lk : 91-11-28
G.01.

new code lk seq 1
940-8961-000

# A RECONNAISSANCE SURVEY OF

# YAKOUN LAKE

WATERSHED: Yakoun River

DATE OF SURVEY: July 17 & 18, 1984

FIELD CREW LEADER: T.N. Webber

FIELD ASSISTANT: C.J. McKean

REPORT PREPARED BY: T.N. Webber

REPORT EDITED BY: D.J. Grant
(Senior Inventory Technician)

ACCEPTED FOR RELEASE BY: _____
(i/c Field Operations)

**FISHERIES BRANCH**
**MINISTRY OF ENVIRONMENT**

LAKE: Yakoun

SYSTEM NAME: Yakoun River

A.S.A.P. REFERENCE NO.: -

SYSTEM NO. : 94-4000

**DATA ON FILE FOR THIS SURVEY**

| | | | |
|---|---|---|---|
| Location | √ | Dissolved Oxygen Profile | √ |
| Physical Data | √ | Temperature Profile | √ |
| Bench Mark | √ | Netting Record | √ |
| Terrain Features | √ | Lake Catch Summary | √ |
| Access | √ | Fisheries Comments | √ |
| Resorts & Campsites | √ | Individual Fish Data | √ |
| Other Developments | √ | Fish Preserved | - |
| Obstructions and Pollutions | √ | Stomach Analysis | √ |
| Special Restrictions | √ | Scale Reading | - |
| Aquatic Plants | √ | History of Previous Surveys | √ |
| Wildlife Observations | √ | Location of Inventory Sites | √ |
| Miscellaneous Comments | √ | Photograph Directory | √ |
| Lake Drainage | √ | Appendices | √ |
| Inlets/Outlets | √ | Bathymetric Reduction | √ |
| Water Chemistry | √ | Contour Map | √ |

**LOCATION** ..... 32 km NW of Sandspit, B.C.

Elevation..... 107 m ±

Latitude/ Longitude..... 53°20':132°17'

U.T.M..... N/A

Management Unit..... 6-13

N.T.S. Map No..... 103 F/8W

Drainage Yakoun R → Masset Inlet → Masset Sound → (Graham Island, Queen Charlotte Islands)

**PHYSICAL DATA**

Lake Drainage Area..... 76.9 sq. km

Water Surface Area..... 7 900 000 sq. m

Volume..... 273 000 000 cu. m

Area above 6 m contour..... 695 000 sq. m

Flushing Rate -

Shoreline Perimeter..... 22 000 m

Perimeter of 11 Islands..... 2 500 m

Maximum Depth..... 91 m

Mean Depth..... 34.7 m

Filtrable Residue (T.D.S.)..... 22 mg/L

Secchi Disc..... 4.6 m

Sounding Device: Furuno FG 11A Mark 3

Elevation Source: 1:250 Topo Map

**BENCH MARK** (Iron spike in center of red circle) Location: 2.8 m above the present water level in a 90 cm diameter sitka spruce tree, 90 m north of Sandstone Creek mouth about 12 m from the waters edge; not easily seen.
High water mark 0.4 m above water level at time of survey. Outlet high water level and shoreline debris. Difficult to estimate due to wave action.

LAKE: Yakoun

**TERRAIN FEATURES**

Immediate Shoreline: About 60% of the shoreline area is moderately steep above and below the waterline and about 20% is very steep with numerous bedrock faces near points and around islands. Gravel and sand beaches comprise about 20% of the total shoreline and are most obvious around stream mouths and at the northeast end where steep, wave cutbeaches are dominant. There is considerable windfall and wave deposited debris around the shoreline but shoreline access remains fairly good as the lake is near its annual low water level. Shoreline type may be broken down as follows: cobble and boulder - 40%, gravels - 30%, bedrock - 20% and sand and mud about 10%.

Surrounding Country: Yakoun Lake is situated within the coastal hemlock biogeoclimatic zone of the northern Queen Charlotte Islands. The surrounding country is steep, hilly and near mountainous toward the south and west. The low relief area is around the outlet. The area is completely forested to the water's edge in primary climax growth of sitka spruce, hemlock and red cedar. Deciduous growth is patchy and scattered. The forest floor is abundant in windfall and organics. Some gullying and small debris avalanche tracks are noticeable in the distance.

LAKE: Yakoun

## ACCESS

Directions: Floatplane (DeHavilland single Otter). Flying time from Sandspit, B.C. is about 20 minutes.

Road Type and Conditions: N/A

Restrictions: N/A

## RESORTS & CAMPSITES

Only one developed campsite area noted and currently in use. Most areas are too steep and rocky for campsite. A few narrow sandy beaches and alluvial fans offer potential although many are very exposed.

## OTHER DEVELOPMENTS

One small cabin is located on the peninsula near the middle of the east lakeside.

## OBSTRUCTIONS AND POLLUTIONS

None. The outlet is currently free of debris jams.

## SPECIAL RESTRICTIONS

No known boating, fishing or access restrictions.

LAKE: Yakoun

## AQUATIC PLANTS

Aquatic plant abundance appears to be low with little diversity although distribution is fairly uniform. A few species were collected in sheltered areas around the campsite location. The following species were collected and have been recorded with the W.I.B. Herbarium, Ministry of Environment in Victoria under site #686:

Potamogeton Richardsonii (Bennett) Rydb,
Potamogeton Epihydrus Raf.
Utricularia Intermedia Hayne
Callitrich Heterophylla Push
Equisetum Fluviatile L.
Potamogeton Natans L.
Sparganium Minimum Fries.
Ranunculus Flammula L.
Nuphar Polysepalum Engelm.
Lilaeopsis Occidentalis Coult. & Rose
Isoetes L.
Potamogeton Nodosus Poit
Sparganium Emersum Rehm.
Ranunculus Aquatilis L.
Lobelia Dortmanna L.
Scirpus Lacustris L.

## WILDLIFE OBSERVATIONS

No observation made during the survey period other than much deer and racoon sign. The area is abundant in gulls, woodpeckers, dippers, ravens, bald eagles, various diving ducks and some unidentified shore birds.

## MISCELLANEOUS COMMENTS

Bathymap: The source outline for the lake map is a computer digitized airphoto BC 77063:134,221,135 (August 1977). No U.T.M. coordinates are available on existing topographic maps.

Invertebrates: Low in abundance at this time of year. Most noticeable are clams, snails, leeches and a few aquatic beetles.

LAKE: Yakoun

## LAKE DRAINAGE

General: Yakoun Lake is the largest and most significant expansion of the 72 kilometre long Yakoun River system which drains into the southeast side of Masset Inlet. The Yakoun River originates in the Mount Stapleton area just south of Yakoun Lake. There is one other small expansion on the system, a small unnamed lake on the main inlet which drains into the southwest corner of Yakoun Lake. The Yakoun River drains out of the northeast side of Yakoun Lake and continues northward, occasionally easterly before emptying into Yakoun Bay. Other than the major inlet, there are three other mapped and named inlets and one unnamed inlet to Yakoun Lake.

Major Systems:

Yakoun River - outlet (System No. 94-4000)
A point sample was established about 200 metres downstream of Yakoun Lake near atypical riffle section. Rearing habitat is abundant in this reach as there are many deep pools, overhanging banks and instream cover. Spawning habitat appears to be very low over the low gradient reach areas (air photo interpretation).

Yakoun River - inlet (System No. 94-4000)
No survey work conducted at this time.

