12:00 hrs (soak time = 16 hrs 10 mins)

**Table 2.** Summary of fish captured at Aconitum Lake.

### LAKE CATCH SUMMARY

Species	Sinking gill net	Floating gill net	Minnow trap	Angling	Total	Number sampled	Size Range (mm)
Lake trout	34	22	2	0	58	58	118-680
Round whitefish	16	0	0	0	16	16	350-432
Slimy sculpin	0	0	2	0	2	0	43-69

### STREAM CATCH SUMMARY

Species	Location *	Method <sup>+</sup>	Total	Number sampled	Number preserved	Fork Lengths (mm)
Lake trout	819-2953 (O)	EL	3	3	0	77, 89, 100
Slimy sculpin	819-2953 (O)	EL	15	15	0	41-90
Lake trout	819-2953. (I)	EL	3	3	0	45, 84, 230
Slimy sculpin	819-2953 (I)	EL	18	18	0	39-73

\* O = outlet and I = inlet

+ EL = electroshocking; MT = minnow traps

Physical measurements for lake trout and round whitefish caught in the lake are presented in appendices 2 and 3. Lake trout ranged in age from two to 32 years, in fork length from 11.8 to 68.0 centimeters, and in weight from 15 to 3600 grams. Round whitefish ranged from six to 10 years in age, in fork length from 35.0 and 43.2 centimeters, and in weight from 450 to 925 grams. Table 3 shows fork length based on age class for these species. This data was insufficient to analyze for sexual dimorphism in fork length by age. Many fish could not be accurately sexed in the field due to lack of distinguishable primary or secondary sexual characteristics in immature fish.

All fish caught in the gill nets were examined for parasites. No external parasites were observed on any fish. However, parasitic worms were noted in the guts of three of the eleven lake trout (27%) whose guts were examined. No internal parasites were noted in the round whitefish.

**Table 3.** Mean fork length (and standard deviation) for different age classes of the two species of salmonids captured in the sinking and floating gill nets set in Aconitum Lake.

Species	Age Group	Sample Size	Sex	Mean Fork Length (mm)	Standard Deviation
Lake trout	2	1	U	118	-
	3	3	U	145	10.0
	4	5	U	189	22.3
	5	8	U	189	15.4
	6	6	U	217	23.2
	8	1	U	385	-
	10	1	U	290	-
	11	1	F	378	-
	12	1	U	405	-
	14	3	1F / 2U	410	31.2
	15	1	U	395	-
	16	1	F	286	-
	17	2	M / U	387	4.2
	18	1	U	540	-
	19	2	F	402	5.0
	20	2	F/M	403	3.5
	21	2	F	436	62.2
	22	3	2F / 1M	458	58.0
	23	3	1M / 2U	422	20.2
	25	3	1F / 2M	493	161.7
	26	1	M	395	-
27	1	M	405	-	
29	1	M	405	-	
32	1	F	460	-	
Round whitefish	6	1	F	365	-
	7	5	1F / 4M	373	17.5
	8	6	2F / 4M	385	10.8
	9	2	F	387	12.7
	10	1	F	432	-

Growth trajectories for lake trout and round whitefish are shown in figure 3. Mean fork length at age n was plotted against mean fork length at age n+1 (Ford-Walford plot) for future comparative analysis of fish growth among lakes. All relationships were assumed to be linear. The regression equations and corresponding  $r^2$  values for trendlines illustrated in figure 3 are:

**lake trout:**

$$(FL \text{ at age } n+1) = 0.7825 (FL \text{ at age } n) + 72.843$$

sample size: 21

$$r^2 = 0.7952$$

age range: 2 - 26

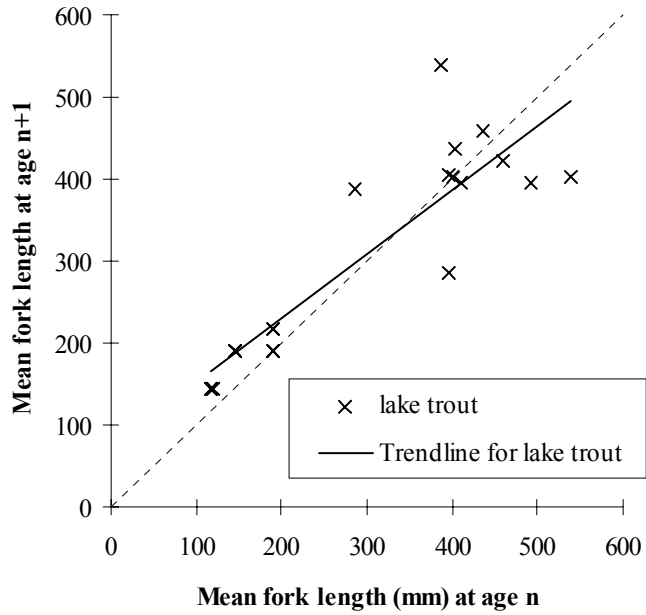
**round whitefish:**

$$(FL \text{ at age } n+1) = 1.8659 (FL \text{ at age } n) - 310.24$$

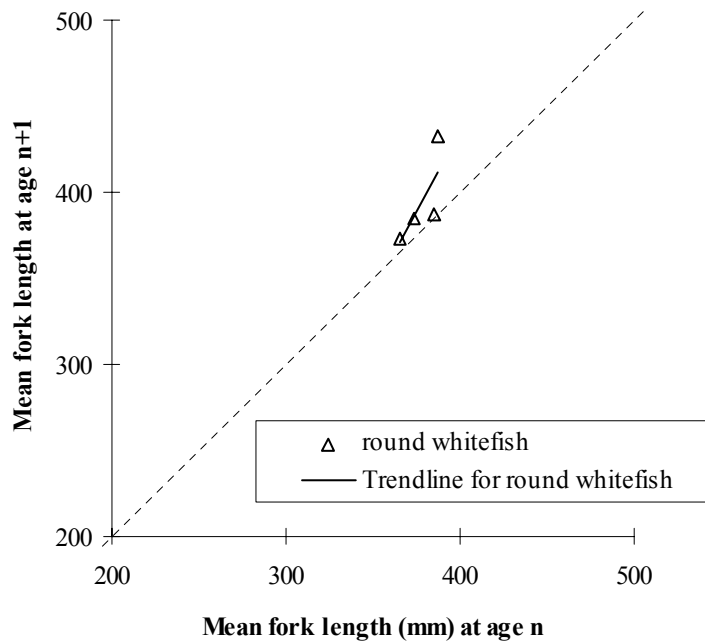
sample size: 4

$$r^2 = 0.5620$$

age range: 6-9



**Figure 3.** Ford-Walford plots for lake trout (above) and round whitefish (below) captured at Aconitum Lake. The 45° line is included to illustrate a uniform absolute increase in length with age.



The asymptotic length ( $L_{\infty}$ ) for both species was estimated using the regression equations from the Ford-Walford Plots. For lake trout, the estimate for  $L_{\infty}$  (33.9 cm) is not accurate due to the poor fit of the regression line to the data ( $r^2 = 0.7952$ ). In fact, 34 of the 58 lake trout (59%) caught in the nets had a fork length greater than 33.9 centimeters. In this survey, sample sizes for each age class were likely too low to provide an accurate estimation of the asymptotic length. Thus this length should only be used for general non-statistical purposes.

A similar situation arose in estimating the asymptotic length for round whitefish.  $L_{\infty}$  was calculated to be 35.8 centimeters. In this case, all whitefish caught were greater than this size. The wide spread nature of the data, indicated by the low  $r^2$  value of 0.562, indicates that the regression line does not represent the sample well.

#### 5.4 Sexual Maturity and Condition

In the following assessments of sexual maturity and condition of the fish population in Aconitum Lake, it is important to note that the methods used to capture the fish were size and age selective. The data used was only representative of the samples from the specified sampling methodologies. They may not accurately represent the overall fish populations.

Sexual maturity was determined for all 56 lake trout and 16 round whitefish captured in the floating and sinking gill nets. As these fish did not exhibit obvious external secondary sexual characteristics, all were examined internally. Twenty-one of the 56 lake trout (37.5%) and all 16 round whitefish (100%) were maturing or mature at the time of sampling (Appendices 2 and 3). The youngest mature female and male lake trout in the sample were 11 and 17 years old, respectively. For round whitefish, the youngest female and male in the sample were six and seven years of age, respectively. These were the round whitefish to be captured in this study.

