Fish Resources of the Mackenzie River Valley

Interim Report 1, Volume 2 1972

Environment Canada

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FISH RESOURCES
of the
MACKENZIE RIVER VALLEY

Interim Report I, Volume II

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METHODS AND MATERIALS

I. Fish

   A. Sampling Techniques

      1. Gill nets

Gill net stations were sampled once every two weeks with standard mesh gill net gangs, composed of 25 yard sections of six mesh sizes, similar to Rawson's netting (Rawson, 1951) (Table 1).

Table 1.   Specifications for nylon gill net gangs.

Mesh Size (inches)	No. Meshes/ Depth (6')	Twine	Mesh Length (yards)
1 1/2	60	210/2	25
2	45	210/2	25
3	30	210/4	25
4	24	210/4	25
5	16	210/4	25
5 1/2	16	210/4	25

Initial nets had been constructed of 210/2 and 210/3 twine. However, for meshes 3 to 5 1/2 it was found that the lighter twine did not have the strength needed for fishing the Mackenzie system, and it was replaced with the heavier 210/4.

All nets, floats and Dura Lake leadline were hung on #84 braided nylon sideline, with #9 nylon seaming twine.

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Anchors consisted of 16 x 32 inch polyethylene bags, or
burlap sacks filled with rocks. Holes were punched in the
bags to permit the escape of air. Buoys consisted of empty
plastic bottles or pieces of driftwood. Gill nets were set
from steel pontoon barges (Table 2).

Table 2. Specifications for steel pontoon barges used on
the Mackenzie River, 1971.

Length	- 22 feet
Width	- 8 feet
Weight (less engines)	- 1500 pounds
Payload	- 2700 pounds
Draft	- 1.0 feet (with motors, 1.0-1.5 ft.)
Pontoons	- 3 (14 gauge steel)
Fuel capacity	- 80 gallons
Power	- Twin 50 hp outboards

Where water conditions did not permit the use of
the barge, nets were set from 16 foot aluminium outboard
boats, powered by 25 hp engines.

The characteristics of individual river sections
necessitated using diverse net lengths. At Arctic Red River,
three separate meshes were fished at one time. At Norman
Wells, two gangs of three meshes were fished at each station,
while three gangs of two meshes were used at Fort Simpson.
In all cases, the mesh combinations were changed after each
sampling period.

Gill nets used in the synoptic survey were similar to those described in table 2 with the exception of net length. Ten-foot sections of the six mesh sizes were combined in one 60 foot gang. These nets were set either from a small rubber boat, or from the pontoon of the helicopter. Rocks were used for anchors.

2. Beach seines

Seining stations were sampled once every two weeks with 30-foot beach seines. Seines were 6 feet in depth, and constructed of 1/4 inch nylon Ace Oval mesh. Hauls in shallow areas were made by holding one end of the seine on shore while the other was walked out and brought in for retrieval. In deeper areas, the seine was set from a boat and retrieved to shore. All seine hauls made by the synoptic survey were by the former method.

B. Catch Analysis

1. River Bases

At the completion of each set, records were made of the total catch of individual species by mesh size. For large catches, the bulk weight of each species was taken with a Toledo hanging scale (model 2110), having a total capacity of 120 pounds (54.5 kg).

In most cases, the entire catch was used for detailed examination. However, when large catches were encountered, a subsample was selected by thoroughly mixing each species from a given mesh in a large bucket, and drawing

a random sample. The size of the sample was determined only by the amount of time available for analysis. The following data was collected from the sample specimens:

a) Species identification - Existing species keys, primarily McPhail and Lindsey (1970), were used for the field identification of fish specimens. If the identification was considered doubtful, the fish was placed in 10 percent formalin and returned to the Winnipeg lab for detailed examination.

b) Length - Fork lengths (tip of the snout to the fork of the tail) were measured to the nearest millimeter (mm).

c) Weight - Individual fish were weighed to the nearest gram (g) using a Stathmos fan-dial scale (model 1411) having a capacity of 30 pounds (13.6 kg) in one gram divisions.

d) Sex and state of maturity - Data on the sex and stage of maturity were collected from direct observations of the exposed gonads.

e) Scale samples - Scale samples (4-8 scales) were removed from specific areas, depending on the species (Fig. 1). Forceps or the point of a small knife were used for removing the scales, which were then placed in individual scale envelopes.

f) Otoliths - Otoliths were removed by making a dorsal-ventral cut through the head and probing with forceps.
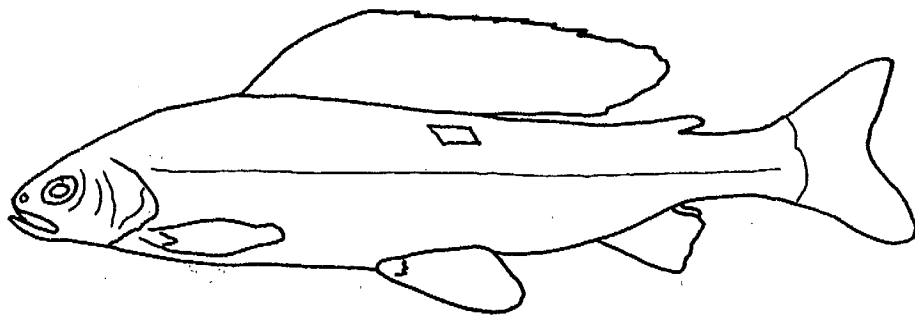
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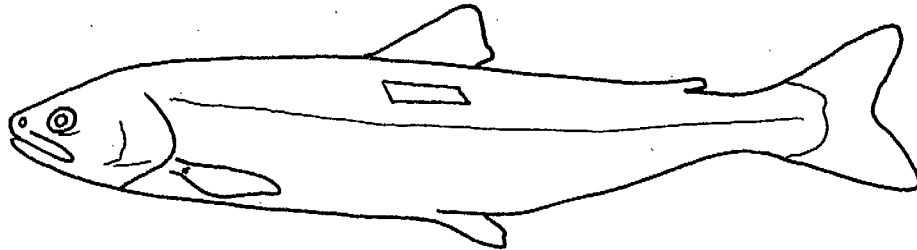
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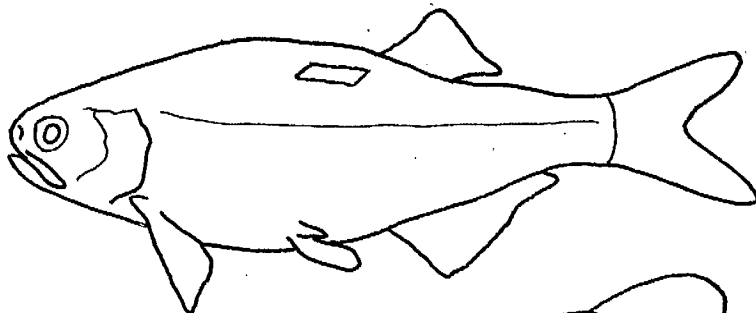
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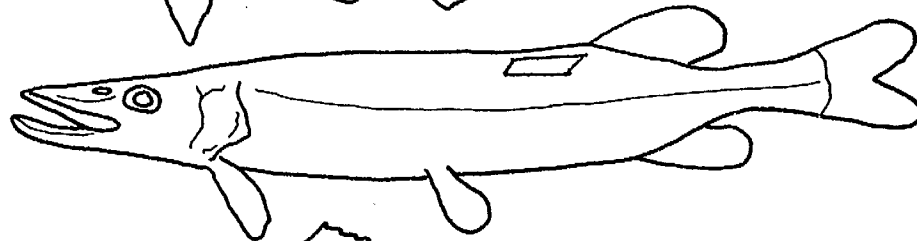
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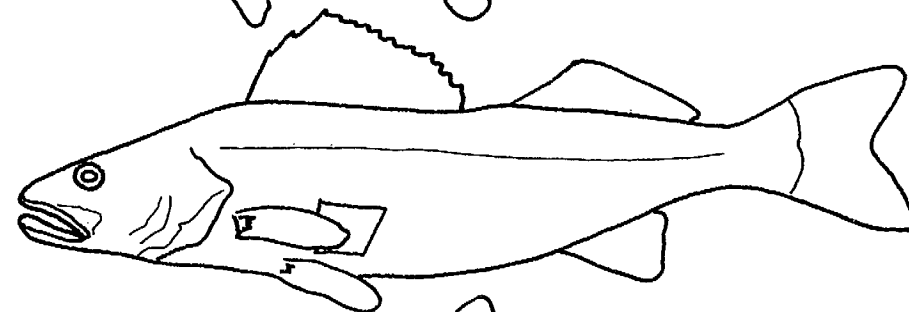
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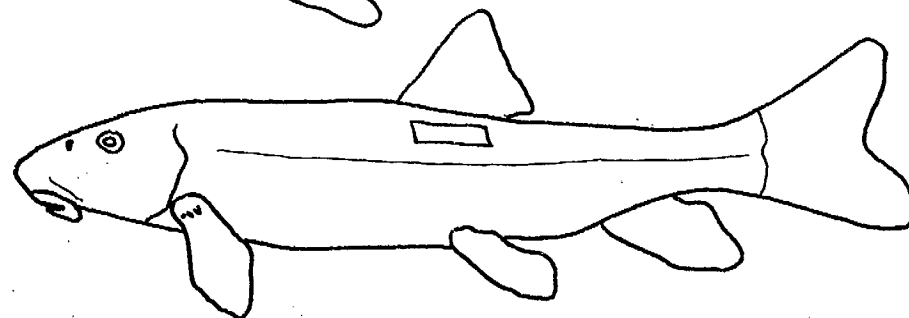
Suckers

Chub

Minnows

Figure 1.   Scale sampling areas for species aged in Mackenzie Valley, 1971.

The otoliths were stored dry in the same envelope as the scales from that particular fish.

g) Stomach samples - Each of the major species was divided into three size groups (Table 3). A minimum of ten stomachs was collected by each base, from each size group. This was repeated for each sampling period. Additional samples were collected when time permitted, and stomachs were taken from most specimens of the minor species.

As much extraneous tissue was removed from the stomach as possible. The stomach and a label bearing the fish number was then wrapped in cheesecloth and placed in 10 percent formalin for preservation and later laboratory examination.

Table 3. Size groups from which stomach samples were collected from the major fish species.

Species	Size Group (mm)			Maximum Size (mm)
Arctic cisco	0-100	100-300	300 plus	640
Arctic grayling	0-100	100-200	200 plus	610
Broad whitefish	0-100	100-200	200 plus	594
Humpback whitefish	0-100	100-200	200 plus	730
Inconnu	0-100	100-400	400 plus	1500
Least cisco	0-100	100-200	200 plus	420
Northern pike	0-100	100-400	400 plus	1220
Yellow walleye	0-100	100-200	200 plus	780
Flathead chub	0-100	100-200	200 plus	317

h) Contamination samples - Twice during the summer (early July and late August), small fish samples (10-20) were collected by each river base for contamination analysis. Efforts were made to collect fish with different feeding habits (bottom feeders - suckers; predacious - whitefish or cisco; piscivirous - northern pike).

Samples to be analysed for heavy metals consisted of skinned fillets (minimum of 454 g), and liver tissue (minimum of 5 g), which were wrapped in plastic bags. All utensils were thoroughly washed after each sample was processed. Whole fish selected for chlorinated hydrocarbon analysis were wrapped in aluminium foil.

All contamination samples were kept as cool as possible until they could be frozen (within six hours). They were then shipped to standardized labs by air, in iced coolers. Data on the fish species and number, sampling location, date, length, weight and sex accompanied each sample.

2. Synoptic Survey

a) Summer sampling program

With a few exceptions, the same data was collected from gill net caught fish by the synoptic crew as was taken by the river bases. Total weights were not taken, nor were any synoptic fish used as contamination samples. Insitu stomach analyses were done, and consisted of a gross identification of the stomach

contents, and numerical counts of each organism. None
of the stomach contents were preserved.

Large fish taken in seine hauls were analysed
in the same manner as were those taken in gill nets.
Small fish were placed in 10 percent formalin for later
identification and laboratory analyses.

b) Winter sampling program

Some fish taken in the domestic winter fish-
ery were analysed by the synoptic survey's winter pro-
gram. Collected data included the species, fork length
(to the nearest millimeter), total weight as determined
by a hand held spring balance, and scale samples. Due
to the frozen state of the fish, no stomach sampling
was attempted, nor were any otoliths removed.

II. Stream Data

A. River Bases

As each station was sampled for fish, records were
made of its physical and chemical parameters whenever possible.
Temperatures were measured by means of pocket thermometers and
Ryan 15-day thermographs. Hach water analysis kits were used
to determine pH, dissolved oxygen, alkalinity and hardness
levels. Turbidity estimates were made with Secchi disks.

Other observations included the shore slope and
vegetative cover, bottom type and vegetative cover, and general
weather conditions. Estimates were also made of the stream
width and rate of flow.

Water samples for laboratory analysis were collected in two-liter plastic bottles, and refrigerated prior to air shipment to Calgary.

B. Synoptic Survey

Stream data collected by the synoptic survey included all of the physical features measured by the river bases. However, none of the chemical parameters were measured.

Records of the general characteristics of each stream were made as the stream was flown. Notes on the locations, heights and types of stream barriers encountered were marked directly on existing maps of the stream areas (scale 1:250,000). Gravel types and locations were similarly marked.

III. Laboratory Analyses

A. Aging

1. Scales

Scale samples were allowed to soak in water before cleaning. They were then placed between two microscope slides. The ends of the slides were taped together, and any pertinent data such as species, fish number, etc., were recorded on the tape.

Scale readings for many of the species were made directly from the projected scale image (50X). For thicker scales, the slides were allowed to stand in water. Water between the scales then acted as a mounting media, thus helping to lighten the projected image.

2. Otoliths

Dry stored otoliths became opaque and difficult to read. However, a solution of benzyl benzoate and wintergreen, in proportions of 3 to 1 respectively, proved to be helpful in clearing them.

Burbot otoliths were broken transversely, and the annuli were counted by viewing a broken end of the otolith under a dissecting microscope. To determine the ages of the remaining species, the otoliths were ground by hand, using a fine carborundum stone. Annuli were then counted directly under a dissecting microscope. Only annuli that were complete around the entire otolith were used in the age determinations.

B. Stomach Analysis

Random samples consisting of at least 10 percent of the catch of major species taken in each area, were analysed for stomach contents. Stomachs were slit longitudinally and the contents emptied into a petri dish. Stomach walls were flushed with water to remove any remaining material.

Food organisms were identified to catagorical family, or genus whenever possible. Numerical counts and frequency of occurrence were recorded for each food item. For those fish taken in gill nets, volumetric measurements were also made by first blotting each food item, then determining its water displacement in a graduated cylinder or centrifuge tube.

C. Contamination Analyses

1. Heavy Metals

Heavy metal analyses were conducted on fish liver and muscle tissues by Dr. H.V. Warren. Lead levels were determined by dithizone colorimetry (Warren and Delavault, 1960), and copper and zinc by atomic absorption. Copper contents were checked by biquinoline colorimetry (Warren and Delavault, 1959) and zinc by dithizone titration (Warren and Delavault, 1949).

Atomic absorption was also used by Mr. D. Jamieson to determine lead, copper, zinc and mercury levels in the same tissue types.

2. Chlorinated Hydrocarbons

Chlorinated hydrocarbon levels in fish samples were determined by Dr. R. Duffy, and by Mr. J. Rienke. Samples were analysed by gas chromatography. Dr. Duffy also used thin-layer chromatography for confirmation of some of the results obtained.

D. Water Chemistry

Each of the river bases periodically sent water samples to the Water Quality Division of Environment Canada, for detailed analyses (Table 4). Detailed descriptions of the methods and equipment can be found in Traversy (1971).

Table 4.   Methods used in the laboratory analyses of water
            samples, Mackenzie River, 1971.

Parameter	Method
Turbidity	Hach turbidimeter
pH	Electronic pH meter
Specific conductance	Radiometer meter
Total alkalinity	Potentiometric titration
Total hardness	Titration with EDTA (EBT indicator)
Dissolved copper	Atomic absorption
Dissolved lead	Atomic absorption
Dissolved zinc	Atomic absorption

E. Map Interpretation and Gravel Estimates

Stream maps presented in this volume were repro-
duced by tracing from existing 1:250,000 scale maps. Stream
lengths were measured from the same maps by means of a wheel
map measure computer, while drainage areas were obtained
through the use of a planimeter (polar compensating).
Potential spawning area (gravel) estimates were made by multi-
plying the length of the gravel area found by the average
estimated stream width for that area.

RESULTS

A. FISH

1. Length-Weight Relationships

Table 5. Summary of b = slope values from length-weight relationships calculated for each 2-week period over the sample season. (N = sample size; sb = standard deviation of b). Data presented only for samples with N > 10 per two-week period.

Base, species & sex	June 20 - July 3			July 4 - July 17			July 18 - July 31			Aug. 1 - Aug. 14		
	N	b	sb	N	b	sb	N	b	sb	N	b	sb
Arctic Red River												
Northern pike												
Male				21	3.173	0.097	19	3.179	1.481	17	3.390	0.110
Female	10	3.151	0.226	18	3.252	0.119	17	2.773	0.115	23	2.858	0.160
Norman Wells												
Northern pike												
Male				16	3.150	0.122	12	3.306	0.192	11	2.379	0.218
Female							11	2.935	0.104	19	2.513	0.405
Fort Simpson												
Northern pike												
Male	24	2.723	0.334	49	3.025	0.125	57	3.284	0.104	105	2.878	0.168
Female	22	3.183	0.091	63	3.196	0.110	70	3.092	0.140	87	2.962	0.128
Norman Wells												
Longnose sucker												
Male	10	2.400	0.393	15	2.950	0.127	10	3.364	0.104	14	3.155	0.089
Female							11	2.781	0.251			
Fort Simpson												
Longnose sucker												
Male										12	3.755	0.118
Female	21	3.137	0.136	15	3.203	0.132	22	3.180	0.087	11	3.112	0.151
Norman Wells												
Flathead chub												
Male	104	2.407	0.080				20	1.404	0.317	20	3.250	0.102
Female	57	2.348	0.103	17	1.626	0.208	27	2.476	0.164	60	2.945	0.124

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Table 5. Summary of b = slope values from length-weight relationships calculated for each 2-week period over the sample season. (N = sample size; sb = standard deviation of b). Data presented only for samples with N > 10 per two-week period.

Base, species & sex	Aug. 15 - Aug. 28			Aug. 29 - Sept. 11			Sept. 12 - Sept. 25			Sept. 26 - Oct. 9			Total		
	N	b	sb	N	b	sb	N	b	sb	N	b	sb	N	b	sb
Arctic Red River															
Northern pike															
Male	33	3.412	0.128	15	2.763	0.193							125	3.158	0.591
Female	24	2.699	0.242	19	3.402	0.160	15	2.603	0.312				127	2.919	0.203
Norman Wells															
Northern pike															
Male	14	2.802	0.248	38	2.968	0.083	17	3.120	0.080				118	3.020	0.173
Female	14	3.160	0.517	10	3.189	0.066							80	2.848	0.307
Fort Simpson															
Northern pike															
Male	72	3.095	0.107	38	2.946	0.100				40	3.050	0.192	390	3.003	0.165
Female	68	3.122	0.124	27	3.138	0.101	13	2.352	0.471	28	3.195	0.141	378	3.124	0.159
Norman Wells															
Longnose sucker															
Male													63	3.088	0.237
Female													52	2.325	0.352
Fort Simpson															
Longnose sucker															
Male													53	2.806	0.224
Female	16	2.962	0.123							12	3.062	0.163	106	3.159	0.147
Norman Wells															
Flathead chub															
Male	15	3.028	0.089	10	3.061	0.126							182	2.293	0.165
Female	23	2.430	0.136										191	2.525	0.142

Table 5.   Summary of b = slope values from length-weight relationships calculated for each 2-week period over the sample season.   (N = sample size; sb = standard deviation of b). Data presented only for samples with N > 10 per two-week period.

Base, species & sex	June 20 - July 3			July 4 - July 17			July 18 - July 31			Aug. 1 - Aug. 14		
	N	b	sb	N	b	sb	N	b	sb	N	b	sb
Arctic Red River												
Inconnu												
Male	15	3.120	0.082	28	3.007	0.129	22	3.142	0.107	16	2.896	0.139
Female				15	3.070	0.184	12	3.250	0.079			
Arctic Red River												
Broad whitefish												
Male	13	3.624	0.092	22	3.108	0.320	28	3.411	0.100	42	2.885	0.153
Female	10	4.031	0.113				24	4.038	0.100	46	1.599	0.220
Arctic Red River												
Humpback whitefish												
Male				17	3.523	0.080	39	3.201	0.213	37	3.555	0.080
Female				14	3.245	0.130	34	3.599	0.309	27	3.721	0.102
Norman Wells												
Humpback whitefish												
Male	10	3.012	0.103									
Female	10	3.394	0.091									
Fort Simpson												
Humpback whitefish												
Male				19	2.903	0.159	21	2.847	0.144	18	3.146	0.116
Female	17	3.344	0.115	16	3.291	0.096	32	3.211	0.124	17	2.789	3.354

Table 5. Summary of b = slope values from length-weight relationships calculated for each 2-week period over the sample season. (N = sample size; sb = standard deviation of b). Data presented only for samples with N > 10 per two-week period.

Base, species & sex	Aug. 15 - Aug. 28 N	b	sb	Aug. 29 - Sept. 11 N	b	sb	Sept. 12 - Sept. 25 N	b	sb	Sept. 26 - Oct. 9 N	b	sb	Total N	b	sb
Arctic Red River															
Inconnu															
Male	19	3.340	0.063										103	3.096	0.107
Female													46	3.128	0.170
Arctic Red River															
Broad whitefish															
Male	62	2.650	0.142	74	2.616	0.162	75	2.767	0.148	14	1.759	0.182	330	3.090	0.170
Female	42	3.315	0.136	31	3.138	0.092	37	3.245	0.086	11	3.799	0.119	209	2.787	0.176
Arctic Red River															
Humpback whitefish															
Male	19	2.006	0.157	36	3.391	0.111	46	3.485	0.179	26	3.401	0.066	229	3.278	0.148
Female	18	3.218	0.251				26	3.705	0.092	15	3.855	0.119	165	3.148	0.250
Norman Wells															
Humpback whitefish															
Male				12	3.230	0.119							40	3.125	0.128
Female													29	3.325	0.204
Fort Simpson															
Humpback whitefish															
Male	16	2.883	0.099										106	2.893	0.140
Female	32	2.916	0.148	10	3.441	0.177				12	3.025	0.113	137	3.078	0.177

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Table 5.   Summary of b = slope values from length-weight relationships calculated for each 2-week period over the
            sample season.   (N = sample size;   sb = standard deviation of b).
            Data presented only for samples with N >10 per two-week period.

Base, species & sex	June 20 - July 3			July 4 - July 17			July 18 - July 31			Aug. 1 - Aug. 14		
	N	b	sb	N	b	sb	N	b	sb	N	b	sb
Arctic Red River												
Arctic cisco												
Male	18	3.078	0.090	36	3.105	.082	36	2.654	0.183	41	2.919	0.082
Female	17	3.055	0.063	56	2.445	0.128	36	2.660	0.101	13	2.083	0.139
Norman Wells												
Arctic cisco												
Male										30	3.228	0.096
Female							47	1.752	0.195	46	1.951	0.148
Arctic Red River												
Least cisco												
Male												
Female												
Norman Wells												
Arctic grayling												
Male	17	3.544	0.055									
Female	24	3.181	0.088									
Fort Simpson												
Yellow walleye												
Male	20	3.220	0.051	34	3.122	0.067	24	3.248	0.059			
Female	29	3.084	0.202	44	2.924		34	3.138	0.082			

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Table 5. Summary of b = slope values from length-weight relationships calculated for each 2-week period over the sample season. (N = sample size; sb = standard deviation of b). Data presented only for samples with N>10 per two-week period.