Minor Systems:

Sandstone Creek (System No. 94-4000-868)

Delta Creek (System No. 94-400-896)

Baddeck Creek (System No. 94-4000-847)

No survey work conducted at this time. The Baddeck Creek mouth area was a very good location for netting of cutthroat trout.

LAKE: Yakoun

**LAKE DRAINAGE CONT'D** Outlet

## POINT SAMPLE

| C | L BANK R | C | BED MATERIAL | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | S 5 Form U 5 | | Ice Scouring Y ? (N) | C | Texture (%) | | | | | | |
| | F Genetic Mat. F | | Imbric (Nil) L M H | | Org. | | F | | | | |
| | Texture % | | Compac Nil L M (H) | | Clay | | | | | | |
| | F Org. F | | Lag Nil L (M) H | | Silt | | 10 | | | | |
| | Clay .004 | | $D_{90}$ (cm) 50 | | Sand | 10 | | | | | |
| | Silt .062 | | HYDRAULICS Meth. | | S. Gr. | 10 | G | | | | |
| | Sand 2 | | Valley W (m) 40 | | L. Gr. | 20 | 30 | | | | |
| | G S. Gr. 16 G | | Chan W (m) 20 | | Cob. | 20 | L | | | | |
| | L. Gr. 64 | | Wet W (m) 15 | | Boul. | 40 | 60 | | | | |
| | L Cob 256 L | | Slope (%) 1.5 | | Bedr. | | 0 | | | | |
| | Boul. | | Max Depth (cm) 70 | | | | | | | | |
| | Bedr. | | Avg. Depth (cm) 40 | | | | | | | | |

| | Distr. | Sp | VEG. | Sp | Distr. |
|---|---|---|---|---|---|
| | 4 | 2 | Conif. | 2 | 3 |
| | 8 | 1 | Decid. | 1 | 7 |
| | 4 | | Under | | 3 |
| | 9 | 3 | Ground | 3 | 8 |

| | Distr. | % Area | Level | % Area | Distr. |
|---|---|---|---|---|---|
| | 7 | 10 | Crown | 10 | 8 |
| | 2 | | Over | | 3 |

| | BIOTA | Sp | Abun. |
|---|---|---|---|
| | Aquatic Veg | | M |
| | Invertebrates | | M |
| | Algae | | M |

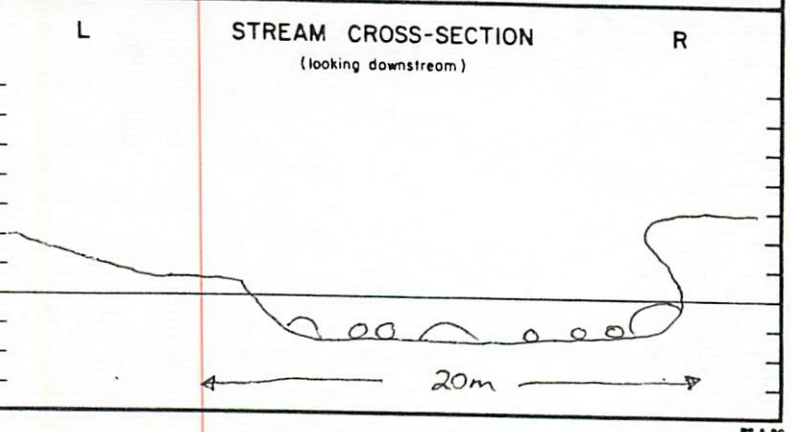
| | | | |
|---|---|---|---|
| 01 | Wet X-sec area | | |
| | Velocity (m/sec) | | |
| | Flow ($m^3$/sec) | | |
| | Bank Height (m) | 0.8 | E |
| | Fld. Signs (Ht./Type) | 1.1/E | |
| | Bank Ice Scour Y ? (N) | | |
| | Stage Dry L (M) H Fld | | |
| 02 | Flow Char P (S) R B T | | |
| | Valley Chan 0-2 (2-5) 5-10 10+ N/A | | |
| | Side Chan (Nil) L M H | | |
| | DEBRIS Channel Nil (L) M H | | |
| | Stable % 70 | | |
| | Floodplain Nil L (M) H | | |

System Name YAKOUN RIVER Point No 1 of 1
No. 944000
Site Location ABOUT 200 m downstream of YAKOUN LAKE
Reach No. 4
Date 84 04 17 (yr mo day) Time 1400 Access FT
NTS Map 103F/8 Agency ASB Crew TW/CM
Field Photo Init. TW Photo Nos. ✓
Weather Some Sun Fish Sample No. –
Air Temp. °C 16 Water Sample No. –

| C | WATER QUAL. | Water temp | Turbidity | TDS | D.O. | pH |
|---|---|---|---|---|---|---|
| 03 | | 16 °C | 17 (m) cm | | | |

04 FISH SPECIES PRESENT:

STREAM CROSS-SECTION (looking downstream)




PS 5 80

Note: for explanation of codes, see APD Technical Paper 3, DATA ENTRY PROCEDURES

### Comments

C1 Velocity measurement: midchannel- 14 secs, left bank - 20 secs, right bank - 24 secs.

C2 The pool to riffle ratio over the reach is probably 90:1 (air photo interpretation)

C3 Slightly tea coloured but visible to the bottom.

C4 Many salmonid juveniles and fry are rearing in this stream.

C2 Flow type is near 100% placid downstream where there is more debris, fewer larges and deeper pools.

CX Rearing habitat appears abundant but spawning potential is very low as riffle areas are almost non-existent.

CX Not typical of the reach as gradient is usually much lower and flow is nearly 100% placid.

S1 Alder

S2 Sitka spruce, hemlock, and cedar

S3 Grasses

LAKE: Yakoun

**WATER CHEMISTRY** Limnology Station No. 1

Date July 18, 1984 Time 1345 Air Temperature 14 °C

Wind Velocity 12 km/hr Wind Direction westerly Field pH Sfce -
Cloud Cover 9 /10 O.C. Surface Condition choppy 50 m -
Secchi Disc 4.6 m Water Colour tannic $H_2S$ 50 m 0 mg/L

Method(s) Used for field tests: Water Temperature YSI Model 57 Oxygen meter.
Dissolved Oxygen YSI Model 57 Oxygen meter.
Air Temperature Hand-held alcohol type thermometer.
Field pH not tested
$H_2S$ not tested

Depth of Bottom approx. 90 m Depth of Water Samples 0 m/50 m

| DEPTH | $O_2$ (mg/L) | TEMP (°C) |
|---|---|---|
| Surface | 10.3 | 15.2 |
| 0.5 | | |
| 1.0 | 10.2 | 15.2 |
| 1.5 | | |
| 2.0 | 10.2 | 15.2 |
| 2.5 | | |
| 3.0 | 10.2 | 15.2 |
| 3.5 | | |
| 4.0 | 10.2 | 15.2 |
| 4.5 | | |
| 5.0 | 10.0 | 14.4 |
| 5.5 | | |
| 6.0 | 10.0 | 13.8 |
| 6.5 | | |
| 7.0 | 10.2 | 12.0 |
| 7.5 | | |

| DEPTH (m) | $O_2$ (mg/L) | TEMP (°C) |
|---|---|---|
| 8.0 | 10.2 | 10.8 |
| 8.5 | | |
| 9.0 | 10.2 | 10.5 |
| 9.5 | | |
| 10.0 | 10.3 | 9.3 |
| 11.0 | | |
| 12.0 | 10.4 | 8.5 |
| 13.0 | | |
| 14.0 | 10.8 | 8.2 |
| 15.0 | | |
| 16.0 | 11.0 | 7.0 |
| 17.0 | | |
| 18.0 | 10.8 | 6.6 |
| 19.0 | | |
| 20.0 | 10.9 | 6.1 |
| 21.0 | | |

| DEPTH | $O_2$ (mg/L) | TEMP (°C) |
|---|---|---|
| 22.0 | 11.0 | 6.0 |
| 23.0 | | |
| 24.0 | 10.9 | 6.0 |
| 25.0 | | |
| 26.0 | 10.8 | 6.0 |
| 27.0 | | |
| 28.0 | 10.8 | 5.9 |
| 29.0 | | |
| 30.0 | 10.8 | 5.9 |
| 31.0 | | |
| 32.0 | | |
| 33.0 | | |
| 34.0 | | |
| 35.0 | | |
| | | |
| 90.0 | Bottom | |

