PEACE/WILLISTON
FISH & WILDLIFE
COMPENSATION
PROGRAM

BC hydro

BRITISH
COLUMBIA

A Reconnaissance Survey Of Spring Lake

M. J. Hunter
March 1997

PWFWCP Report No. 145

The Peace/Williston Fish & Wildlife Compensation Program is a cooperative venture of BC Hydro and the provincial fish and wildlife management agencies, supported by funding from BC Hydro. The Program was established to enhance and protect fish and wildlife resources affected by the construction of the W.A.C. Bennett and Peace Canyon dams on the Peace River, and the subsequent creation of the Williston and Dinosaur Reservoirs.

Peace/Williston Fish and Wildlife Compensation Program, 1011 Fourth Ave. 3rd Floor, Prince George B.C. V2L 3H9

Website: *www.bchydro.bc.ca/environment/initiatives/pwcp/*

This report has been approved by the Peace/Williston Fish and Wildlife Compensation Program Fish Technical Committee.

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A RECONNAISSANCE SURVEY OF

SPRING LAKE

WATERSHED:	**Williston Reservoir (Parsnip Reach)**
DATE OF SURVEY:	**July 12 - 13, 1996**
FIELD CREW LEADER:	**Mark Hunter**
FIELD ASSISTANT:	**Karin Mathias**
REPORT PREPARED BY:	**Mark Hunter**

BRITISH COLUMBIA CONSERVATION FOUNDATION

PEACE / WILLISTON FISH AND WILDLIFE COMPENSATION PROGRAM

B. C. MINISTRY OF ENVIRONMENT, LANDS AND PARKS

FUNDED BY: FOREST RENEWAL BRITISH COLUMBIA

RELEASED BY: _____

D. J. Cadden, Regional Fisheries Biologist

µhLAKE: Spring Lake **SYSTEM NAME: Manson River**

A.S.A.P. REFERENCE NO.: **WATERSHED CODE: 230-9167-413-641**

DATA ON FILE FOR THIS SURVEY

Location	X	Dissolved 02 / Temp. Profiles	X
Physical Data	X	Winter Dissolved 02 / Temp. Profiles	--
Bench Mark	X	Netting Record	X
Terrain Features	X	Lake Catch Summary	X
Access	X	Individual Fish Data	X
Resorts and Campsites	X	Fish Preserved	--
Other Developments	X	Stomach Analysis	X
Obstructions and Pollutions	X	Scale Reading	X
Special Restrictions	X	Location of Inventory Sites	X
Aquatic Plants	X	Photograph Directory	X
Wildlife Observations	X	Appendices	
Miscellaneous Comments	X	A: Water Chemistry Analysis	X
Lake Drainage	X	B: Tributary Stream Data	X
Fisheries Management Comments	X	C: Fish Scale Analysis	X
History of Previous Surveys	X	Bathymetric Map Reduction	X
Water Chemistry Summary	X	Bathymetric Map	--

LOCATION

Location:	approximately 58 km west of Mackenzie		
Elevation:	1025 m ± 25 m	U.T.M.:	10.436398.6137405
Latitude / Longitude:	55°22'44" 124^{0}00'14"	N.T.S. Map No.:	93 - N / 8, 0 / 5
Management Unit:	7-28	Biogeoclimatic Zone:	Sub-Boreal Spruce
Ecoprovince:	Sub-Boreal Interior	Ecoregion:	Fraser Basin
Ecosection:	Babine Uplands		

Drainage: Unnamed C. --> Gaffney C. --> Manson R. --> Williston Reservoir (Parsnip Reach) --> Peace R.

PHYSICAL DATA

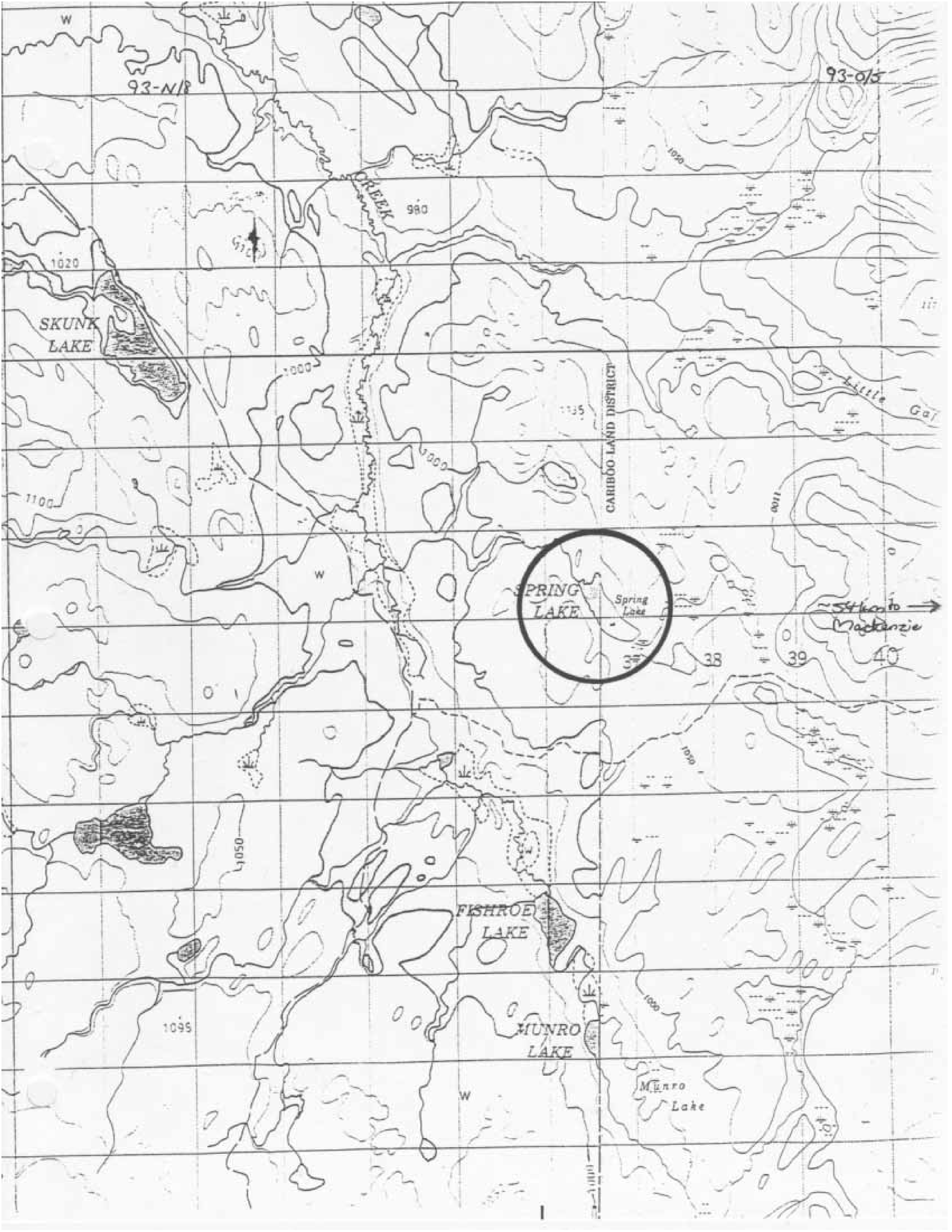
Lake Drainage Area:	5.4 km^2	Volume:	981 746 m^3
Water Surface Area:	189 210 m^2	Perimeter of Islands:	0 m
Area Above 6 m Contour:	110 61 m^2	Number of Islands:	0
Shoreline Perimeter:	2 375 m	Mean Depth:	5.3 m
Maximum Depth:	13.8 m	Secchi Reading:	5.35 m
Filterable Residue (TDS):	80 mg/L		

Sounding Device: Lowrance X-15 Elevation Source: Contour Interpolation

BENCHMARK

(Iron spike, center of red circle) located 2.0 m above present water level in a 31 cm diameter spruce tree that is 2.6 m from the present water's edge and located approximately 90 m northeast of Inlet # I (Plate # 4).