Base, species & sex	Aug. 15 - Aug. 28			Aug. 29 - Sept. 11			Sept. 12 - Sept. 25			Sept. 26 - Oct. 9			Total		
	N	b	sb	N	b	sb	N	b	sb	N	b	sb	N	b	sb
Arctic Red River															
Arctic cisco															
Male	32	2.767	0.073										172	3.015	0.116
Female	24	2.646	0.123										151	2.629	0.120
Norman Wells															
Arctic cisco															
Male	86	2.244	0.118	56	3.017	0.078	13	4.459	0.148				227	2.103	0.140
Female	51	3.366	0.064	23	3.216	0.073							177	2.238	0.143
Arctic Red River															
Least cisco															
Male				34	3.098	0.117	47	2.713	0.423	24	3.355	0.129	113	2.860	0.289
Female				10	3.445	0.105	32	2.173	0.218	15	3.815	0.102	64	1.904	0.335
Norman Wells															
Arctic grayling															
Male							12	3.181	0.073	23	3.018	0.077	61	3.325	0.240
Female							14	3.344	0.125	42	3.134	0.077	88	3.366	0.110
Fort Simpson															
Yellow walleye															
Male													86	3.127	0.072
Female													126	2.816	0.200

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2.   Length-Frequency Distributions

FIGURE 2 . LENGTH-FREQUENCY DISTRIBUTION—1971
Arctic Grayling

Fort Simpson

Norman Wells

TOTAL
MALE
FEMALE

Arctic Red River

LENGTH RANGE (10 m.m. groups)

FREQUENCY

22
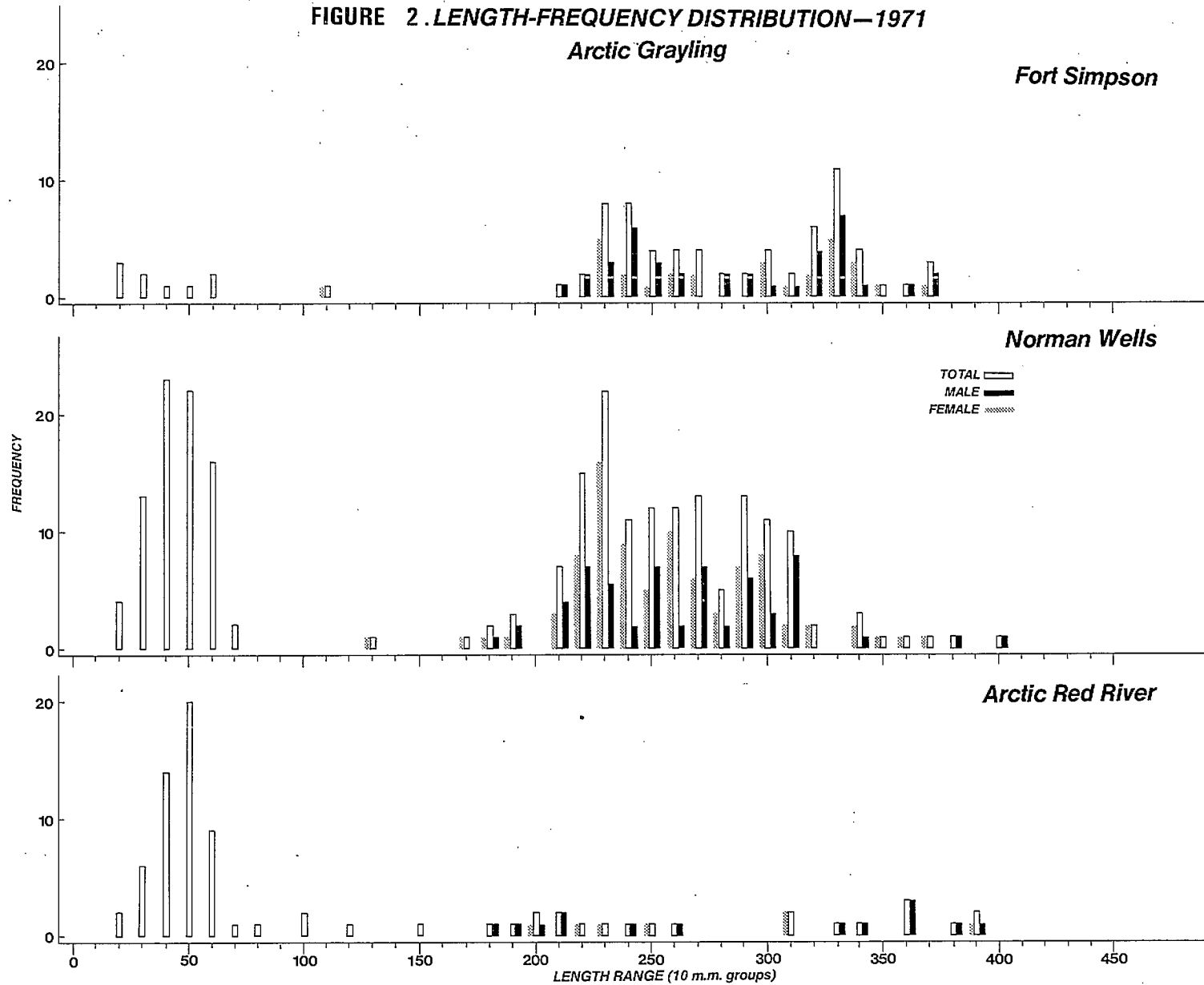
FIGURE 2. LENGTH-FREQUENCY DISTRIBUTION—1971
Northern Pike

Fort Simpson

Norman Wells

Arctic Red River

LENGTH RANGE (20 m.m. groups)

23
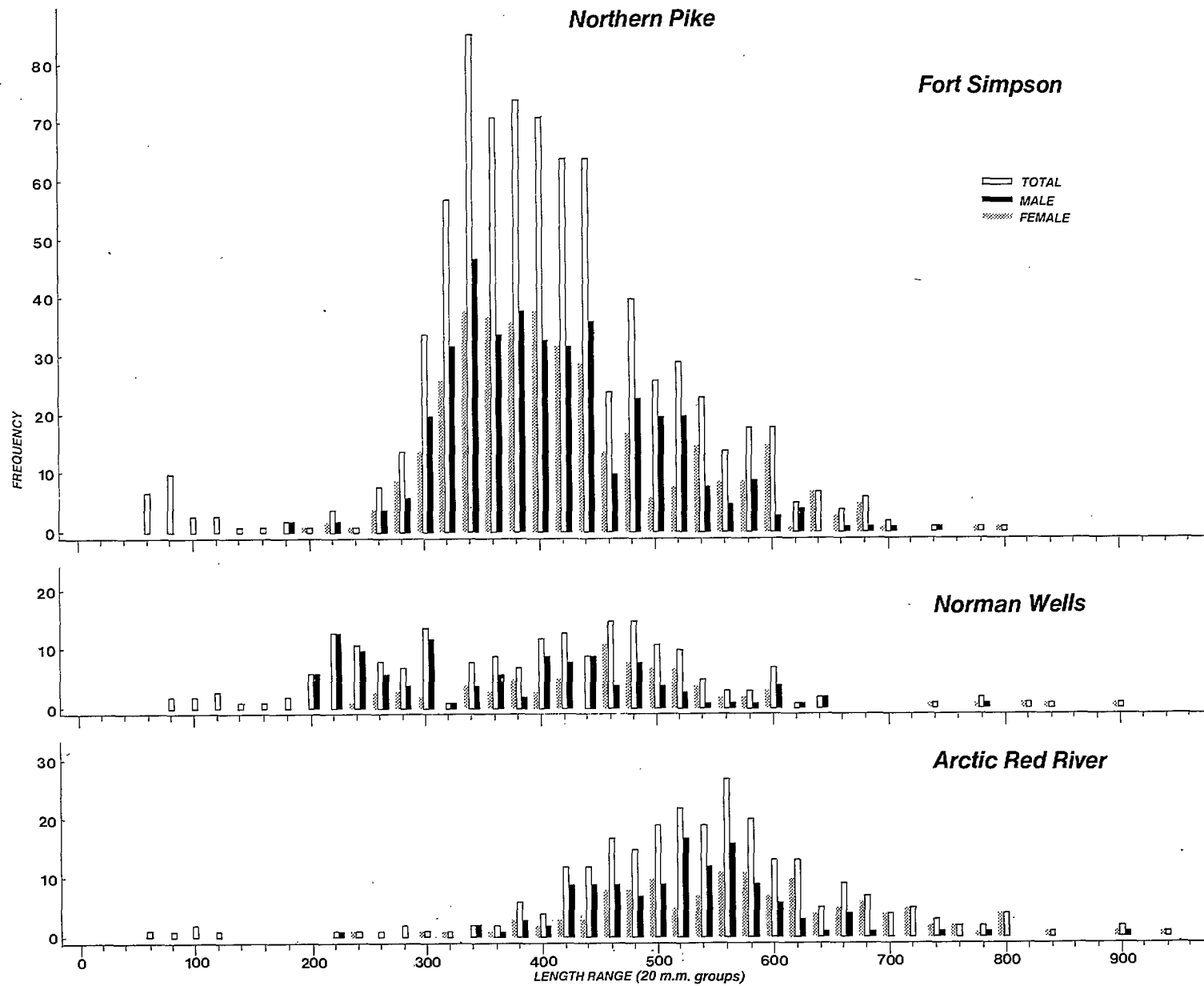
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Lake Cisco
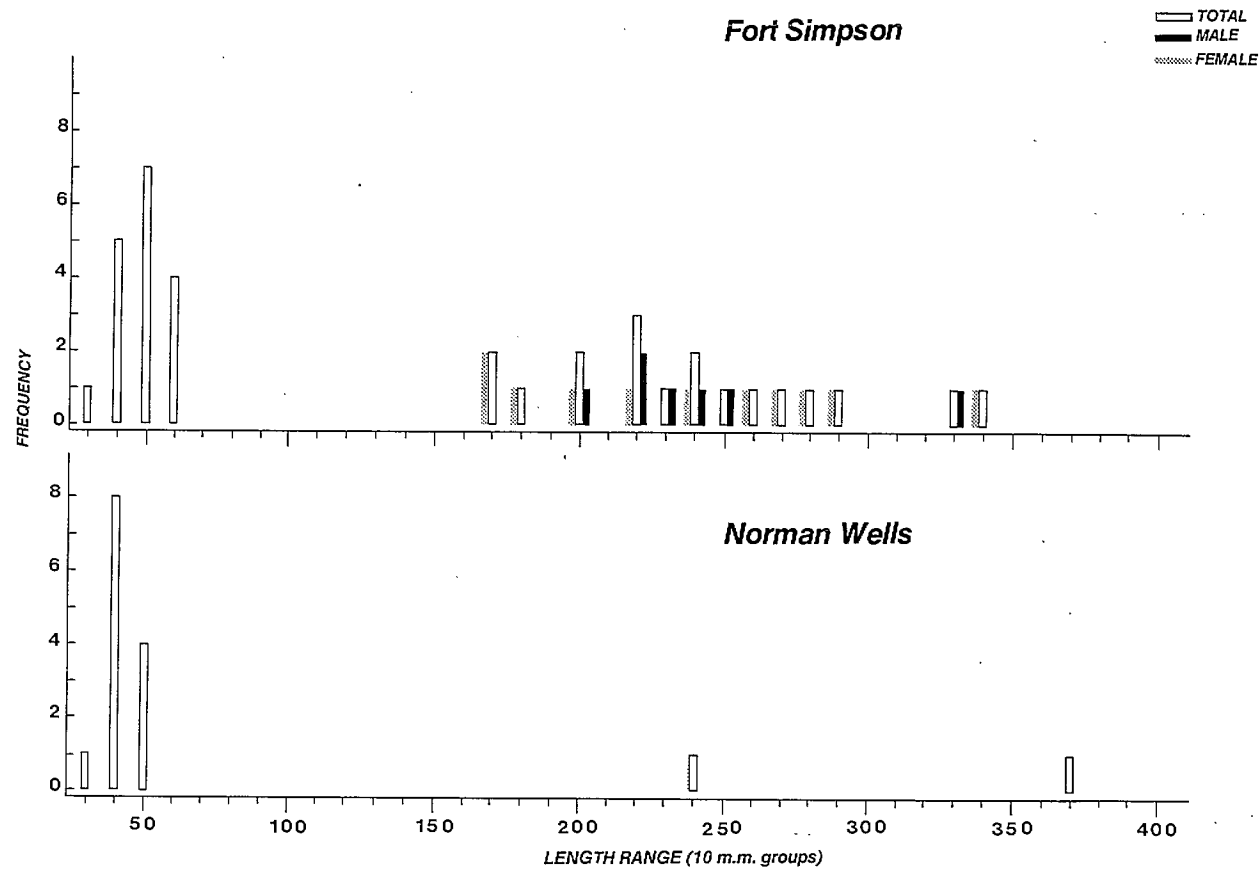
FIGURE 2. LENGTH-FREQUENCY DISTRIBUTION—1971
Arctic Cisco
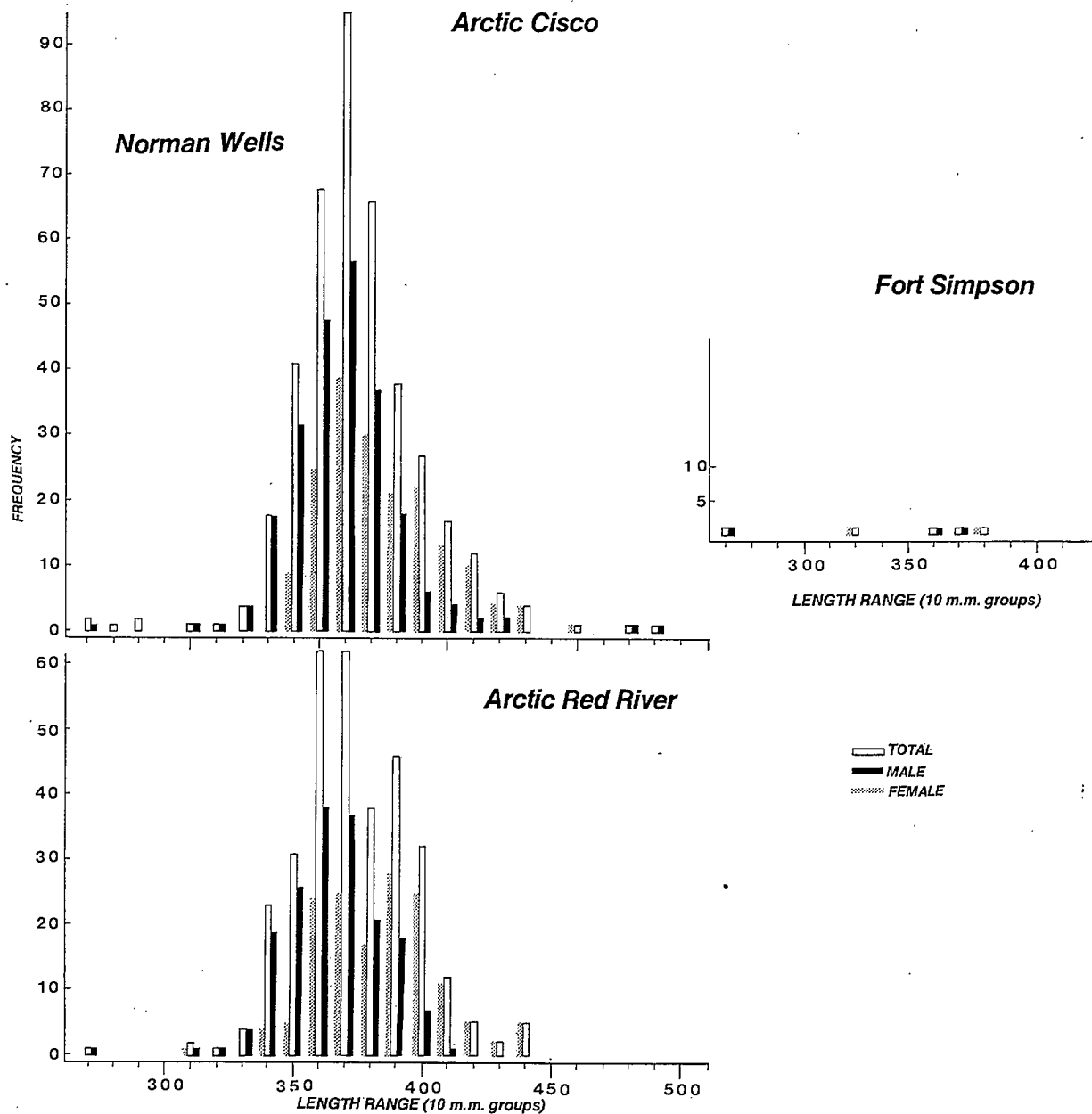
Norman Wells

Fort Simpson

Arctic Red River

TOTAL
MALE
FEMALE

LENGTH RANGE (10 m.m. groups)

25

FIGURE 2. LENGTH-FREQUENCY DISTRIBUTION—1971

Least Cisco

Goldeye

TOTAL
MALE
FEMALE

Arctic Red River

Fort Simpson

FREQUENCY

LENGTH RANGE (10 m.m. groups)
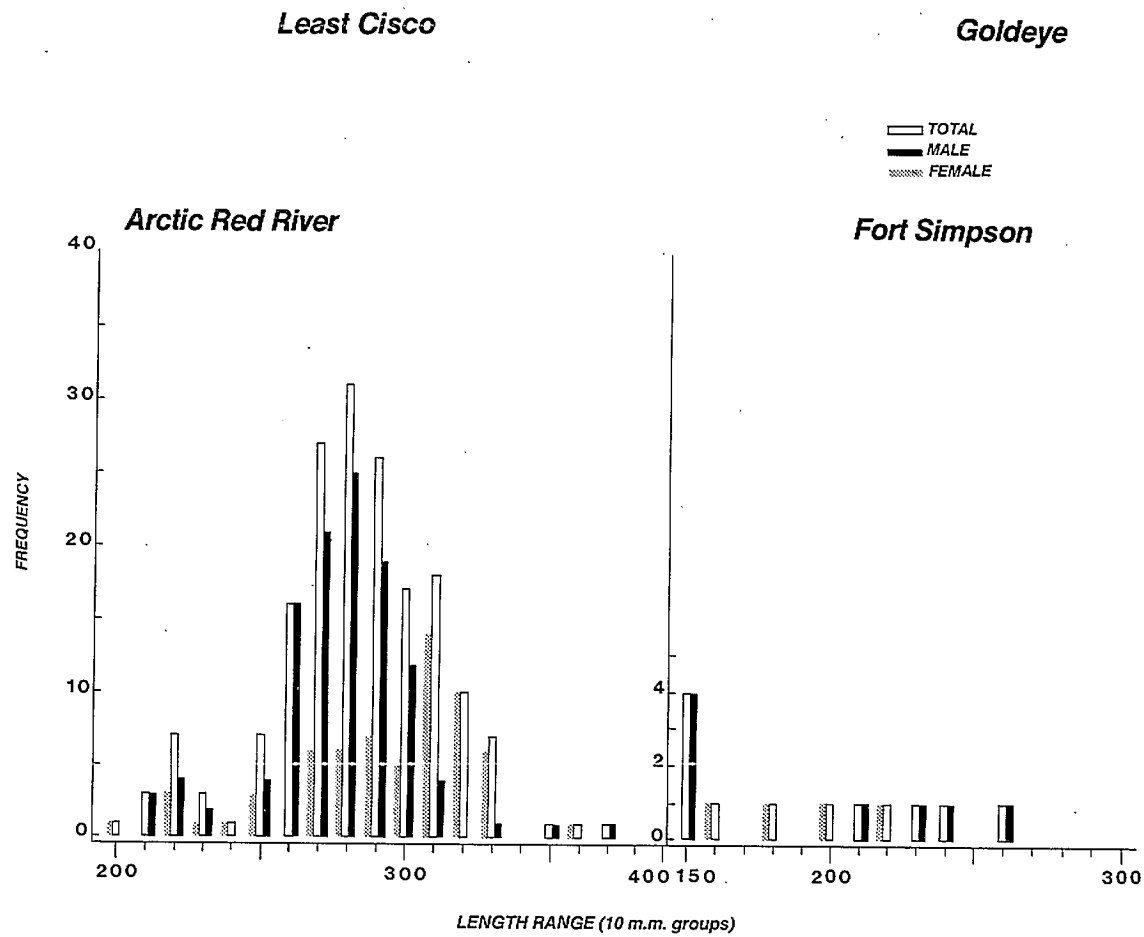
FIGURE 2. LENGTH-FREQUENCY DISTRIBUTION—1971
Broad Whitefish

Norman Wells

Arctic Red River

TOTAL
MALE
FEMALE

FREQUENCY

LENGTH RANGE (10 m.m. groups)
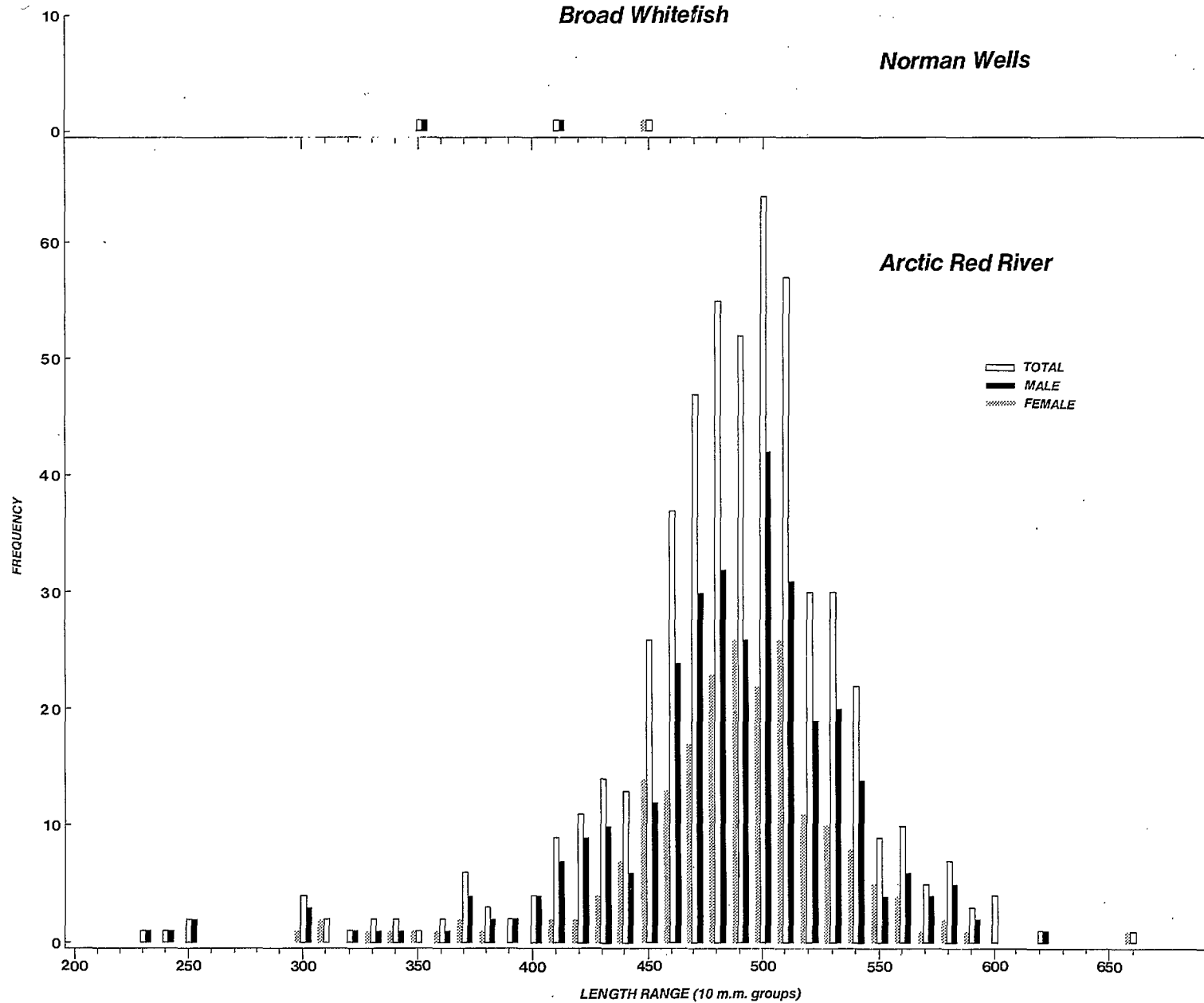
FIGURE 2. LENGTH-FREQUENCY DISTRIBUTION—1971
Round Whitefish