LAKE: Yakoun

**WATER CHEMISTRY CONT'D**

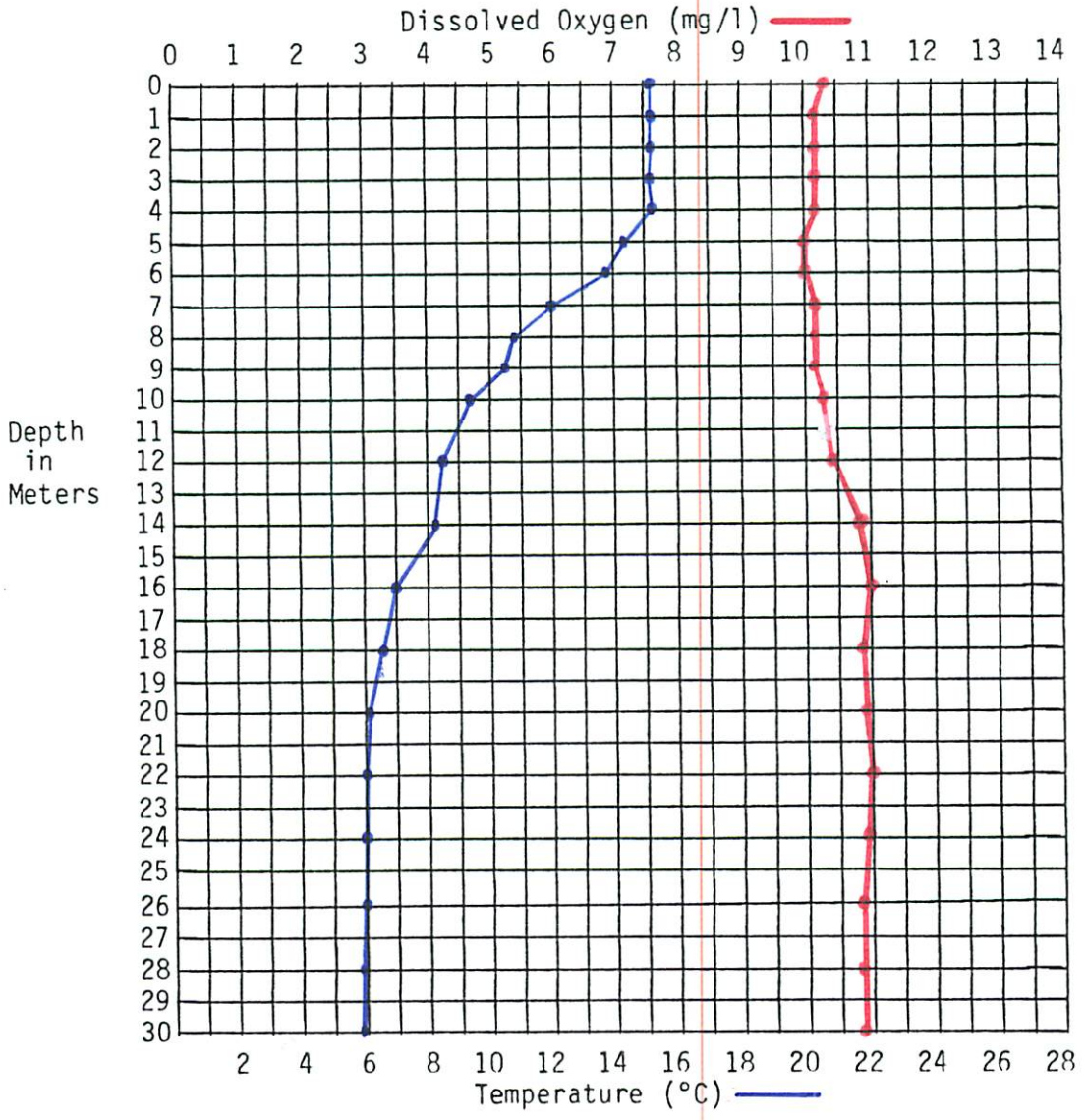
Limnology Station No: 1 Equis No: 1130681

| Residue Filtrable 105°C (T.D.S.) | Specific Conductance | Lab pH |
|---|---|---|
| Surface 22 mg/L | Surface 31 umhos/cm | Surface 6.3 |
| 50 m 22 mg/L | 50 m 31 umhos/cm | 50 m 6.9 |

Method /Agency Used: Ministry of Environment Lab at UBC

Comments: A mud sample was collected near the campsite at 45 m using an Ekman dredge. Some small copepods were noted in the near bottom water sample.

DISSOLVED OXYGEN AND TEMPERATURE PROFILE



LAKE: Yakoun

**NETTING RECORD**

Mesh sizes are hung in an experimental order: 25, 76, 51, 89, 38, 64 mm.

NETTING SITE #1 Type sinking monofilament — Date Set July 16, 1984 Time 2200 — Date Lifted July 17, 1984 Time 1000
Net Dimensions: Length 91.4 m Depth 2.4 m
Shallow End Mesh Size 64 mm, Depth 12.4 m, Substrate cobble/fines
Deep End Mesh Size 25 mm, Depth 20+ m, Substrate mud

Comments:

NETTING SITE #2 Type sinking monofilament — Date Set July 17, 1984 Time 1030 — Date Lifted July 17, 1984 Time 1830
Net Dimensions: Length 91.4 m Depth 2.4 m
Shallow End Mesh Size 25 mm, Depth 10 m, Substrate ?
Deep End Mesh Size 64 mm, Depth 20+ m, Substrate mud

Comments: Reset the first net as sample size was very small.

NETTING SITE #3 Type sinking monofilament — Date Set July 17, 1984 Time 1900 — Date Lifted July 18, 1984 Time 0900
Net Dimensions: Length 91.4 m Depth 2.4 m.
Shallow End Mesh Size 64 mm, Depth 6 m, Substrate cobble/fines
Deep End Mesh Size 25 mm, Depth 13 m, Substrate mud

Comments: Reset again as no fish were caught in net set #2.

NETTING SITE #4 Type sinking monofilament — Date Set July 17, 1984 Time 1915 — Date Lifted July 18, 1984 Time 0830
Net Dimensions: Length 91.4 m Depth 2.4 m.
Shallow End Mesh Size 25 mm, Depth 9 m, Substrate cobble,fines
Deep End Mesh Size 64 mm, Depth 15 m, Substrate mud

Comments: Set near an inlet in shallower water.