High Water Mark: 0.09 m above water level at time of survey



93-N/8
93-O/5
CREEK
980
1020
SKUNK LAKE
1000
1100
1135
CARIBOO LAND DISTRICT
Little Gal
SPRING LAKE
Spring Lake
~54 km to Mackenzie
38
39
40
1050
FISHROE LAKE
MUNRO LAKE
Munro Lake
1095
W

LAKE: Spring Lake

TERRAIN FEATURES

Immediate Shoreline:

Spring Lake is fronted along the three swamps, one in the southeast end and two in the north end of the lake, by a growth of sedge grasses, Equisetum and willows growing on a low slope. Along the rest of the shoreline, a thick growth of alders with some sedge grasses grows along the edge of the lake with spruce, lodgepole pine and fir trees growing on a moderate slope behind. Bunchberry plants are very common around the lake's edge where the swamps do not occur. A beaver hut is located in the southeast corner of Spring Lake near the swamp in that end, and an old dock made out of small logs is located in the corner on the other side of that swamp.

The shoreline substrate is silts and organics in front of all of the swamp areas, and gravels and cobbles with an occasional boulder around the rest of the lake. There is a large bed of yellow waterlily (Nuphar sp.) in front of the swamp in the southeast end of the lake. The lake's bottom drops off at a moderately steep slope towards the center of the Spring Lake.

Surrounding Country:

Spring Lake is surrounded by a mature forest of spruce, Lodgepole pine and fir trees growing on gently rolling hills. The Nation - Finlay Forest Service Road is located approximately 1.25 km to the south of the lake. Spring Lake is situated within the Sub-Boreal Spruce biogeoclimatic zone.

LAKE: Spring Lake

ACCESS

Directions:

From the junction of Highway 27, the Teardrop Forest Service Road and the Germansen Landing North Road, drive north on the Germansen Landing North Road for approximately 100 km, then continue north on the Thutade Forest Service Road for approximately 28 km to a clear cut. From this clear cut, Spring lake is approximately a 5 km helicopter ride to the northeast.

Road Type and Conditions:

Both the Germansen Landing North Road and the Thutade Forest Service Road are well maintained, two-lane gravel roads that are easily accessible with two-wheel drive vehicles. Logging trucks can be active on both of these roads.

Restrictions:

None known.

RESORTS AND CAMPSITES

There are no resorts or campsites on Spring Lake.

OTHER DEVELOPMENTS

An old dock made from small logs was found in the southeast end of the lake, in the south corner of the swamp.

OBSTRUCTIONS AND POLLUTIONS

The large bed of yellow waterlily (Nuphar sp.) found in the southeast end of the lake is difficult for motor boats to pass through without the propeller becoming wrapped in weeds (Plate # 5).

LAKE: Spring Lake

SPECIAL RESTRICTIONS

None known.

AQUATIC PLANTS

The following aquatic plants were identified during the time of the survey:

yellow waterlily (Nuphar sp.)
whitestem pondweed (Potamogeton praelongus)
variableleaf pondweed (Potamogeton gramineus)

WILDLIFE OBSERVATIONS

The following wildlife or signs were seen during the time of the survey:

moose tracks, beds and droppings
various songbirds

MISCELLANEOUS COMMENTS

1) A Forest Recreation Site could be built on the point of land found in the north end of the lake or along the south shore of Spring Lake.

2) Although the water is knee deep, a boat can be placed near the lake on the southeast swamp by a helicopter. The swamp dries up further back from the lake and is clear of high vegetation growth; this is a good location for landing a helicopter.

3) Bathymetric map: The lake outline was drawn from an enlargement of air photo 30 BCB 94063: No. 173, flown August 27, 1994.

LAKE: Spring Lake

LAKE DRAINAGE

General:

One main inlet and two seasonal inlets feed into Spring Lake. The unnamed outlet creek drains Spring Lake to the northwest and flows for approximately 3.1 km to it's confluence with Gaffney Creek. Gaffney Creek then flows north for approximately 38 km before it joins with the Manson River.

Major Systems:

There are no major systems.

Minor Systems:

Inlet # 1 - Unnamed Creek

Inlet # 1 enters Spring Lake in the southeast end of the lake through the swamp (Plate # 5). The first 40 m has an average wetted width of 1.3 m and depth of 0.6 m. The channel becomes braided approximately 40 m upstream from the lake. Approximately 80 m upstream of the lake, there is a beaver dam that is 0.75 m high and roughly 100 m long. Water flows over the top of the dam in many spots to feed the different braids of the creek; however, there was probably not enough flow over the top of the dam to allow for upstream fish passage at the time of survey. Upstream of the dam, there are two channels that converged.

Channel # 1 continues to run back through the marsh (the swamp had dried up by this point). This channel has an average wetted width of 1.0 m and depth of 0.4 m. The substrate is silt and organics. Approximately 130 m upstream from the lake, there is a 1.3 m high and 8.0 m long beaver dam. There was not enough flow over the top of the dam at the time of survey to allow for fish passage. Approximately 155 m upstream from the lake, the channel goes underground.

Channel # 2 flows from the east into the swamp. Approximately 110 m upstream from the lake, there is a 0.4 m high and 25 m long beaver dam with a beaver hut built on it. Redside shiners were seen in the pool on the upstream side of the dam. Approximately 140 m upstream from the lake, there is a 0.6 m high and 5 m long beaver dam (Plate # 6). The substrate of the pool on the upstream side of the dam is gravels and small cobble covered by silts and organics. Some rainbow trout (approximately 10 cm long) and redside shiners were seen in this pool. Approximately 170 m upstream from Spring Lake, there is good to excellent rainbow trout spawning substrate (small and large gravels) in a channel that has an average wetted width of 1.3 m and depth of 0.2 m. Further upstream, there are three debris jams located approximately 190 m, 225 m and

250 m upstream from Spring Lake, each of which was 0.1 m high. Approximately 300 m upstream from the lake, the channel becomes thickly overgrown by willows. Approximately 400 m upstream of Spring Lake, there is a pond that fed the creek.

A Stream Survey card was completed for a sample site located approximately 230 m upstream from Spring Lake (Plates # 7 - # 8). The average wetted width is 1.8 m and the average maximum riffle depth is 0.14 m. The substrate is comprised of gravels (45%), fines (40%), cobbles (10%) and boulders (5%). The fines are located mainly on the sides of the channel, and the gravels and cobbles are in the middle. The creek morphology is mainly riffle and run (40% each). The water temperature was 15°C at the time of survey. For additional information, refer to Appendix B.

Outlet - Unnamed Creek

The outlet creek flows through a 1.1 m high and 20 m long beaver dam that is located at the lake's edge (Plate # 9). Willows and alders have become well established on the top of the dam, and there is no flow over the top of the beaver dam. Approximately 30 m downstream from the lake, there is a 0.1 m high debris jam. Approximately 50 m downstream from the Take, there is a second debris j am that is 0.2 m high. Approximately 90 m downstream from Spring Lake, three small rainbow trout (approximately 10 cm long) were seen feeding on the surface; some redside shiners were also seen here. Approximately 115 m downstream from the lake, a small inlet enters the outlet creek on the right side (looking upstream). The channel is overgrown by a moderately thick growth of alders and there is a large amount of blowdown over the creek.