Legend:
- TOTAL
- MALE
- FEMALE

Fort Simpson

Norman Wells

Arctic Red River

FREQUENCY

LENGTH RANGE (10 m.m. groups)
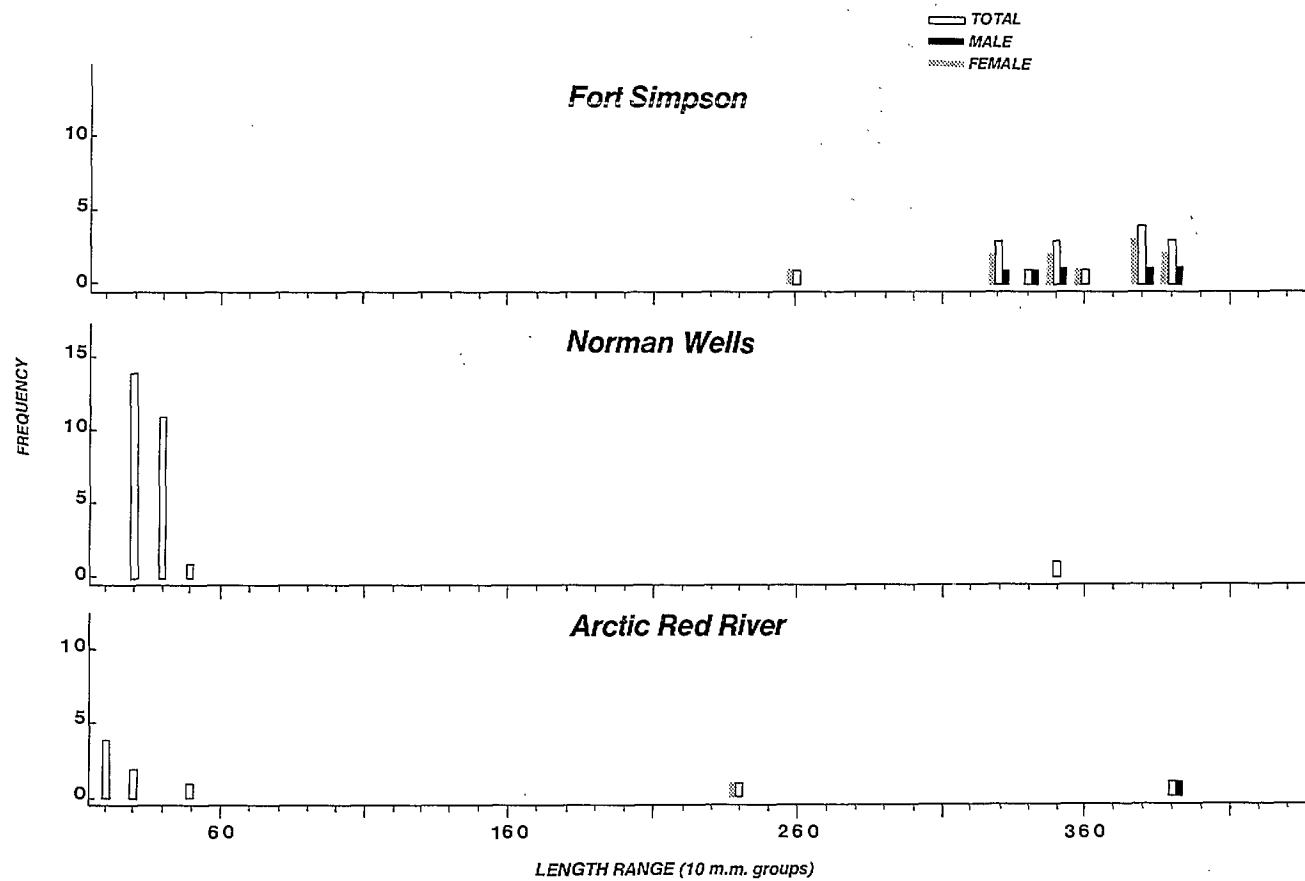
FIGURE 2 . LENGTH-FREQUENCY DISTRIBUTION—1971
Humpback Whitefish
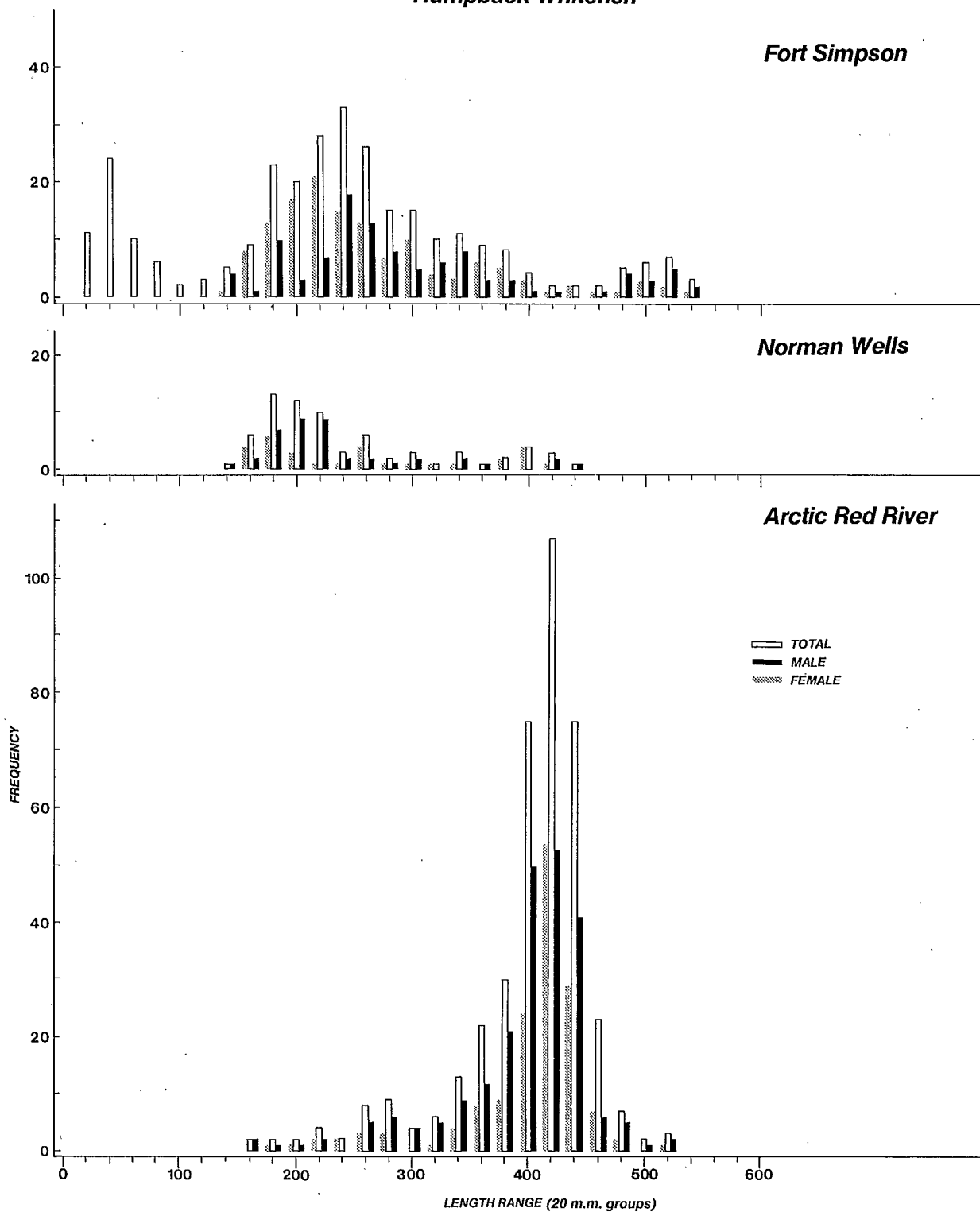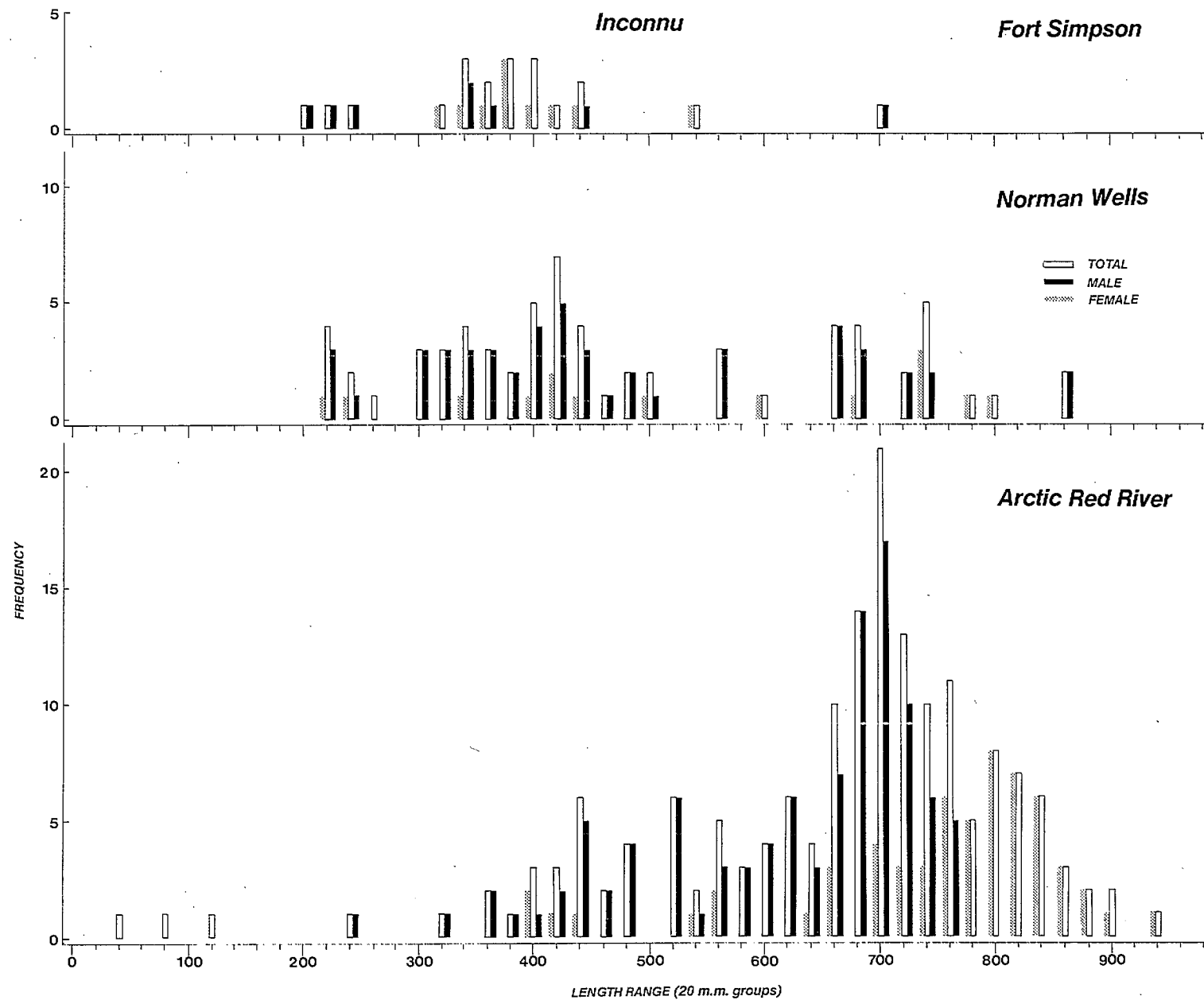
Fort Simpson

Norman Wells

Arctic Red River

TOTAL
MALE
FEMALE

FREQUENCY

LENGTH RANGE (20 m.m. groups)

FIGURE 2. *LENGTH-FREQUENCY DISTRIBUTION—1971*

Inconnu   *Fort Simpson*

Norman Wells

Arctic Red River

LENGTH RANGE (20 m.m. groups)

FIGURE 2. LENGTH-FREQUENCY DISTRIBUTION—1971

Burbot   Fort Simpson

Norman Wells

Arctic Red River

LENGTH RANGE (20 m.m. groups)
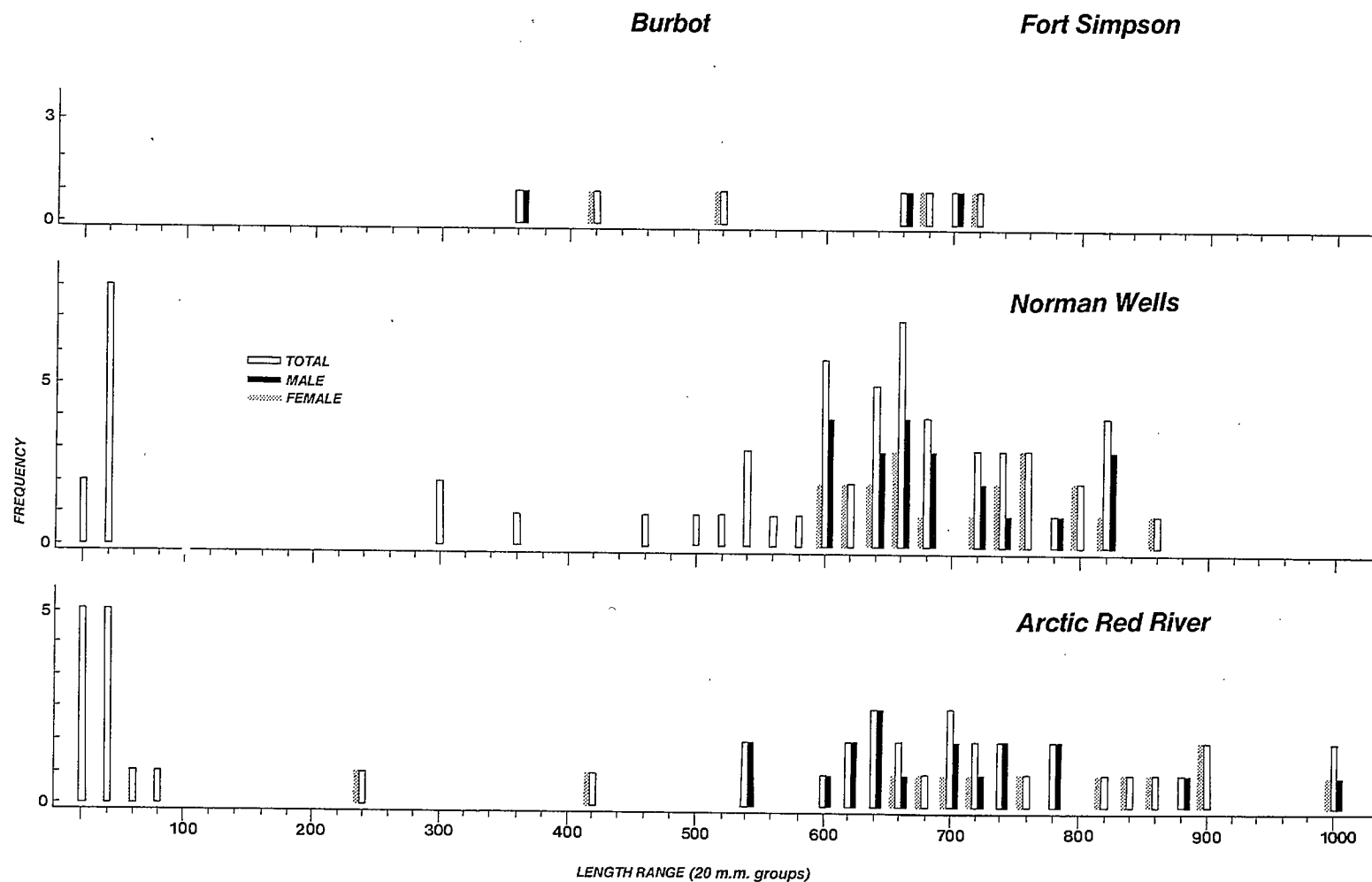
FIGURE 2. LENGTH-FREQUENCY DISTRIBUTION—1971
Yellow Walleye
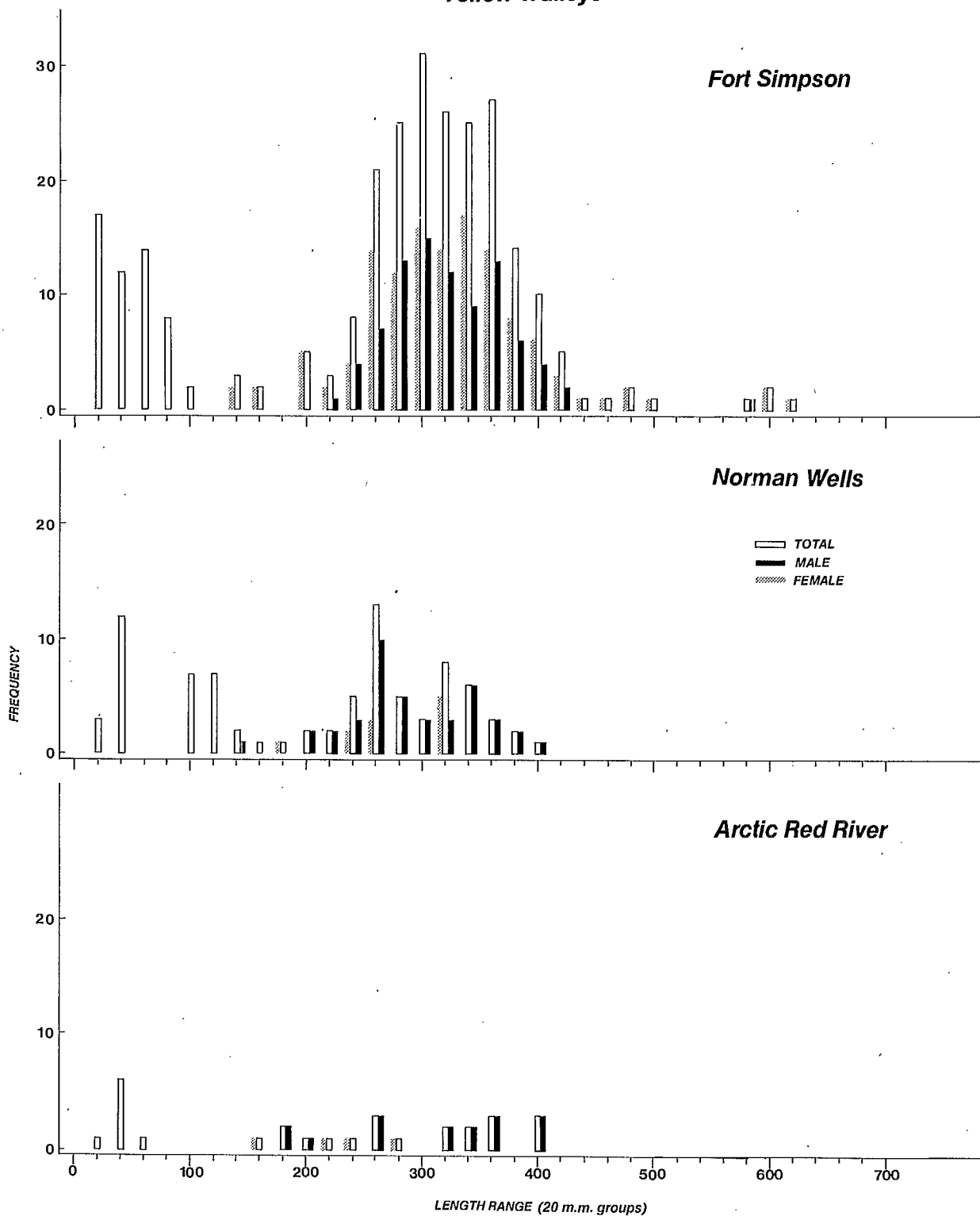
FIGURE 2. LENGTH-FREQUENCY DISTRIBUTION—1971
Longnose Sucker

Fort Simpson

Norman Wells

Arctic Red River

TOTAL
MALE
FEMALE

FREQUENCY

LENGTH RANGE (20 m.m. groups)

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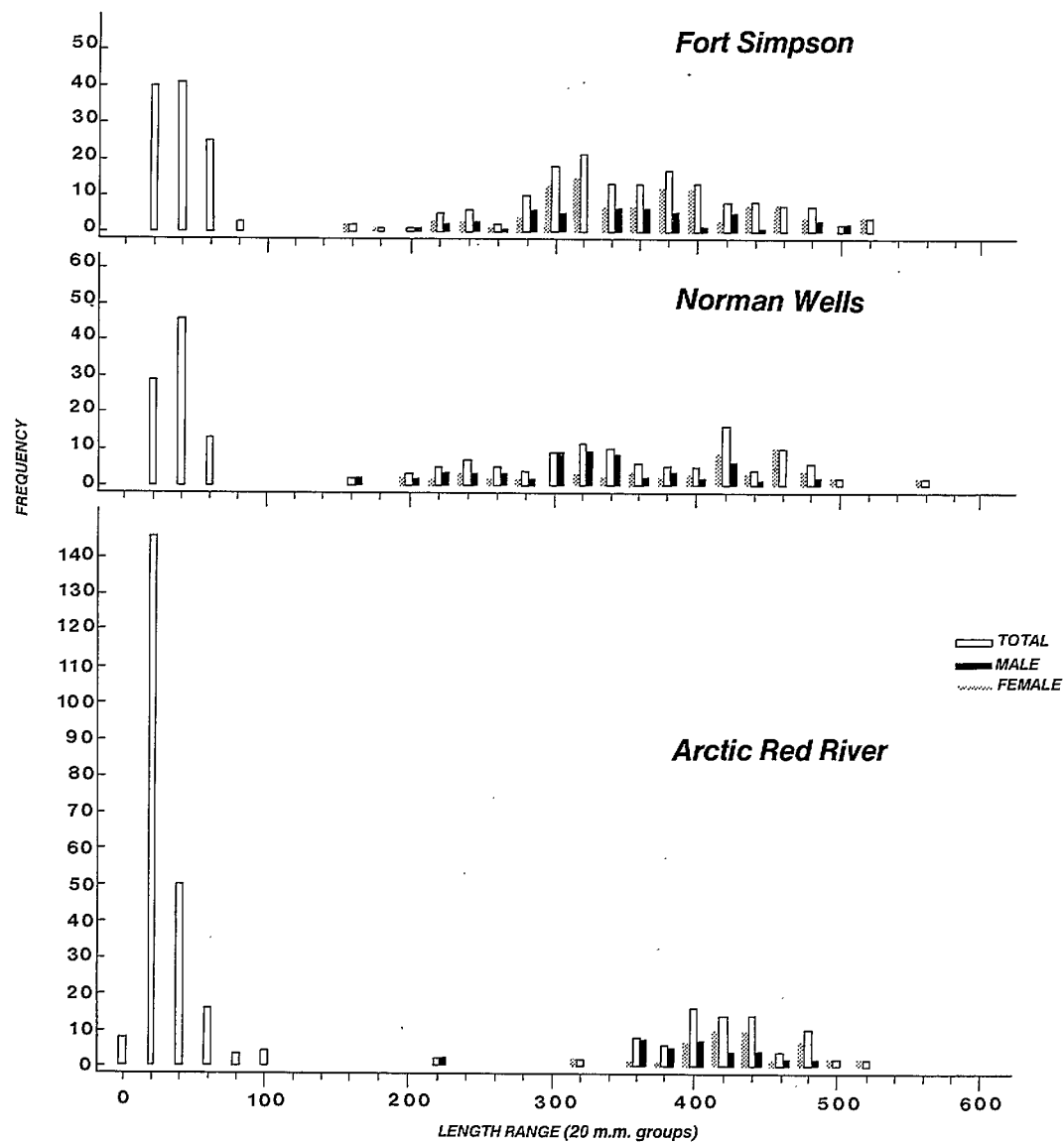
FIGURE 2. LENGTH-FREQUENCY DISTRIBUTION—1971
White Sucker

Fort Simpson
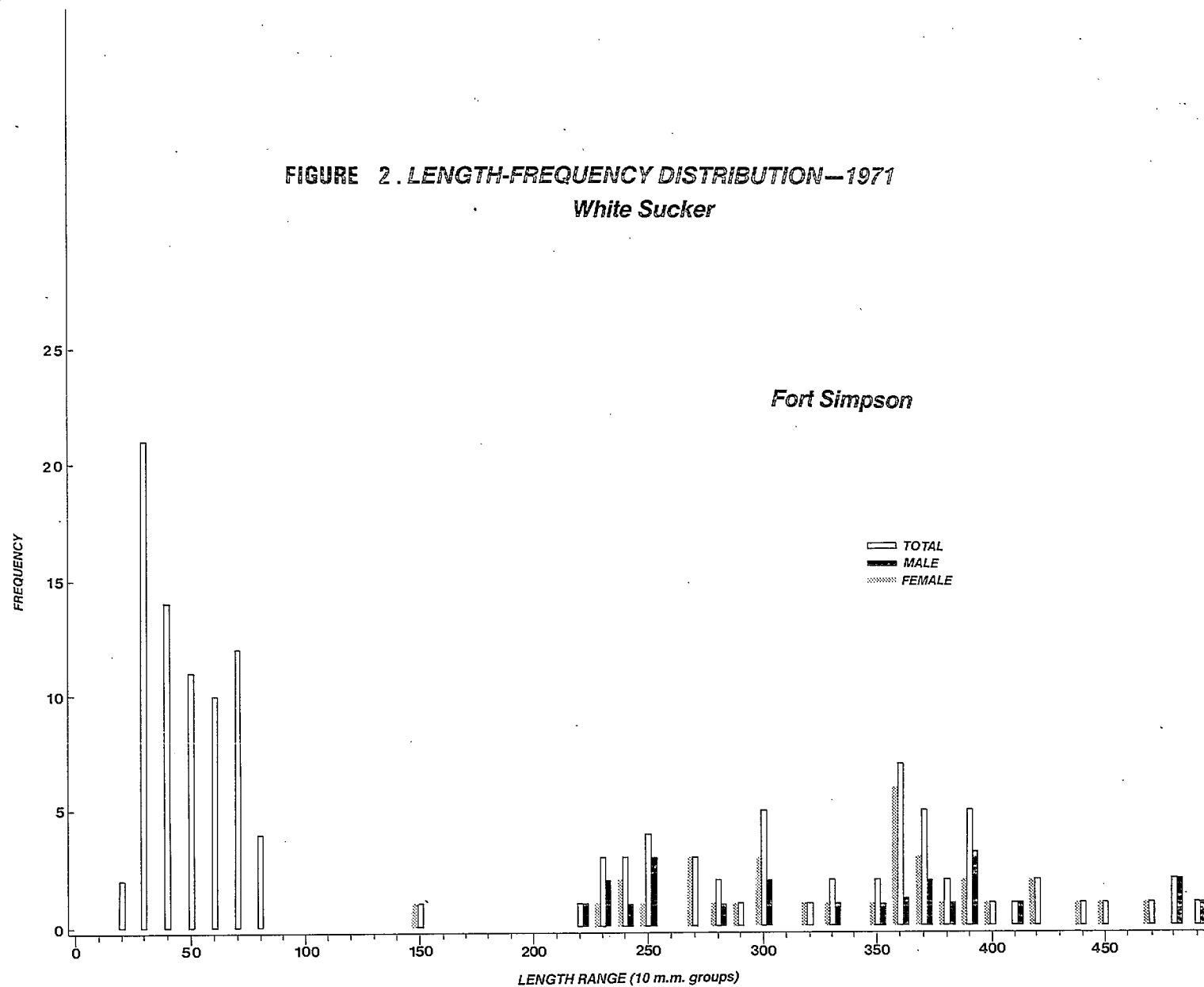
FIGURE 2 . LENGTH-FREQUENCY DISTRIBUTION—1971
Flathead Chub

Fort Simpson

Norman Wells

TOTAL
MALE
FEMALE

Arctic Red River

LENGTH RANGE (10 m.m. groups)
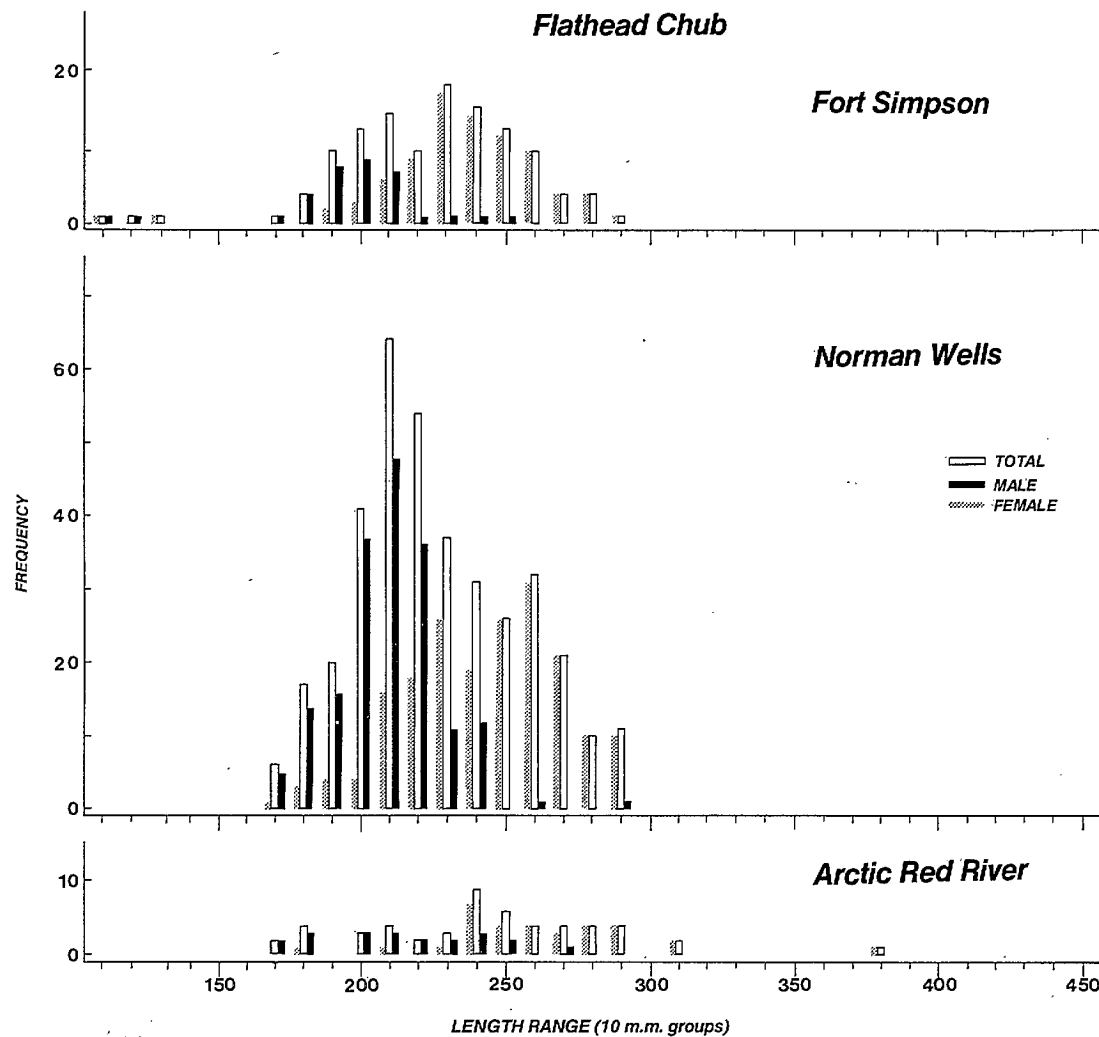
Table   . Summary of length frequency data, for seine-caught fish, not presented in graphical form.