LAKE: Yakoun

**LAKE CATCH SUMMARY**

| SPECIES | NETTING SITE NO. | | | | ANGLED | OTHER | TOTAL | NUMBER SAMPLED | NUMBER PRESERVED | SIZE RANGE (cm) |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | | | | | | |
| sockeye salmon | 1 | 0 | 6 | 1 | 0 | 0 | 8 | 8 | - | 33.0-52.0 |
| cutthroat trout | 0 | 0 | 4 | 0 | 0 | 0 | 4 | 4 | - | 31.0-40.0 |
| Dolly Varden char | 1 | 0 | 4 | 0 | 0 | 0 | 5 | 5 | - | 17.0-30.0 |
| Prickley sculpin | 0 | 0 | 6 | 0 | 0 | 0 | 6 | 0 | - | - |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |

Minnow Traps: (Set about 1800, July 16) Bait granola

| # | HOURS | DEPTH(m) | SUBSTRATE | SPECIES |
|---|---|---|---|---|
| 1 | 46 | 0.7 | sand & mud | *16 stickleback, 1 salmonid |
| 2 | 46 | 0.8 | sand & mud | * 6 stickleback, 3 salmonids |
| | | | | |
| | | | | |

**FISHERIES COMMENTS**

Liver and flesh tissue samples were collected from all of the cutthroat trout, seven of the salmon and all of the Dolly Varden char. All fish are healthy and robust with a minimum of visible gut parasites. The cutthroat trout are in particularly good shape. The cutthroat were feeding on large sculpins whereas the Dolly Varden char were found to be eating snails and occasionally small bottom invertebrates. Salmon stomachs were empty. Many small stickleback and salmon fry are rearing around the shoreline and near inlet mouths. The salmon fry are suspected to be coho. The outlet is a popular fishing area and local comment suggests that the Yakoun river has a steelhead run.

* Stickleback are threespine - Gasterosteus aculeatus

LAKE: Yakoun

**INDIVIDUAL FISH DATA**

Date Captured July 17, 18, 1984

Method of Capture monofilament gill nets

M-Male
F-Female
?-Not Obvious

IMM-Immature
MG-Maturing
MT-Mature
GV-Gravid
SP-Spent
?-Not Obvious

EG-Egg
FR-Fin Ray
HD-Head
ML-Milt
OT-Otolith

SC-Scale
ST-Stomach
TG-Fish Tag
WF-Whole Fish

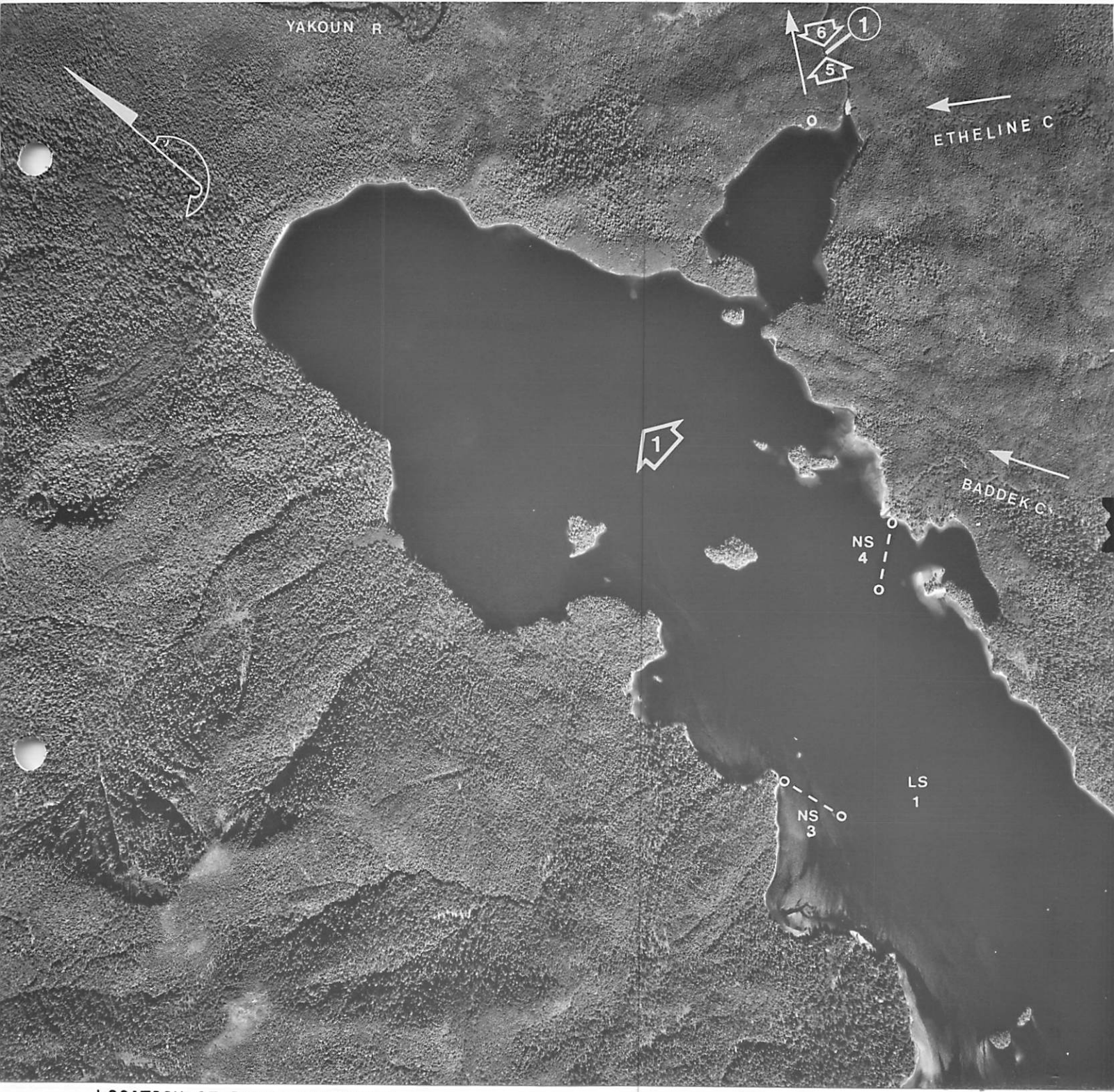
| SPECIES | FORK LENGTH (cm) | WEIGHT (g) | SEX | GONADAL MATURITY | SAMPLE TYPE | AGE (YRS) | STOMACH CONTENTS | | | | | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | BOTTOM ORGANISMS | PLANKTON | INSECTS | FISH | OTHER | |
| cutthroat trout | 31.0 | 275 | F | IMM | SC | | | | | stickleback | | |
| | 32.5 | 360 | F | IMM | SC | | | | | | | empty gut |
| | 36.0 | 475 | M | IMM | SC | | | | | | | empty gut |
| | 40.0 | 525 | F | IMM | SC | | | | | stickleback | | |
| Dolly Varden char | 17.0 | 50 | F | IMM | OT | | | | | | | |
| | 17.5 | 70 | F | MG | | | | | | | | no otoliths |
| | 18.5 | 75 | M | MG | OT | | snails | | | | | |
| | 24.0 | 165 | M | MG | OT | | snails | | | | | |
| | 30.0 | 275 | F | MG | OT | | snails | | | | | |
| Sockeye salmon | 33.0 | 400 | M | MG | SC | | | | | | | |
| | 34.0 | 425 | M | MG | SC | | | | | | | |
| | 45.5 | 950 | F | MG | SC | | | | | | | |
| | 46.0 | 1100 | M | MG | SC | | | | | | | empty gut |
| | 46.5 | 1100 | F | MG | SC | | | | | | | |
| | 49.0 | 1300 | M | MT | SC | | | | | | | empty gut |
| | 52.0 | 1525 | M | MG | SC | | | | | | | empty gut |

LAKE: Yakoun

**HISTORY OF PREVIOUS SURVEYS**

No known previous surveys.