A Stream Survey card was complete for a sample site located approximately 120 m downstream from the lake (Plates # 10 - # 11) . The average wetted width is 3 m and the average maximum riffle depth is 0.22 m. The substrate is comprised of gravels (60%) and fines (40%), and offers areas of good spawning habitat (Plate # 12). The creek morphology is mainly run (45%) and riffle (40%). The water temperature was 18°C at the time of the survey. For additional information, refer to Appendix B.

LAKE: Spring Lake

FISHERIES MANAGEMENT COMMENTS

Spring Lake sustains a moderately sized population of rainbow trout that could support a low use fishery. Putting a partial breach in the beaver dam located at the mouth of the outlet would allow for access to the spawning substrate in the outlet creek for the rainbow trout in Spring Lake. At the moment, downstream passage is probably not possible because water flows through the beaver dam, not over it. If access was made possible to more spawning habitat, the rainbow trout population may grow, and then the lake may be able to support a higher use fishery. Oxygen and pH levels where sufficient throughout the entire water column for supporting a fish population.

HISTORY OF PREVIOUS SURVEYS

Lake Surveys:

None known.

Other Related Studies:

None known.

LAKE: Spring Lake

WATER CHEMISTRY SUMMARY **Limnology Station No. 1**

Field Conditions:

Date:	July 12, 1996		
Time:	1245 hrs	Air Temperature:	19.0 °C
Wind Velocity:	0 - 5 km/h	Wind Direction:	from the SW
Cloud Cover:	3 / 10 o.c.	Surface Conditions:	very light ripple
Secchi Disc:	5.35 m	Water Colour:	tea colour

Method Used:

Dissolved Oxygen:	YSI Model 57 Oxygen / Temperature Meter
Water Temperature:	YSI Model 57 Oxygen / Temperature Meter
Air Temperature:	Hand-Held Alcohol Thermometer
pH (field):	Digital pH Pocket Tester
H2S (field):	Hach H2S Field Test Kit
Laboratory Used:	Pacific Environmental Science Center
Water Sampler:	Vertical Alpha Water Bottle (Vandorn)
Metal Sampler:	By Hand; Preserved With 2.0 mL Nitric Acid
Substrate Sampler:	Substrate Sample Not Taken

Water Sample Chemistry: **SEAM Site No.:** E 223169

	Sampling Depths	
	Surface (0.5 m)	Lower (13.0 m)
Alkalinity (lab)	53.9 mg / L	84.7 mg / L
Filterable Residue 105°C (lab)	80 mg / L	120 mg / L
H2S (field)	N/A	0mg / L
Nitrogen - Total (lab)	0.26 mg / L	1.1 mg / L
Non-Filterable Residue (lab)	< 5 mg / L	16 mg / L
pH (field)	7.6	7.4
pH (lab)	7.73	7.10
Phosphorus - Total Dissolved (lab)	0.008 mg / L	0.043 mg / L
Specific Conductance (lab)	101 µS / cm	157 µS / cm

Bottom Depth: 13.5 m

Substrate Sample Depth: N/A

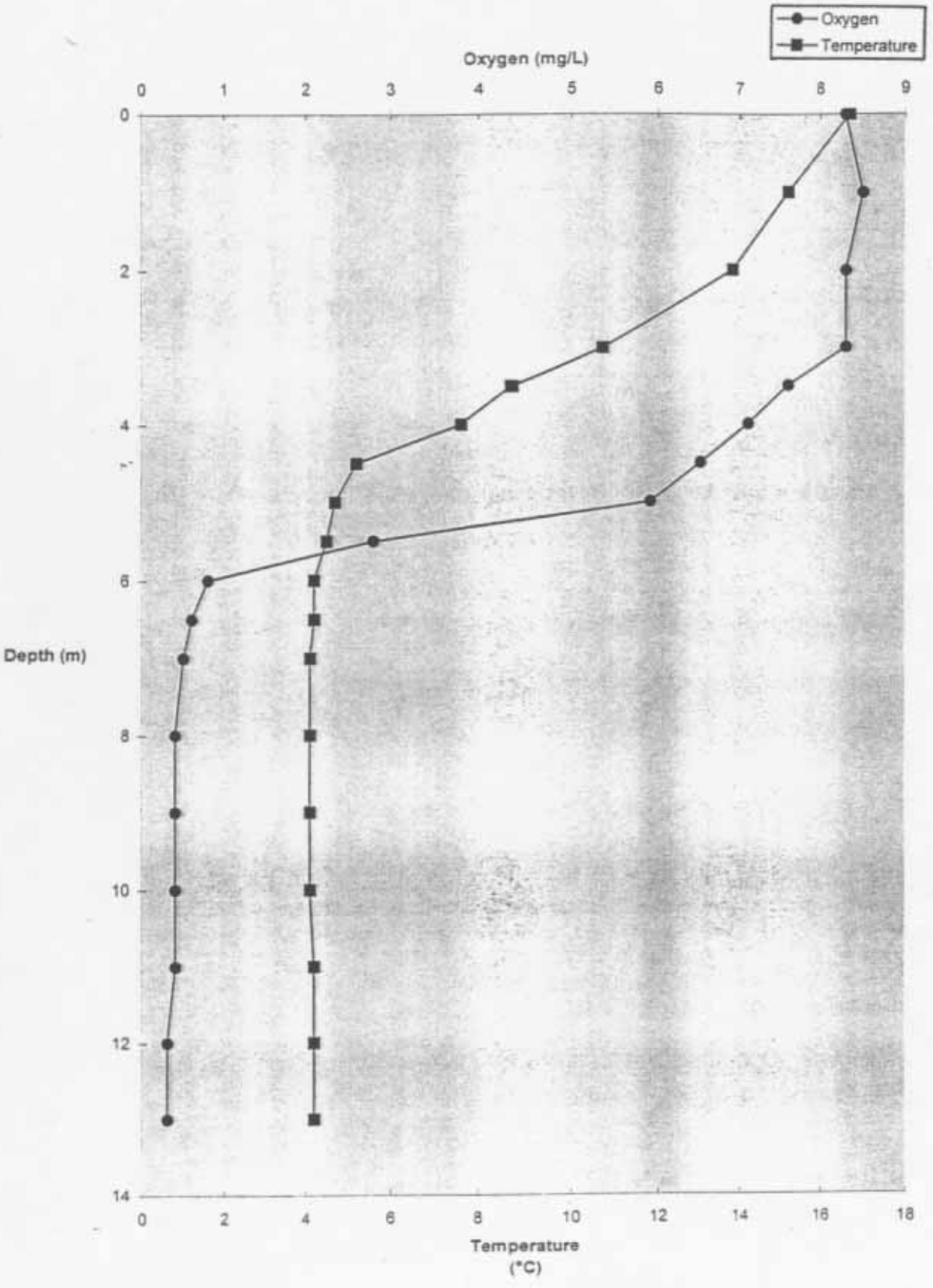
* additional analyzed parameters and results, including metals, are found in Appendix 1

LAKE: Spring Lake

SUMMER OXYGEN / TEMPERATURE DATA

DEPTH (m)	02 (mg/L)	TEMPERATURE (°C)
Surface	8.3	16.7
1.0	8.5	15.2
2.0	8.3	13.8
3.0	8.3	10.7
3.5	7.6	8.7
4.0	7.1	7.6
4.5	6.5	5.2
5.0	5.9	4.7
5.5	2.8	4.2
6.0	0.8	4.2
6.5	0.6	4.1
7.0	0.5	4.1
8.0	0.4	4.1
9.0	0.4	4.1
10.0	0.4	4.2
11.0	0.4	4.2
12.0	0.3	4.2
13.0	0.3	4.2
13.5	Bottom	