		Fork Length Interval (mm)													
		0 to 9	10 to 19	20 to 29	30 to 39	40 to 49	50 to 59	60 to 69	70 to 79	80 to 89	90 to 99	100 to 109	110 to 119	120 to 129	130 to 139
Lake chub	Arctic Red River		1	21	142	699	781	168	29	14	22	11			
	Norman Wells			7	33	83	80	52	15	9	1	2	1		1
	Fort Simpson		1	4	14	13	11	2							
Trout perch	Arctic Red River		10	38	210	193	131	134	54	8	1				
	Norman Wells			18	9	14	7	4	3						
	Fort Simpson		7	22	33	25	5	5	1						
Spottail shiner	Arctic Red River			4				2	1						
	Norman Wells		3	32	6										
	Fort Simpson		3	22	21	11	6	2							
Slimy sculpin	Arctic Red River			3	8		1				2				
	Norman Wells		2	11	12	7	4	1	1			1			
Spoonhead sculpin	Arctic Red River		2	8	7	23	4	5	1			1			
	Norman Wells			7	20	8	1								
	Fort Simpson		1												
Longnose dace	Arctic Red River					1									
	Norman Wells		4	5	3										
Lamprey	Arctic Red River						1	1	1			2			
Ninespine stickleback	Arctic Red River		2	8	7	23	4	5	1			1			
	Norman Wells						1	2							
Brook stickleback	Arctic Red River						1	1	1						
Pond smelt	Arctic Red River				2	4	7	7	1						
	Norman Wells					1									

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3. Age and Growth

Table 7. Average fork lengths by age class for samples of major fish species caught in the Mackenzie Valley during 1971. Calculations based only on those fish for which age was determined.

Symbols: N = Number; $\overline{X}$ = Mean; R = Range; SE = Standard Error.

Table 7 — Pike

Base and Function		0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
																						Age in Years
Arctic Red River	N	4	1	1	2	6	4	3	1				1	1						1		
	X̄	95	267	364	428	443	481	500	572				626	755						900		
	R	121	0	0	446	473	495	518	0				0	0						0		
		63			409	425	462	478														
	SE	12	0	0	19	7	8	12	0				0	0						0		
Norman Wells	N	1	9	1	1	9	5	5	2	1	2					1						
	X̄	97	207	264	316	395	456	488	532	573	587					798						
	R	0	256	0	0	456	513	534	550	0	618					0						
			147			356	416	450	514		555											
	SE	0	11	0	0	12	18	14	18	0	32					0						
Fort Simpson	N		10	4	23	20	8	4	2	2	1											
	X̄		107	265	344	403	461	508	577	610	635											
	R		151	288	403	482	511	534	608	613	0											
			74	220	275	324	410	491	546	606												
	SE		9	16	6	9	12	10	31	4	0											
Total	N	5	20	6	26	35	17	12	5	3	3		1	1		1				1		
	X̄	95	160	169	349	408	464	498	558	597	603		626	755		798				900		
	R	121	267	364	446	482	513	534	608	613	635		0	0		0				0		
		63	74	220	275	324	410	450	514	573	555											
	SE												0	0		0				0		

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Table 7   Grayling

Base and Function		Age in Years																				
		0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Arctic Red River	N	8	3	12	4		3	1	4														
	$\overline{X}$	55	152	202	250		324	362	377														
	R	73 37	183 113	235 166	260 238		340 319	0	390 366														
	SE	5	21	6	5		8	0	6														
Norman Wells	N	17	3	12	21	16	7		1														
	$\overline{X}$	55	169	214	259	289	312		389														
	R	73 40	187 148	261 148	278 222	314 273	320 302		0														
	SE	2	11	10	4	3	3		0														
Fort Simpson	N	5		4	8	14	7	9	8	1													
	$\overline{X}$	47		189	232	241	273	321	331	361													
	R	66 29		220 119	275 210	283 220	328 240	336 302	365 318	0													
	SE	8		24	8	5	11	4	5	0													
Total	N	30	6	28	33	30	17	10	13	1													
	$\overline{X}$	53	161	206	251	266	298	326	349	361													
	R	73 29	187 113	261 119	278 210	314 220	340 240	362 302	390 318	0													
	SE									0													

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Table. 7.   Inconnu

Base and Function		Age in Years																			
		0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Arctic Red River	N	2				2	5	4	4	2	8	8	8	7	7	2	1	1				
	X̄	119				364	454	474	545	568	659	690	731	731	780	828	848	875				
	R	134				373	474	505	588	596	710	718	810	801	835	830	0	0				
		104				355	410	445	495	539	575	638	685	659	690	825						
	SE	15				9	11	13	21	29	16	9	14	19	18	3	0	0				
Norman Wells	N		4	4	11	9	5		2		1	4	5	3		1						
	X̄		196	278	349	439	484		586		668	680	731	785		861						
	R		209	337	402	518	509		611		0	687	757	807		0						
			178	234	300	406	454		561			677	690	759								
	SE		6	26	10	11	10		25		0	2	12	14		0						
Fort Simpson	N		2	7	9	3		1														
	X̄		198	264	378	425		542														
	R		230	342	416	440		0														
			165	175	348	410																
	SE		33	24	8	9		0														
Total	N	2	6	11	20	14	10	5	6	2	9	12	13	10	7	3	1	1				
	X̄	119	196	269	362	425	459	487	558	568	660	687	731	747	780	839	848	875				
	R	134	230	342	416	518	509	542	611	596	710	718	810	807	835	861	0	0				
		104	165	175	300	355	410	445	495	539	575	638	683	659	690	825						
	SE	15								29					18		0	0				

Table 7.   Longnose Sucker

Base and Function		0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Arctic Red River	N		7	1	4		1	6	3		1	4	4	6								
	$\overline{X}$		71	100	222		335	370	383		400	433	454	483								
	R		100	0	234		0	379	397		0	447	480	500								
			48		215			361	365			417	428	460								
	SE		7	0	4		0	3	10		0	6	12	6								
Norman Wells	N		6	2	9	7	3	2	3		2	1	3	4								
	$\overline{X}$		62	106	224	268	314	318	340		415	424	454	485								
	R		78	106	261	336	358	324	384		425	0	465	499								
			51	106	181	232	274	311	318		404		432	479								
			4	0	10	14	24	7	22		11	0	11	5								
Fort Simpson	N	9	6		1	4	7	6	2	3	2		2	2								
	$\overline{X}$	50	73		185	291	323	329	372	410	422		464	477								
	R	57	82		0	329	361	351	375	415	440		484	488								
		42	65			242	269	303	368	405	404		443	466								
	SE	2	3		0	18	7	11	4	3	18		21	11								
Total	N	9	19	3	14	11	11	14	8	3	5	5	9	12								
	$\overline{X}$	50	69	104	221	277	322	345	364	410	415	431	456	483								
	R	57	100	106	261	336	361	379	397	415	425	447	484	500								
		42	48	100	185	232	269	303	318	405	400	417	428	460								
	SE	2									3											

Table 7.   Flathead Chub

Base and Function		Age in Years																				
		0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Arctic Red River	N							9	2	1	8	5	3	1								
	$\overline{X}$							176	211	220	243	255	283	306								
	R							187	219	0	252	270	299	0								
								162	203		233	241	272									
	SE							3	8	0	3	5	8	0								
Norman Wells	N							2	8	5	2	5	3									
	$\overline{X}$							188	207	223	231	256	291									
	R							190	223	229	232	267	294									
								186	177	219	230	249	285									
	SE							2	5	1	1	3	3									
Fort Simpson	N								11	7	4	2	1									
	$\overline{X}$								205	226	246	275	335									
	R								232	234	250	281	0									
									195	218	240	268										
	SE								3	2	2	7	0									
Total	N							11	21	13	14	12	7	1								
	$\overline{X}$							179	206	224	242	258	294	306								
	R							190	232	234	252	281	335	0								
								162	177	218	230	241	272									
	SE													0								

Table 7.   Walleye

Base and Function		0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
															Age in Years							
Arctic Red River	N	3		4	3	15	2	2	1	5	2	1				1						
	$\overline{X}$	56		185	236	252	275	323	360	371	407	416				450						
	R	64		196	267	283	279	325	0	400	408	0			0							
		44		169	212	223	271	320		352	406											
	SE	6		6	16	4	4	3	0	9	1	0			0							
Norman Wells	N		7	7	1	3	8	8	5	5	1		1									
	$\overline{X}$		121	179	224	261	259	284	332	354	378		390									
	R		136	203	0	293	299	323	349	372	0		0									
			105	165		235	230	254	319	332												
	SE		4	5	0	17	8	8	6	7	0		0									
Fort Simpson	N	7	2	5	3	7	11	7	7	9	4	2				1	1					2
	$\overline{X}$	88	162	184	243	277	299	314	329	357	383	389				452	500					618
	R	106	171	210	262	293	315	325	345	370	398	405				0	0					636
		73	152	170	218	262	260	308	312	320	372	373										600
	SE	5	10	8	13	4	5	2	4	6	6	16				0	0					18
Total	N	10	9	16	7	25	21	17	13	19	7	3	1		1	1	1					2
	$\overline{X}$	78	130	182	237	260	281	301	333	360	389	398	390		450	452	500					618
	R	106	171	210	267	293	315	325	360	400	408	416	0		0	0	0					636
		44	105	165	212	223	230	254	312	320	372	373										600
	SE																					

Table 7.   Burbot

Base and Function		0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
								Age in Years														
Arctic Red River	N	1	1			1			3	3	2	3	1	2	2	1		1			1	
	X̄	52	97			236			578	642	681	758	905	824	860	865		1005			1000	
	R	0	0			0			636 544	665 600	735 626	791 735	0	858 789	884 835	0		0			0	
	SE	0	0			0			29	21	55	17	0	35	25	0		0			0	
Norman Wells	N			1	2	2	2		1	1	2	3	4	4	7	3		1		1		
	X̄			114	243	212	361		510	602	575	624	707	702	762	742		722		774		
	R			0	313 172	230 194	372 349		0	0	600 550	664 596	778 626	816 545	827 696	832 570		0		0		
	SE			0	71	18	12		0	0	25	21	38	66	16	86		0		0		
Fort Simpson	N			2		1	1	1	1		1	1	2	1			1					
	X̄			188		299	368	368	427		554	685	628	676			702					
	R			250 125		0	0	0	0		0	0	729 526	0			0					
	SE			62		0	0	0	0		0	0	102				0					
Total	N	1	1	3	2	4	3	1	5	4	5	7	7	7	9	4	1	2		1	1	
	X̄	52	97	163	243	240	363	368	534	632	613	690	713	733	784	773	702	861		774	1000	
	R	0	0	250 114	313 172	299 194	372 349	0	636 427	665 600	735 554	791 596	905 526	858 545	884 696	865 570	0	1005 722		0	0	
	SE	0	0					0									0			0	0	

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Table 7.   Humpback Whitefish

| Base and Function | | Age in Years | | | | | | | | | | | | | | | | | | | |
Base and Function		0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Arctic Red River	N					3	1	1	4	8	4	4	6	9	4	2	1					
	$\overline{X}$					210	245	268	352	365	388	408	414	428	437	452	459					
	R					221 204	0	0	372 311	396 330	394 377	425 390	425 390	440 420	452 425	461 443	0					
	SE					6	0	0	14	7	4	7	6	2	6	9	0					
Norman Wells	N			8	2	4	6	4	2	6	3	7										
	$\overline{X}$			169	204	223	230	297	341	362	393	410										
	R			192 152	215 192	228 210	262 219	352 246	363 318	428 291	423 352	440 384										
	SE			5	12	4	7	22	23	22	21	8										
Fort Simpson	N		4	20	13	7	4	3	2	2		1		1		1	1	1				
	$\overline{X}$		137	176	236	253	299	354	358	398		411		475		508	503	518				
	R		140 135	214 115	280 199	271 238	340 241	366 335	370 346	404 392		0		0		0	0	0				
	SE		1	5	6	5	22	10	12	6		0		0		0	0	0				
Total	N		4	28	15	14	11	8	8	16	7	12	6	10	4	3	2	1				
	$\overline{X}$		137	174	232	235	256	315	351	368	390	409	414	432	437	471	481	518				
	R		140 135	214 115	280 192	271 204	340 219	366 246	372 311	428 291	423 352	440 390	425 390	475 420	452 425	508 443	503 459	0				
	SE		1										6	6				0				

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4. Sex Ratios

Table 8. Summary of sex ratios (female to male) for fish species caught during 1971.

Base	Species	6/6-19/6	20/6-3/7	4/7-17/7	18/7-31/7	1/8-14/8	15/8-28/8	29/8-11/9	12/9-25/9	26/9-9/10	Total
	Arctic cisco		0.9444	1.5555	1.0000	0.3171	0.7500	0.5000		1.000	0.8779
	Arctic grayling		1.3333						0.5000	2.000	0.5000
	Broad whitefish		0.7092	0.3636	0.8571	1.0952	0.6774	0.4189	0.4933	0.7857	0.6333
	Burbot		1.0000						1.3333	1.0000	0.7222
Arctic	Humpback whitefish		0.3333	0.8235	0.8718	0.7297	0.9474	0.7778	0.5652	0.5769	0.7205
Red	Inconnu		0.5333	0.5357	0.5454	0.4375	0.0526	0.6667			0.4466
River	Least cisco						0.5714	0.2941	0.6808	0.6250	0.5664
	Longnose sucker		1.0000	0.9231	1.2500	2.6667	1.0000	2.0000	1.8000	1.0000	1.3125
	Pike		1.2500	0.8571	0.8947	1.3529	0.7273	1.2667	1.6667	0.3333	1.0160
	Round whitefish										1.0000
	Walleye			2.0000		0.2500					0.3333
	Flathead chub			4.5000	2.3333	2.0000	0.7143				1.5714
	Arctic cisco				1.2051	1.5333	0.5930	0.4107	0.6154	0.6667	0.7797
	Arctic grayling		1.4118	0.5000	1.0000			1.0000	1.1667	1.8261	1.4426
	Broad whitefish										0.3333
	Burbot							0.5000	1.0000	0.9412	0.7333
Norman	Humpback whitefish		1.0000		1.0000	0.5000	0.6000	0.6667	1.0000		0.7250
Wells	Inconnu	0.5000	0.3333	0.3333	0.3333	0.2500	0.2500	0.2308	0.2500		0.2800
	Longnose sucker		1.1000	0.5333	1.1000	0.4286	1.2000	1.5000	0.8571		0.8254
	Pike		0.5000	0.8125	0.9167	1.7273	1.0000	0.2632	0.4118	0.7500	0.6780
	Walleye			0.2857	0.7500	0.5555	0.5000				0.2619
	Flathead chub		0.5481	1.5454	1.3500	3.0000	1.5333	0.5000	1.0000		1.0494
	Arctic cisco							3.0000			1.5000
	Arctic grayling		0.6000	0.4286	6.0000	0.5000	3.0000	0.6000		1.0000	0.7436
	Burbot									0.5000	1.0000
	Goldeye			1.0000	0.3333						0.5000
Fort	Humpback whitefish		1.1333	0.8421	1.5238	0.9444	2.0000	1.6667	0.2000	2.0000	1.2924
Simpson	Inconnu			1.0000		1.5000				3.0000	1.8571
	Lake cisco				2.0000	0.7500	4.0000				1.5714
	Longnose sucker		2.3333	1.6667	2.4444	0.9167	2.0000	2.0000		12.0000	2.0000
	Pike		0.9167	1.2857	1.2281	0.8286	0.9444	0.7105	2.6000	0.7000	0.9692
	Round whitefish						3.0000	2.0000	1.0000		2.4000
	White sucker		0.7500	0.8333	1.6667	1.0000	2.5000				-1.4783
	Walleye		1.4500	1.2941	1.4167	1.6667		1.5000			1.4651
	Flathead chub	0.3571	3.5000	4.4000	1.1250	13.0000	3.0000		4.0000		2.3784

5. Food Habits

FIGURE 3. STOMACH CONTENTS ANALYSIS—1971

Arctic Grayling

SEINE CATCH

FOOD ITEM % TOTAL NUMBER AND % OCCURRENCE

LEGEND
% Occurrence ■
% Total Number ▨

FIGURE 3. STOMACH CONTENTS ANALYSIS—1971

Arctic Grayling

GILL NET CATCH
FOOD ITEM % TOTAL VOLUME AND % OCCURRENCE

LEGEND
% Occurrence ■
% Total Volume ☐

FIGURE 3. STOMACH CONTENTS ANALYSIS—1971

Northern Pike

SEINE CATCH

FOOD ITEM % TOTAL NUMBER AND % OCCURRENCE

LEGEND
% Occurrence
% Total Number
% Total Volume

GILL NET CATCH
FOOD ITEM % TOTAL VOLUME AND % OCCURRENCE

FIGURE 3. STOMACH CONTENTS ANALYSIS—1971

SEINE CATCH
FOOD ITEM % TOTAL NUMBER AND % OCCURRENCE

Least Cisco

Arctic Cisco

LEGEND
% Occurrence ■
% Total Number ▓
% Total Volume □

FOOD ITEM

GILL NET CATCH
FOOD ITEM % TOTAL VOLUME AND % OCCURRENCE

Least Cisco

Arctic Cisco

FOOD ITEM

FIGURE 3. STOMACH CONTENTS ANALYSIS—1971

SEINE CATCH
FOOD ITEM % TOTAL NUMBER AND % OCCURRENCE

Broad Whitefish

LEGEND
% Occurrence ■
% Total Number ▨
% Total Volume ☐

FOOD ITEM

GILL NET CATCH
FOOD ITEM % TOTAL VOLUME AND % OCCURRENCE

Broad Whitefish   ## Inconnu

FOOD ITEM

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FIGURE 3. STOMACH CONTENTS ANALYSIS—1971
Round Whitefish

SEINE CATCH
FOOD ITEM % TOTAL NUMBER AND % OCCURRENCE

LEGEND
% Occurrence
% Total Number
% Total Volume

90
80
70
60
50
%
40
30
20
10
0

Total Chironomidae   Hydracarina
Diptera

FOOD ITEM

GILL NET CATCH
FOOD ITEM % TOTAL VOLUME AND % OCCURRENCE

50
40
%
30
20
10
0

Total Lepidostoma | Glossosoma Phryganeidae Total Chironomidae | Ceratopogonidae Gastropoda Pelecypoda Hyalella Gordiidae Plecoptera Hexagenia
Limnephilidae   Simulidae   Mollusca   azteca