The condition of the lake trout and round whitefish populations at Aconitum Lake was estimated using the data from fish caught in the gill nets. Length ( $L$ ) to weight ( $w$ ) relationships were log-plotted for both species (Figure 4). The two fish species were plotted on separate graphs to enable the data points of the round whitefish to be seen. Data for the sexes were pooled due to the low number of fish which could be sexed accurately. The regression equations for the two fish species are:

**lake trout:**

$$\log(\text{weight}) = 3.06 \log(\text{FL}) - 5.0969$$

sample size: 54

$$r^2 = 0.9909$$

age range: 2 -32

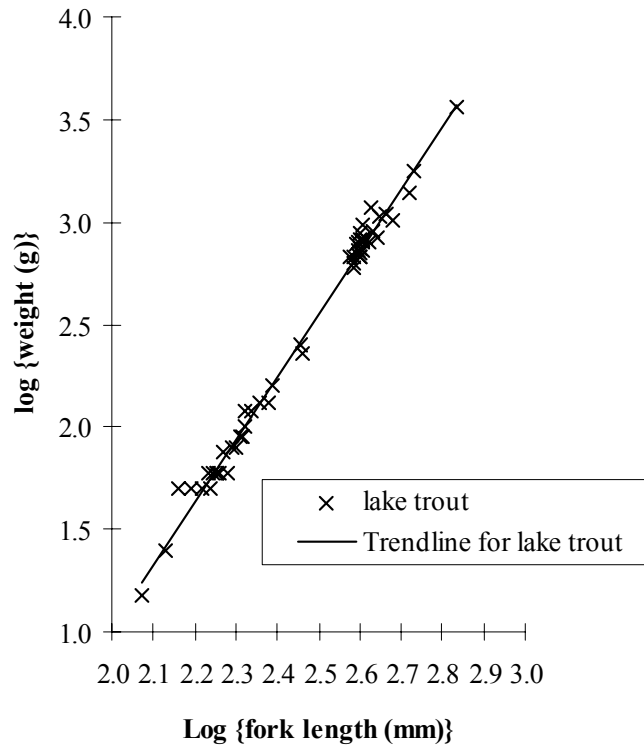
**round whitefish:**

$$\log(\text{weight}) = 3.0514 \log(\text{FL}) - 5.1113$$

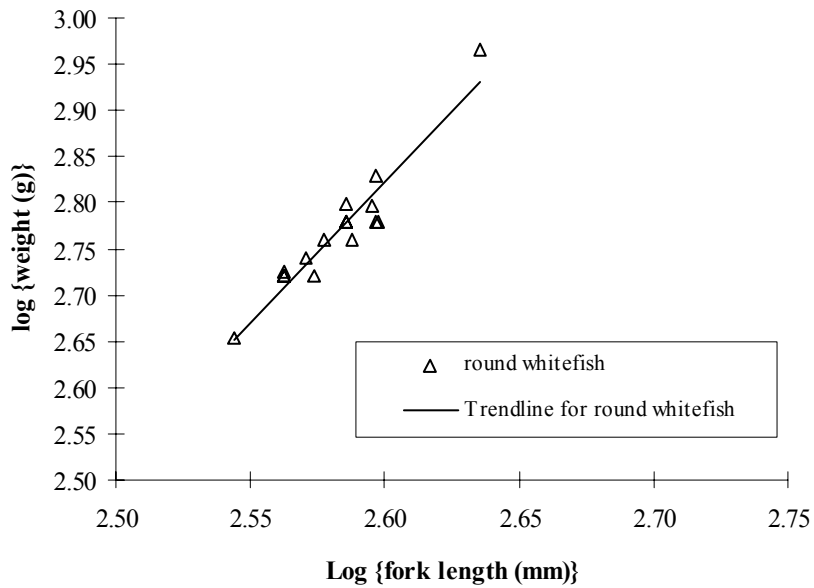
sample size: 16

$$r^2 = 0.9032$$

age range: 6 to 10



**Figure 4.** Length - weight relationship for lake trout (above) and round whitefish (below) that were captured at Aconitum Lake. Both parameters are  $\log_{10}$  transformed.





The growth of lake trout approached isometric growth, as indicated by the slope of the regression line (3.06) and a high  $r^2$  value (0.9909). Isometric growth, indicated by a slope of 3, “characterize[s] a fish having an unchanging body form and unchanging specific gravity” (Ricker 1975, p. 209). As the slope was not exactly 3.00, both the allometric and Fulton’s condition factors were estimated. The allometric condition factor for lake trout ( $10^{5.0969} \times 100,000$ ) was 0.800. For future comparisons, the Fulton’s condition factor ( $K = 100,000 w/l^3$ ) was calculated for the population (1.13) by averaging the Fulton’s condition factors for the individual fish in the sample.

Round whitefish exhibited a similar growth pattern, approaching isometric growth as well. The regression line had a slope of 3.0514 and a relatively good fit ( $r^2 = 0.9032$ ). The allometric condition factor for this sample of round whitefish is 0.774. For future comparisons, the Fulton’s condition factor was calculated for the population (1.05) by averaging the Fulton’s condition factors for the individual fish in the sample.

## 5.5 Lake Trout Assessment

The *Skeena Region Lake Trout Assessment* (Appendix 5) was applied to lake trout captured in the gill nets. The sample sizes used for the lake trout assessment were 34 (sinking gill net only) or 56 (sinking and floating gill net) lake trout, depending on the analysis. These sample sizes are large enough to indicate the lake trout population characteristics for this lake. The lake trout assessment indicates that lake trout at Aconitum Lake are relatively abundant (>15 fish captured) and that their survival to maturity is good (<60 Immature). The youngest sexually mature lake trout captured at Aconitum Lake was 16 years old. The age versus fork length relationship shows that this population is slow growing. No large bodied fish (> 70 cm) were caught in the gill net sample. Data also indicate that survival to 20 years of age is good (more than 10% of fish were 20 years or older) and suggest a moderately “young” age distribution of this population.

Potential biases existed with the *Skeena Region Lake Trout Assessment Report Survey Methods* (ND) as they were applied to the sample data. These biases were related to the timing and location of sampling at Aconitum Lake. In particular, sampling within or shortly after the lake trout spawning season may result in misleading interpretation of maturity results due to the definitions used for classifying maturity in the RIC standards. In addition, the distribution of different age classes of lake trout in the lake is not random in or around the spawning season.

## 6.0 LIMNOLOGICAL SAMPLING

Water samples were collected at the deep station of the lake (Limnological Station No. 1, Figure 2). The samples were collected with a van Doren bottle, and placed on ice in a cooler. Chlorophyll  $a$  samples were filtered in the field, placed in an airtight container inside a black plastic bag, and put on ice. Parameters measured in the field included secchi depth, water temperature, and pH. Water samples were analyzed by Zenon Laboratories.

Water samples were collected at two depths to represent surface and general water column conditions. The surface and general samples were collected at 0.5 meters and 25 meters, respectively. Water chemistry data is summarized in table 4. Appendix 7 contains the detailed laboratory report.

---

**Table 4.** Water chemistry summary for Aconitum Lake.

---

Field conditions:

Date:	August 21, 1996	Time:	07:30 hrs
Wind Velocity:	fresh breeze (30-38 km/hr)	Wind Direction:	from the south
Cloud Cover:	50%	Surface conditions:	rough (0.3 to 0.5m waves)
Secchi Depth:	9.1 m	Water colour:	colourless
Air Temperature:	5°C	Deep station depth:	27 m

Method(s) Used:

Dissolved Oxygen:	Oxyguard Mark II Oxygen Meter
Water Temperature:	Oxyguard Mark II Oxygen Meter
Air Temperature:	pocket alcohol thermometer
pH (field):	pHep 3 - pocket pH meter
H <sub>2</sub> S (field):	---
Water sampler:	LaMotte vertical sampler (van Doren)
Substrate Sampler:	---
Laboratory Used:	Zenon Environmental Laboratories, Burnaby, BC.