SUMMER OXYGEN / TEMPERATURE PROFILE



LAKE: Spring Lake

NETTING RECORD

Mesh Size Experimental Order: 25, 76, 51, 89, 38, 64 mm

NETTING SITE # 1

Type:	Sinking Monofilament Gill Net		
Date Set:	July 12, 1996	Time:	1438 hrs
Date Lifted:	July 12, 1996	Time:	1833 hrs
Net Dimensions:	Length: 91.4 m	Depth:	2.4 m
Shallow End Mesh Size:	25 mm	Depth:	1.1 m
		Substrate:	gravels / cobbles
Deep End Mesh Size:	64 mm	Depth:	9.5 m
		Substrate:	thick silts / organics

Comments:

LAKE CATCH SUMMARY

Species	Netting Site No. l	Angled	Other	Total	Number Sampled	Number Preserved	Size Range (cm)
RB	12	0	0	12	12	0	11.4-25.8
WS	8	0	0	8	0	0	24.7-33.5
LNS	16	0	0	16	0	0	11.9-18.6
RSC	18	0	0	18	0	0	10.2-11.2

Minnow Traps:

Bait: Sardines

Trap No.	Hours	Depth (m)	Substrate	Species	No. Caught	Size Range (cm)
1	5:20	1.0	silt / organics	RB CC RSC	1 7 3	13.6 7.5-10.1 7.5-9.8
2	5:14	0.8	gravels / cobbles	RB RSC	1 24	12.8 7.2-10.3
3	5:16	1.6	silt / organics	RB CC	1 4	11.6 6.6-9.3

LAKE: Spring Lake

INDIVIDUAL FISH DATA

Date Captured: July 12, 1996

Method: Sinking Monofilament Gillnet

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

Species	Fork Length (cm)	Weight (grams)	Sex	Gonadal Maturity	Sample Type	Age (yr)	Stomach Contents				Comments
							Plankton	Insects	Fish	Other	
RB	25.8	171.9	M	IMM	SC		YES*	B			TW in St
RB	24.0	147.0	F	MG	SC			B			
RB	24.3	150.7	M	IMM	SC						TW in St
RB	17.7	62.6	M	MG	SC					O	
RB	17.9	66.4	M	MG	SC		YES	B			
RB	14.7	34.2	M	IMM	SC		YES	B, mosquito			
RB	13.9	29.9	M	MG	SC			B, mosquito			
RB	13.8	28.8	M	IMM	SC		YES	B			
RB	11.4	17.0	F	IMM	SC		YES	B			TW in St
RB	12.6	21.3	M	IMM	SC						
RB	13.0	23.5	M	IMM	SC			B, spider		O	
RB	12.4	18.4	M	IMM	SC		YES	B			

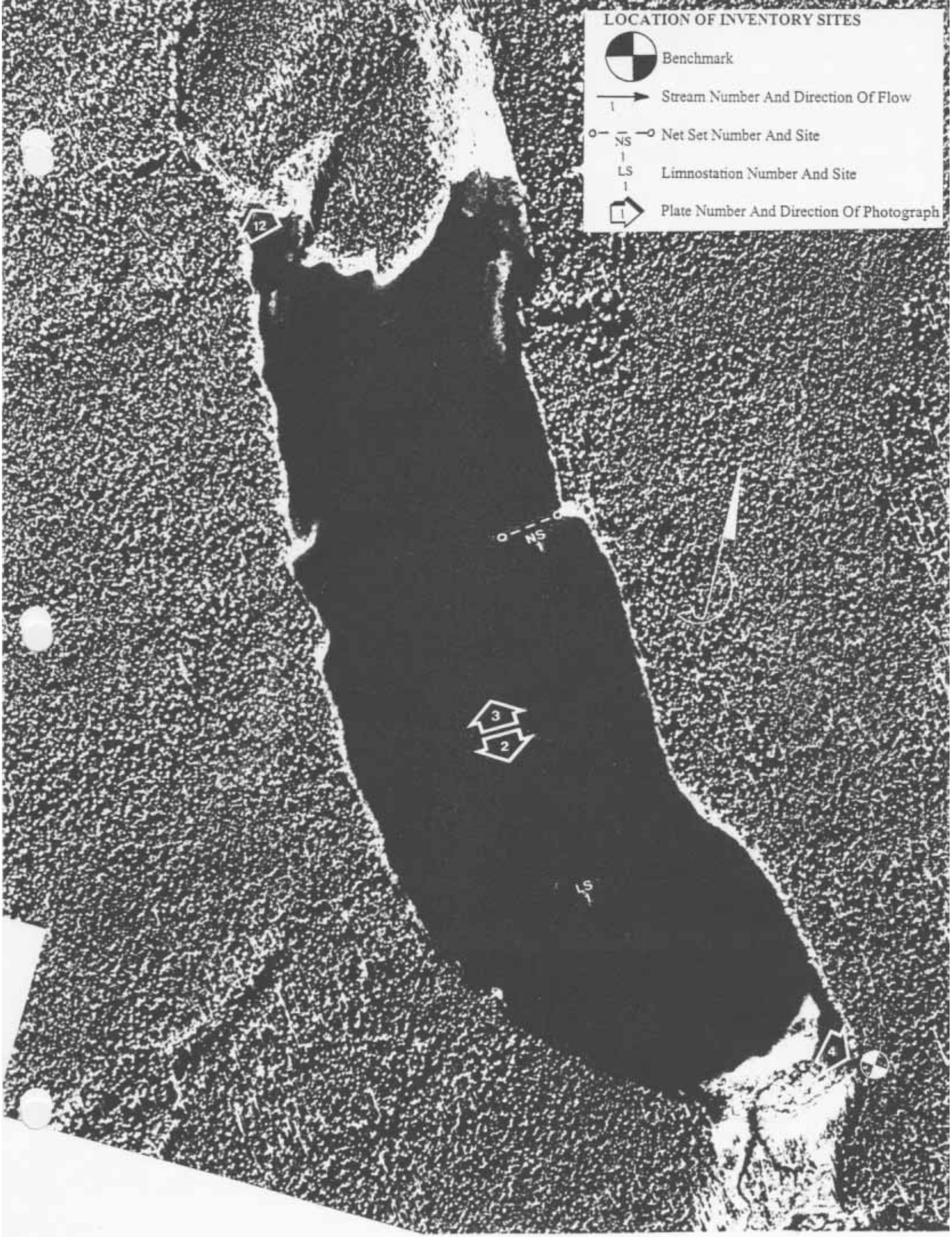
B - Beetle
C - Clams
CF - Caddis Fly
Ch - Chaoborus
Cr - Chironomids
Da - *Daphnia*
Di - Diptera
G - *Gammerus*
L - Leech
Li - Lice
O - Organics
S - Snails
St - Stomach
TW - Tape Worm
WB - Water Boatman
WF - Whole Fish

* plankton was unidentified

LAKE: Spring Lake

PHOTOGRAPH DIRECTORY

Plate	Roll : Number	Description
1	5: 3	Aerial view of Spring Lake looking northwest.
2	6: 24 - 22	Panoramic view of Spring Lake looking southeast from the center of the lake.
3	6: 21-19	Panoramic view of Spring Lake looking northwest from the center of the lake.
4	6: 10	View of the benchmark located 2.0 m above present water level in a 31 cm diameter spruce tree that is 2.6 m from the present water's edge and located approximately 90 m northeast of Inlet # 1.
5	6: 9	View of the mouth of Inlet # 1 where it enters Spring Lake in the east end of the lake. Note the large bed of Yellow Waterlilies (Nuphar sp.)
6	6: 5	Upstream view of beaver dam # 3 on Channel # 2 of Inlet # 1, located approximately 140 m upstream of Spring Lake.
7	6: 1	Upstream view of the sample site on Channel # 2 of Inlet # 1, taken approximately 220 m upstream of Spring Lake.
8	6: 3	Downstream view of the sample site on Channel # 2 of Inlet # 1, taken approximately 235 m upstream of Spring Lake.
9	6: 16 - 17	Upstream view of beaver dam # 1 on the outlet. The dam is 1.1 m high and is located at the mouth of the outlet.
10	6: 15	Upstream view of the sample site on the outlet, taken approximately 130 m downstream of Spring Lake.
11	6: 12	Downstream view of the sample site on the outlet, taken from approximately 110 m downstream of Spring Lake.
12	6: 11	View of the typical gravel substrate found in the sample site on the outlet.