Survey Date




LOCATION OF INVENTORY SITES

Figure 2 (north)

Lake: Yakoun

Reference No.: BC 77063:134

Reference Date: August 4, 1977

Scale: 1:20 661.2

| | |
|---|---|
| 1 | Plate number, area, and direction |
| 2 | Point sample, number, and location |
| | Bench mark |
| LS 1 | Limno station location and number |
| O–NS 1–O | Netting site location and number |
| 1 | Stream flow direction and number |


LOCATION OF INVENTORY SITES

Figure 1 (southwest)

Lake: Yakoun

Reference No.: BC 77063:221

Reference Date: August 4, 1977

Scale: 1:20 661.2

| | |
|---|---|
| 1 | Plate number, area, and direction |
| 2 | Point sample, number, and location |
| | Bench mark |
| LS 1 | Limno station location and number |
| O–NS 1–O | Netting site location and number |
| 1 | Stream flow direction and number |

LAKE: Yakoun

**PHOTOGRAPH DIRECTORY**

| Negative # | Plate # | Description |
|---|---|---|
| 18 | 1 | Aerial view to the north end of the lake. |
| 19 | 2 | Aerial view to the south and west end of the lake. |
| 26 | 3 | Campsite area at the mouth of Sandstone Creek. |
| 25 | 4 | A portion of the fish caught in the gill nets. |
| 24 | 5 | Downstream view over the point sample site on the outlet. |
| 23 | 6 | Upstream view over the point sample site on the outlet. |
| 20 | - | Aerial view towards the north end of the lake. |
| 21 | - | Aerial view of the far west end of the lake. |
| 22 | - | Viewing a portion of the east side, north end of the lake. |

Plate 1: Aerial view to the north end of the lake.

Plate 2: Aerial view to the south and west end of the lake. The month of Sandstone Creek is visible in the right foreground.

Plate 3: The mouth of Sandstone Creek is one of the few areas suitable as a campsite.

Plate 4: These represent a portion of the fish caught in our gill nets.

Plate 5: Downstream view over the point sample area of the outlet (Yakoun River).

Plate 6: Upstream view over the point sample site on the outlet.

LAKE: Yakoun

APPENDICES

# APPENDIX A - LABORATORY REPORT
## Water Chemistry Analysis

WATER QUALITY REPORT FOR SAMPLE 405287W

TO: RESOURCE QUALITY SEC
765 BROUGHTON ST.
VICTORIA,B.C. V8V 1X5
ATTENTION OF: L SWAIN

FOR SITE: 1130681 YAKOUN LAKE DEEP STATION

SAMPLING DATE(S): JUL 18/84 0000 HRS
SAMPLE TYPE: FRESH WATER
SAMPLING DEPTH: 0
SAMPLED BY: RESOURCE QUALITY SECTION
CHARGE TO: WATER PGM (RSRC QUAL SCN)
DATE PROCESSED TO COMPUTER: JUL 31/84

| | | | | | |
|---|---|---|---|---|---|
| 0040103 | PH | 6.9 REL UNIT | 0050101 | RESIDUE:TL 105C | 23. MG/L |
| 0071701 | RES:FILT.105C | 22. MG/L | 0110101 | SPECIFIC CONDUC | 31. UMHO/CM |
| 1070003 | HARDNES.T:CACO3 | 7.91 MG/L | 1083704 | NITROGN:AMMONIA | L 0.005* MG/L |
| 1093703 | NITROGN:NO2 NO3 | L 0.02* MG/L | 1120003 | NITROGN:ORGANIC | 0.11* MG/L |
| 1133605 | NITROGN:KJELDAH | 0.11 MG/L | 1140001 | NITROGEN:TOTAL | 0.11* MG/L |
| 1183703 | PHOSPHORUS:ORT | L 0.003 MG/L | 1193703 | PHOSPHORUS :TOT DISSOLVED | 0.006 MG/L |
| 1580101 | TITRATION CURVE | K | 2530210 | CADMIUM TOTAL | L 0.0005* MG/L |
| 2560310 | COPPER TOTAL | 0.001 MG/L | 2580310 | LEAD TOTAL | 0.002 MG/L |
| 2630310 | NICKEL TOTAL | L 0.01 MG/L | | | |
| | FOLLOWING ARE PACKAGE TESTS: | | | | |
| 2510214 | ARSENIC TOTAL | L 0.25 MG/L | 2530214 | CADMIUM TOTAL | L 0.01 MG/L |
| 2540214 | CALCIUM TOTAL | 2.31 MG/L | 2550214 | CHROMIUM TOTAL | L 0.01 MG/L |
| 2560214 | COPPER TOTAL | L 0.01 MG/L | 2570214 | IRON TOTAL | 0.04 MG/L |

SAMPLE NO. 405287W CONTINUED ON NEXT PAGE.

WATER QUALITY REPORT FOR SAMPLE 405287W

| | | | | | |
|---|---|---|---|---|---|
| 2580214 | LEAD TOTAL | L 0.1 MG/L | 2590214 | MAGNESIUM TOTAL | 0.52 MG/L |
| 2600214 | MANGANESE TOTAL | L 0.01 MG/L | 2620214 | MOLYBDENUM TOTAL | L 0.01 MG/L |
| 2630214 | NICKEL TOTAL | L 0.05 MG/L | 2660214 | ZINC TOTAL | L 0.01 MG/L |
| 2670214 | ALUMINUM TOTAL | 0.06 MG/L | 2680214 | COBALT TOTAL | L 0.1 MG/L |
| 2720214 | VANADIUM TOTAL | L 0.01 MG/L | | | |

THE APPROXIMATE COST OF THE ABOVE TESTS IS $ 222.00

THERE IS NO CHARGE FOR THE FOLLOWING TESTS

| | | |
|---|---|---|
| 2531406 | CADMIUM DISSOLVED | E MG/L |

REMARKS: Titration Curve Printout Attached

TOTAL ALKALINITY ($CaCO_3$) = 7.0 mg/L.

FOR ENVIRONMENTAL LABORATORY

WATER QUALITY REPORT FOR SAMPLE 405288W

TO: RESOURCE QUALITY SEC
765 BROUGHTON ST.
VICTORIA,B.C. V8V 1X5
ATTENTION OF: L SWAIN

FOR SITE: 1130681 YAHOUN LAKE DEEP STATION

SAMPLING DATE(S): JUL 18/84 0000 HRS
SAMPLE TYPE: FRESH WATER
SAMPLING DEPTH: 50
SAMPLED BY: RESOURCE QUALITY SECTION
CHARGE TO: WATER PGM (RSRC QUAL SCN)
DATE PROCESSED TO COMPUTER: JUL 31/84

| | | | | | |
|---|---|---|---|---|---|
| 0040103 | PH | 6.3 REL UNIT | 0050101 | RESIDUE:TL 105C | 23. MG/L |
| 0071701 | RES:FILT.105C | 22. MG/L | 0110101 | SPECIFIC CONDUC | 31. UMHO/CM |
| 1070003 | HARDNES,T:CACO3 | 7.55 MG/L | 1083704 | NITROGN:AMMONIA | 0.024 MG/L |
| 1093703 | NITROGN:NO2 NO3 | 0.04 MG/L | 1120003 | NITROGN:ORGANIC | 0.02 MG/L |
| 1133605 | NITROGN:KJELDAH | 0.04 MG/L | 1140001 | NITROGEN:TOTAL | 0.08 MG/L |
| 1183703 | PHOSPHORUS:ORT | L 0.003 MG/L | 1193703 | PHOSPHORUS :TOT DISSOLVED | 0.005 MG/L |
| 1580101 | TITRATION CURVE | K | 2530210 | CADMIUM TOTAL | L 0.0005* MG/L |
| 2560310 | COPPER TOTAL | L 0.001 MG/L | 2580310 | LEAD TOTAL | L 0.001 MG/L |
| 2630310 | NICKEL TOTAL | L 0.01 MG/L | | | |

FOLLOWING ARE PACKAGE TESTS:

| | | | | | |
|---|---|---|---|---|---|
| 2510214 | ARSENIC TOTAL | L 0.25 MG/L | 2530214 | CADMIUM TOTAL | L 0.01 MG/L |
| 2540214 | CALCIUM TOTAL | 2.2 MG/L | 2550214 | CHROMIUM TOTAL | L 0.01 MG/L |
| 2560214 | COPPER TOTAL | L 0.01 MG/L | 2570214 | IRON TOTAL | 0.08 MG/L |

SAMPLE NO. 405288W CONTINUED ON NEXT PAGE.