Water Sample Chemistry: SEAM Site No.: E223370

	Sampling Depths	
	Surface (0 m)	Lower (30.0m)
pH (field)	8 pH units	---
pH (lab)	7.4 pH units	7.3
Specific Conductance (lab)	38 µS/cm	36 µS/cm
Residue Nonfilterable (TSS) (lab)	<4 mg/L	<4 mg/L
H <sub>2</sub> S (field)	---	---

Note: Water samples were collected on August 21, 1996 at the deep station of the lake (Limnological Station No. 1).

All parameters examined met provincial and federal water quality guidelines for drinking water and the aquatic environment (Nagpal 1995; Canadian Council of Resource and Environment Ministers 1983). Water quality was consistent throughout the water column. Total nitrogen (<0.07 mg/L), total phosphorus (0.005 mg/L), and chlorophyll *a* (0.9 mg/L) concentrations (Appendix 7) indicated that Aconitum Lake was oligotrophic (Wetzel 1983). This was confirmed by the secchi depth of 9.1 m.

## 6.1 Stratification

Temperature and dissolved oxygen were measured at one meter intervals from the surface to 26 meters at the deep station of the lake (Limnological Station 1, figure 2) on August 21 at 07:30 hrs (Appendix 6). Readings were taken every meter to a depth of 26 meters (maximum depth = 27 m). A weak thermocline existed between 14 and 15 meters (Figure 5). The lake was well oxygenated to 26 m. Aconitum Lake was also not well stratified in a previous water quality study conducted on July 20, 1984 (Dabrowski & Grant 1984).

---

**Figure 5.** Oxygen and temperature profiles of Aconitum Lake, August 21, 1996 at 08:30 hrs.

## **7.0 OTHER FLORA AND FAUNA**

### **7.1 Aquatic Plants**

Aquatic plants were rare in Aconitum Lake. Periphyton (not identified to species) formed a thin layer on many littoral cobbles and boulders. Some sedges (*Carex* spp.) and grasses (not identified) extended approximately one meter into the water at the south end of the lake. An area equivalent to less than 5% of the surface area of the lake was vegetated with aquatic plants.

### **7.2 Wildlife Observations**

Few signs of wildlife were observed at Aconitum Lake. A beaver was seen on the lake and an extensive network of beaver dams existed on Aconitum Creek (inlet), 600-700m upstream of the lake. A flock of ducks was noticed in the distance at the south end of the lake but could not be identified. Several sandpipers scurried along the shore; one gull was seen flying. Evidence of moose included tracks near the creek banks of Aconitum Creek (inlet), and old droppings near camp at the north end of the lake. According to the guide-outfitter personnel at the lake, grizzly bears are found in the area and are most often seen on the west edge of the lake.

No aquatic insects were observed in the lake. However insect larvae, aquatic snails, beetles, and unidentified zooplankton were recorded during sporadic stomach content analysis of fish caught in the lake.

### **7.3 Summary of Rare and Endangered Species**

No rare or endangered species were sighted at Aconitum Lake during the lake survey. Grizzly bears, reported by guide-outfitter crew, are blue listed in B.C. (BC Conservation Data Centre, 1995).

## **8.0 MANAGEMENT CONCERNS**

No resource development (e.g. mineral extraction, forestry) or roads were planned for the Aconitum Lake area as of January 1997. Therefore, management concerns are restricted to exploitation of fish stocks by anglers. This risk is relatively low as the number of people visiting the lake is limited. Nonetheless, hunters using the guide-outfitter base camp pose a potential threat to the lake trout population in Aconitum Lake. The lake may be used for fishing by these hunters.. Communication with, and voluntary submission of catch records from, Russel Cummins (the guide-outfitter) are recommended to help monitor the effects of varying fishing pressures on the lake trout population.

If fishing pressure were to increase at Aconitum Lake, special management strategies may be required as lake trout populations are vulnerable to over-fishing. Increased fishing tends to remove the older, larger, more productive fish from the populations. At the time of the survey, as indicated by analyses from the *Skeena Region Lake Trout Assessment Report Survey Methods* (Appendix 5), overfishing did not appear to be a problem at this lake. There was a high abundance of lake trout and good survival to maturity and age 20 (Appendix 5E). Fishing pressure is unlikely to increase dramatically in the near future due to limited access, and due to a large number of lakes offering similar fishing experience in the area.

The only possible constraint to fish production identified during the survey was low concentrations of nutrients which may affect overall lake productivity. Potential to increase fish production was not assessed.

## **9.0 PHOTOGRAPHS**

*See next page*

**Figure 6.** Panoramic view of the shoreline of Aconitum Lake, looking north (above) and northeast (below).

**Figure 7.** Panoramic view of the shoreline of Aconitum Lake, looking east (above) and southeast (below).

**Figure 8.** Panoramic view of the shoreline of Aconitum Lake, looking south (above) and southwest (below).



**Figure 9.** Panoramic view of the shoreline of Aconitum Lake, looking northwest.

**Figure 10.** Benchmark. Close-up of bench mark (above). Wider perspective showing forested slope (below).

**Figure 11.** Forty-five gallon drum found on the east shore of Aconitum Lake (above). Guide-outfitter camp at the southeast corner of the lake (below).

**Figure 12.** Lake trout (above) and round whitefish (below) captured with gill nets at Aconitum Lake.

## **10.0 BATHYMETRIC MAP**

## 11.0 REFERENCES

- British Columbia. Ministry of Environment, Lands and Parks. Fishes Branch Inventory Unit. 1995. *Lake and Stream Inventory Standards and Procedures*. Victoria, BC.
- British Columbia. Ministry of Environment, Lands and Parks Fish and Wildlife Branch. ND. *Skeena Region Lake Trout Assessment Report Survey Methods*. Smithers, BC.
- Canadian Council of Resource and Environment Ministers. 1987. *Canadian Water Quality Guidelines*. Environmental Quality Guidelines Division, Water Quality Branch, Ottawa, Ontario.
- Herchmer, Doug. 1996. Pers. comm.. Recreation Branch, Prince Rupert Forest Region. Smithers, BC.
- Johnson, Sandy. 1996. Pers. comm.. Stock Assessment/Fisheries Management, Department of Fisheries and Oceans, Northern BC and Yukon. Whitehorse, YT.
- Ministry of Employment and Investment, Energy and Minerals Division. 1996. Coal licence, placer stakes and mineral tenure files.
- Ministry of Environment, Lands and Parks. 1996. Water permit files and waste permit files.
- Ministry of Environment, Lands and Parks. 1996. *British Columbia Freshwater fishing regulation synopsis: 1996-1997*. Victoria, BC.
- Ministry of Forests. 1988. *Biogeoclimatic and ecoregion units of the Prince Rupert Forest Region*. Victoria, BC.
- Nagpal, N. K. 1995. *Approved and working criteria for water quality - 1995*. Water Quality Branch, Environmental Protection Department, Ministry of Environment, Lands and Parks. Victoria, BC.
- Ricker, W. E. 1958. *Handbook of computations for biological statistics of fish populations*. Fish. Res. Bd. Can. Bull. 119.
- Water Survey of Canada. Water Resources Branch. 1989. *Historical streamflow summary: British Columbia 1988*. Ottawa, Ont.
- Wetzel, R. G. 1983. *Limnology*. 2nd ed. Saunders College Publishing. Toronto, Ontario.
- Wheatley, Andrew. 22 January 1997. Personal Communication. Planning Forester, Prince Rupert Forest Region, Smithers, BC.

## **APPENDICES**

**Appendix 1.** Stream survey cards



**Appendix 1 - Stream Survey Cards**

Aconitum Creek - lake outlet (819-2953) - Reach A

**Put stream survey card here**

**Appendix 1** - Stream Survey Cards

Aconitum Creek - lake outlet (819-2953) - Reach A

Plate #1. Reach A - sample site 1. Upstream view (above), downstream view (above right) and loose substrate on east bank of creek, 375 m downstream of lake (right).

**Appendix 1 - Stream Survey Cards**

Aconitum Creek - lake outlet (819-2953) - Reach B

Put stream survey card here

**Appendix 1 - Stream Survey Cards**

Aconitum Creek - lake outlet (819-2953) - Reach B

Plate #2. Reach B - sample site 1. Upstream view (above) and downstream view (below).