LOCATION OF INVENTORY SITES
Benchmark
1
Stream Number And Direction Of Flow
NS
1
Net Set Number And Site
LS
1
Limnostation Number And Site
1
Plate Number And Direction Of Photograph
12
NS
1
3
2
LS
1
4

LAKE: Spring Lake

Plate # 1: Aerial view of Spring Lake looking northwest.

LAKE: Spring Lake

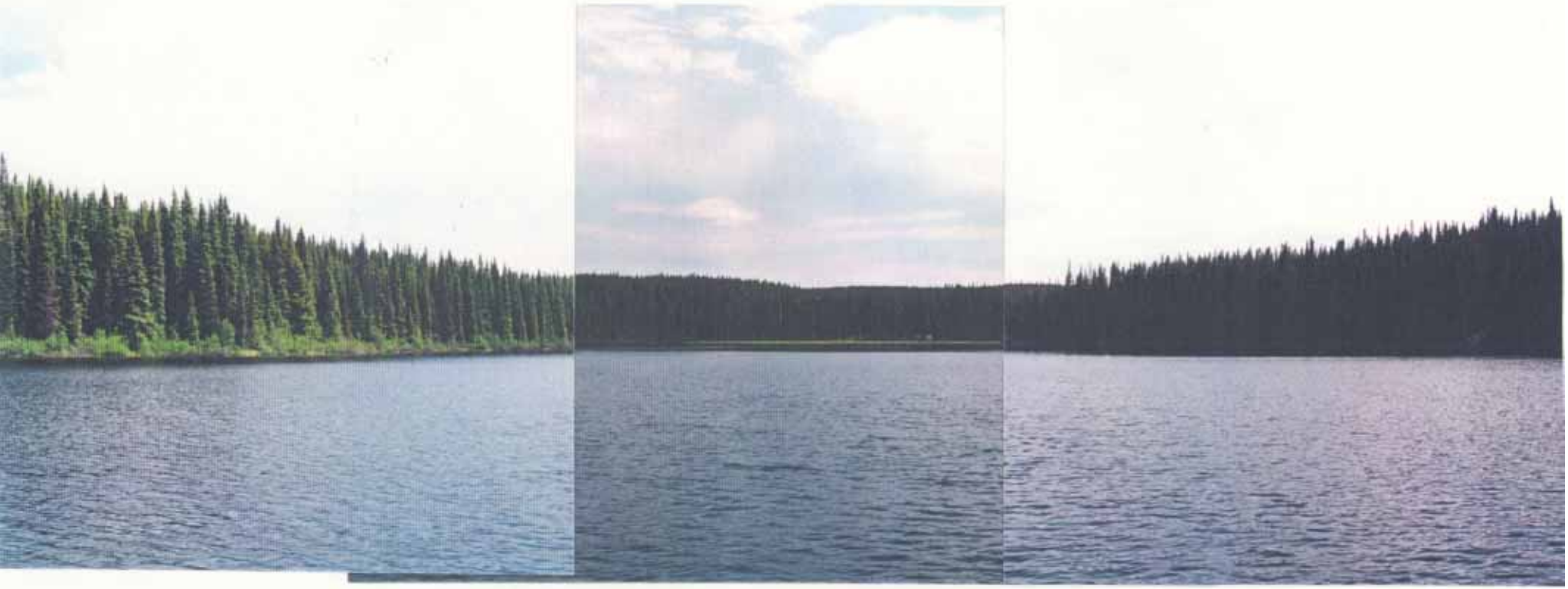


Plate # 2: Panoramic view of Spring Lake looking southeast from the center of the lake.

LAKE: Spring Lake

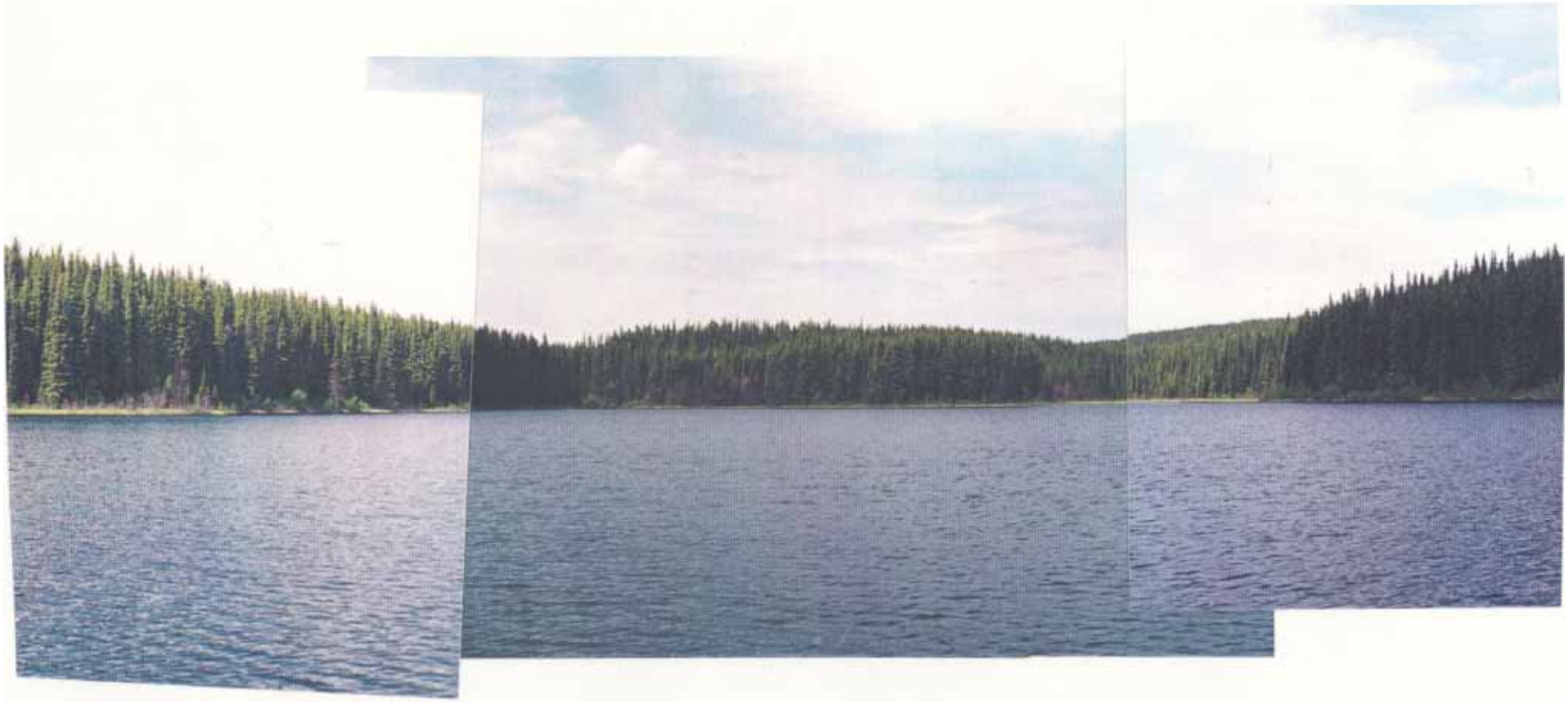


Plate #3: Panoramic view of Spring Lake looking northwest from the center of the lake.