WATER QUALITY REPORT FOR SAMPLE 405288W

| | | | | | |
|---|---|---|---|---|---|
| 2580214 | LEAD TOTAL | L 0.1 MG/L | 2590214 | MAGNESIUM TOTAL | 0.5 MG/L |
| 2600214 | MANGANESE TOTAL | L 0.01 MG/L | 2620214 | MOLYBDENUM TOTAL | L 0.01 MG/L |
| 2630214 | NICKEL TOTAL | L 0.05 MG/L | 2660214 | ZINC TOTAL | L 0.01 MG/L |
| 2670214 | ALUMINUM TOTAL | 0.06 MG/L | 2680214 | COBALT TOTAL | L 0.1 MG/L |
| 2720214 | VANADIUM TOTAL | L 0.01 MG/L | | | |

THE APPROXIMATE COST OF THE ABOVE TESTS IS $ 222.00

THERE IS NO CHARGE FOR THE FOLLOWING TESTS

| | | |
|---|---|---|
| 2531406 | CADMIUM DISSOLVED | E MG/L |

REMARKS: Titration Curve :- Printout Attached

TOTAL ALKALINITY ($CaCO_3$) = 6.2 mg/L.

FOR ENVIRONMENTAL LABORATORY

LAKE: Yakoun

APPENDICES

## APPENDIX B - LABORATORY REPORT
Bottom Sediment Analysis

MINISTRY OF THE ENVIRONMENT

WATER QUALITY REPORT FOR SAMPLE 406029W

TO: RESOURCE QUALITY SEC
765 BROUGHTON ST.
VICTORIA, B.C. V8V 1X5
ATTENTION OF: C MCKEAN

1686

#:6 FOR SITE: 1130681 YAHOUN LAKE DEEP STATION

Z:45 SAMPLING DATE(S): JUL 16/84 0000 HRS
SAMPLE TYPE: BOTTOM SEDIMENT
SAMPLING DEPTH: 45
SAMPLED BY: RESOURCE QUALITY SECTION
CHARGE TO: WATER PGM (RSRC QUAL SCN)
DATE PROCESSED TO COMPUTER: AUG 03/84

| | | | | | |
|---|---|---|---|---|---|
| 0322402 | RESIDUE:%TOT.VO | 25.4 % | 1032402 | CARBON:ORGANIC | 85. K MG/G DRY |
| 1132402 | NITROGN:KJELDAH | ~~4.11~~ 5.0 K MG/G DRY | 1242402 | CARBON:INORG. | 4.0 K MG/G DRY |
| 1472401 | CARBON:TOTAL | 89. MG/G DRY | 2612408 | MERCURY | 0.50 UG/G@20C |
| 2892411 | SILICON | 20. UG/G DRY | | | |
| | FOLLOWING ARE PACKAGE TESTS: | | | | |
| 1192412 | PHOSPHORUS :TOT | ~~1120.~~ 1120. MG/G DRY | 2512411 | ARSENIC | 73. UG/G DRY |
| 2522411 | BORON | L 1. UG/G DRY | 2532411 | CADMIUM | L 1. UG/G DRY |
| 2542412 | CALCIUM | 4.17 MG/G DRY | 2552411 | CHROMIUM | 42. UG/G DRY |
| 2562411 | COPPER | 35. UG/G DRY | 2572412 | IRON | 57.9* MG/G DRY |
| 2582411 | LEAD | 27. UG/G DRY | 2592412 | MAGNESIUM | 6.58 MG/G DRY |
| 2602412 | MANGANESE | ~~2240.~~ 2240. MG/G DRY | 2622411 | MOLYBDENUM | 19. UG/G DRY |
| 2632411 | NICKEL | 21. UG/G DRY | 2662411 | ZINC | 89. UG/G DRY |
| 2672412 | ALUMINUM | 34.0 MG/G DRY | 2682411 | COBALT | 18. UG/G DRY |

SAMPLE NO. 406029W CONTINUED ON NEXT PAGE.

WATER QUALITY REPORT FOR SAMPLE 406029W

| | | | | | |
|---|---|---|---|---|---|
| 2702411 | BARIUM | 131. UG/G DRY | 2722411 | VANADIUM | 55. UG/G DRY |
| 2742411 | SELENIUM | L 10. UG/G DRY | 2762411 | TITANIUM | 26. UG/G DRY |
| 2822411 | TIN | L 5. UG/G DRY | 2832411 | BERYLLIUM | L 1. UG/G DRY |
| 2842411 | THALLIUM | L 20. UG/G DRY | 2872411 | STRONTIUM | 34. UG/G DRY |
| 2882411 | TELLURIUM | 60. UG/G DRY | | | |