**Appendix 1 - Stream Survey Cards**

Aconitum Creek - lake outlet (819-2953) - Reach C

Put Stream Survey Card here

**Appendix 1** - Stream Survey Cards

Aconitum Creek - lake outlet (819-2953) - Reach C

Plate #3. Reach C - sample site 3. Upstream view (above),  
downstream view (above right) and 2.5 m high beaver dam  
600 m upstream of Aconitum Lake (right).

**Appendix 2.** Physical and aging data for salmonids captured in the sinking monofilament gill net

## Appendix 2

## Appendix 2. Physical and aging data for salmonids captured in the sinking monofilament gill net set in Aconitum Lake.

Date Captured: Aug. 18/19, 1996 Method of Capture: **Sinking monofilament gill net**

Species (code)	Length FL (mm)	Weight (g)	age sample #	AGE* (M/F/U)	Sex (M/F/U)	Maturity (code)	Comments
LT	118	15	1736	2	U	IM	barr marks
LT	145	50	1714	3	U	IM	
LT	155	50	1717	3	U	IM	
LT	165	40	1728	?	U	IM	
LT	165	50	1732	5	U	IM	
LT	172	60	1726	4	U	IM	
LT	174	50	1719	5	U	IM	
LT	176	60	1723	4	U	IM	
LT	180	60	1718	6	U	IM	
LT	180	60	1730	4	U	IM	
LT	181	60	1725	5	U	IM	
LT	185	75	1729	5	U	IM	
LT	187	50	1727	?	U	IM	
LT	191	60	1722	4	U	IM	
LT	195	80	1716	5	U	IM	
LT	200	80	1731	5	U	IM	
LT	205	90	1720	5	U	IM	parasites in gut
LT	208	90	1724	5	U	IM	
LT	210	120	1710	6	U	IM	
LT	210	100	1721	6	U	IM	
LT	217	120	1715	6	U	IM	
LT	227	130	1712	4	U	IM	
LT	238	130	1711	6	U	IM	
LT	245	160	1713	6F	U	IM	3cm fish in gut
LT	286	250	1734	16	F	MT	
LT	290	230	1709	10	U	IM	
LT	385	625	1733	8	U	IM	parasitic worms and 13cm fish in gut
LT	395	725	1708	15F	U	MT	released
LT	400	675	1738	25	M	M	
LT	440	840	1737	23	U	MT	beetles, flying insects, larvae in gut
LT	445	1075	1707	14F	U	MT	released
LT	480	1025	1735	21	F	MT	fish, flying insects, larvae, zooplankton in gut
LT	540	1775	1705	18F	U	MT	released
LT	680	3600	1706	25	M	M	insect larva in gut
RW	350	450	3336/C5	7	M	M	
RW	365	530	3335/C1	6	F	M	
RW	365	525	3335/C3	7	M	MT	
RW	365	525	3336/C3	8	F	M	
RW	372	550	3336/C1	7	F	M	
RW	375	525	NONE		F	M	
RW	378	575	3335/C2	9	F	M	
RW	385	600	3335/C4	7	M	MT	
RW	385	600	3335/C8	8	M	M	
RW	385	630	3335/C10	8	M	M	
RW	387	575	3335/C9	8	F	M	
RW	394	625	3335/C5	8	M	M	
RW	395	600	3335/C7	7	M	M	small snails in gut
RW	395	675	3336/C2	8	M	M	
RW	396	600	3335/C6	9	F	M	small snails in gut
RW	432	925	3336/C4	10	F	M	

\* F refers to an age determined from a pelvic fin clip rather than an otolith



(IM = immature) MT = maturing M = Mature

**Appendix 3.** Physical and aging data for salmonids captured in the floating monofilament gill net

**Appendix 4.** Individual fish data for fish captured in Aconitum Creek

**Appendix 3.** Physical and aging data for salmonids captured in the floating monofilament gill net set in Aconitum Lake.

Date captured: August 18/19, 1996 Method of capture: **Floating monofilament gill net**

Species (code)	Length FL (mm)	Weight (g)	Age sample #	Age*	Sex (M/F/U)	Maturity (code)	Comments
LT	135	25	1739	3	U	IM	
LT	378	675	1748	11	F	M	
LT	384	600	1702	17F	U	MT	released
LT	385	675	1703	14F	U	MT	released
LT	390	775	1743	17	M	M	
LT	392	800	1744	21	F	M	
LT	395	690	1742	26	M	M	mouse in gut
LT	398	675	1752	19	F	MT	parasitic worms in gut
LT	400	750	1750	23	M	M	
LT	400	875	1755	20	F	M	
LT	400	825	1756	14	F	M	
LT	400	710	1746	25	F	M	
LT	405	725	1704	12F	U	MT	released
LT	405	975	1740	20	M	M	many snails in gut
LT	405	825	1753	27	M	M	
LT	405	800	1741	19	F	M	many snails in gut
LT	405	810	1745	29	M	M	
LT	420	800	1747	22	M	MT	snails, nymphs in gut
LT	425	1175	1701	23F	U	MT	released
LT	430	900	1749	22	F	M	
LT	460	1100	1751	32	F	MT	
LT	525	1400	1754	22	F	MT	

\* F refers to an age determined from a pelvic fin clip rather than an otolith.

**Appendix 4.** Individual fish data for fish captured in Aconitum Creek.

Date: August 20

Method: **electroshocking**

Species	Fork Length (mm)	Weight (g)	Sex/ Maturity	Age	DNA #	Comments
Aconitum Creek (819-2953) - outlet						
LT	77-100	-	U/J	-	-	FL = 77, 89, 100
CCG	41-90	-	U/U	-	-	15 individuals
Aconitum Creek (819-2953) - inlet						
LT	45-230	-	U/J	-	-	FL = 45, 84, 230
CCG	36-68	-	U/U	-	-	15 individuals

**Appendix 5. Skeena Region Lake Trout Assessment**

**SKEENA REGION  
LAKE TROUT ASSESSMENT REPORT**

**Lake Name: Aconitum Lake**

Gazetted: Aconitum Lake Alias: ---  
 Watershed Code: 819-2953-01 UTM: 9.352196.6588217

**Lake Location:**

Nearest Town: Dease Lake  
 Drainage: Aconitum Creek to Jennings River to Teslin Lake to Teslin River  
 Accessed: Air (see Appendix 5A)

**Lake Trout Management Objectives:** (see Appendix 5B for definitions and methods)

- Objective 1. Maintain natural population.
- Objective 2. Develop population of small fish
- Objective 3. Develop/maintain population of large fish

**Management/Survey History:** (see Appendix 5C)

Previous surveys: None  
 Previous lake trout assessment: None

**Survey Methods:** (see Appendix 5D)

Method	Date (YY.MM.DD)	Agency/Crew
Fish: <i>Gill netting</i> <input checked="" type="checkbox"/>	96.08.19	SKR/Greg Tamblyn, Lincoln Smith
Chem: <i>O<sub>2</sub>, nutrients, metals</i> <input checked="" type="checkbox"/>	96.08.21	SKR/Greg Tamblyn, Lincoln Smith
Physical: <i>bathymetry</i> <input checked="" type="checkbox"/>	96.08.18	SKR/Greg Tamblyn, Lincoln Smith
Temp.: <i>°C, secchi</i> <input checked="" type="checkbox"/>	96.08.21	SKR/Greg Tamblyn, Lincoln Smith

**Survey Results:** (Appendix 5E)

**Fish caught:**

Lake: 58 lake trout (34 sinking net, 22 floating net, 2 GEE minnow traps, and 0 angling), 16 round whitefish, and 2 slimy sculpin (minnow traps).  
 Streams: 6 lake trout and 30 slimy sculpin.