LAKE: Spring Lake

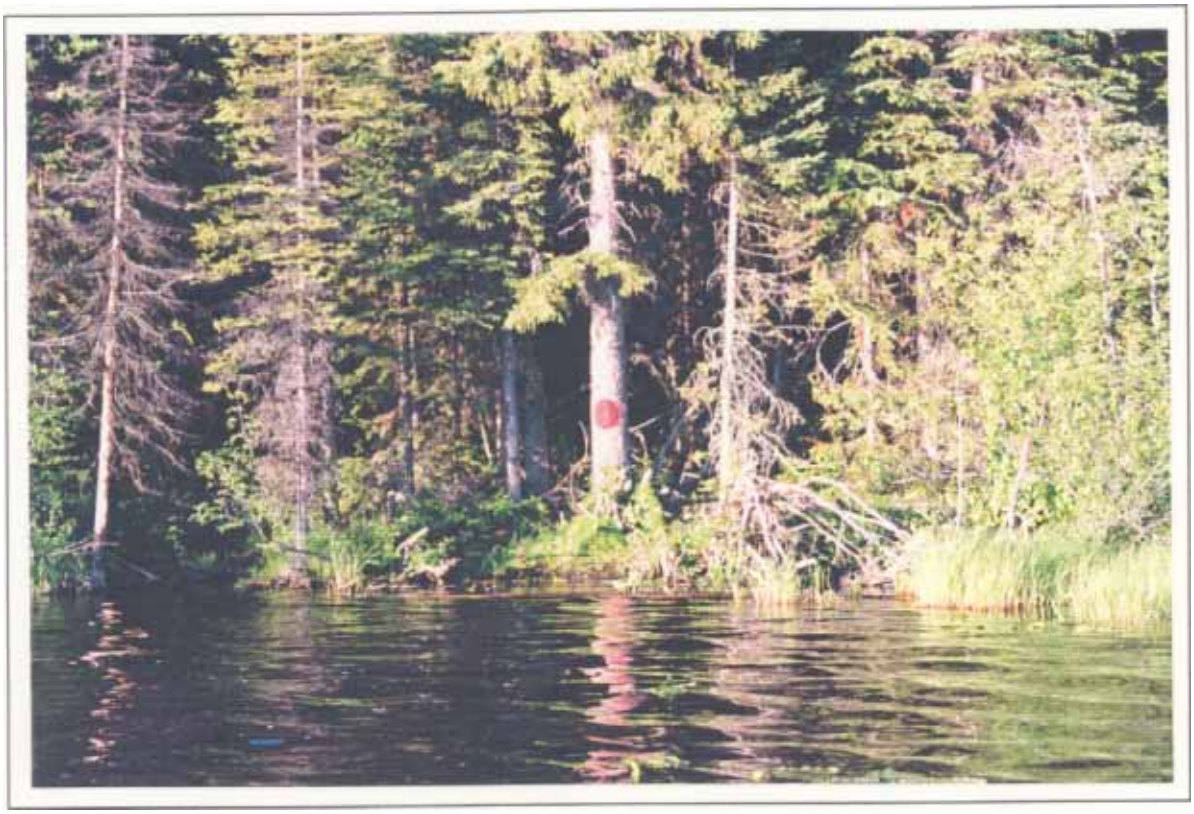


Plate # 4: View of the benchmark located 2.0 m above present water level in a 31 cm diameter spruce tree that is 2.6 m from the present water's edge and located approximately 90 in northeast of Inlet # 1.

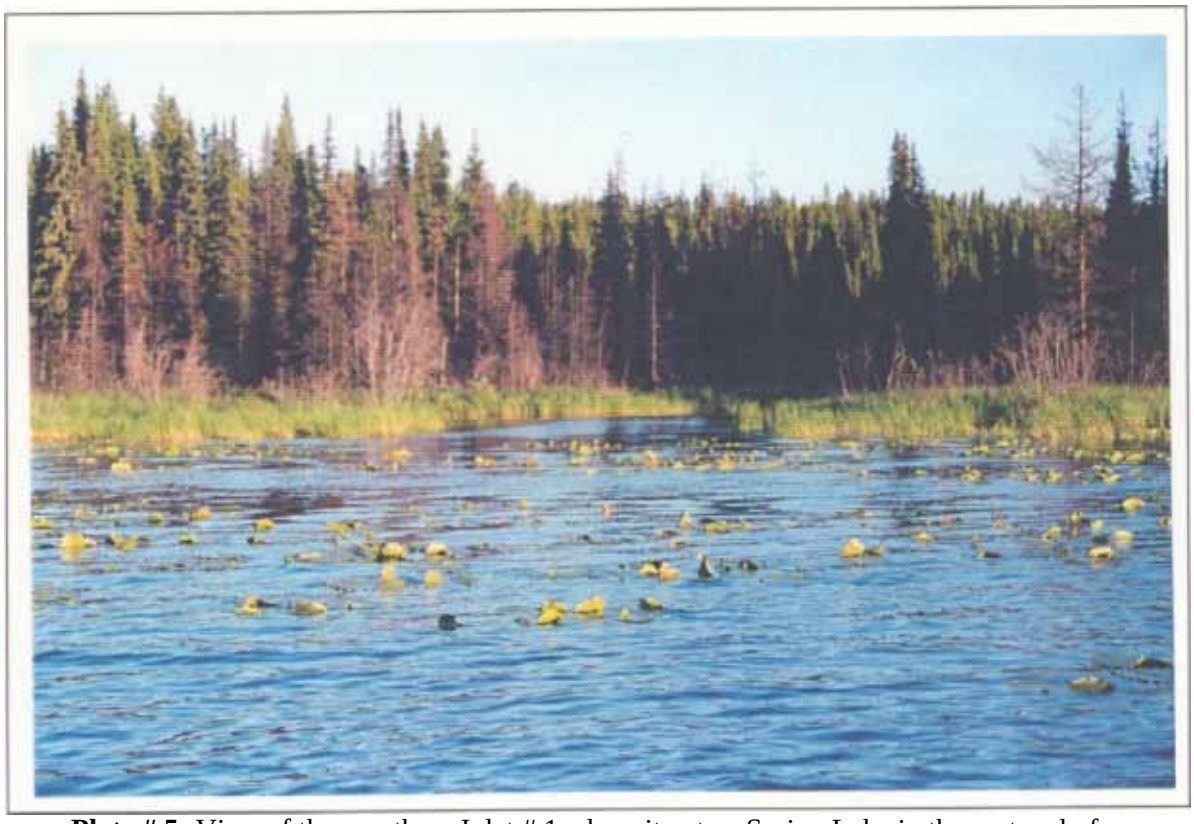


Plate # 5: View of the mouth on Inlet # 1 where it enters Spring Lake in the east end of the lake. Note the large bed of Yellow Waterlilies (Nuphar sp.).