———— Trichoptera ————   ———— Diptera ————   Ephemeroptera

FOOD ITEM

FIGURE 3. STOMACH CONTENTS ANALYSIS—1971
Humpback Whitefish

SEINE CATCH

FOOD ITEM % TOTAL NUMBER AND % OCCURRENCE

LEGEND
% Occurrence
% Total Number
% Total Volume

FOOD ITEM

GILL NET CATCH

FOOD ITEM % TOTAL VOLUME AND % OCCURRENCE
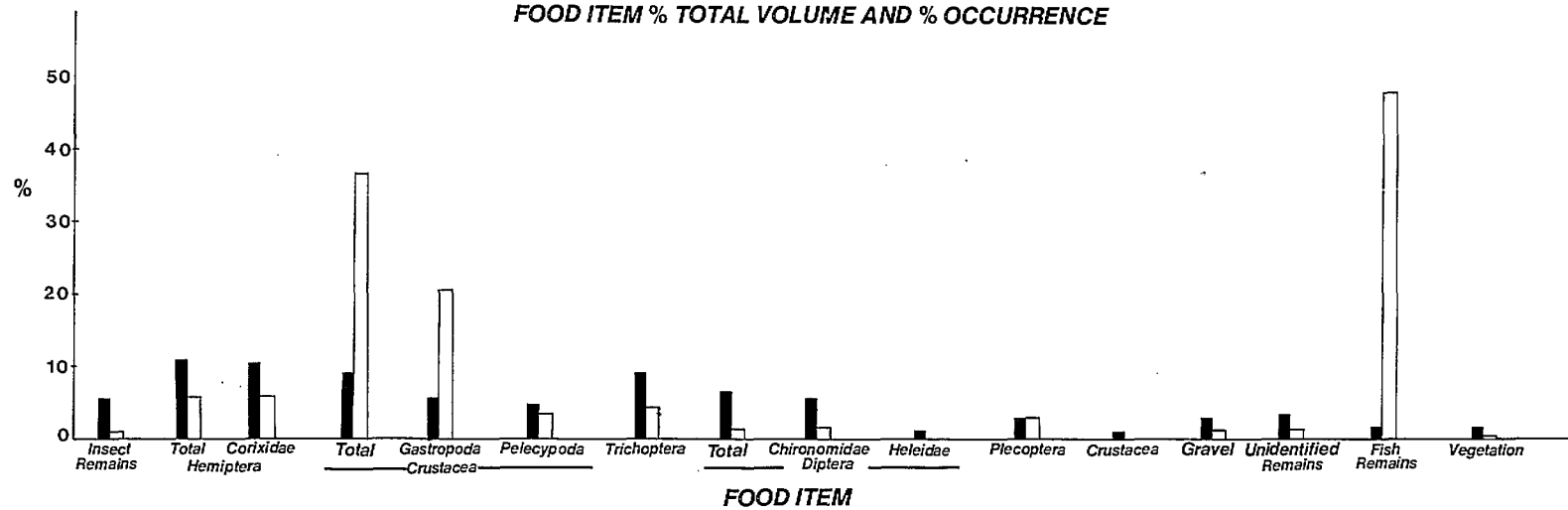
FOOD ITEM

FIGURE 3. STOMACH CONTENTS ANALYSIS—1971

Burbot

SEINE CATCH
FOOD ITEM % TOTAL NUMBER AND % OCCURRENCE

LEGEND
% Occurrence
% Total Number
% Total Volume

GILL NET CATCH
FOOD ITEM % TOTAL VOLUME AND % OCCURRENCE
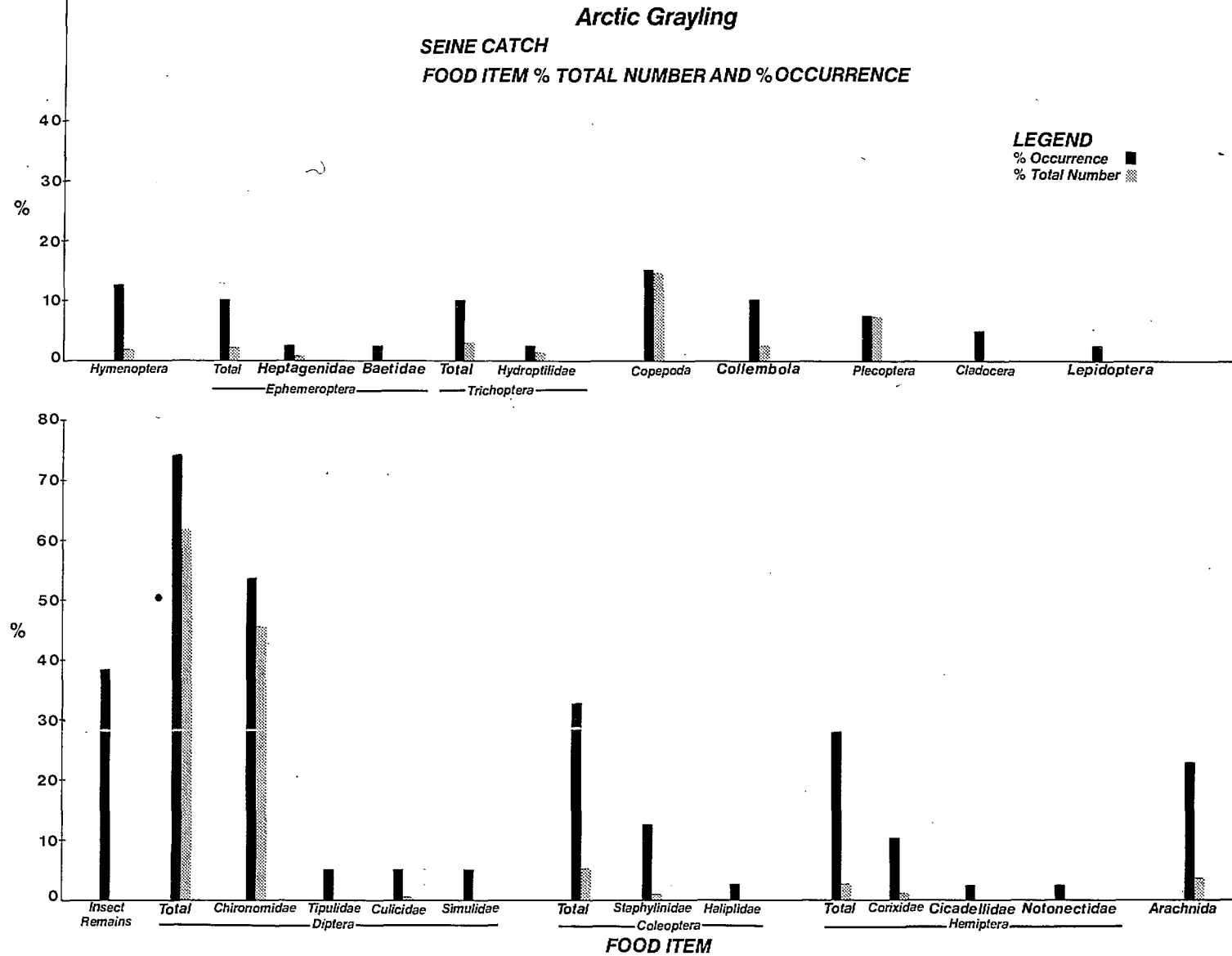
57
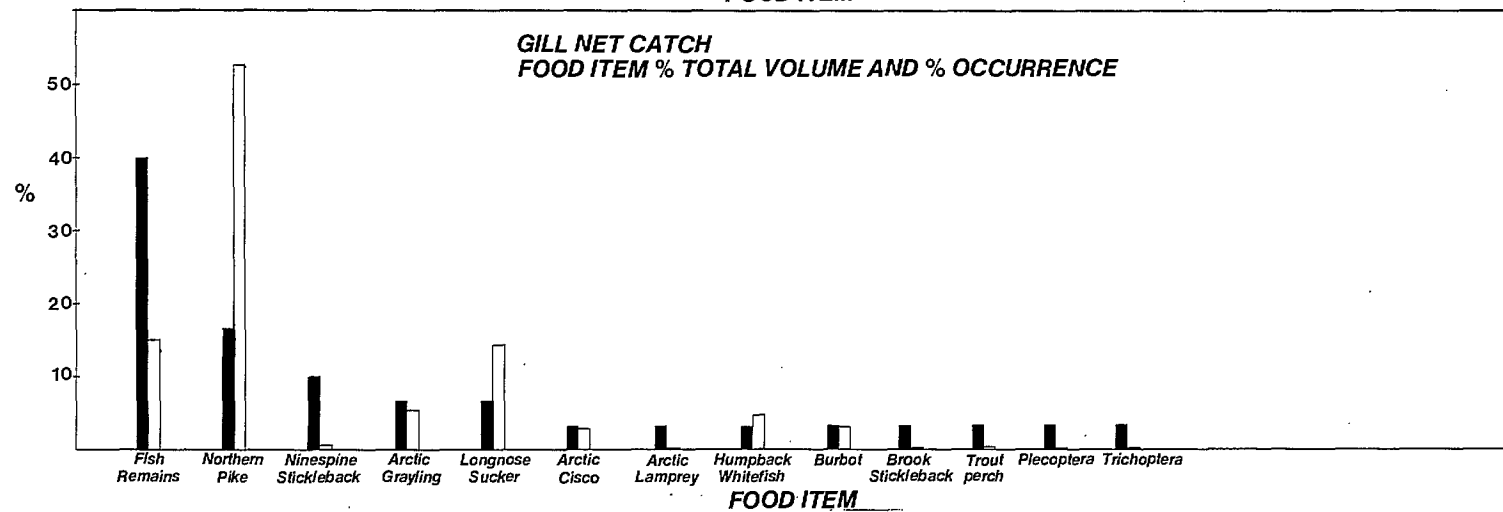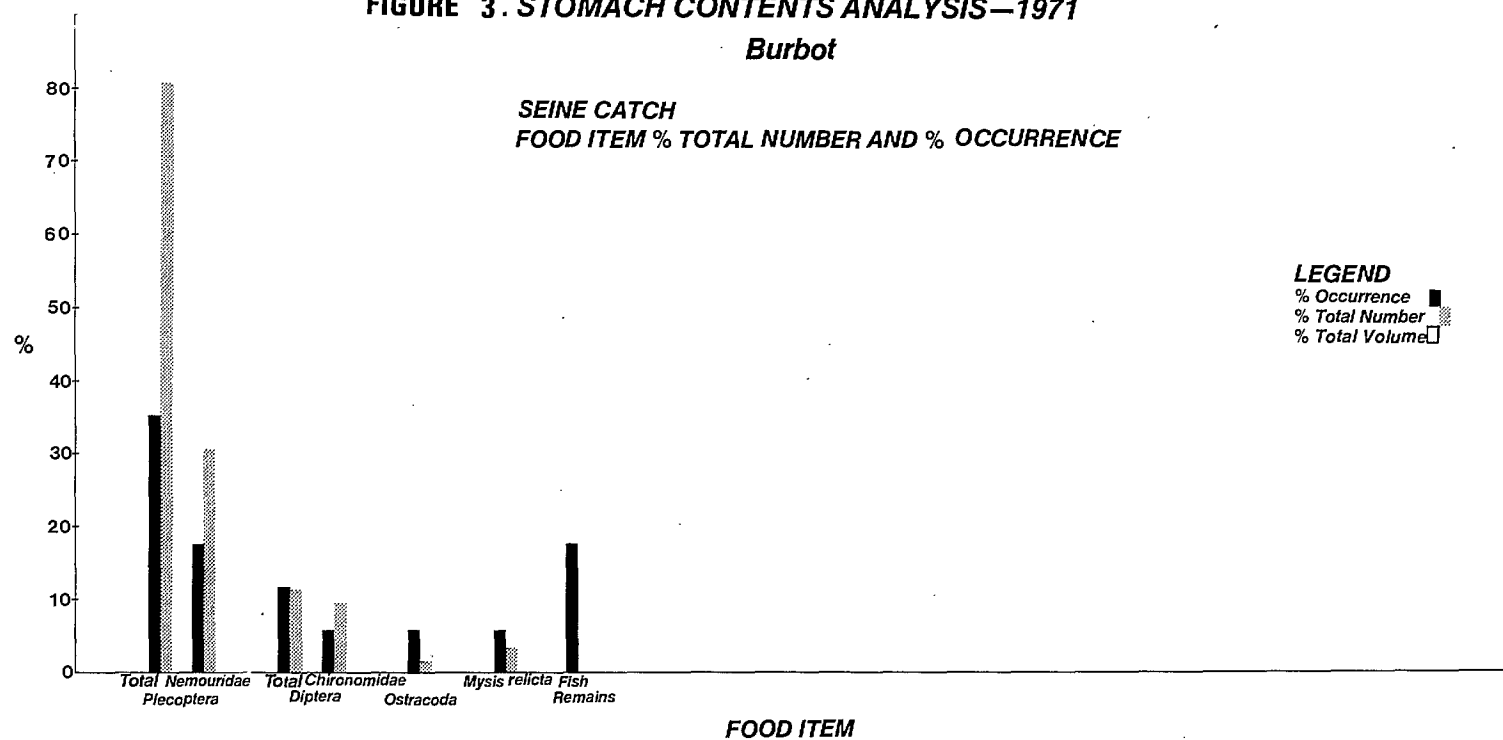
FIGURE 3. STOMACH CONTENTS ANALYSIS—1971
Yellow Walleye

SEINE CATCH

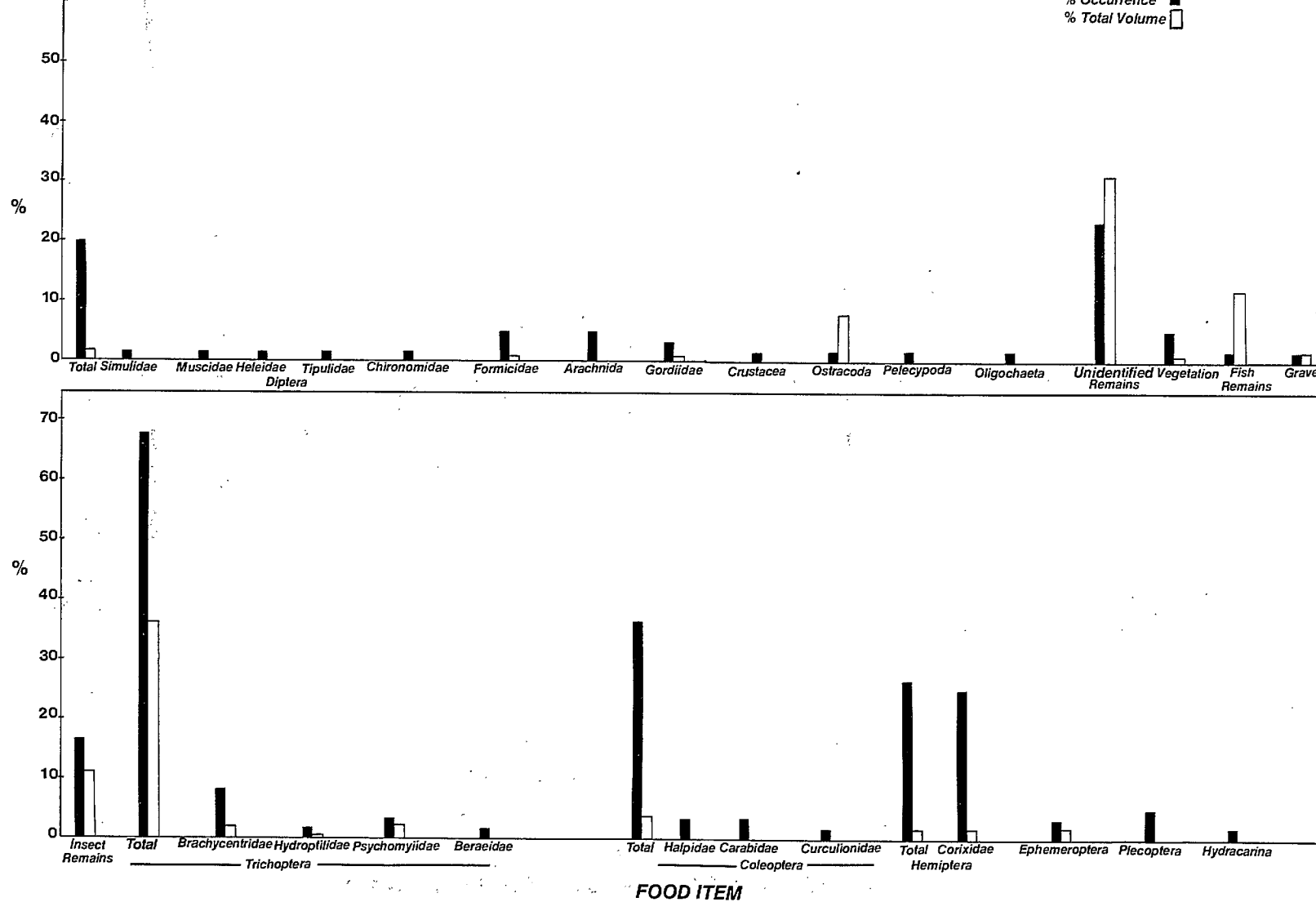FOOD ITEM % TOTAL NUMBER AND % OCCURRENCE

LEGEND
% Occurrence ■
% Total Number ▨
% Total Volume □

GILL NET CATCH

FOOD ITEM % TOTAL VOLUME AND % OCCURRENCE

58
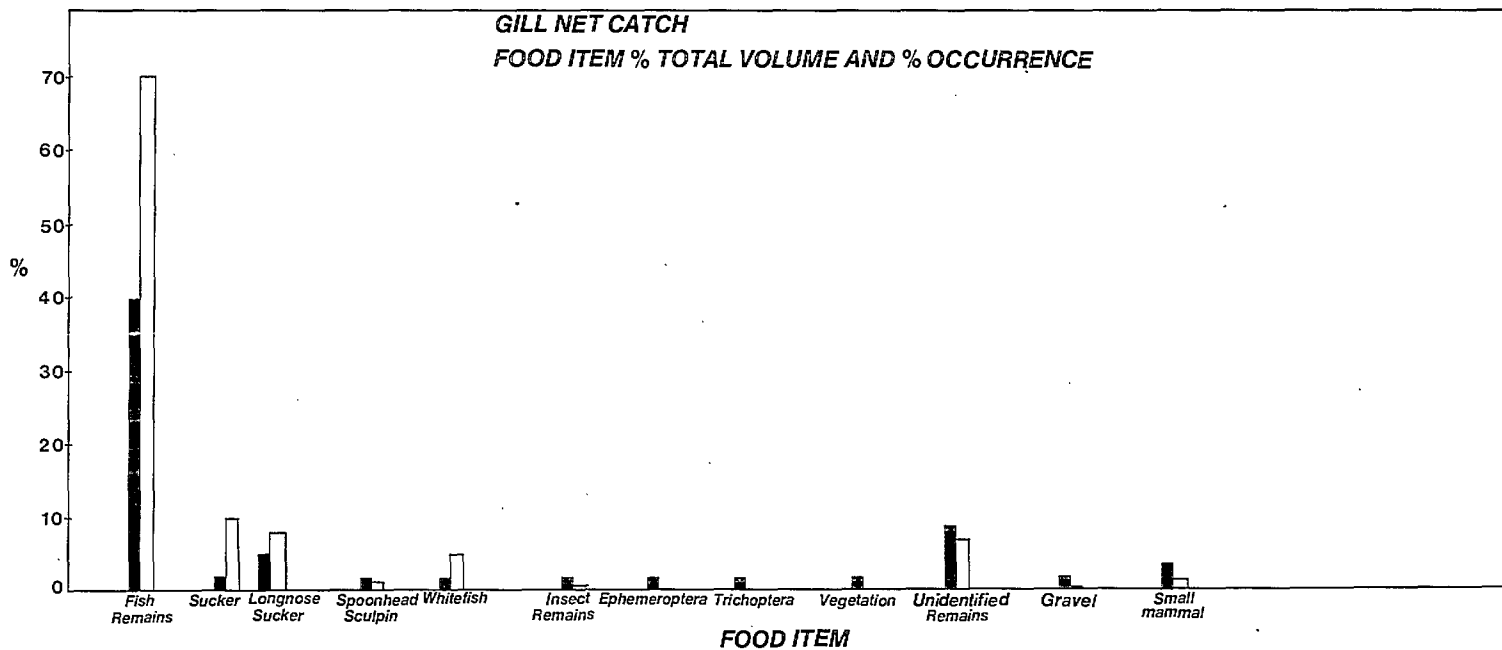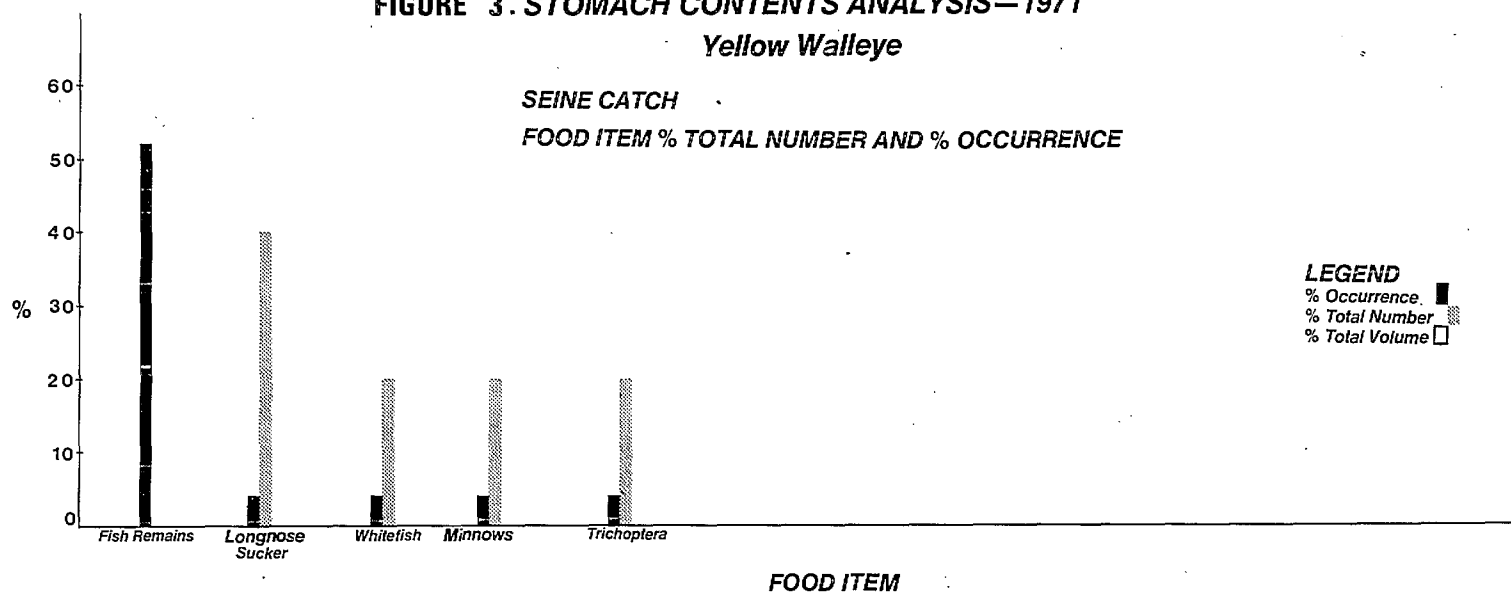
Table 9.

Summary of stomach content results for species not presented in graphical form

Species	Catch Method	Food Item Taxa	% Occurrence	% Total Number	% Total Volume
Goldeye	Gill net	Insect remains	100.0	6.2	58.2
		Coleoptera	50.0	21.6	
		Plecoptera	40.0	28.9	15.5
		Hymenoptera			
		Formicidae	30.0	22.7	5.4
		Diptera	20.0	6.2	1.3
		Trichoptera	10.0	1.0	
		Hemiptera			
		Notonectidae	10.0	1.0	0.4
		Nematomorpha			
		Paragordius sp.	10.0	1.0	0.9
		Homoptera			
		Cicadellidae	10.0	3.1	
Lake cisco	Gill net	Insect remains	20.0		18.5
		Trichoptera	50.0	26.3	18.5
		Hymenoptera	40.0	23.3	16.7
		Formicidae	20.0	15.0	7.4
		Diptera	30.0	2.3	
		Chironomidae			
		Anopheles sp.	10.0	0.8	

Table 9.

Species	Catch Method	Food Item Taxa	% Occurrence	% Total Number	% Total Volume
Lake cisco	Gill net	Plecoptera	30.0	21.8	14.8
		Homoptera	30.0	9.8	7.4
		Cicadellidae	10.0	7.5	7.4
		Hemiptera	30.0	3.8	3.7
		Pentatomidae	20.0	2.3	3.7
		Corixidae	10.0	1.5	
		Coleoptera	20.0	7.5	3.7
		Staphylinidae	10.0	1.5	
		Gastropoda	20.0	3.0	3.7
		Araneida	10.0	0.8	
		Unidentified remains	40.0		13.0
Least cisco	Gill net	Insect remains	30.0	8.3	21.7
		Hemiptera			
		Corixidae	50.0	80.6	34.8
		Trichoptera	10.0	5.6	4.3
		Ostracoda	10.0	5.6	
		Gravel	10.0		39.1
Least cisco	Seine	Insect remains	25.0		
		Diptera	50.0	38.3	
		Chironomidae	50.0	26.6	
		Hymenoptera	37.5	22.3	

Table 9.

Species	Catch Method	Food Item Taxa	% Occurrence	% Total Number	% Total Volume
Least cisco	Seine	Plecoptera	12.5	7.4	
		Copepoda	12.5	3.2	
		Araneida	12.5	2.1	
White sucker	Seine	Diptera	9.1	100.0	
		Chironomidae	9.1	50.0	
		Remains	81.8		
Lake chub	Seine	Insect remains	40.0		
		Hymenoptera			
		Formicidae	20.0	50.0	
		Coleoptera	10.0		
		Plecoptera	10.0	25.0	
		Hemiptera			
		Corixidae	10.0	25.0	
		Remains	10.0		
Spottail shiner	Seine	Insect remains	21.7		
		Hemiptera	8.7		
		Diptera	4.4		
		Remains	17.4		
Emerald shiner	Seine	Insect remains	75.0		
Trout-perch	Seine	Plecoptera	20.0	41.6	
		Isoperla sp.	10.0	33.3	

Table 9.

Species	Catch Method	Food Item Taxa	% Occurrence	% Total Number	% Total Volume
Trout-perch	Seine	Branchiopoda	10.0	8.3	
		Mysidacea			
		Mysis _relicta_	10.0	41.6	
		Nematoda	10.0	8.3	
Slimy sculpin	Seine	Insect remains	40.0		
		Oligochaeta	10.0	38.4	
		Plecoptera	10.0	23.1	
		Trichoptera	10.0	23.1	
		Ephemeroptera	10.0	7.7	
		Nematoda	10.0	7.7	
		Remains	20.0		
Spoonhead sculpin	Seine	Insect remains	20.0		
		Plecoptera	30.0	90.0	
		Isoperla sp.	10.0	50.0	
		Diptera	10.0	10.0	
		Remains	40.0		
Ninespine stickleback	Seine	Diptera			
		Chironomidae	20.0	1.9	
		Copepoda	20.0	1.4	
		Cladocera	20.0	96.8	

6. Catch Summary

Table 10. Summary of gill net catch record from Arctic Red River, all locations combined.
(N = sample size; % = percentage composition; C/E = average catch effort in no. fish/100 yds/hr)

| Species | Time Period - June 21-August 15 | | | | | | | | | | | |
| | June 21 to July 4 | | | July 5 to July 18 | | | July 19 to August 1 | | | August 2 to August 15 | | |
	N	%	C/E	N	%	C/E	N	%	C/E	N	%	C/E
Arctic cisco	82	1.026	35.26	160	39.41	0.723	161	33.19	0.723	208	39.5	0.942
Grayling	10	0.069	4.34	10	2.46	0.033	2	0.42	0.089	1	0.2	0.005
Boreal smelt	2	0.024	0.86				1	0.21	0.004			
Broad whitefish	34	0.267	14.62	35	8.75	0.144	66	13.66	0.320	98	18.6	0.422
Burbot	4	0.029	1.72	3	0.75	0.012	2	0.42	0.009	1	0.2	0.004
Dolly Varden							1	0.21	0.005			
Humpback whitefish	18	0.161	7.74	38	9.50	0.167	96	20.16	0.411	78	14.8	0.348
Inconnu	38	0.377	16.34	59	14.75	0.248	49	10.29	0.220	31	5.4	0.137
Least cisco	2	0.009	0.86	2	0.50	0.010	2	0.42	0.007	4	0.80	0.022
Longnose sucker	8	0.080	3.44	78	7.00	0.122	12	2.52	0.055	13	2.4	0.059
Pike	25	0.201	10.75	50	12.5	0.235	47	9.87	0.215	57	10.8	0.266
Round whitefish												
Walleye	3	0.024	1.29	6	1.50	0.029	12	2.52	0.058	10	1.9	0.042
Flathead chub	2	0.008	0.86	15	3.75	0.065	36	7.56	0.152	28	5.3	0.110
Total	228			406			487			529		

Table 10. Summary of gill net catch record from Arctic Red River, all locations combined.
(N = sample size; % = percentage composition; C/E = average catch effort in no. fish/100 yds/hr)

| Species | Time Period - August 16-October 10 | | | | | | | | | | | | | | |
| | August 16 to August 29 | | | August 30 to September 12 | | | September 13 to September 26 | | | September 27 to October 10 | | | Total | | |
	N	%	C/E	N	%	C/E	N	%	C/E	N	%	C/E	N	%	C/E
Arctic cisco	128	29.7	0.549	19	4.0	0.092				2	1.1	0.024	760	23.41	0.510
Grayling	1	0.2	0.004				6	1.3	0.018	3	1.6	0.026	33	0.39	0.030
Boreal smelt	1	0.2	0.004										4	0.12	0.004
Broad whitefish	126	29.0	0.585	145	30.3	0.741	133	28.9	0.590	39	21.2	0.382	676	21.04	0.444
Burbot	1	0.2	0.004	8	1.7	0.016	15	3.3	0.064	2	1.1	0.020	36	0.96	0.018
Dolly Varden				1	0.2	0.005							2	0.06	0.001
Humpback whitefish	50	11.6	0.226	105	21.9	0.453	95	20.7	0.438	49	26.6	0.475	529	16.19	0.335
Inconnu	25	5.8	0.111	7	1.5	0.037	1	0.2	0.005	1	0.6	0.012	211	6.42	0.143
Least cisco	10	2.3	0.044	143	29.9	0.003	166	36.1	0.898	82	44.6	0.838	411	13.73	0.304
Longnose sucker	7	1.6	0.014	7	1.5	0.035	15	3.3	0.065	2	1.1	0.021	92	2.75	0.056
Pike	52	12.1	0.301	36	7.5	0.209	24	5.2	0.105	4	2.2	0.034	295	9.59	0.196
Round whitefish	1	0.2	0.005				1	0.2	0.004				2	0.06	0.001
Walleye	8	1.9	0.035	3	0.6	0.015	3	0.6	0.012				45	1.39	0.027
Flathead chub	22	5.1	0.091	5	1.0	0.029	1	0.2	0.004				109	3.39	0.057
Total	432			479			460			184			3205		

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Table 10. Summary of gill net catch record from Norman Wells, all locations combined.
(N = sample size; % = percentage composition; C/E = average catch effort in no. fish/100 yds/hr)

| | Time Period - June 21-August 15 | | | | | | | | | | |
| | June 21 to July 4 | | | July 5 to July 18 | | | July 19 to August 1 | | | August 2 to August 15 | | |
	N	%	C/E	N	%	C/E	N	%	C/E	N	%	C/E
Arctic cisco							85	41.06	0.022	119	44.74	0.021
Arctic grayling	40	13.56	0.014	6	6.18	0.002	2	0.97	0.001	4	1.50	0.001
Goldeye				1	1.03	0.003						
Broad whitefish	1	0.03	0.0001				1	0.48	0.0003			
Burbot	1	0.03	0.001				3	1.45	0.001	4	1.50	0.001
Dolly Varden							1	0.45	0.0003			
Humpback whitefish	25	8.47	0.009				9	4.35	0.002	11	4.14	0.002
Inconnu	8	2.71	0.003	4	4.12	0.001	14	6.76	0.004	10	3.76	0.002
Lake cisco										1	0.38	0.0002
Longnose sucker	27	9.15	0.010	27	27.83	0.008	17	8.21	0.005	17	6.39	0.003
Pike	8	2.71	0.003	18	18.55	0.003	13	6.28	0.003	22	8.27	0.004
Yellow walleye	13	4.41	0.005	9	9.28	0.003	12	5.08	0.003	13	4.89	0.002
Flathead chub	172	58.30	0.060	29	29.89	0.008	50	24.15	0.013	65	24.44	0.011
Lake trout				2	2.06	0.001						
	295			96			207			266		