Adequate for further analysis: Yes

**Survey Results (cont.):**

Lake Trout Abundance and Survival Analysis

	Poor	Moderate	Good
Abundance of fish total.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Abundance of fish over 70 cm	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Survival to maturity	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Survival to age 20 years	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Lake Trout Age and Growth Analysis

Age	Old	<input type="checkbox"/>	Moderate	<input checked="" type="checkbox"/>	Young	<input checked="" type="checkbox"/>
Growth	Slow	<input checked="" type="checkbox"/>	Moderate	<input type="checkbox"/>	Rapid	<input type="checkbox"/>

Survey location: Yes, see *A Reconnaissance Inventory of Aconitum Lake*  
 Catch & survey information: Yes, see *A Reconnaissance Inventory of Aconitum Lake*  
 Photo documentation: Yes, see *A Reconnaissance Inventory of Aconitum Lake*

**Survey Conclusions:**

Objective	Objectives Achieved			Reason
	Yes	No	Unknown	
1. Natural population			<input checked="" type="checkbox"/>	No historic information
2. Small fish			<input checked="" type="checkbox"/>	
3. Large fish			<input checked="" type="checkbox"/>	

**Recommendations:**

A. Assessment:

B. Other:

**Comments:**

**APPENDIX 5A**

**LAKE LOCATION**

**Lake Name:** Aconitum Lake  
**Watershed Code:** 819-2953-01  
**Drainage:** Aconitum Creek → Jennings River → Teslin Lake → Teslin River →  
Big Salmon River → Lewis River → Selkirk River → Yukon River  
**Map Number:** 104 O/5  
**Access Direction:** Highway 16 to Kitwanga → Highway 37 to Watson Lake → Fixed-  
wing float plane from Watson Lake approx. 175 km SW

**APPENDIX 5B  
LAKE TROUT MANAGEMENT OBJECTIVE**

In addition to province-wide fisheries goals, strategic objectives of lake trout management in northern British Columbia will be to promote the maintenance and development of three types of lake trout populations and their associated fisheries. Strategic objectives for lake trout include the following:

**Strategic objective 1:           Maintain natural populations.**

Definition:                   The majority of lakes containing lake trout will fall into this category, including those for which there is no information. Management intent will be to maintain the natural size and age distribution as well as population abundance of char. These lakes will generally receive low to moderate angling pressure. In some very accessible popular lakes where over harvest of lake trout has occurred, management for this objective will be required in order to restore such lake trout populations to natural levels.

Method:                      Methods to obtain this objective will include conservative region wide angler regulations and required habitat maintenance measures. This objective allows for future implementation of objectives 2 and 3 below. In overfished lakes, catch and release regulations may have to be implemented.

**Strategic objective 2:           Develop populations of small fish.**

Definition:                   A few productive, generally very accessible and heavily angled lakes will be managed to obtain large numbers of primarily small, uniform sized lake trout.

Method:                      Methods to achieve this objective will include, in addition to habitat maintenance, the implementation of more liberal catch and minimum size restrictions on a few specified lakes. Once implemented the future option of providing large lake trout will likely not be possible.

**Strategic objective 3:           Develop/maintain populations of large fish.**

Definition:                   In a few lakes it will be desirable to maintain/develop trophy size lake trout. These fish will always be “rare” and somewhat dependent on lake size and available forage base.

Method:                      Very likely the only possible method to achieve this objective will be to severely restricted catch quotas or to develop catch and release fisheries. This objective allows for future implementation of objectives 1 and 3.



**APPENDIX 5C**

**MANAGEMENT/SURVEY HISTORY**

**Management history:**

No lake specific regulations (Freshwater fishing regulation synopsis 1996-1997)

**Survey History and Additional Information:**

No previous surveys have been conducted. The local guide-outfitter and his clients may angle occasionally on the lake as there was a small boat on shore near the guide-outfitter shelters. The air service pilots had no knowledge of the use of this lake by anglers.

## APPENDIX 5D

### SURVEY METHODS

The following general guidelines for sampling lake trout have been developed.

1. In order to obtain the greatest number of lake trout with the widest possible age range, sinking variable mesh monofilament gill nets should be set overnight at right angles from shore during spring on bouldery substrates with each net set at a depth of 5 m near shore to 30 m at the deep end. This procedure, in addition to catching adult and juvenile lake trout, will also reduce the number of other fish taken.

In small lakes (less than 500 ha) two nets set overnight should suffice regardless of the number of lake trout obtained; a small sample probably indicates a small population. No more than two nets should be set in any single lake for a 24 hr. period, and a maximum of four individual sets should be made during a sampling period. Sinking variable mesh experimental gill nets should measure 91.4 by 2.4 m. with the following mesh sizes: 25, 38, 51, 64, 76, 89, and 102 mm.

2. At the very least, fork length and age must be determined for each lake trout caught. On any given lake, age should be determined consistently using either the finray or otolith method. The two techniques will age the same population with an average difference of about one year. If the release of live fish is important, lake trout should be aged using the finray method whereby the basal portion of the first pectoral finray can be removed with surgical scissors or pruning shears. Information which should also be recorded include weight, state of maturity, stomach contents and any additional measurements which may be useful.
3. With restricted sampling capabilities and moderate to low population abundance of lake trout, the smallest change in average fork length which can realistically be detected is five cm or more, while the smallest detectable change in average age is greater than one year. Both these changes can be detected with sample sizes of between 24 and 36 fish, and a confidence coefficient of 0.8. The detection of smaller changes or the use of larger confidence coefficients requires unattainable large sample sizes and are therefore likely not applicable for the monitoring of most Skeena region lake trout populations.

#### **Additional Survey Methods Information:**

All survey information is described in:

SKR Consultants Ltd. 1996. *A Reconnaissance Inventory of Aconitum Lake (819-2953-01)*. Prepared for Ministry of Environment Lands and Parks, Fisheries Branch, Smithers, B.C.

**APPENDIX 5E****SURVEY RESULTS****Lake Trout Abundance Analysis**LAKE NAME: *Aconitum Lake*SAMPLE DATE: *96/08/19*

## Correction Factor Calculation

Net Number	Net length (m)	x	hours	m.net hrs.
1 (sinking)	91.4		10	914.0
Total nets	( 1 / 91.4 m)		Total m.net hrs*	914.0

$$[(2400 \times \text{number of nets (1)}) \div (\text{total m.net hrs.: } 914.0) \div (\text{number of nets } 1) = \text{CF} = \mathbf{2.62}$$

\* m.net hrs. = meter net hours

## Catch/100 m sinking gill net/day calculation

Name	Catch	x	CF	catch/100m net/day
Lake trout	34		2.62	89.09
Lake trout over 70 cm	0		2.62	0
Round whitefish	16			n/a

**Conclusion, Lake Trout Abundance** (lake trout catch/100 m gill net/day)

TOTAL:            Poor  (0-5)            Moderate  (5-15)    Good  (over 15)  
 OVER 70 CM:    Poor  (0-0.5)    Moderate  (0.5-1)    Good  (over 1)

**APPENDIX 5E (cont.)**

**Lake Trout Survival to Maturity Analysis**

LAKE NAME: *Aconitum Lake*

SAMPLE DATE: *96/08/19*

Fork length (cm)	Frequency (N)			Total
	Immature (IMM)	Maturing (MT)	Mature (M)	
1 - 4				
5 - 9				
10 - 14	3			
15 - 19	13			
20 - 24	9			
25 - 29	1	1		
30 - 34				
35 - 39	1	4	4	
40 - 44		5	10	
45 - 49		2		
50 - 54		2		
55 - 60				
60 - 65				
65 - 70			1	
<b>Total (%)</b>	<b>27 (48 %)</b>	<b>14 (25%)</b>	<b>15 (27%)</b>	<b>56 (100%)</b>

**Conclusion, Survival to Maturity** (% immature fish in sample):

Poor  (80-100% IMM),    Moderate  (60-80% IMM),    Good  (<60% IMM)

**Lake Trout Survival to Age 20 Analysis**

LAKE NAME: *Aconitum Lake*

SAMPLE DATE: *96/08/19*

**For age sorted data and respective fork lengths used in the following calculation see Table 3 in *A Reconnaissance Inventory of Aconitum Lake*.**

Total fish = 32  
 Total fish 20 years or older = 4  
 % fish 20 years or older = 12.5 %

**Conclusion, Survival to Age 20 Years** (% of fish 20 years or older):

Poor  (0-5%),    Moderate  (5-10%),    Good  (+10%)