LAKE: Yakoun

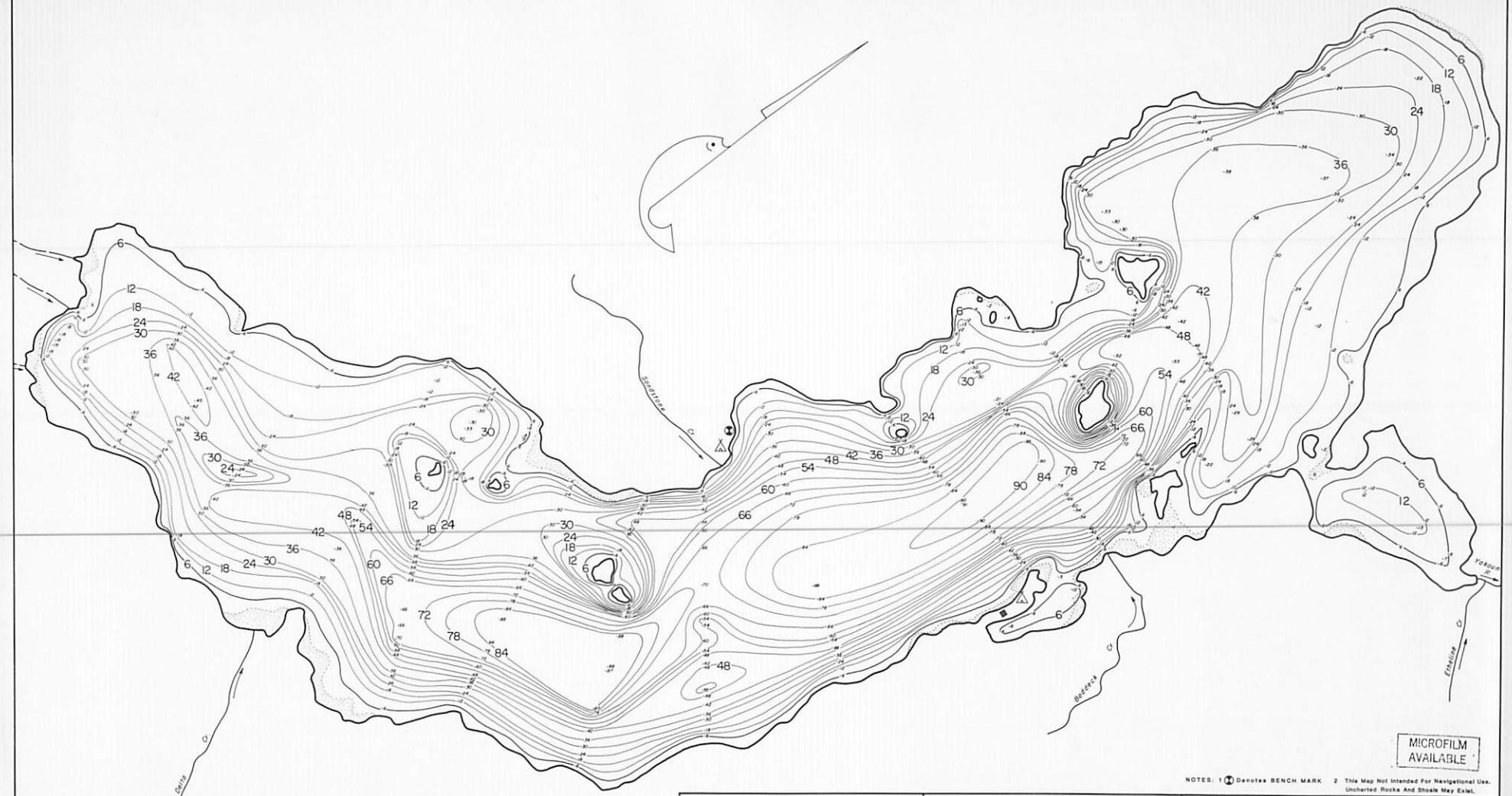
APPENDICES

# APPENDIX C - LABORATORY REPORT
## Fish Tissue Analysis

# FISH DATA
(all results ug/g dry EXCEPT moisture (%) and Hg (ug/g wet))

| Rec# | Sample | Spec | Tis | Rep# | Len | Wt | Sex | Dev | %MOIS | Mo | Al | As | B | Ba | Be | Ca | Cd | Co | Cr |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 1 | CT | L | 1 | 31.0 | 275 | F | IMM | 81.9 | 1 | 110 L | .1 L | 1 | 2 L | 1 | 424 L | 1 L | 12 | 2 |
| 2 | 1 | CT | L | 2 | 36.0 | 475 | M | IMM | 79.7 | 1 | 7 L | .1 L | 1 L | 1 L | 1 | 232 L | 1 L | 10 | 1 |
| 3 | 1 | CT | L | 3 | 40.0 | 525 | F | IMM | 77.4 | 1 | 10 | .1 L | 1 L | 1 L | 1 | 207 L | 1 L | 10 | 1 |
| 4 | 1 | CT | L | 4 | 33.0 | 360 | F | IMM | 80.4 L | 1 | 6 L | .1 L | 1 L | 1 L | 1 | 248 L | 1 L | 11 L | 1 |
| 5 | 1 | CT | M | 1 | 31.0 | 275 | F | IMM | 78.9 L | 1 L | 2 L | .1 L | 1 L | 1 L | 1 | 1280 L | 1 L | 10 L | 1 |
| 6 | 1 | CT | M | 2 | 36.0 | 475 | M | IMM | 75.9 L | 1 L | 2 L | .1 L | 1 L | 1 L | 1 | 535 L | 1 L | 10 L | 1 |
| 7 | 1 | CT | M | 3 | 40.0 | 525 | F | IMM | 77.9 L | 1 L | 2 L | .1 L | 1 L | 1 L | 1 | 925 L | 1 L | 10 L | 1 |
| 8 | 1 | CT | M | 4 | 33.0 | 360 | F | IMM | 77.1 L | 1 L | 2 L | .1 L | 1 L | 1 L | 1 | 623 L | 1 L | 10 L | 1 |
| 9 | 1 | DV | L | 1 | 18.0 | 70 | F | MG | 78.1 L | 4 | 17 L | .4 L | 4 L | 4 L | 4 | 267 L | 4 L | 37 L | 4 |
| 10 | 1 | DV | L | 2 | 19.0 | 75 | M | MG | 74.8 L | 3 | 20 L | .3 L | 3 L | 3 L | 3 | 197 L | 3 L | 32 L | 3 |
| 11 | 1 | DV | L | 3 | 30.0 | 275 | F | MG | 74.9 L | 1 | 9 L | .1 L | 1 L | 1 L | 1 | 169 L | 1 L | 10 L | 1 |
| 12 | 1 | DV | L | 4 | 24.0 | 165 | M | MG | 80.0 L | 1 L | 3 L | .1 L | 1 L | 1 L | 1 | 324 L | 1 L | 13 | 2 |
| 13 | 1 | DV | M | 1 | 18.0 | 70 | F | MG | 79.3 L | 1 L | 2 L | .1 L | 1 L | 1 L | 1 | 926 L | 1 L | 10 L | 1 |
| 14 | 1 | DV | M | 2 | 19.0 | 75 | M | MG | 78.3 L | 1 L | 2 L | .1 L | 1 L | 1 L | 1 | 2770 L | 1 L | 10 L | 1 |
| 15 | 1 | DV | M | 3 | 30.0 | 275 | F | MG | 78.6 | 1 L | 2 L | .1 L | 1 L | 1 L | 1 | 416 L | 1 L | 10 L | 1 |
| 16 | 1 | DV | M | 4 | 24.0 | 165 | M | MG | 78.9 L | 1 L | 2 L | .1 L | 1 L | 1 L | 1 | 1690 L | 1 L | 10 L | 1 |
| 17 | 1 | SO | C | 0 | | | | | 78.3 L | 2 | 9 L | .2 L | 2 L | 2 L | 2 | 258 | 3 L | 20 | 2 |
| 18 | 1 | SO | L | 1 | 46.0 | 1100 | M | MG | 78.1 L | 1 L | 2 L | .1 L | 1 L | 1 L | 1 | 219 | 4 L | 10 L | 1 |
| 19 | 1 | SO | L | 2 | 46.0 | 950 | F | MG | 80.8 | 1 | 4 L | .1 L | 1 L | 1 L | 1 | 193 | 4 L | 10 | 1 |
| 20 | 1 | SO | L | 3 | 34.0 | 425 | M | MG | 77.1 L | 1 | 2 L | .1 L | 1 L | 1 L | 1 | 247 | 2 L | 10 L | 1 |
| 21 | 1 | SO | L | 4 | 49.0 | 1300 | M | MT | 78.3 L | 1 L | 2 L | .1 L | 1 L | 1 L | 1 | 236 | 2 L | 11 L | 1 |
| 22 | 1 | SO | L | 5 | 33.0 | 400 | M | MG | 81.2 L | 1 | 4 | .2 L | 1 L | 1 L | 1 | 230 | 7 L | 12 | 2 |
| 23 | 1 | SO | M | 1 | 46.0 | 1100 | M | MG | 79.3 L | 1 L | 2 | .1 L | 1 L | 1 L | 1 | 276 L | 1 L | 10 L | 1 |
| 24 | 1 | SO | M | 2 | 46.0 | 950 | F | MG | 74.0 L | 1 L | 2 | .1 L | 1 L | 1 L | 1 | 484 L | 1 L | 10 L | 1 |
| 25 | 1 | SO | M | 3 | 34.0 | 425 | M | MG | 75.3 L | 1 L | 2 L | .1 L | 1 | 1 L | 1 | 826 L | 1 L | 10 L | 1 |
| 26 | 1 | SO | M | 4 | 49.0 | 1300 | M | MT | 74.9 L | 1 L | 2 L | .1 L | 1 L | 1 L | 1 | 230 L | 1 L | 10 L | 1 |
| 27 | 1 | SO | M | 5 | 33.0 | 400 | M | MG | 75.1 L | 1 L | 2 L | .1 L | 1 L | 1 L | 1 | 5320 L | 1 L | 10 L | 1 |