LAKE: Spring Lake

Plate # 6: Upstream view of beaver dam # 3 on Channel # 2 of Inlet # 1, located approximately 140 m upstream of Spring Lake.

Plate # 7: Upstream view of the sample site on Channel # 2 of Inlet # 1, taken approximately 220 m upstream of Spring Lake.

LAKE: Spring Lake

Plate # 8: Downstream view of the sample site on Channel # 2 of Inlet # 1, taken approximately 230 m upstream of Spring Lake.

LAKE: Spring Lake

Plate # 9: Upstream view of beaver dam # 1 on the outlet. The dam is 1.1 m high and is located at the mouth of the outlet.

LAKE: Spring Lake

Plate # 10: Upstream view of the sample site on the outlet, taken approximately 130 m downstream of Spring Lake.

LAKE: Spring Lake

Plate # 11: Downstream view of the sample site on the outlet, taken approximately 110 m downstream of Spring Lake.

LAKE: Spring Lake

Plate # 12: View of the typical gravel substrate found in the sample site on the outlet.

Appendix A

LABORATORY REPORT

Water Chemistry Analysis

RESULTS FOR SPRING LK E223169 SAMPLES

Analyzed		Units	96/07/12 0.5M 962933-001	96/07/12 12.5M 962933-002
ALKALINITY		mg/l	53.9	84.7
CONDUCTIVITY		uS/cm	101	157
METALS/TOTAL (WATER-ICP)	AG	mg/l	<.01	-
	AL	mg/l	<.06	-
	AS	mg/l	<.06	-
	B	mg/l	<.01	-
	BA	mg/l	<.001	-
	BE	mg/l	<.001	-
	CA	mg/l	17.2	-
	CD	mg/l	<.006	-
	CO	mg/l	<.006	-
	CR	mg/l	<.006	-
	CU	mg/l	<.006	-
	FE	mg/l	.062	-
	K	mg/l	.2	-
	MG	mg/l	1.9	-
	MN	mg/l	.01	-
	MO	mg/l	<.01	-
	NA	mg/l	.9	-
	NI	mg/l	<.02	-
	P	mg/l	<.1	-
	PB	mg/l	<.06	-
	SB	mg/l	<.06	-
	SE	mg/l	<.06	-
	SI	mg/l	2.24	-
	SN	mg/l	<.06	-
	SR	mg/l	.07	-
	TI	mg/l	<.002	-
	V	mg/l	<.01	-
	ZN	mg/l	.003	-
NITROGEN/AMMONIA		mg/l	.008	.17
/NITRITE		mg/l	<.002	.003
/NITRITE+NITRATE		mg/l	<.002	.003
/TOTAL		mg/l	.26	1.1
PH		Rel.U.	7.73	7.10
PHOSPHORUS/O-PO4		mg/l	<.001	.034
/TOTAL		mg/l	.019	.14
/TOTAL DISSOLVED		mg/l	.008	.043
RESIDUE/FILTERABLE		mg/l	80	120
/NON-FILTERABLE		mg/l	<5	16

Appendix B

Tributary Stream Data

D.F.O. / M.O.E. Stream Survey Form

DFO / MOE
STREAM SURVEY FORM

Stream Name (gaz.) Unnamed Ck	(local) Channel 2 of Inlet 1 to Spring Lk	Access	Method
Watershed Code		Reach No. 1	Length (km)
Location ~230 m U/s of Spring Lk	Map # 93-0/5	Site No. 1	Chain (m) 15
	UTM	Fish Card Y (N)	C
Date Y M D 96 07 13 · Time 1012 · Agency	Crew Mill / Kim	Photos	Air Photos

C	PARAMETER	VALUE	METH	SPECIFIC DATA
	Ave.Chan.Width (m)	2.5	ST	3.0 2.2 2.2 2.5
	Ave.Wet.Width (m)	2.0	ST	2.5 1.1 1.5 2.0
	Ave.Max.Riffle Depth (cm)	15	OM	12 15 16
	Ave.Max.Pool Depth (cm)	30	OM	30
	Gradient %	5.5	SC	
·	% Pool 20 Riffle 40 Run 40 Other		GE	
	Side Chan.%	0 [X] 0-10 [ ] 10-40 [ ] >40 [ ]	GE	
	Debris Area%	0 [ ] 0-5 [X] 5-15 [ ] >15 [ ]	GE	
	Debris Stable %	30	GE	
	COVER: Total %	30	GE	
	Comp sum 100%: Dp Pool 20, L.O.D. 10, Boulder 0, In Veg 5, Over Veg 45, Cutbank 20			
	Crown Closure % 25	C	Aspect	S

OBSTRUCTIONS

C	Ht (m)	Type	Loc'n

BED MATERIAL

C	BED MATERIAL	%
	Fines: clay, silt, sand (<2mm)	40
	Gravels: small (2-16mm)	20
	Gravels: large (16-64mm)	–
	Larges: sm cobble (64-128mm)	5
	Larges: lge cobble (128-256mm)	5
	Larges: boulder (>256mm)	5
	Bedrock (R)	0
	D_{90} (cm) 14 · C · Compaction L (M) H	

BANKS

C	BANKS	
	Height (m) 0.2 · % Unstable 40	
1	Texture (F) G L R	
	Confinement	EN CO FC OC (UC) N/A
	Valley Channel Ratio	0-2 2-5 5-10 (10+) N/A
	Stage	Dry L M (H) Flood
2	Flood Signs Ht (m) 0.4	Braided Y (N)
	Bars (%) 0	pH · O_2 (ppm)
	Water temp (°C) 15	Turb (cm) · Cond (25°C)

Over 90 m

DISCHARGE

C	Parameter	Value	Method	Specific Data
3				
	Wetted Width (m)	1.5	ST	1.5 1.3 1.1
	Mean Depth (m)	0.1	OM	0.15 0.13 0.1
	Mean Velocity (m/s)	2.6	FOM	11.3, 9.7, 9.6
	Discharge (m^3/s)	0.29	FOM	

REACH SYMBOL (Fish)

Width Valley Channel Slope · (Bed Material)

REVISED DEC. 87 · SS187

FISH SUMMARY

C	Species	No.	Size Range (mm)	Life Phase	Use	Method/Ref.

STREAM/VALLEY CROSS-SECTION [ ] (Looking Downstream)

PLANIMETRIC VIEW [ ]

L · R

COMMENTS

Channel Stability [ ] Debris [ ] Management Concerns [ ] Obstructions [ ] Riparian Zone [ ] Valley Wall Processes [ ] Etc.