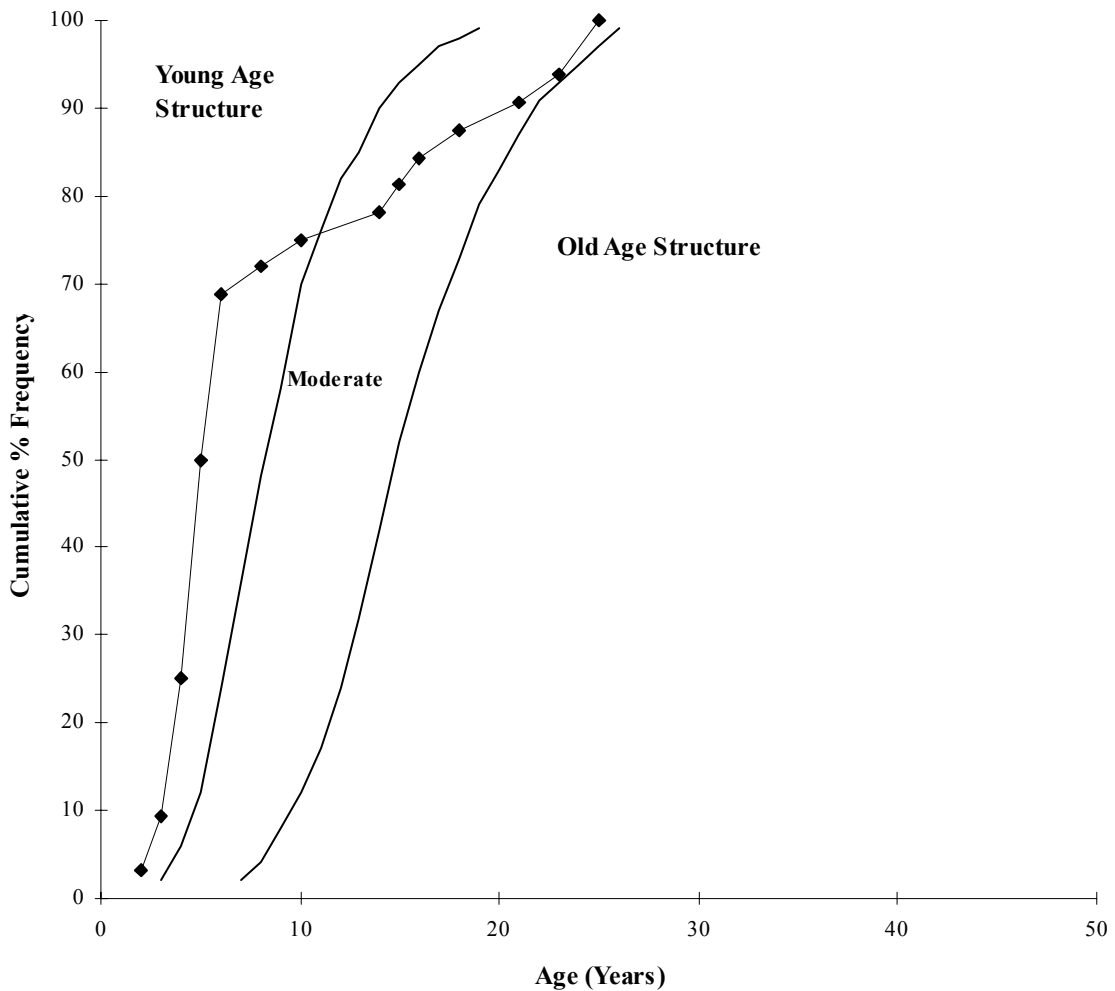
**APPENDIX 5E (cont.)**

**Lake Trout Age Analysis**

Lake Name: *Aconitum Lake* Sample Date: *96/08/19*  
Sample Method: *Sinking gill net*  
Sample Size: 32\* Adequate  Not Adequate

\* data for fish aged by otoliths and by fin rays was pooled. 4 fish were aged using fin rays.

**Conclusion, Age Structure:**



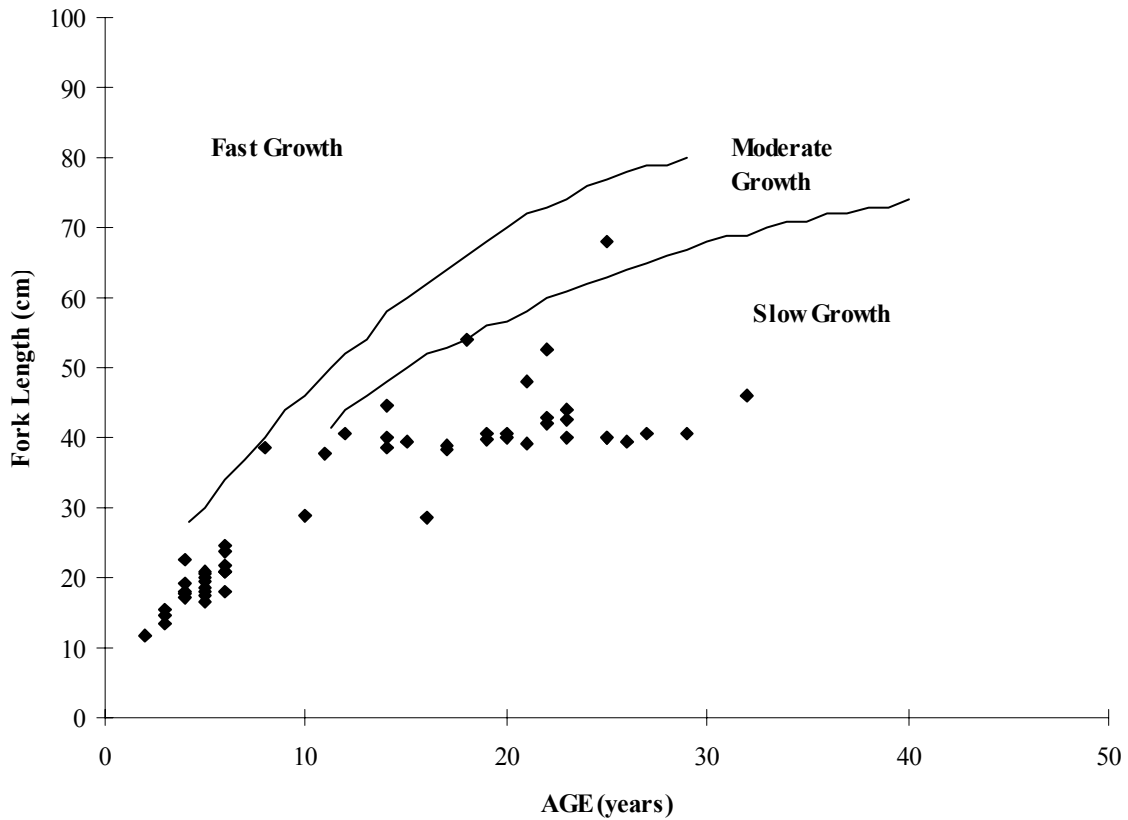
Old  Moderate  Young

**APPENDIX 5E (cont.)**

**Lake Trout Growth Analysis**

Lake Name: *Aconitum Lake* Sample Date: 96/08/19  
 Sample Method: Sinking Gill net  
 Sample Size: 54\* Adequate , Not Adequate

\* data for fish aged by otoliths and by fin rays was pooled



**Conclusion, Growth:**

Slow , → Moderate , Rapid

**Lake Trout Survey Location**

Lake Name: *Aconitum Lake* Sample Date: 96/08/19  
 Map Number: 1040/5

For sample location, information on gill net setting, photos and other pertinent information, please see *A Reconnaissance Inventory of Aconitum Lake*.

**Appendix 6.** Oxygen and temperature data

Appendix 6

Appendix 6. Oxygen and temperature data at 1 m intervals to 26 m collected at the deep station of Aconitum Lake on August 21, 1996 at 08:30 hrs.