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Table 10. Summary of gill net catch record from Norman Wells, all locations combined.
(N = sample size; % = percentage composition; C/E = average catch effort in no. fish/100 yds/hr)

Species	August 16 to August 29			August 30 to September 12			September 13 to September 26			September 27 to October 10			Total		
	N	%	C/E	N	%	C/E	N	%	C/E	N	%	C/E	N	%	C/E
Arctic cisco	135	52.94	0.014	82	41.00	0.008	22	18.03	0.005	5	4.07	0.003	448	26.77	0.009
Arctic grayling	1	0.39	0.0001	4	2.00	0.0004	26	21.31	0.006	73	59.35	0.039	156	10.24	0.008
Goldeye													1	0.07	0.001
Broad whitefish				1	0.50	0.0001							3	0.20	0.0002
Burbot	1	0.39	0.0001	3	1.50	0.0003	10	8.20	0.002	35	28.46	0.018	57	3.77	0.003
Dolly Varden	1	0.39	0.0001	1	0.50	0.0001	2	1.64	0.0004				5	0.33	0.0001
Humpback whitefish	14	5.49	0.002	21	10.50	0.002	6	4.92	0.001	1	0.81	0.001	87	4.82	0.002
Inconnu	8	3.14	0.001	17	8.50	0.002	5	4.10	0.001				66	0.79	0.002
Lake cisco	2	0.78	0.0002										3	0.20	0.0001
Longnose sucker	11	4.31	0.001	5	2.50	0.0005	13	10.66	0.003				117	8.00	0.004
Pike	34	13.33	0.004	47	23.50	0.005	27	22.13	0.006	8	6.50	0.004	177	11.57	0.004
Yellow walleye	4	1.57	0.0004	4	2.00	0.0004	6	4.92	0.001	1	0.81	0.001	62	4.10	0.002
Flathead chub	44	17.25	0.005	15	7.50	0.002	4	3.28	0.001				379	25.12	0.013
Lake trout							1	0.82	0.0002				3	0.20	0.0002
Total	255			200			122			123			1564		

Time Period - August 16-October 10

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Table 10. Summary of gill net catch record from Fort Simpson, all locations combined.
(N = sample size; % = percentage composition; C/E = average catch effort in no. fish/100 yds/hr)

| Species | Time Period - June 21-August 15 | | | | | | | | | | | |
| | June 21 to July 3 | | | July 5 to July 18 | | | July 19 to August 1 | | | August 2 to August 15 | | |
	N	%	C/E	N	%	C/E	N	%	C/E	N	%	C/E
Arctic grayling	27	6.98	.005	12	2.51	.0024	7	1.79	.0019	9	2.34	.0023
Burbot	2	0.52	.0003	1	0.21	.0002				2	0.52	.0005
Goldeye				6	1.26	.0012	4	1.02	.001	7	1.82	.0018
Humpback whitefish	91	23.51	.0152	48	10.04	.0098	87	22.31	.0238	97	25.19	.0254
Inconnu	6	1.55	.001	9	1.88	.0018	1	0.26	.0002	6	1.56	.0015
Lake cisco	14	3.62	.0023	1	0.21	.0002	3	0.77	.0008	7	1.82	.0018
Longnose sucker	44	11.36	.0073	25	5.23	.0051	36	9.23	.0098	26	6.75	.0068
Northern pike	77	19.00	.0130	216	45.18	.0445	144	36.92	.0394	195	50.64	.0512
Arctic cisco												
Round whitefish	5	1.29	.0008	3	0.63	.0006	4	1.02	.0010			
White sucker	14	3.62	.0023	13	2.72	.0026	26	6.66	.0071	2	0.52	.0005
Yellow walleye	66	17.05	.011	87	18.20	.0179	58	14.87	.0158	16	4.16	.0042
Flathead chub	41	10.59	.0068	57	11.92	.0117	20	5.13	.0054	17	4.42	.0044
Total	387			478			390			384		

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Table 10. Summary of gill net catch record from Fort Simpson, all locations combined.
(N = sample size; % = percentage composition; C/E = average catch effort in no. fish/100 yds/hr)

| | Time Period - August 16-October 10 | | | | | | | | | | | | | | |
| | August 16 to August 29 | | | August 30 to September 12 | | | September 13 to September 26 | | | September 27 to October 10 | | | Total | | |
	N	%	C/E	N	%	C/E	N	%	C/E	N	%	C/E	N	%	C/E
Arctic grayling	4	1.48	.0008	11	7.48	.0024	1	1.35	.0006	4	2.92	.0027	75	3.31	.0034
Burbot	1	0.37	.0002							3	2.19	.0020	9	.34	.0004
Goldeye	2	0.74	.0004										19	.8388	.0005
Humpback whitefish	67	24.81	.0149	28	19.05	.0061	14	18.91	.0085	41	29.93	.0286	473	20.88	.0165
Inconnu	1	0.37	.0002	2	1.36	.0004	1	1.35	.0006	4	2.92	.0027	30	1.33	.0010
Lake cisco	8	2.96	.0017				1	1.35	.0006				34	1.50	.0009
Longnose sucker	24	8.88	.0053	17	11.56	.0037	3	4.05	.0016	13	9.49	.009	188	8.30	.0061
Northern pike	140	51.85	.0311	71	48.23	.0157	46	62.16	.028	70	51.09	.0488	959	42.34	.0339
Arctic cisco	1	0.37	.0002	1	0.68	.0002							2	.09	.0002
Round whitefish				3	2.04	.0006	2	2.70	.0012	1	0.73	.0006	18	.79	.0006
White sucker	7	2.59	.0015	5	3.40	.0011				1	0.73	.0006	68	3.00	.0019
Yellow walleye	10	3.70	.0022	5	3.40	.0011							242	10.68	.0065
Flathead chub	5	1.85	.0011	3	2.04	.0006	5	6.76	.0035				148	6.53	.0041
Total	270			146			73			137			2265		

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Table 11. Summary of seine net catch record data from Arctic Red River, all locations combined for 2-week intervals (N = sample size; % = percentage composition).

Species	June 21 to July 4		July 5 to July 18		July 19 to Aug. 1		Aug. 2 to Aug. 15		Aug. 16 to Aug. 29		Aug. 30 to Sept. 12		Sept. 13 to Sept. 26		Sept. 27 to Oct. 10		Total	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Grayling	1	.17	8	0.7	12	1.2	19	1.7	3	0.5	6	3.8	12	3.4	1	1.7	62	1.2
Lamprey			2	0.2	10	1.0	2	0.2			1	0.6					15	0.3
Burbot	6	1.0	2	0.2	3	0.3	3	0.3	1	0.2							15	0.3
Goldeye					1	0.1											1	
Inconnu							1	0.1					2	0.6			3	0.1
Lake Cisco	1	.17															1	
Least Cisco	1	.17															1	
Longnose Sucker	21	3.5	117	9.8	108	10.6	86	7.9	23	3.7	39	24.7					394	7.7
Northern Pike	2	.30			5	0.5			2	0.3	1	0.6					10	0.2
Pond Smelt	17	2.9					4	0.4			1	0.6					22	0.4
Round Whitefish			5	0.4	2	0.2	1	0.1			1	0.6					9	0.2
Trout-perch	95	16.0	333	28.0	150	14.7	294	27.0	125	20.0	17	10.8	11	3.1	1	1.7	1026	20.2
Walleye					5	0.5	2	0.2	1	0.2							8	0.2
Ninespine Stickleback					1	0.1	6	0.6	3	0.5	19	12.0	26	7.3	18	30.5	73	1.4
Flathead Chub					1	0.1											1	
Spoonhead Sculpin	20	3.4	9	0.8	3	0.3	5	0.5	1	0.2	1	0.6	9	2.5	2	3.4	50	1.0
Slimy Sculpin	3	0.5	4	0.3	5	0.2	3	0.3	1	0.2			1	0.3	1	1.7	18	0.4
Longnose Dace	2	0.3															2	
Spottail Shiner					1	0.1	1	0.1	2	0.3	1	1.9					5	0.1
Brook Stickleback													3	0.8			3	0.1
Whitefish	106	11.8	200	16.8	20	2.0	43	3.9	6	1.0	10	6.3	18	5.0			403	7.9
Salmonids	1	0.17															1	
Cyprinids	1	0.17	2	0.2			2	0.2									5	0.1
Ciscoes	25	4.2	11	0.9	4	0.4	10	0.9	3	0.5	2	1.3	3	0.8			58	1.1
Lake Chub	294	49.5	496	41.7	689	67.5	607	55.7	454	72.7	57	36.1	271	75.8	36	61.0	2904	41.1
Total	596		1188		1020		1089		625		156		356		59		5089	

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Table 11. Summary of seine net catch record data from Norman Wells, all locations combined for 2-week intervals (N = sample size; % = percentage composition).

| Species | Time Interval | | | | | | | | | | | | | | | | |
| | June 21 to July 4 | | July 5 to July 18 | | July 19 to Aug. 15 | | Aug. 2 to Aug. 15 | | Aug. 16 to Aug. 29 | | Aug. 30 to Sept. 12 | | Sept. 13 to Sept. 26 | | Sept. 27 to Oct. 10 | | Total | |
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Grayling	1	0.1	24	1.9	21	0.8	3	0.4	29	9.1	18	6.8	8	2.1	15	0.9	119	1.5
Burbot	36	3.8	13	1.0	8	0.3	1	0.1									58	0.7
Goldeye	1	0.1															1	0.01
Lake Cisco							8	1.2					1	0.3			9	0.1
Least Cisco							4	0.6					1	0.3			5	0.1
Longnose Sucker	202	21.1	47	3.7	43	1.6	377	54.7	42	13.2	34	12.8	27	7.1	26	1.6	798	0.7
Pike	1	0.1	1	0.1	2	0.1	4	0.6	2	0.6	3	1.1	1	0.3			14	0.2
Pond Smelt			1	0.1													1	0.01
Round Whitefish			6	0.5	2	0.1	17	2.5					1	0.3			26	0.3
Trout-perch	99	10.3	167	13.2	221	8.0	54	7.8	5	1.6	6	2.3	2	0.5			554	6.7
Walleye	8	0.8	4	0.3	22	0.8	1	0.1									35	0.4
Ninespine Stickleback					1	0.04			2	0.6	1	0.4	2	0.5	1	0.1	7	0.1
Flathead Chub	32	3.3	8	0.6			6	0.9	1	0.3	2	0.8					49	0.6
Lake Chub	466	48.6	866	68.7	2328	84.4	137	19.9	217	68.5	168	63.2	317	83.4	1551	97.0	6050	73.5
Spoonhead Sculpin	4	0.4	17	1.3	6	0.2	2	0.3					6	1.6	1	0.1	36	0.4
Slimy Sculpin	36	3.8	18	1.4	7	0.3	5	0.7	6	1.9	5	1.9	5	1.3	1	0.1	83	1.0
Spottail Shiner			14	1.1	6	0.2	12	1.7	6	1.9	22	8.3	9	2.4			69	0.8
Longnose Dace			11	0.9							6	2.3					17	0.2
Redbelly Dace					1	0.04									2	0.1	3	0.04
Whitefish	71	7.4	63	5.0	64	2.3	58	8.4	7	2.2	1	0.4					264	3.2
Cyprinids															2	0.1	2	0.02
Salmonids	1	0.1	1	0.1													2	0.02
Suckers					3	0.1											3	0.04
Ciscoes					24	0.9											24	0.3
Total	958		1261		2759		689		317		266		380		1599		8229	

Table 11. Summary of seine net catch record data from Fort Simpson, all locations combined for 2-week intervals. (N = sample size; % = percentage composition).

Species	June 21 to July 4 N	%	July 5 to July 18 N	%	July 19 to Aug. 1 N	%	Aug. 2 to Aug. 15 N	%	Aug. 16 to Aug. 29 N	%	Aug. 30 to Sept. 26 N	%	Sept. 27 to Oct. 10 N	%	Total N	%
Grayling	6	2.6					1	1.0					2	6.7	9	0.7
Burbot											1	1.0			1	0.1
Humpback Whitefish	44	19.2	1	0.6	16	3.9	1	1.0	3	1.1	5	5.2	3	10.0	73	5.6
Lake Cisco	1	0.4			57	14.0			1	0.4					59	4.5
Longnose Sucker	38	16.6	7	4.6	77	18.9	5	5.0	24	8.4	4	4.1	1	3.3	156	12.0
Northern Pike	5	2.2	6	3.9	14	3.4	4	4.0	4	1.4					33	2.5
Round Whitefish							2	2.0							2	0.2
Trout-perch	55	24.0	32	20.9	15	3.7	31	30.7	124	43.7	13	13.4	10	33.0	280	21.5
White Sucker	1	0.4	6	3.9	55	13.5	1	1.0	61	21.5	54	55.7	8	26.7	186	14.3
Yellow Walleye	15	6.6	13	8.5	17	4.2			2	0.7	5	5.2			52	4.0
Lake Chub	25	10.9	7	4.6	10	2.4	3	3.0	12	4.2	1	1.0			58	4.5
Spoonhead Sculpin							1	1.0							1	0.1
Slimy Sculpin													2	6.7	2	0.2
Spottail Shiner	10	4.4	3	2.0	62	15.2	38	37.6	12	4.2	4	4.1	3	10.0	132	10.1
Longnose Dace									1	0.4					1	0.1
Emerald Shiner	17	7.4	15	9.8	3	0.7	14	13.9	29	10.2	2	2.1	1	3.3	80	6.1
Whitefish					2	0.5			11	3.9					14	1.1
Suckers	11	4.8	62	40.5	7	1.7									80	6.1
Sculpins			1	0.6											1	0.1
Ciscoes					26	6.4					1	1.0			27	2.1
Goldeye	1	0.4													1	0.1
Other					47	11.5					7	7.2			54	4.2
Total	229		153		408		101		284		97		30		1302	

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B. FISH CONTAMINATION

Table 12. Mean concentration (ppm) of mercury, lead, zinc, copper and cadmium in the muscle tissue of fish from the three Mackenzie River study areas, Mackenzie River, 1971.

Species	Base	N	Wt. Range	Hg	Pb	Zn	Cu	Cd
Humpback whitefish	FS[1]	4	656-2056	0.14	0.05	4.7	0.24	0.09
	AR	3	653-2270	0.02	0.13	6.99	0.47	0.03
	all	7		0.09	0.07	5.34	0.34	0.06
Arctic cisco	NW	4	439-662	0.00	0.03	8.78	0.56	0.02
	AR	2	539-908	0.00	0.01	8.55	0.60	0.02
	all	6		0.00	0.02	8.70	0.57	0.02
Longnose sucker	FS	4	478-1226	0.08	0.14	5.38	0.31	0.13
	NW	4	322-1301	0.03	0.04	9.51	0.42	0.12
	all	8		0.06	0.06	7.44	0.37	0.12
Northern pike	FS	4	592-2380	0.09	0.05	5.0	0.28	0.18
	NW	4	203-1002	0.07	0.03	9.02	0.32	0.05
	AR	2	227-284	0.12	0.00	6.06	0.27	0.005
	all	10		0.08	0.03	6.81	0.29	0.09
Inconnu	AR	4	398-3547	0.08	0.0	3.64	0.28	0.01

[1] FS - Fort Simpson

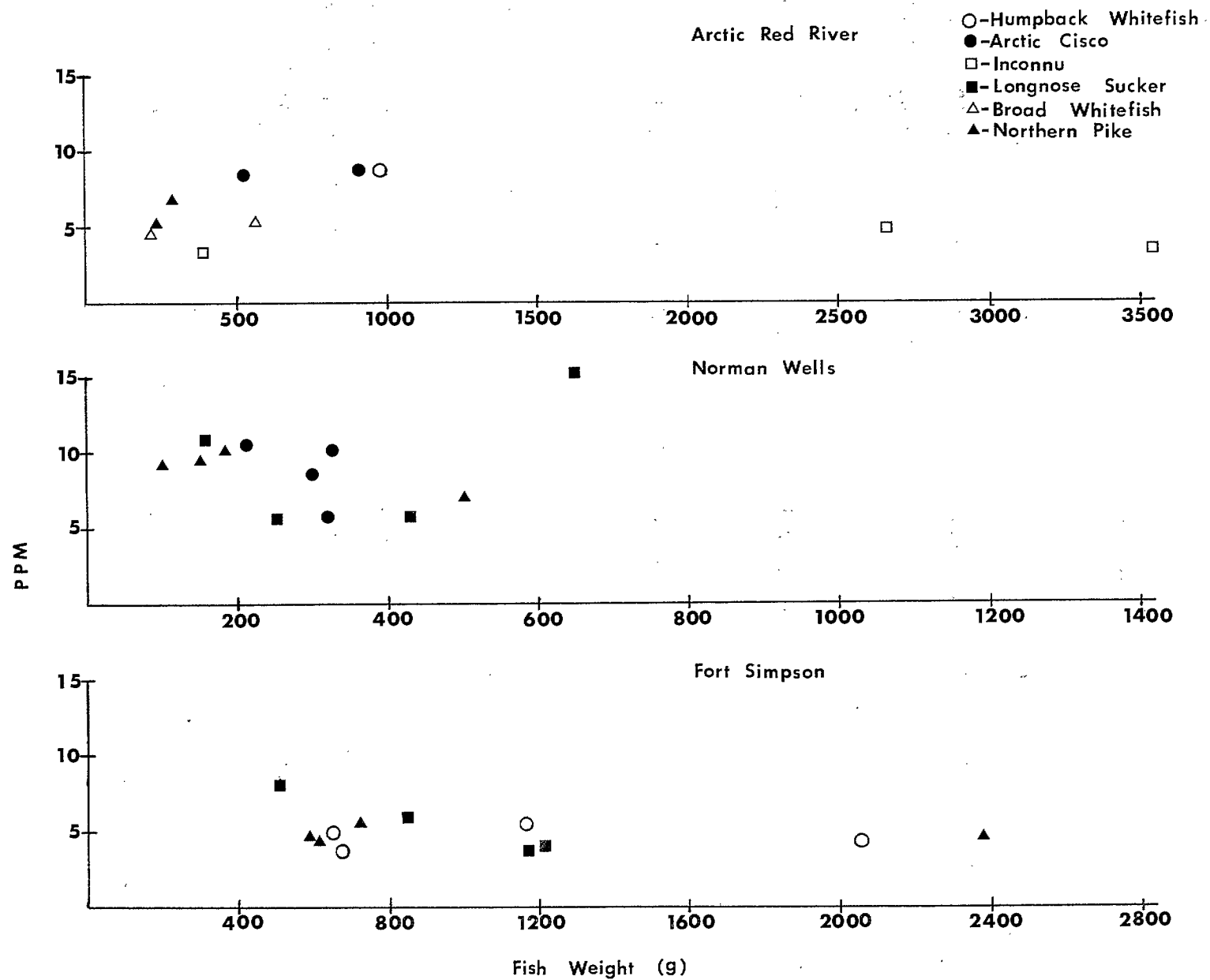NW - Norman Wells

AR - Arctic Red River

Figure 4.   Concentration of zinc in the muscle tissue of fish from the three Mackenzie River study areas, 1971.

Table 13.   Mean concentration (ppm) of mercury, lead, zinc, copper and cadmium in the livers of fish from the three study areas Mackenzie River, 1971.

Species	Base	N	Wt. Range	Hg	Pb	Zn	Cu	Cd
Humpback whitefish	FS[1]	6	700-1662	0.27	0.03	33.52	10.38	0.40
	AR	3	1135-1589	0.13	0.06	46.96	29.20	0.0
	all	9		0.22	0.04	38.00	16.65	0.27
Broad whitefish	AR	6	1844-2298	0.19	0.00	32.79	20.10	0.20
Arctic cisco	NW	3	662-814	0.12	0.00	30.43	3.87	0.08
Inconnu	AR	3	3547-	0.14	0.21	26.27	11.45	0.05
Longnose sucker	FS	5	759-1916	0.06	0.17	27.17	2.90	0.29
	NW	3	856-1301	0.07	0.00	35.51	5.48	0.54
	all	8		0.06	0.10	30.30	3.87	0.38
Northern pike	FS	7	928-3552	0.03	0.02	28.64	5.42	0.03

[1]FS - Fort Simpson

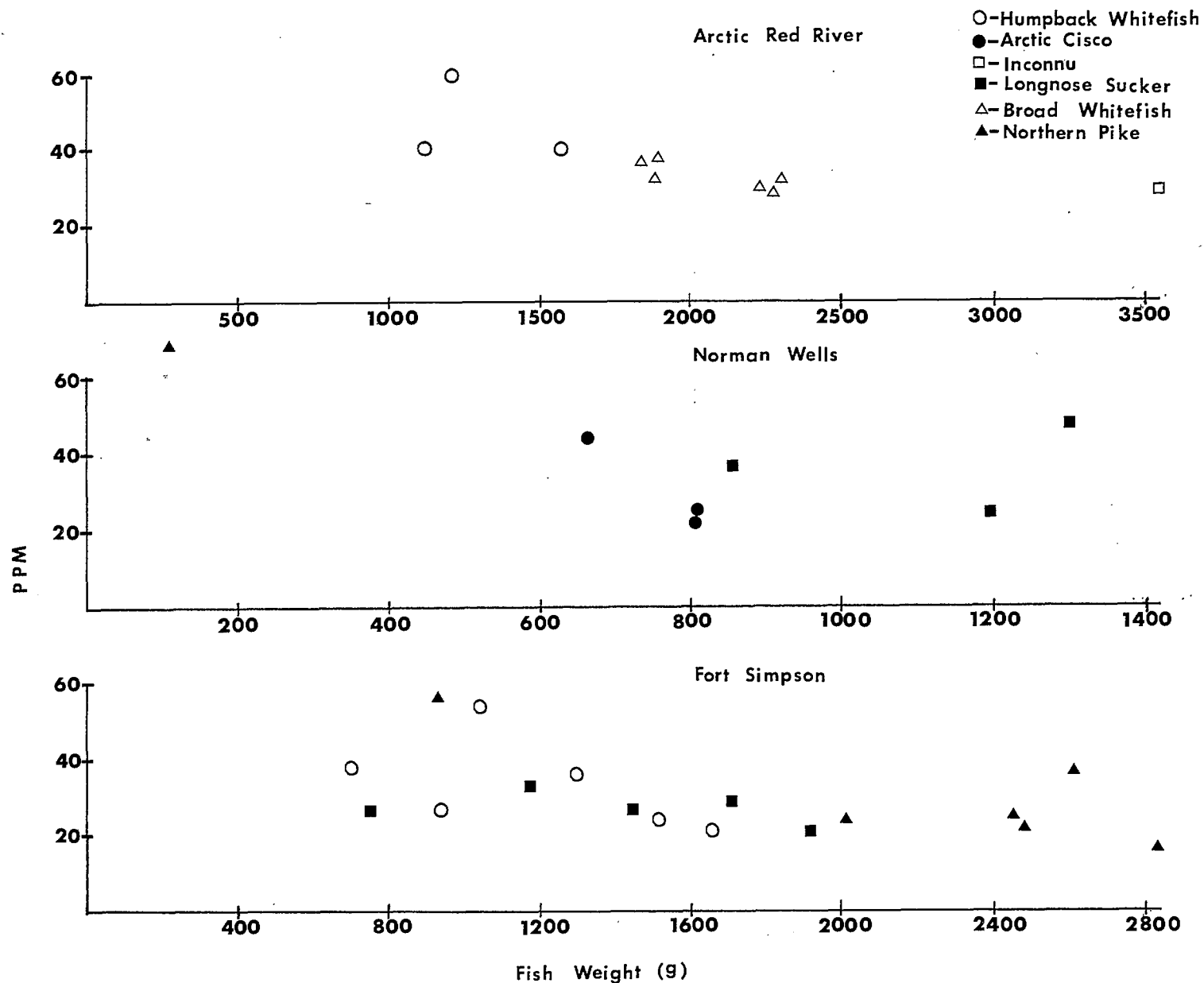NW - Norman Wells

AR - Arctic Red River

Figure 5.   Concentration of zinc in the liver tissue of fish from the three Mackenzie River study areas, 1971.

Table 14. Chlorinated hydrocarbon levels found in some Mackenzie River whole fish samples, 1971[1].

Species	Location	No. Samples Averaged	o,p'-DDT[2] (ppm)	o,p'-DDE (ppm)
Least Cisco	Arctic Red River	7	0.20	0.73
Arctic Cisco	Arctic Red River	1	0.07	0.25
	Norman Wells	4	0.03	0.07
Humpback Whitefish	Arctic Red River	1	0.05	0.40
	Fort Simpson	4	0.02	0.07
Yellow Walleye	Arctic Red River	1	0.09	0.35
Flathead Chub	Arctic Red River	2	0.35	0.75
Northern Pike	Arctic Red River	1	0.75	1.05
	Norman Wells	4	0.03	0.30
	Fort Simpson	4	0.01	0.03
Longnose Sucker	Norman Wells	4	0.02	0.19
	Fort Simpson	4	0.02	0.13
Broad Whitefish	Fort Simpson	1	0.02	0.35
All Species	Arctic Red River	13	0.29	0.67
All Species	Norman Wells	12	0.02	0.17
All Species	Fort Simpson	13	0.02	0.12

1. Similar samples analysed by J. Rienke, Fisheries Research Board, Winnipeg, yielded only trace amounts of o,p'-DDT or o,p'-DDE.