| Rec# | Cu | Fe | Hg | Mg | Mn | Ni | Pb | Se | Sn | Sr | Ti | V | Zn | P |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 28 | 443 | .57 | 775 | 7 L | 6 L | 1 L | 12 L | 6 L | 1 | 2 L | 1 L | 1 | 13000 |
| 2 | 168 | 234 | .35 | 827 | 6 L | 5 | 1 | 40 L | 5 L | 1 | 1 L | 1 | 114 | 14000 |
| 3 | 51 | 111 | .49 | 863 | 8 L | 5 L | 1 | 22 L | 5 L | 1 L | 1 L | 1 | 99 | 17000 |
| 4 | 166 | 186 | .27 | 779 | 7 L | 5 L | 1 | 37 L | 5 L | 1 L | 1 L | 1 | 122 | 13000 |
| 5 L | 1 | 1 | | 1430 L | 1 L | 5 | L | 10 L | 5 | 2 L | 1 L | 1 | 14 | 11000 |
| 6 L | 1 | 1 | .29 | 1310 L | 1 L | 5 L | 1 L | 10 L | 5 L | 1 L | 1 L | 1 | 12 | 9000 |
| 7 L | 1 | 1 | .41 | 1360 L | 1 L | 5 | 1 L | 10 L | 5 | 1 L | 1 L | 1 | 10 | 10000 |
| 8 L | 1 | 1 | | 1380 L | 1 L | 5 | L | 10 L | 5 L | 1 L | 1 L | 1 | 12 | 10000 |
| 9 | 54 | 596 | | 733 | 8 L | 19 L | 4 L | 37 L | 19 L | 4 L | 4 L | 4 | 175 | 14000 |
| 10 | 454 | 1080 | | 744 | 17 L | 16 L | 3 L | 32 L | 16 L | 3 L | 3 L | 3 | 177 | 15000 |
| 11 | 41 | 1180 | | 776 | 13 L | 5 | 2 L | 10 L | 5 L | 1 L | 1 L | 1 | 104 | 14000 |
| 12 | 107 | 1050 | | 763 | 6 L | 7 L | 1 L | 13 L | 7 L | 1 L | 1 L | 1 | 164 | 14000 |
| 13 L | 1 | 18 | .09 | 1270 | 1 L | 5 | 3 L | 10 L | 5 | 1 L | 1 L | 1 | 19 | 10000 |
| 14 L | 1 | 4 | | 1330 | 4 L | 5 | 3 L | 10 L | 5 | 3 L | 1 L | 1 | 20 | 10000 |
| 15 | 1 | 1 | .08 | 1130 | 1 L | 5 | 1 L | 10 L | 5 L | 1 L | 1 L | 1 | 14 | 8000 |
| 16 L | 1 | 4 | 1.50 | 1420 | 2 L | 5 | 1 L | 10 L | 5 | 2 L | 1 L | 1 | 18 | 11000 |
| 17 | 1580 | 810 | .07 | 743 | 6 L | 10 L | 2 | 66 L | 10 L | 2 L | 2 L | 2 | 186 | 13600 |
| 18 | 1410 | 282 | .07 | 808 | 5 L | 5 L | 1 | 85 L | 5 | 1 L | 1 L | 1 | 186 | 14000 |
| 19 | 1340 | 931 | .05 | 770 | 4 L | 5 | 1 | 103 L | 5 | 1 | 1 | 1 | 164 | 14000 |
| 20 | 251 | 680 L | .05 | 858 | 9 L | 5 | 1 | 33 L | 5 | 1 L | 1 L | 1 | 111 | 16000 |
| 21 | 331 | 531 L | .05 | 896 | 8 L | 5 L | 1 | 24 L | 5 L | 1 L | 1 L | 1 | 129 | 16000 |
| 22 | 997 | 241 L | .05 | 765 | 6 L | 6 L | 1 | 51 L | 6 L | 1 L | 1 L | 1 | 139 | 13000 |
| 23 L | 1 | 1 | | 1090 L | 1 L | 5 L | 1 L | 10 L | 5 L | 1 L | 1 L | 1 | 11 | 8000 |
| 24 | 1 | 1 | .05 | 1420 L | 1 L | 5 L | 1 L | 10 L | 5 | 2 L | 1 L | 1 | 10 | 7000 |
| 25 L | 1 | 1 | .05 | 1180 L | 1 L | 5 | L | 10 L | 5 | 3 L | 1 L | 1 | 9 | 8000 |
| 26 L | 1 | 20 | .05 | 1370 L | 1 L | 5 L | 1 L | 10 L | 5 L | 1 L | 1 L | 1 | 12 | 10000 |
| 27 L | 1 | 3 | .05 | 1440 | 1 L | 5 | 2 L | 10 L | 5 | 19 L | 1 L | 1 | 13 | 12000 |

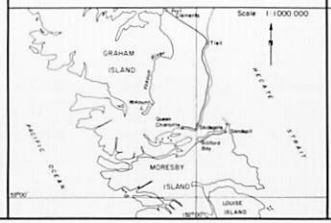



MICROFILM AVAILABLE

NOTES: 1 Ⓑ Denotes BENCH MARK 2 This Map Not Intended For Navigational Use. Uncharted Rocks And Shoals May Exist.

Reduced to 33% of Original

**INSET MAP**




SURVEYED BY: T.N. WEBBER DATE: JULY 17, 18 1984
OUTLINE SOURCE: AIR PHOTO BC 77063: 134, 135, 221, AUGUST 1977

**STATISTICS AT TIME OF SURVEY**

| | | |
|---|---|---|
| ELEVATION | 107 | m. ß |
| SURFACE AREA | 7 900 000 | sq.m. |
| AREA ABOVE 6m. CONTOUR | 695 000 | sq.m. |
| VOLUME | 273 000 000 | cu.m. |
| MEAN DEPTH | 34.7 | m. |
| MAX. DEPTH | 96 | m. |
| PERIMETER, MAIN SHORE | 22 000 | m. |
| PERIMETER, ISLANDS | 2 500 | m. |
| BENCH MARK HEIGHT ABOVE WATER LEVEL | 2.8 | m. |

Province of British Columbia Ministry of Environment

FISHERIES BRANCH
INVENTORY OPERATIONS

# YAKOUN LAKE

DEPTHS IN METRES

| | | |
|---|---|---|
| WATERSHED CODE: 94-4000 | | U.T.M. CO-ORDINATE: — |
| M.U. 6-13 | FAIR DWG: R.A.W. | REV. DATE: |
| PLOTTING: T.N.W. | FAIR DWG. CHECK: D.J.S. | SCALE: 1:8000 |
| CONTOURS: J.A.B. | DRAFT DATE: NOV. 1985 | |
| CALCULATIONS: T.N.W. | APPROVED: J.A.P. Hunt | N.T.S. NO: 103 F/8 |
| TECH. CHECK: D.J.S. | | |