<u>Depth (m)</u>	<u>Temperature (oC)</u>	<u>Oxygen (ppm)</u>
surface	9.7	8.8
1	10.3	8.7
2	10.3	8.6
3	10.4	8.5
4	10.4	8.4
5	10.4	8.3
6	10.4	8.3
7	10.4	8.1
8	10.4	8.1
9	10.4	8.0
10	10.4	7.9
11	10.3	7.9
12	10.3	7.8
13	10.3	7.7
14	9.8	7.1
15	8.2	7.1
16	7.8	7.3
17	7.6	7.4
18	7.4	7.5
19	7.3	7.3
20	7.2	7.3
21	7.2	7.2
22	7.1	7.2
23	7.1	7.1
24	7.1	7.1
25	7.1	6.9
26	7.1	6.7



**Appendix 7. Water quality data**

**Appendix 8.** Photodocumentation list

**PHOTO SURVEY FORM 1 - EQUIPMENT DETAILS**

Survey start date (yyyymmdd): 1996/08/18

Agency: *SKR Cons. Ltd.*

Survey end date (yyyymmdd): 1996/08/21

Crew: GT, LS

## Camera #1

Make and model: <i>Kodak Funsaver Panoramic 35</i>	Lenses: A
Format: <i>135 mm film</i>	
Resolution (for digital and video cameras): <i>n/a</i>	
Output file type (for digital and video camera): <i>n/a</i>	

## Camera #2

Make and model: <i>Canon Sure Shot Prima AS-1</i>	Lenses: B
Format: <i>135 mm film</i>	
Resolution (for digital and video cameras): <i>n/a</i>	
Output file type (for digital and video camera): <i>n/a</i>	

## Lenses

Lens #	Focal Length
A	35 mm
B	32 mm

## Roll and/or batch details

Roll # or Batch #	Camera #	Output medium	For film cameras	
			Film type	ISO
Aconitum/ Lake 14 Panoramic	1	negative/print	colour	400
Melgard II/ Aconitum I	2	negative/print	colour	200
Aconitum II/ Lake 14 I	2	negative/print	colour	400

Appendix 8

Survey start date	Agency	name (gaz.)	name (loc.)	Watershed code	Reach/ site card (Y/N)	Fish cards (Y/N)	Roll/ Batch #	Negative #	Date of photo	Reach #	Site #	Stream photo dir.	Picture type	Photo Dir.	Comments
1996/08/18	SKR	Aconitum Lake	none	819-2953-01	N	N	Aconitum/ Lake 14	7	1996/08/20	n/a	n/a	n/a	WS	NW	Fig. 9; UTM refers to lake outlet
1996/08/18	SKR	Aconitum Lake	none	819-2953-01	N	N	Aconitum/ Lake 14	8	1996/08/20	n/a	n/a	n/a	WS	SW	Fig. 8 (below); UTM refers to lake outlet
1996/08/18	SKR	Aconitum Lake	none	819-2953-01	N	N	Aconitum/ Lake 14	9	1996/08/20	n/a	n/a	n/a	WS	S	Fig. 8 (above); UTM refers to lake outlet
1996/08/18	SKR	Aconitum Lake	none	819-2953-01	N	N	Aconitum/ Lake 14	10	1996/08/20	n/a	n/a	n/a	WS	SE	Fig. 7 (below); UTM refers to lake outlet
1996/08/18	SKR	Aconitum Lake	none	819-2953-01	N	N	Aconitum/ Lake 14	11	1996/08/20	n/a	n/a	n/a	WS	E	Fig. 7 (above); UTM refers to lake outlet
1996/08/18	SKR	Aconitum Lake	none	819-2953-01	N	N	Aconitum/ Lake 14	12	1996/08/20	n/a	n/a	n/a	WS	NE	Fig. 6 (below); UTM refers to lake outlet
1996/08/18	SKR	Aconitum Lake	none	819-2953-01	N	N	Aconitum/ Lake 14	13	1996/08/20	n/a	n/a	n/a	WS	N	Fig. 6 (above); UTM refers to lake outlet
1996/08/18	SKR	Aconitum Lake	none	819-2953-01	N	N	MelgardII/ Aconitum I	19A	1996/08/18	n/a	n/a	n/a	WS	N	UTM refers to lake outlet
1996/08/18	SKR	Aconitum Lake	none	819-2953-01	N	N	MelgardII/ Aconitum I	20A	1996/08/18	n/a	n/a	n/a	WS	N	UTM refers to lake outlet
1996/08/18	SKR	Aconitum Lake	none	819-2953-01	N	N	MelgardII/ Aconitum I	21A	1996/08/18	n/a	n/a	n/a	WS	NE	UTM refers to lake outlet
1996/08/18	SKR	Aconitum Lake	none	819-2953-01	N	N	MelgardII/ Aconitum I	22A	1996/08/19	n/a	n/a	n/a	Fi	n/a	Fig. 12 (below). RW from gill net; UTM refers to lake outlet
1996/08/18	SKR	Aconitum Lake	none	819-2953-01	N	N	MelgardII/ Aconitum I	23A	1996/08/19	n/a	n/a	n/a	Fi	n/a	Fig. 12 (above). LT from gill net; UTM refers to lake outlet
1996/08/18	SKR	Aconitum Creek	none	819-2953	N	N	MelgardII/ Aconitum I	24A	1996/08/20	A	1	Xs	Ch	E	Plate #1 (left) in Append. 1. Loose substrate on valley wall; UTM refers to mouth of Aconitum Cr.
1996/08/18	SKR	Aconitum Creek	none	819-2953	N	N	MelgardII/ Aconitum I	E	1996/08/20	A	1	Up	Ch	S	Main outlet; UTM refers to mouth of Aconitum Cr.
1996/08/18	SKR	Aconitum Creek	none	819-2953	N	N	Aconitum II/ Lake 14 I	1	1996/08/20	A	1	Up	Ch	S	Plate #1 (above right). Main outlet; UTM refers to mouth of Aconitum Cr.
1996/08/18	SKR	Aconitum Creek	none	819-2953	N	N	Aconitum II/ Lake 14 I	2	1996/08/20	A	1	Dn	Ch	N	Plate #1 (above left). Main outlet; UTM refers to mouth of Aconitum Cr.
1996/08/18	SKR	Aconitum Creek	none	819-2953	N	Y	Aconitum II/ Lake 14 I	3	1996/08/20	B	2	Up	Ch	S	Plate #2 (above). Main outlet; UTM refers to mouth of Aconitum Cr.
1996/08/18	SKR	Aconitum Creek	none	819-2953	N	Y	Aconitum II/ Lake 14 I	4	1996/08/20	B	2	Dn	Ch	N	Plate #2 (below). Main outlet; UTM refers to mouth of Aconitum Cr.
1996/08/18	SKR	Aconitum Lake	none	819-2953-01	N	N	Aconitum II/ Lake 14 I	5	1996/08/20	n/a	n/a	n/a	O	SE	Fig. 11. 45 gal. drum on east shore of lake; UTM refers to lake outlet
1996/08/18	SKR	Aconitum Creek	none	819-2953	N	Y	Aconitum II/ Lake 14 I	6	1996/08/20	C	3	Up	O	W	Plate #3 (right). 2.5 m high BD on main inlet; UTM refers to mouth of Aconitum Cr.
1996/08/18	SKR	Aconitum Creek	none	819-2953	N	Y	Aconitum II/ Lake 14 I	7	1996/08/20	C	3	Up	O	W	Staff photo. 2.5 m high BD on main inlet; UTM refers to mouth of Aconitum Cr.
1996/08/18	SKR	Aconitum Creek	none	819-2953	N	N	Aconitum II/ Lake 14 I	8	1996/08/20	D	n/a	Up	O	W	Pond and beaver lodge behind dam; UTM refers to mouth of Aconitum Cr.
1996/08/18	SKR	Aconitum Creek	none	819-2953	N	N	Aconitum II/ Lake 14 I	9	1996/08/20	D	n/a	Up	O	SE	Pond and beaver lodge behind dam; UTM refers to mouth of Aconitum Cr.