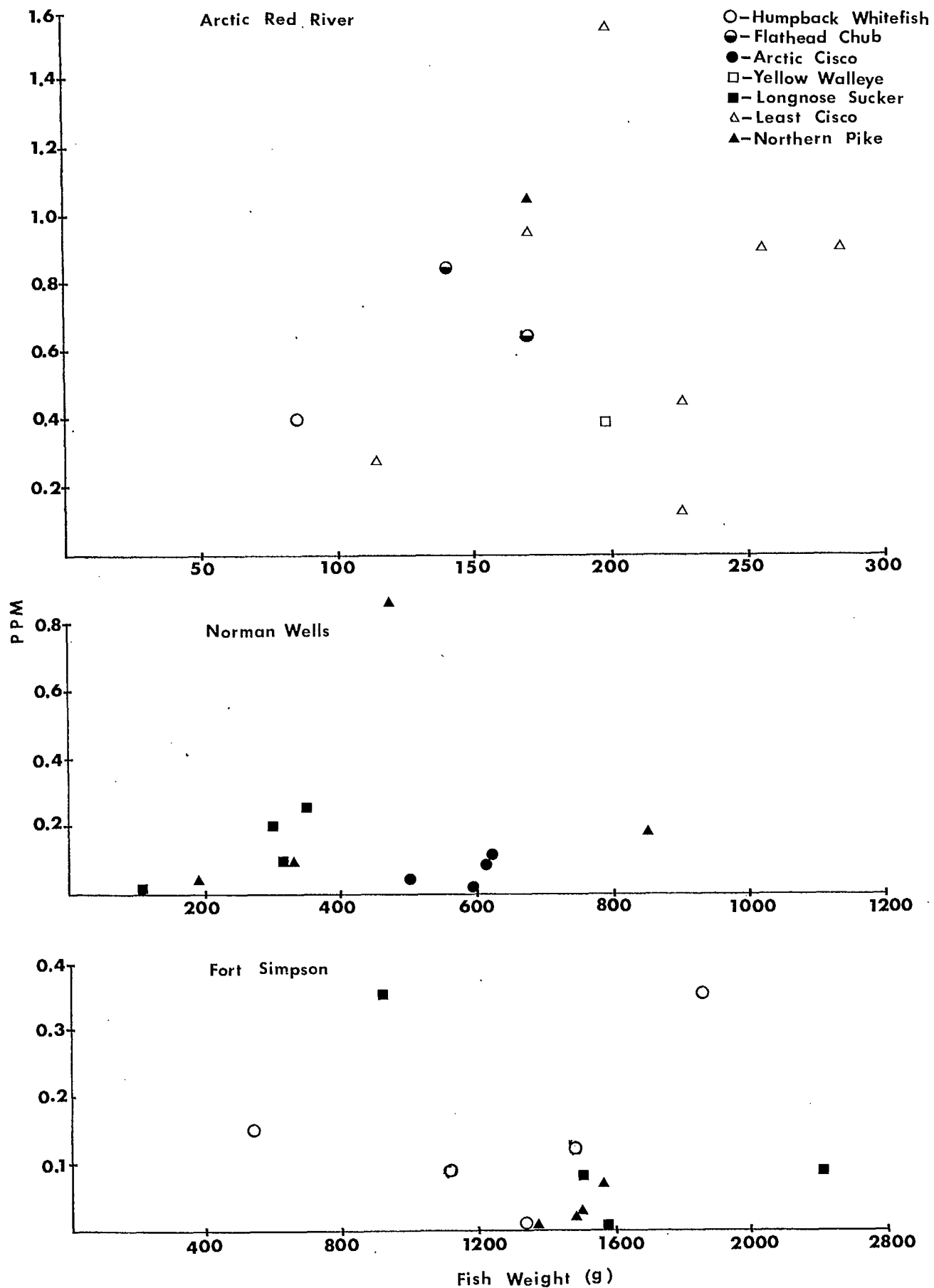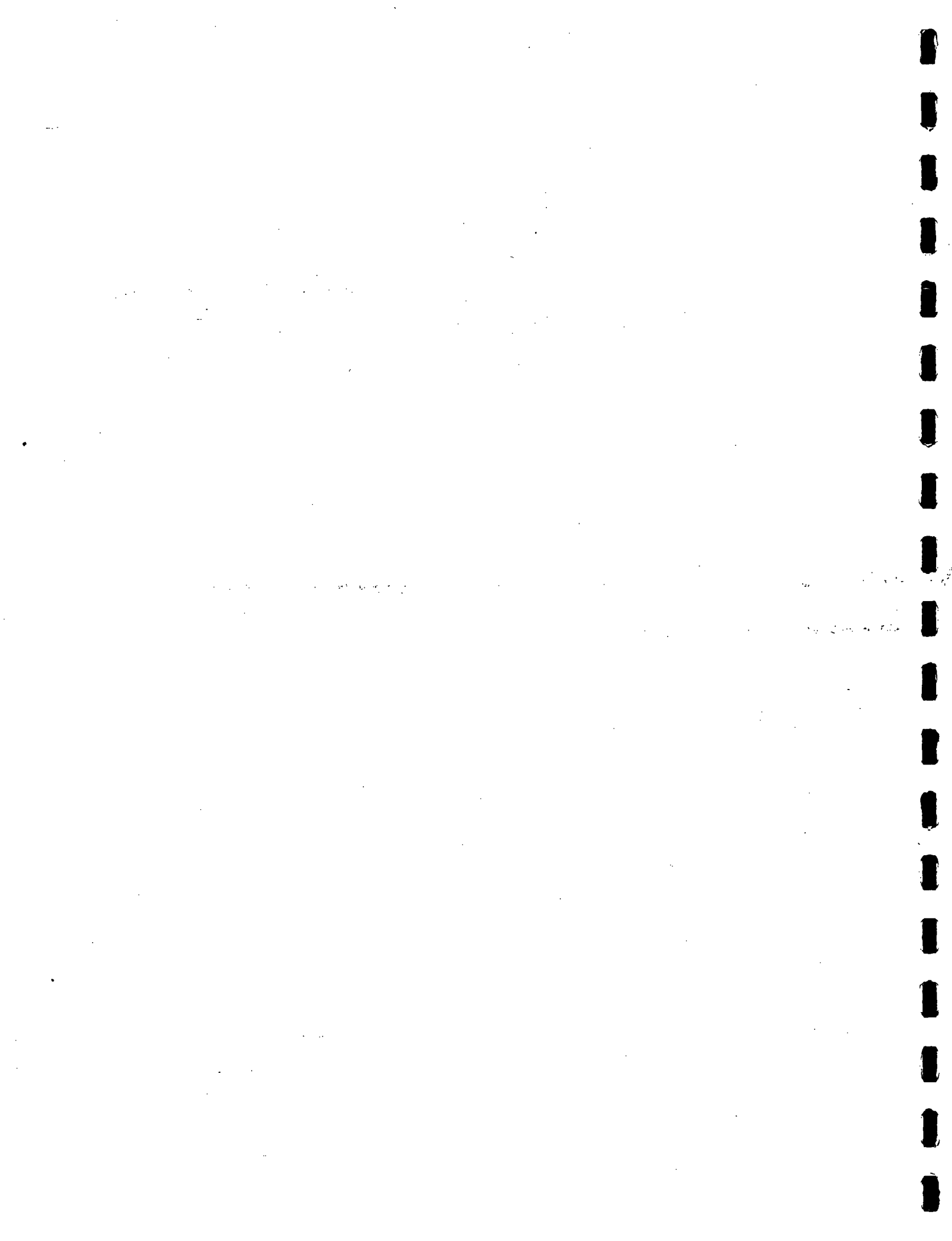2. No DDT or DDE was found.

Figure 6.   Concentration of o,p' - DDE in whole fish samples from the three Mackenzie River study areas, 1971.

C. WINTER SURVEY

Table 15. Water chemistry, ice depths, and weather during the winter survey

Date	Area	Location	Weather Air Temp. F (C)	Ice Depth. (cm)	Water Colour	Water Temp. (C)	D.O. (ppm)	pH	Alkalinity (ppm)	Hardness (ppm)
07-12-71	Fort Simpson	McGill L.	-37 (-38)	31	Clear	0	11	8	137	154
07-12-71	Fort Simpson	Trout L. at mouth of Island R.	-37 (-38)	31	Clear	0	5	7.5	86	205
07-12-71	Fort Simpson	Mackenzie R. at Fort Simpson	-37 (-38)	31	Clear	0	13	8	171	257
09-12-71	Fort Norman	Mackenzie R. at Fort Norman	-20 (-29)	122	Clear	0	10	8	103	120
09-12-71	Norman Wells	Kelly L.	-20 (-29)	61	Clear	0	10	8	188	257
10-12-71	Norman Wells	Mackenzie R. at Norman Wells D.O.T. Cr. mouth	-30 (-34)	61	Clear	0	13	8	103	120
13-12-71	Arctic Red River	Mouth of Arctic Red R.	-49 (-45)	91	Clear	0	13	7.5	137	205

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Table 16. Catch record of fish sampled from the domestic fishery during the winter survey.

Date of Capture (Approximate)	Location	Area	Mesh	Species	Number Sampled	Average Length (mm)	Average Weight (g)
05-12-71	McGill L.	Fort Simpson	4½	Walleye	4	512.3	1769
				Humpback whitefish	1	410.0	1134
				Pike	1	510.0	1043
				White sucker	1	553.0	2722
05-12-71	Trout L.	Fort Simpson	4½	Burbot	12	684.6	2858
				Humpback whitefish	6	374.0	726
				Lake trout	9	546.2	1678
				Pike	1	630.0	2268
				Longnose sucker	15	425.2	1089
11-71	Kelly L.	Norman Wells	4½	Humpback whitefish	5	411.0	998
11-71	Lake - 68°21'N. 133°47'W.	Inuvik		Humpback whitefish	4	443.3	1361
				Broad whitefish	3	434.3	1043
11-71	Mackenzie R. (main channel)	Inuvik		Broad whitefish	1	495.0	1814
11-71	Mackenzie R. (east channel)	Inuvik		Inconnu	3	688.3	3583
10&11-71	Mouth of Arctic Red R.	Arctic Red R.	5	Broad whitefish	23	488.2	1860
				Humpback whitefish	6	441.7	1089
11&12-71	Mouth of Aklavik Channel	Aklavik	5½	Burbot	3	664.3	1905
				Pike	2	607.5	2041
				Inconnu	5	711.0	5126

D.   WATER CHEMISTRY

Table 17. Water chemistry parameters determined for tributaries in the three study areas, Mackenzie River, 1971.

Table 17.

Stream	Date	Turbidity (JTU)	Temp. (C)	pH	Dissolved Copper (ppm)	Dissolved Lead (ppm)	Dissolved Zinc (ppm)	Specific Conductance (Micro MHOS/cm)	Total Alkalinity (mg/1)	Total Hardness (mg/1)
Fort Simpson Area										
Trout R.	16/7/71	1.3	17.0	8.1	*L0.001	L0.005	0.016	180.0	79.3	86.9
Jean-Marie Cr.	1/7/71	1.2	22.0	8.3	0.001	L0.005	0.001	288.0	136.0	143.0
	16/7/71	1.2	20.0	8.2	0.001	L0.005	0.004	312.0	145.0	152.0
	29/7/71	1.4	--	8.4	L0.001	0.013	0.002	333.0	154.0	161.0
	13/8/71	0.8	14.5	8.6	0.002	L0.006	0.002	328.0	158.0	160.0
Spence R.	1/7/71	3.5	20.0	8.0	0.001	0.018	0.001	265.0	91.3	113.0
	16/7/71	1.3	20.0	8.3	0.002	L0.005	0.002	240.0	80.2	102.0
	13/8/71	1.4	16.5	8.4	0.002	0.006	0.002	204.0	63.6	83.1
	27/8/71	18.0	--	8.1	0.005	L0.008	0.002	238.0	79.6	100.0
Rabbitskin R.	1/7/71	2.5	20.0	8.0	0.008	0.010	0.009	246.0	99.4	118.0
	16/7/71	1.9	20.0	8.1	0.001	L0.005	0.028	257.0	102.0	118.0
	13/8/71	2.4	18.0	8.3	0.002	L0.006	0.002	260.0	112.0	117.0
	27/8/71	2.8	--	8.0	0.005	L0.008	0.005	275.0	112.0	121.0
	23/9/71	7.5	8.5	8.3	0.003	L0.018	0.002	280.0	117.0	127.0
	7/10/71	4.8	--	8.1	0.003	0.014	0.005	283.0	119.0	129.0
Liard R.	1/7/71	140.0	13.0	7.9	0.002	L0.005	0.001	209.0	79.3	107.0
	16/7/71	19.0	17.0	8.5	0.002	L0.005	0.14	411.0	210.0	219.0
	13/8/71	42.0	19.0	8.3	L0.001	L0.006	0.003	267.0	108.0	133.0
	27/8/71	36.0	--	8.2	0.004	L0.008	0.003	281.0	107.0	136.0
	10/9/71	150.0	11.0	8.1	0.002	L0.006	L0.001	282.0	103.0	136.0
	26/9/71	19.0	8.0	8.3	0.001	L0.018	L0.001	291.0	117.0	147.0
	8/10/71	11.0	--	8.1	0.002	0.007	0.001	312.0	120.0	152.0

* L - Less Than

Table 17.

Stream	Date	Turbid-ity (JTU)	Temp. (C)	pH	Dis-solved Copper (ppm)	Dis-solved Lead (ppm)	Dis-solved Zinc (ppm)	Specific Conduc-tance (Micro MHOS/cm)	Total Alkalinity (mg/1)	Total Hard-ness (mg/1)
Harris R.	25/6/71	3.7	18.5	7.9	0.002	*L0.003	L0.001	247.0	84.4	125.0
	8/7/71	1.5	--	8.1	0.001	L0.008	L0.001	278.0	99.7	131.0
	22/7/71	6.2	16.0	8.1	0.001	L0.006	0.002	262.0	89.9	146.0
	5/8/71	6.7	18.0	8.0	0.001	L0.008	0.011	278.0	97.4	119.0
	19/8/71	3.3	18.0	8.1	0.007	L0.008	0.003	392.0	152.0	182.0
	3/9/71	17.0	13.0	8.4	0.003	L0.004	0.004	412.0	156.0	184.0
	1/10/71	13.0	--	8.2	0.001	L0.008	L0.001	233.0	79.0	98.4
Martin R.	25/6/71	6.6	19.0	8.0	0.001	L0.003	L0.001	278.0	127.0	141.0
	9/7/71	6.6	16.0	8.5	0.002	L0.008	0.005	311.0	145.0	158.0
	22/7/71	4.2	15.0	8.4	0.001	L0.006	0.004	315.0	148.0	160.0
	5/8/71	7.6	20.0	8.3	0.002	L0.008	0.006	331.0	152.0	167.0
	19/8/71	4.5	19.0	8.3	0.007	L0.008	L0.001	370.0	173.0	190.0
	3/9/71	5.7	12.0	8.7	0.001	0.009	0.002	404.0	190.0	207.0
	30/9/71	11.0	--	8.0	0.001	L0.008	L0.001	241.0	100.0	120.0
Trail R.	25/6/71	2.6	16.0	7.7	0.001	L0.003	L0.001	167.0	60.1	80.7
	8/7/71	2.2	17.5	8.1	0.001	L0.008	L0.001	192.0	76.6	94.6
	22/7/71	3.7	15.0	8.0	L0.001	L0.006	0.004	183.0	70.4	86.1
	19/8/71	2.4	16.0	7.6	L0.014	L0.008	0.003	441.0	103.0	122.0
	2/9/71	2.7	11.5	8.2	0.002	L0.004	0.002	430.0	113.0	131.0

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* L - Less Than

Table 17.

Stream	Date	Turbidity (JTU)	Temp. (C)	pH	Dissolved Copper (ppm)	Dissolved Lead (ppm)	Dissolved Zinc (ppm)	Specific Conductance (Micro MHOS/cm)	Alkalinity (mg/1)	Total Hardness (mg/1)
Norman Wells Area										
Oscar Cr.	16/7/71	7.8	15.0	8.0	0.003	*L0.005	0.006	568.0	140.0	209.0
	1/8/71	15.0	19.0	7.9	0.001	L0.008	0.002	520.0	137.0	199.0
	27/8/71	17.0	14.0	8.2	0.007	L0.008	0.002	360.0	124.0	158.0
	11/9/71	8.4	8.5	8.2	0.001	L0.006	L0.001	400.0	127.0	166.0
	25/9/71	8.8	--	8.3	0.001	L0.018	L0.001	431.0	135.0	178.0
Trapper Cr.	16/7/71	125.0	8.0	7.9	0.006	L0.005	0.003	69.0	40.8	61.0
	1/8/71	3.3	--	7.3	0.004	L0.008	0.008	104.0	32.6	51.2
	13/8/71	15.0	10.0	5.8	0.005	L0.006	0.019	60.0	4.0	34.7
	27/8/71	16.0	14.0	7.6	0.003	L0.008	0.002	58.0	19.5	32.6
	11/9/71	8.7	8.0	7.5	0.001	L0.004	0.001	64.0	19.4	33.7
	25/9/71	7.3	6.0	7.2	0.002	L0.018	0.001	64.0	20.0	35.7
Vermilion Cr.	25/6/71	145.0	--	7.9	0.005	L0.008	0.004	840.0	117.0	437.0
	9/7/71	23.0	--	8.3	0.001	L0.008	0.001	1200.0	146.0	653.0
	25/7/71	0.9	18.0	8.3	0.003	0.007	0.003	472.0	189.0	810.0
	7/8/71	18.0	--	8.2	0.004	L0.008	0.007	615.0	108.0	307.0
	22/8/71	29.0	--	7.3	0.006	L0.008	0.004	320.0	95.2	143.0
	3/9/71	2.3	9.0	8.3	0.002	0.005	0.002	850.0	161.0	456.0
	17/9/71	3.3	6.0	8.4	0.002	L0.010	0.001	993.0	169.0	561.0
Slater R.	25/6/71	17.0	15.0	8.0	0.002	0.008	0.003	457.0	179.0	124.0
	9/7/71	94.0	16.5	8.0	0.002	L0.008	0.003	268.0	80.8	111.0
	25/7/71	13.0	16.0	7.4	0.004	L0.006	0.008	173.0	24.2	67.7
	7/8/71	37.0	16.5	7.8	0.004	0.008	0.009	301.0	37.0	113.0

* L - Less Than

98

Table 17.

Stream	Date	Turbidity (JTU)	Temp. (C)	pH	Dissolved Copper (ppm)	Dissolved Lead (ppm)	Dissolved Zinc (ppm)	Specific Conductance (Micro MHOS/cm)	Total Alkalinity (mg/1)	Total Hardness (mg/1)
Slater R. (cont'd.)						*				
	22/8/71	70.0	12.0	7.8	0.005	L0.008	0.005	259.0	64.6	107.0
	3/9/71	13.0	9.0	7.6	0.005	L0.004	0.008	229.0	33.0	84.4
	17/9/71	7.8	5.0	7.3	0.003	L0.010	0.010	234.0	35.0	90.7
	3/10/71	9.2	2.0	7.3	0.002	L0.008	0.011	233.0	27.4	79.5
Brackett R.	24/6/71	23.0	--	7.9	0.001	L0.008	0.002	332.0	75.0	103.0
	24/7/71	11.0	19.0	8.1	0.001	0.007	0.004	488.0	100.0	142.0
	7/8/71	61.0	13.0	8.0	0.001	0.006	0.001	533.0	110.0	154.0
	21/8/71	11.0	--	7.9	0.003	L0.008	L0.001	525.0	107.0	150.0
	2/9/71	16.0	10.0	8.1	0.002	L0.004	0.002	425.0	95.5	136.0
Great Bear R.	24/6/71	48.0	--	8.0	0.001	L0.008	0.004	192.0	65.1	86.6
	9/7/71	84.0	8.0	7.9	0.001	L0.008	0.002	207.0	69.5	90.7
	25/7/71	2.4	11.0	8.1	0.002	0.029	0.076	164.0	53.8	67.7
	7/8/71	1.6	10.0	8.1	L0.001	L0.006	0.002	164.0	55.5	68.7
	3/9/71	17.0	9.0	8.2	L0.001	0.005	0.001	170.0	56.4	71.4
	17/9/71	6.2	5.0	8.0	0.001	L0.010	0.001	356.0	84.3	117.0
Mountain R.	16/7/71	100.0	12.0	8.1	0.002	L0.005	0.14	264.0	131.0	131.0
	1/8/71	72.0	--	8.3	L0.001	L0.008	0.008	333.0	107.0	159.0
	12/8/71	150.0	10.0	8.2	0.003	0.011	0.005	290.0	101.0	141.0
	27/8/71	56.0	11.0	7.7	0.009	0.024	0.090	478.0	133.0	179.0
	11/9/71	31.0	6.5	8.0	L0.001	L0.004	0.001	402.0	125.0	194.0
	24/9/71	32.0	5.0	8.3	L0.001	0.018	0.001	387.0	123.0	192.0
Bluefish Cr.	22/8/71	37.0	--	8.0	0.004	L0.008	0.002	343.0	95.0	136.0
	3/9/71	1.4	10.0	8.1	0.001	0.013	0.002	470.0	126.0	192.0

* L - Less Than

90

Table 17.

Stream	Date	Turbidity (JTU)	Temp. (C)	pH	Dissolved Copper (ppm)	Dissolved Lead (ppm)	Dissolved Zinc (ppm)	Specific Conductance (Micro MHOS/cm)	Total Alkalinity (mg/1)	Total Hardness (mg/1)
Bluefish Cr. (cont'd.)										
	17/9/71	2.2	6.5	8.1	*L0.001	L0.010	L0.001	398.0	116.0	174.0
	3/10/71	1.4	3.0	8.2	L0.001	L0.008	0.001	413.0	116.0	176.0
Little Bear R.	25/6/71	59.0	--	7.8	0.002	L0.008	0.004	520.0	81.3	138.0
	9/7/71	38.0	17.0	7.9	0.003	L0.008	0.003	471.0	86.9	136.0
	25/7/71	160.0	11.0	7.7	0.005	L0.006	0.008	288.0	65.9	94.7
	7/8/71	48.0	--	8.3	0.001	0.007	0.013	264.0	91.7	116.0
	3/9/71	58.0	9.0	8.0	0.002	0.004	0.003	350.0	71.4	115.0
	16/9/71	27.0	6.0	7.9	0.002	L0.010	0.001	378.0	74.6	122.0
	3/10/71	21.0	3.0	8.0	0.002	L0.008	0.001	404.0	77.3	126.0
Prohibition Cr.	25/6/71	210.0	--	7.7	0.002	L0.008	0.001	271.0	82.0	123.0
	9/7/71	86.0	--	8.1	0.001	L0.008	0.001	222.0	73.6	97.6
	7/8/71	26.0	--	8.3	0.001	L0.006	0.006	304.0	101.0	138.0
Carcajou R.	16/7/71	125.0	15.0	7.8	0.002	L0.005	0.30	550.0	94.8	156.0
	1/8/71	110.0	--	7.9	0.002	0.008	0.003	421.0	101.0	143.0
	12/8/71	110.0	14.0	8.2	0.003	L0.006	0.004	427.0	118.0	171.0
	27/8/71	71.0	12.0	7.8	0.005	L0.008	0.002	453.0	93.3	147.0
	11/9/71	28.0	8.0	8.1	0.001	L0.004	L0.001	574.0	114.0	181.0
	24/9/71	27.0	6.0	8.2	0.001	L0.018	L0.001	553.0	106.0	178.0
Loon Cr.	17/7/71	54.0	15.0	7.7	0.011	L0.005	0.16	323.0	48.1	110.0
	28/8/71	95.0	8.0	7.8	0.007	L0.008	0.007	197.0	42.9	79.7
	11/9/71	22.0	--	7.7	L0.010	L0.006	0.002	222.0	48.3	86.8

* L - Less Than

51

Table 17.

Stream	Date	Turbidity (JTU)	Temp. (C)	pH	Dissolved Copper (ppm)	Dissolved Lead (ppm)	Dissolved Zinc (ppm)	Specific Conductance (Micro MHOS/cm)	Total Alkalinity (mg/l)	Total Hardness (mg/l)
Stewart Cr.	9/7/71	29.0	--	7.9	0.003	*L0.008	0.005	182.0	66.2	85.0
	25/7/71	19.0	19.5	8.0	0.002	0.007	0.003	184.0	70.7	85.7
	4/9/71	48.0	11.0	8.0	0.003	0.017	0.002	207.0	78.0	96.8
	17/9/71	36.0	5.5	8.0	0.001	L0.010	L0.001	200.0	75.7	95.3

* L - Less Than

Table 17.

Stream	Date	Turbidity (JTU)	Temp. (C)	pH	Dissolved Copper (ppm)	Dissolved Lead (ppm)	Dissolved Zinc (ppm)	Specific Conductance (Micro MHOS/cm)	Total Alkalinity (mg/1)	Total Hardness (mg/1)
Arctic Red River										
Tsital Trien Cr.	17/8/71	6.4	7.5	8.0	0.001	0.006	*L0.001	102.0	42.2	44.5
Dzien Dieck Cr.	3/8/71	34.0	16.5	7.8	0.021	L0.008	0.007	220.0	102.0	114.0
Pierre Cr.	24/6/71	22.0	--	8.0	L0.001	0.012	0.002	186.0	83.6	91.6
	6/7/71	8.3	--	7.9	L0.001	L0.006	0.002	188.0	80.1	87.6
	20/7/71	6.6	19.0	8.1	L0.001	L0.003	0.003	197.0	87.9	94.9
	3/8/71	12.0	16.0	7.5	L0.001	L0.008	0.005	259.0	95.0	104.0
	17/8/71	6.7	10.0	8.0	L0.001	L0.006	L0.001	219.0	97.7	106.0
	30/8/71	26.0	9.0	8.0	L0.001	L0.004	0.001	238.0	100.0	117.0
Peel R.	15/7/71	110.0	15.0	8.3	0.002	L0.005	0.060	304.0	98.3	142.0
	30/7/71	91.0	15.0	8.0	L0.001	L0.008	0.044	307.0	110.0	147.0
	12/8/71	165.0	9.5	7.6	0.003	0.009	0.004	273.0	85.3	133.0
	10/9/71	90.0	--	7.6	0.003	L0.004	0.001	258.0	80.7	122.0
Tree R.	24/6/71	2.9	17.0	7.6	0.002	0.010	0.003	191.0	72.6	88.4
	6/7/71	4.3	16.0	7.9	0.001	L0.006	0.009	230.0	94.2	107.0
	20/7/71	38.0	19.0	8.3	0.002	L0.003	0.003	274.0	108.0	124.0
	3/8/71	110.0	16.0	8.0	0.002	L0.008	0.002	282.0	112.0	129.0
	17/8/71	9.4	11.5	8.3	0.003	0.011	0.008	299.0	132.0	142.0
	30/8/71	12.0	9.0	8.0	0.001	L0.004	L0.001	190.0	80.0	93.8

* L - Less Than

Table 17.