1	Undercut moss banks w/ willows & Equisetum
2	Dried grasses hanging in over many of willows branches
3	Over 90 m

Edited by:

Date Y M D:

DFO / MOE
STREAM SURVEY FORM

Stream Name (gaz.) Clearwood Ck		(local) Outlet to Spring Lk				Access	Method
Watershed Code				[illegible]	/	Length(km)	
Location ~120 m D/S of Spring Lk		Map	43-N/8	[illegible]	/	[illegible]	20
		UTM		[illegible]	Y (N)	C	[illegible] ☒ Hist ☐
Date Y M D 9 16 0 7 / 1 27	Time 1545	Agency	Crew MH/KM	Photos		Air Photos	

C	PARAMETER	VALUE	METH	SPECIFIC DATA
	Ave. Chan. Width (m)	5.0	ST	5.5 4.0 3.5 3.5 5.5
	Ave. Wet. Width (m)	3.0	ST	2.5 3.5 2.0 3.0 4.0
	Ave. Max. Riffle Depth (cm)	20	GE	15 30 20
	Ave. Max. Pool Depth (cm)	35	GE	35 35
	Gradient %	3	SC	
	% Pool 15 Riffle 40 Run 45 Other		GE	
	Side Chan. %	0 ☐ 0-10 ☒ 10-40 ☐ >40 ☐	GE	
	Debris Area %	0 ☐ 0-5 ☐ 5-15 ☒ >15 ☐	GE	
	Debris Stable %	30	GE	
	COVER: Total %	25	GE	
	Comp. Sum 100%: Dp Pool 5, L.O.D. 35, Boulder 0, In Veg 0, Over Veg 10, Cutbank 50			
	Crown Closure %	10	C	Aspect NW

C	BED MATERIAL		%
	Fines	clay, silt, sand (<2 mm)	40
	Gravels	small (2-16 mm)	25
	Gravels	large (16-64 mm)	35
	Larges	sm. cobble (64-128 mm)	0
	Larges	lge. cobble (128-256 mm)	0
	Larges	boulder (>256 mm)	0
	Bedrock (R)		0
	D_{90} (cm)	5	Compaction L (M) H

C	BANKS	
	Height (m) 0.1	% Unstable 30
	Texture (F) G L R	
	Confinement	EN CO (FC) OC UC N/A
	Valley: Channel Ratio	0-2 (2-5) 5-10 10+ N/A
	Stage	Dry L M (H) Flood
4	Flood Signs Ht (m) 0.35	Braided Y (N)
	Bars (%) 10	pH	O₂ (ppm)
	Water Temp (°C) 12	Turb (cm)	Cond (25°C)

OBSTRUCTIONS			
C	[illegible]	Type	Loc'n
2	0.3	X	150
3	0.1	X	112

DISCHARGE

✓	Parameter	Value	Method	Specific Data
	Wetted Width (m)	1.5	ST	1.5, 1.5, 2.0
	Mean Depth (m)	0.1	Om	0 0.15 0.15 0.15 0.15
	Mean Velocity (m/s)	2.5	Fom	[illegible]
	Discharge (m^3/s)	0.28	Fom	

REACH SYMBOL (Fish)

(Bed Material)

REVISED DEC. 87 SS187

FISH SUMMARY						
C	Species	No.	Size Range (mm)	Life Phase	Use	Method/Ref.

STREAM/VALLEY CROSS-SECTION ☐ (Looking Downstream)

L R

PLANIMETRIC VIEW ☐

COMMENTS

Channel Stability ☐ Debris ☐ Management Concerns ☐ Obstructions ☐ Riparian Zone ☐ Valley Wall Processes ☐ Etc.

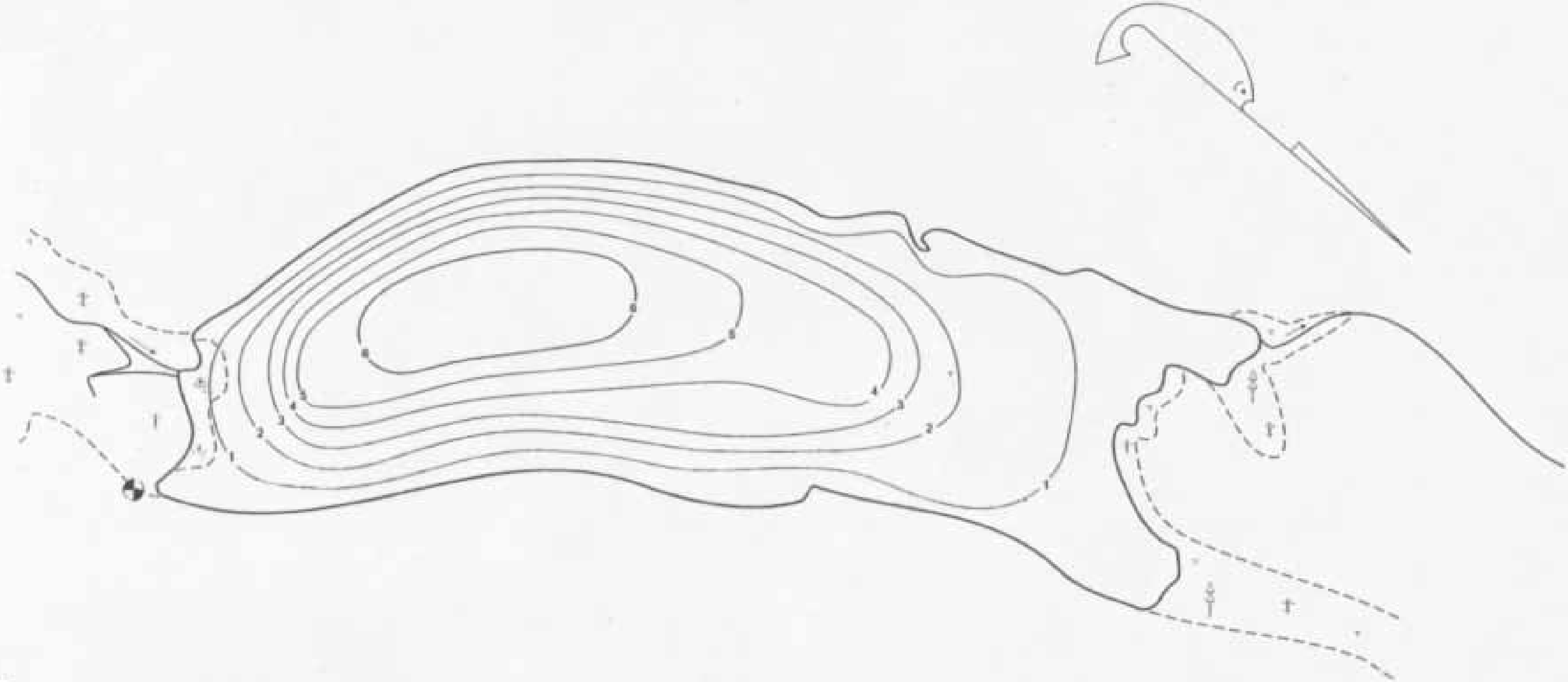
1 [illegible] 3.5 m
2 [illegible] fallen into creek from banks
3 [illegible] fallen across creek; water flowing under [illegible] on left side [illegible]
4 [illegible] of spruce needles below this height; needles are quite dense [illegible]
above the present water level

Edited by

Date Y M D

Appendix C

BATHYMETRIC MAP



Reduced to
34%
of Original Size

NOTES: 1 - Depths are in Metres; 2 - [symbol] Denotes Bench Mark; 3 - Not intended for navigational use. Uncharted rocks and shoals may exist.

SURVEYED BY: M. Hunter/E. Mathias DATE: July 12, 1996
OUTLINE SOURCE: Air Photo 30BCB94063 #171, July 16/94

PREPARED FOR: Ministry of Environment, Lands and Parks
BY: Jennifer Pajkos
B.C. Conservation Foundation

STATISTICS AT TIME OF SURVEY

Elevation	1023	m. †
Surface Area	149210	sq.m.
Area above 6m. contour	110461	sq.m.
Volume	981746	cu.m.
Mean Depth	5.3	m.
Maximum Depth	13.8	m.
Perimeter, Main Shore	2375	m.
Perimeter, Islands	0	m.
Bench Mark	2.0	m.

Spring Lake

WATERSHED CODE: [illegible]	UTM COORDINATE: [illegible]	
MU: 7-28	PLOT DATE: Jan.13, 1997	SCALE: 1 : [illegible]
DIGITIZED: CompuGrid	REVISION DATE:	
CONTOURS: J.M.P.	APPROVED: Don Cadden	NTS No: [illegible]
TECH. CHECK:		