Appendix 8

Survey start date	Agency	name (gaz.)	name (loc.)	Watershed code	Reach/site card (Y/N)	Fish cards (Y/N)	Roll/ Batch #	Negative #	Date of photo	Reach #	Site #	Stream photo dir.	Picture type	Photo Dir.	Comments
1996/08/18	SKR	Aconitum Creek	none	819-2953	N	Y	Aconitum II/ Lake 14 I	10	1996/08/20	C	3	Up	Ch	SW	Plate #3 (above right). UTM refers to mouth of Aconitum Cr.
1996/08/18	SKR	Aconitum Lake	none	819-2953	N	Y	Aconitum II/ Lake 14 I	11	1996/08/20	C	3	Dn	Ch	NE	Plate #3 (above left). UTM refers to mouth of Aconitum Cr.
1996/08/18	SKR	Aconitum Lake	none	819-2953-01	N	N	Aconitum II/ Lake 14 I	12	1996/08/20	n/a	n/a	n/a	O	SE	Fig. 11. Guide-outfitter camp; UTM refers to outlet of lake
1996/08/18	SKR	Aconitum Lake	none	819-2953-01	N	N	Aconitum II/ Lake 14 I	13	1996/08/20	n/a	n/a	n/a	O	E	Benchmark - 1.7 m high
1996/08/18	SKR	Aconitum Lake	none	819-2953-01	N	N	Aconitum II/ Lake 14 I	14	1996/08/20	n/a	n/a	n/a	O	E	Fig. 10. Benchmark - 1.7 m high
1996/08/18	SKR	Aconitum Lake	none	819-2953-01	N	N	Aconitum II/ Lake 14 I	15	1996/08/20	n/a	n/a	n/a	O	E	Fig. 10. Benchmark - 1.7 m high

**Appendix 9.** Salmon escapement data for the Jennings River

Appendix 9. Salmon escapement data for the Jennings River between 1982 and 1991.

Species	1982	1983	Year 1984	1985	1986-1991
Chinook	---	---	62	25	N/A
Chum	40	37	29	6	

(Johnson 1996)

**Appendix 10.** List of plants seen near the lake shore of Aconitum Lake



Appendix 10: List of plants seen near the lake shore of Aconitum Lake

Common Name	Latin name
Fireweed	<i>Epilobium angustifolium</i>
Sitka Burnet	<i>Sanguisorba canadensis</i> spp. <i>latifolia</i>
Mountain Monkshood	<i>Aconitum delphiniifolium</i>
Subalpine daisy	<i>Erigeron peregrinus</i>
Crowberry	<i>Empetrum nigrum</i>
Alpine clubmoss	<i>Lycopodium alpinum</i>
Northern Goldenrod	<i>Solidago multiradiata</i>
Arrow-leave Groundsel	<i>Senecio triangularis</i>
Scrub birch	<i>Betula glandulosa</i> var. <i>glandulosa</i>
Common Juniper	<i>Juniper communis</i>
Subalpine fir	<i>Abies lasiocarpa</i>
Green Reindeer lichen	<i>Cladina mitis</i>
Bunchberry	<i>Cornus canadensis</i>
Common Coral Lichen	<i>Stereocaulon paschale</i>

<b>Lake Biophysical Data Form</b>										
Date:	Aug. 18-21, 1996		Crew:	GT/LS						
<u>Site Identification</u>										
Watershed code:	819-2953		Sequenc Number:	01						
Gazetted Name:	Aconitum Lake		Alias Name:							
FW Region:	Skeena		UTM:	9.6588219.352196						
Management Unit:	6-25		NTS Map No.:	104 O 05						
			TRIM Map No.:	104 O .032, .042, .043						
<u>Biophysical</u>										
Biogeo Zone:	SWB		Biogeo Zone No.:							
Benchmark (Y/N):	Y		Elevation (m):	1225 m+/-						
Benchmark details:	1.70 m above surface									
<u>Nutrient Status</u>										
SEAM No.:	E223370		Limnological station No.1:							
Secchi depth (m):	9.1 m		TDS method:	Lab						
Other samples taken:	pH, water samples		DO method:	Oxyguard mark II						
			Temp method:	Oxyguard mark II						
			Alkalinity:	Lab						
<u>Field condition</u>										
wind velocity:	30-38 km/hr		wind direction:	from south		air temp. (C):	5			
cloud cover:	50%		surface condition:	rough		water colour:	colourless			
<u>Development</u>										
MOF rec sites:	N		Resorts/campsites:	N		Residences	N			
MOF campsites:	N		Resorts:	N		Co. Rec. facilities	N			
Parks camgrds:	N		Resort cabins:	2 small framed cabins						
Inlets/Outlets:	see stream survye cards for mandatory fields									
<u>Biological</u>										
Fish card attached:	N		Fish. Man. Com.:	LT, RW, CCG; no immediate fisheries concerns due to lack of access.						
Wildlife:	see comments		Reptiles:	none observed						
Aquatic Birds:	see comments		Invertebrates:	insect larvae, zooplankton, aquatic snails, beetles						
Amphibians:	none observed		Aquatic plants:	Carex sp., periphyton (not identified)						
<u>Comments</u>										
	horse trail around lake									
	Birds: gulls, ducks, sandpipers,									
	Wildlife: beaver, moose, grizzly are present in area (local guide-outfitter crew)									
	Grizzly bear are blue listed in B.C.									

SKR CONSULTANTS LTD.

Lake 17 (Aconitum) Lake Trout Otolith/Fin Analysis, August 19 - 1996.

Attention: Regina Saimoto, Senior Fisheries Biologist

Fish #	Length (cm)	Weight (g)	Sex	Fin Age	Otolith Age	Comments
1701	42.5	1175	U	23		Floating net
1702	38.4	600	U	17		Floating net
1703	38.5	675	U	14		Floating net
1704	40.5	725	U	12		Floating net
1705	54.0	1775	U	18		
1706	68.0	8lbs	M	21	25	
1707	44.5	1075	U	14		
1708	39.5	725	U	15		
1709	29.0	230	IMM	8	10	
1710	21.0	120	IMM	5	6	
1711	23.8	130	IMM	6	6	
1712	22.7	130	IMM	4	4	
1713	24.5	160	IMM	6		
1714	14.5	50	IMM	2	3	
1715	21.7	120	IMM	5	6	
1716	19.5	80	IMM	4	5	
1717	15.5	50	IMM	2	3	
1718	18.0	60	IMM	5	6	
1719	18.0	60	IMM	4	5	
1720	20.5	90	IMM	4	5	
1721	21.0	100	IMM	5	6	
1722	19.4	60	IMM	3	4	
1723	17.6	60	IMM	4	4	
1724	20.8	90	IMM	4	5	
1725	18.1	60	IMM	4	5	
1726	17.2	60	IMM	3	4	
1727	18.7	50	U, IMM	3	?	2 otoliths 5/6 yrs
1728	16.5	40	IMM	4	?	2 otoliths 4/5 yrs
1729	18.5	75	IMM	4	5	
1730	18.0	60	IMM	3	4	
1731	20.0	80	IMM	4	5	
1732	16.5	50	IMM	4	5	
1733	38.5	625	IMM	7	8	
1734	28.6	250	F	11	16	
1735	48.0	1025	F		21	Poor oto, fin unread.
1736	11.8	15	IMM	2	2	
1737	44.0	840	IMM		23	Fin unreadable
1738	40.0	675	M		25	Fin unreadable
1739	13.5	25	IMM	3	3	
1740	40.5	975	M	17	20	Poor fin
1741	40.5	800	F	17	19	
1742	39.5	690	M		26	Fin unreadable
1743	39.0	775	M	14	17	Poor fin
1744	39.2	800	F		21	Fin unreadable
1745	40.5	810	M		29	Fin unreadable
1746	40.0	710	F	14	25	Poor oto, poor fin
1747	42.0	80?	M	15	22	Poor fin
1748	37.8	675	F	10	11	
1749	43.0	900	F	15	22	Poor fin
1750	40.0	750	M		23	Fin unreadable

SKR CONSULTANTS LTD.

Lake 17 (Aconitum) Lake Trout Otolith/Fin Analysis, August 19 - 1996.

Attention: Regina Saimoto, Senior Fisheries Biologist

Fish #	Length (cm)	Weight (g)	Sex	Fin Age	Otolith Age	Comments
1751	46.0	1100	F		32	Fin unreadable
1752	39.8	675	F	15	19	
1753	40.5	825	M	21	27	Poor fin
1754	52.5	1400	F	19	22	
1755	40.0	875	F	17	20	Poor otolith
1756	40.0	825	F	13	14	