Stream	Date	Turbidity (JTU)	Temp. (C)	pH	Dissolved Copper (ppm)	Dissolved Lead (ppm)	Dissolved Zinc (ppm)	Specific Conductance (Micro MHOS/cm)	Total Alkalinity (mg/1)	Total Hardness (mg/1)
Rabbit Hay R.	6/7/71	105.0	16.0	7.9	0.001	*L0.006	0.003	233.0	77.6	101.0
	20/7/71	77.0	17.0	8.3	0.003	L0.003	0.006	265.0	99.8	123.0
	17/8/71	12.0	12.0	8.2	0.002	L0.006	L0.001	281.0	121.0	146.0
	30/8/71	81.0	9.0	8.2	0.001	L0.004	0.001	262.0	111.0	136.0
Rat R.	6/7/71	7.0	16.0	7.7	0.001	L0.006	0.002	159.0	71.4	78.2
	20/7/71	5.6	18.0	7.9	0.001	L0.003	0.002	169.0	76.0	86.5
	3/8/71	12.0	17.0	7.9	0.002	L0.008	0.006	177.0	82.0	93.4
	17/8/71	14.0	14.0	8.1	0.002	L0.006	L0.001	156.0	72.6	81.1
	30/8/71	42.0	9.0	7.9	0.001	L0.004	0.001	156.0	75.0	87.3
Frog Cr.	15/7/71	4.2	17.0	8.0	0.002	L0.005	L0.001	160.0	60.3	75.8
	12/8/71	145.0	10.0	7.9	0.002	0.009	0.003	281.0	88.6	132.0
	10/9/71	3.4	--	7.5	0.002	L0.004	L0.001	125.0	48.7	63.6
Rengleng R.	15/7/71	2.7	17.0	7.4	0.003	L0.005	0.044	133.0	50.7	61.5
	30/7/71	2.7	18.0	7.8	0.002	0.008	0.002	130.0	51.5	60.4
	12/8/71	3.3	13.0	7.5	0.002	0.008	0.003	124.0	50.1	58.2
	10/9/71	8.9	6.0	7.3	0.001	L0.004	0.001	88.0	30.8	41.8
Arctic Red R.	24/6/71	135.0	--	8.1	0.001	0.010	0.003	303.0	94.2	146.0
	6/7/71	--	19.0	8.2	L0.001	L0.006	0.003	371.0	110.0	176.0
	20/7/71	140.0	17.0	8.2	L0.001	L0.003	0.004	341.0	105.0	164.0
	3/8/71	110.0	12.0	8.0	0.007	L0.008	0.004	281.0	91.4	126.0
	17/8/71	110.0	11.0	8.0	0.003	0.006	L0.001	299.0	87.1	144.0
	30/8/71	35.0	--	8.0	L0.001	L0.004	L0.001	273.0	85.9	146.0

* L - Less Than

E.   TRIBUTARY DATA

LEGEND

1.	Rengleng R.	36.	Vermilion Cr.
2.	Rat R.	37.	Jungle Ridge Cr.
3.	Fish Cr.	38.	Bogg Cr.
4.	Peel R.	39.	Little Bear R.
5.	Frog Cr. - Niendo L.	40.	Great Bear R.
6.	Stony Cr.	41.	Brackett R.
7.	Satah R.	42.	St. Charles Cr.
8.	Vittrekwa R.	43.	Porcupine Cr.
9.	Arctic Red R.	44.	Big Smith Cr.
10.	Swan Cr. - Swan L.	45.	Keele R.
11.	Tsital Trien Cr.	46.	Redstone R.
12.	Pierre Cr.	47.	Dahadinni R.
13.	Rabbit Hay R.	48.	Blackwater R.
14.	Tree R.	49.	Johnson R.
15.	Travaillant R.	50.	Ochre R.
16.	Ontaratue R.	51.	Wrigley R.
17.	Tieda R. - Yeltea L.	52.	River between two Mountains
18.	Loon R.	53.	Willowlake R.
19.	Hare Indian R.	54.	Root R.
20.	Bluefish R.	55.	North Nahanni R.
21.	Ramparts R.	56.	Trail R.
22.	Tsintu R.	57.	Martin R.
23.	Hume R.	58.	Harris R.
24.	Donelly R.	59.	Liard R.
25.	Hanna R.	60.	Polar R.
26.	Mountain R.	61.	Birch R.
27.	Carcajou R.	62.	Matou R.
28.	Trapper Cr.	63.	Blackstone R.
29.	Oscar Cr.	64.	Grainger R.
30.	Stewart Cr.	65.	Rabbitskin R.
31.	Canyon Cr.	66.	Spence R.
32.	Francis Cr.	67.	Jean-Marie Cr.
33.	Christina Cr.	68.	Trout R.
34.	Helava Cr.	69.	Horn R.
35.	Prohibition Cr.	70.	Kakisa R.

MAP OF THE MACKENZIE RIVER AND TRIBUTARIES
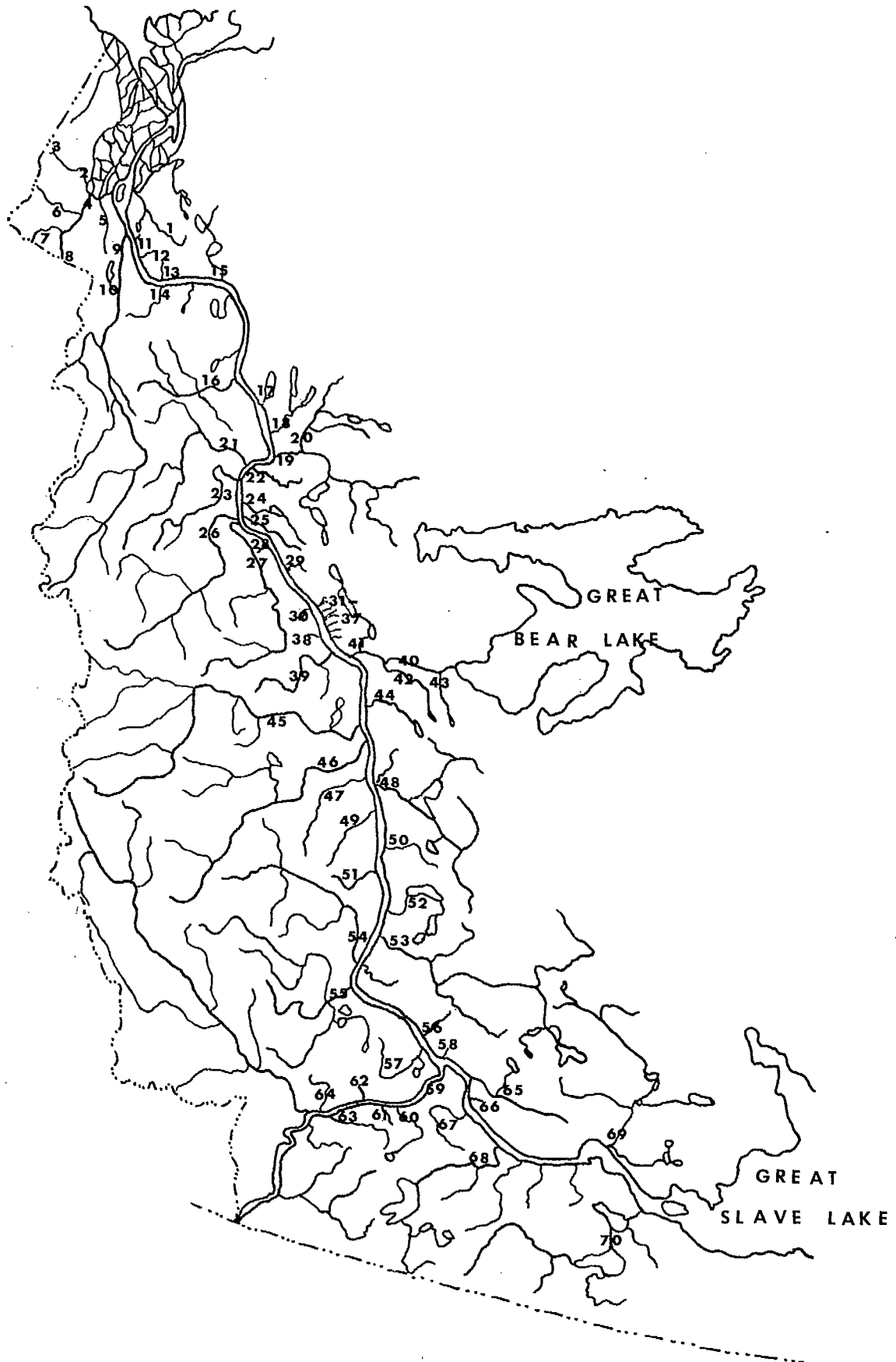
Rat River

A. General Data:

Total length: 129 km (80 miles)

Length surveyed: all

Drainage area: 688 sq km (270 sq miles)

Estimate of potential spawning area (gravel) in length of stream

surveyed: 2,036,000 sq m (2,453,000 sq yds).

Description:

The Rat River empties into the Husky Channel of the

Mackenzie Delta system. In the upper reaches it consists of a

single channel with moderate flow. In this area the bottom type

is variable ranging from boulders, coarse and fine gravel to silt.

The Rat becomes shallower and multi-channeled towards its mid-point.

The water in its middle and upper stretches is clear indicating a

good spawning potential. Towards its mouth the Rat meanders

through a low-lying terrain of numerous small lakes and ponds.

In this region it is single-channeled with mud banks and a heavy

silt brown coloration. Above the delta area the Rat flows over a

boulder and gravel bottom interspersed with silt.

Various reports of Arctic char runs in August and September

up this river were obtained from Fort MacPherson residents.

LEGEND

SCALE: 1 cm. - 2.5 km.
        (1 in. - 4.0 mi.)

▲   SAMPLE AREA

▒▒▒   EXPOSED GRAVEL AREA

900,1000 . . . . . LAND ELEVATIONS

|-SI-| . . . . . AREA OF SILT
|-SI-| MUD BANKS AND BARS

|-G-| . . . . . AREA OF GRAVEL
|-G-|

RICHARDSON

MOUNTAINS

RAT R.

FISH CREEK

HUSKY CHANNEL

MACKENZIE DELTA

PEEL R.
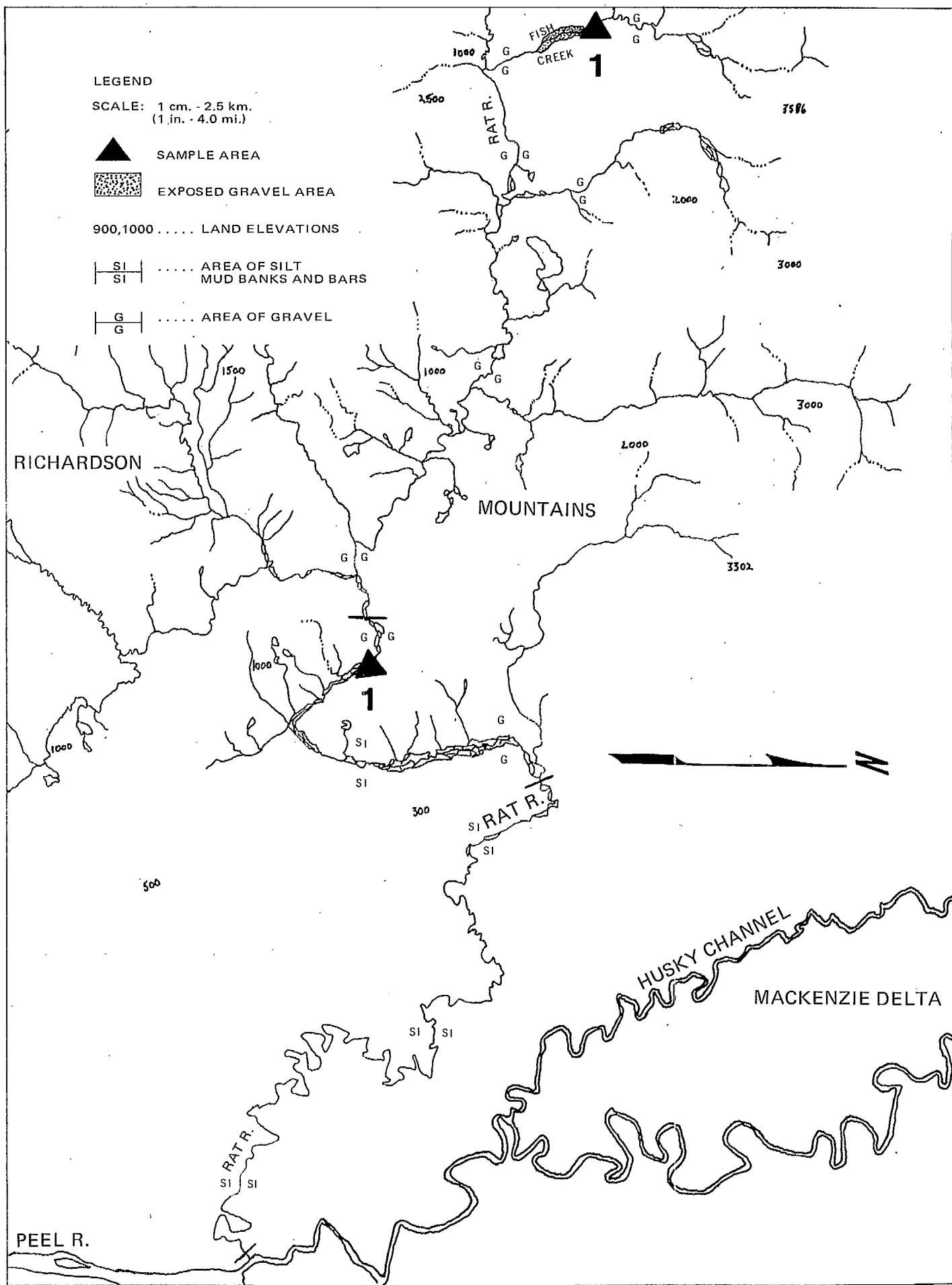
B. Sample Location Data: Rat River

Loc. Data			Temp.	Fish Data				
Loc. # & Date	Bottom Type	Color	Air Water (C)	Invert Status	Catch Method	Species	#	Maturity
#1 July 13	Gravel	Green	12 12	Dip.	--	--	--	--
#1 Aug. 13	Boulders Gravel	Heavy Silt	6 7	Neg.	--	--	--	--
#1 Sept. 23	Gravel Silt	Clear	7	Neg.	S. O.	Grayling Grayling	2 20+	Yearling Yearling

LEGEND:

Dip. - Diptera
S. - Seine
O. - Observation

Fish Creek

A. General Data:

Total length: 48 km (30 miles)

Length surveyed: 13 km (8 miles)

Drainage area: 115 km (44 sq miles)

Estimate of potential spawning area (gravel) in length of stream

surveyed: 152,000 sq m (183,000 sq yds).

Description:

Fish Creek is a clear stream flowing over large areas
of gravel. Several deep and extensive pools were noted while
some stretches were fast and shallow. An excellent spawning
potential is exhibited by this stream throughout its length.
Countless numbers of fish were observed (from the helicopter)
during the September survey and upon landing, species present
were grayling and the Dolly Varden-Arctic char complex. Obser-
vations on the latter during the August survey indicated spawning
behaviour. The fish were pairing, becoming territorial and
short periods of a side by side quivering motion were noted.

B.   Sample Location Data: Fish Creek

	Loc. Data		Temp.	Fish Data				
Loc. # & Date	Bottom Type	Color	Air Water (C)	Invert Status	Catch Method	Species	#	Maturity
#1 Aug. 18	Gravel	Clear	20 8	Ple. Dip. Tri. Eph.	An. An.	Grayling Char sp.	6 2	Mature Mature
#1 Sept. 23	Gravel	Clear	8 4	Neg.	S. S. An. An.	Grayling Char sp. Grayling Char sp.	21 2 2 13	Immature Mature Mature Mature

LEGEND:
        Ple. - Plecoptera
        Dip. - Diptera
        Tri. - Trichoptera
        Eph. - Ephemeroptera
          S. - Seine
        An. - Angling

Peel River and Tributaries - (Mackenzie River to N.W.T. - Yukon border)

A. General Data: - Peel River

Total length: 438 km (274 miles)

Length surveyed: 116 km (72 miles) (Mackenzie River to N.W.T.

- Yukon border)

Drainage area: 109,448 sq km (42,529 sq miles)

Estimate of potential spawning area (gravel) in length of stream

surveyed: indefinite.

Description:

In the length surveyed, the Peel River consists of mud

banks and is subject to drastic fluctuations in water level and

current velocity. It carries a high silt load throughout the

season and in periods of low water, many mud and silt bars were

observed. Spawning potential is doubtful in the Peel River to

the Yukon border, however, some of its tributaries exhibit

greater abundance of gravel areas and clearer water indicating

potential as spawning areas. Sample locations were placed on

the following larger tributaries: Frog Creek - Niendo Lake (1);

Stony Creek (1); Vittrekwa River (2); and the Satah River (1).

A resident of Fort MacPherson reported that whitefish

species, herring (Arctic cisco) and inconnu run up the Peel in

July and August to spawn in the vicinities of the Road and Snake

rivers. There, the Peel River, apparently, has extensive gravel

areas as do the tributaries. These fish return down the Peel in

September.

MACKENZIE R.

NIENDO LAKE

1

FROG CR

SI

SI

PEEL R.

FORT
McPHERSON

SI

SI

SI

SI

SI

STONY CREEK

SI

SI

G

SHILTEE ROCK

1

RAT R.

500

500

1000

500

1000

500

G

G

1000

1000

500

500

1000

1000

G

G

1000

1000

1000

1000

1000

LEGEND

SCALE: 1 cm. - 2.5 km.
        (1 in. - 4.0 mi.)

▲   SAMPLE AREA

900,1000 . . . . . LAND ELEVATIONS

|SI |
|SI | . . . . . AREA OF SILT
         MUD BANKS AND BARS

|G |
|G | . . . . . AREA OF GRAVEL

LEGEND

SCALE: 1 cm. - 2.5 km.
         (1 in. - 4.0 mi.)

▲   SAMPLE AREA

900,1000 . . . . . LAND ELEVATIONS

⊢SI⊣
 SI   . . . . . AREA OF SILT
                   MUD BANKS AND BARS

⊢G⊣
 G   . . . . . AREA OF GRAVEL
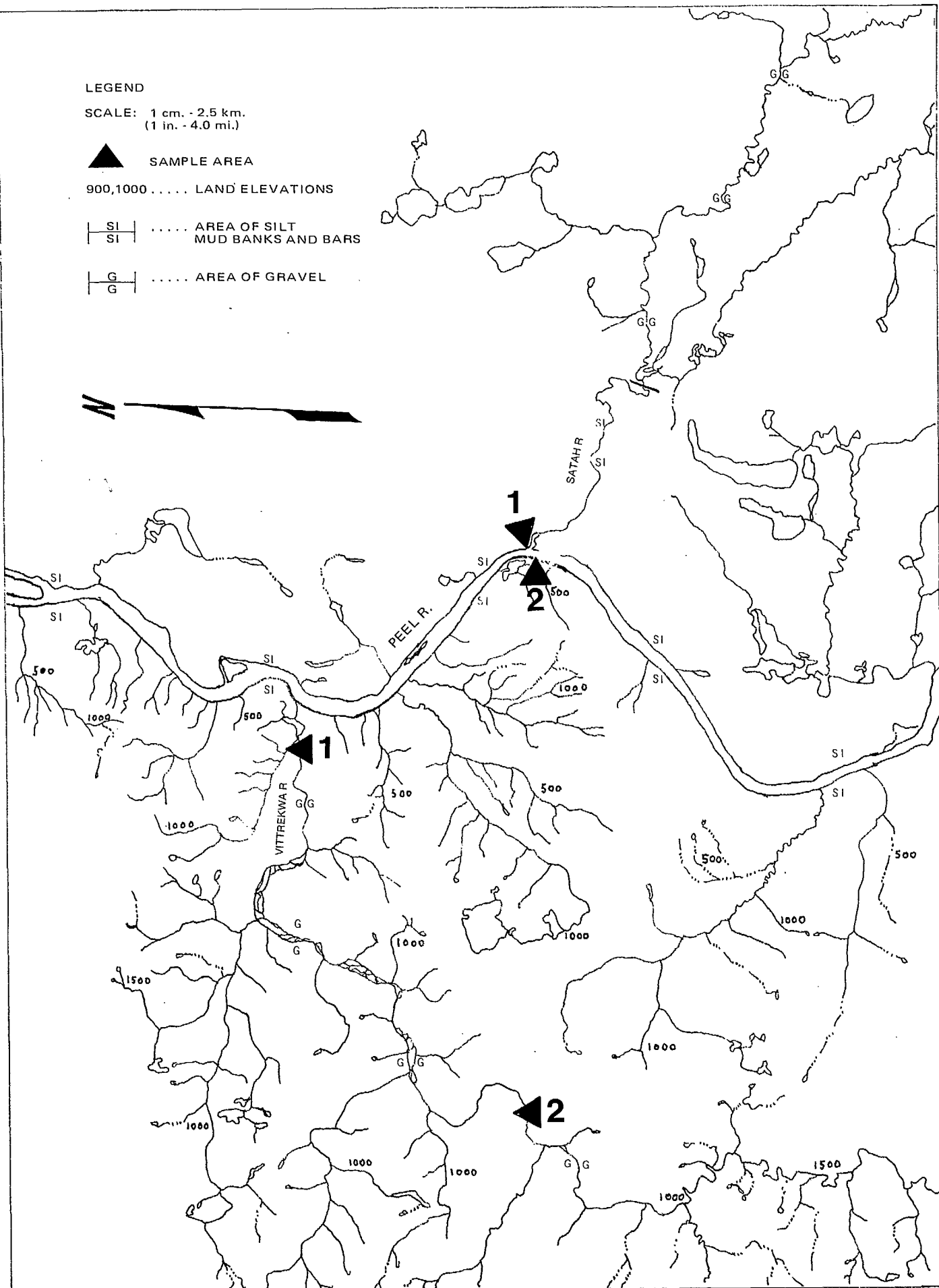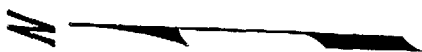
B. Sample Location Data: Peel River

Loc. Data			Temp.		Fish Data			
Loc. # & Date	Bottom Type	Color	Air Water (C)	Invert Status	Catch Method	Species	#	Maturity
#1 July 12	Shale	Heavy Silt	19 14	Neg	S. S.	Lake Chub Slimy Sculpin	7 1	Mature Yearling
#1 Aug. 17	LOCATION FLOODED - UNABLE TO SAMPLE							
#1 Sept. 24	Shale	Heavy Silt	11 6	Neg	S. S. S. S.	Lake Chub Longnose Sucker Least Cisco Burbot	5 3 1 1	Mature Yearling Yearling Yearling
#2 July 13	Unclassi- fied	Heavy Silt	13 16	--	--	--	--	--
#2 Aug. 17	LOCATION FLOODED - UNABLE TO SAMPLE							
#2 Sept. 24	Unclassi fied	Heavy Silt	13 6	Neg.	--	--	--	--

LEGEND:
    S. Seine

C. Peel River Tributaries

Frog Creek - Niendo Lake

Frog Creek on its course from Niendo Lake is a narrow meandering stream with a scarcity of gravel areas. Niendo Lake has more spawning potential due to abundant gravel areas along its shores. Gill net sets in the lake yielded broad whitefish, pike and least cisco.

Stony Creek

This is a multi-channeled, fast-flowing stream. It flows through a system of ridges and valleys and is comprised of gravel areas throughout most of its length. For approximately 3 miles upstream from its mouth on the Peel, the creek meanders in a single channel and mud banks are dominant. This condition changes farther upstream to gravel areas and a multi-channeled course. This creek is subject to drastic fluctuations in water level and velocity after periods of rain.

Vittrekwa River

The Vittrekwa River is a multi-channeled, fast-flowing river with many boulder and gravel areas. It is subject to drastic increases of water volume following rains. Flowing primarily through a valley with steep rock banks and canyon areas, it carries a heavy silt load into the Peel.

B. Sample Location Data: Stony Creek

Loc. # & Date	Bottom Type	Color	Air Water (C)	Invert Status	Catch Method	Species	#	Maturity
#1 July 13	Gravel	Heavy Silt	14 12	Tri.	--	--	--	--
#1 Aug. 13	Boulders Gravel	Heavy Silt	6 6	Ple.	--	--	--	--
#1 Sept. 29	Gravel	Clear	9 3	Neg.	S. S.	Grayling Lake Chub	23 2	Yearling Mature

LEGEND:

Tri. - Trichoptera
Ple. - Plecoptera
  S. - Seine

B. Sample Location Data: Vittrekwa River

	Loc. Data		Temp.	Fish Data				
Loc. # & Date	Bottom Type	Color	Air Water (C)	Invert Status	Catch Method	Species	#	Maturity
#1 July 12	Unclassi- fied	Flood	22 9	Neg.	--	--	--	--
#1 Aug. 13	Gravel Silt	Heavy Silt	7 7	Neg.	--	--	--	--
#1 Sept. 24	Gravel Silt	Light Silt	13 3	Neg.	--	--	--	--
#2 July 13	Gravel Silt	Heavy Silt	19 12	Neg.	--	--	--	--
#2 Aug. 13	Boulders Gravel Silt	Heavy Silt	6 6	Neg.	S.	Grayling	1	Yearling
#2 Sept. 24	Gravel	Green	12 3	Neg.	--	--	--	--

LEGEND:
        S. - Seine

Satah River

Upstream from its mouth on the Peel, the Satah River has a heavy silt colour and gently meanders for 6-8 miles. The banks are mud to this point and bottom type was unclassifiable. It then changes to a faster-flowing course though still meandering. Occasional gravel areas and pools were noted. A sampling station was located at its mouth and gill netted on the first survey. However, on the subsequent surveys, sampling at this location was not feasible due to high water levels in the Peel River.

B. Sample Location Data: Satah River

Loc. # & Date	Loc. Data		Temp.	Fish Data				
	Bottom Type	Color	Air Water (C)	Invert Status	Catch Method	Species	#	Maturity
#1 July 12	Unclassi-fied	Heavy Silt	13 15	--	G.N.	Broad Whitefish	8	Mature
					G.N.	Humpback Whitefish	2	Mature
					G.N.	Least Cisco	1	Mature
					G.N.	Longnose Sucker	1	Mature
					G.N.	Pike	4	Mature
					G.N.	Inconnu	1	Mature

LEGEND:
G.N. - Gill Net

<u>Rengleng River</u>
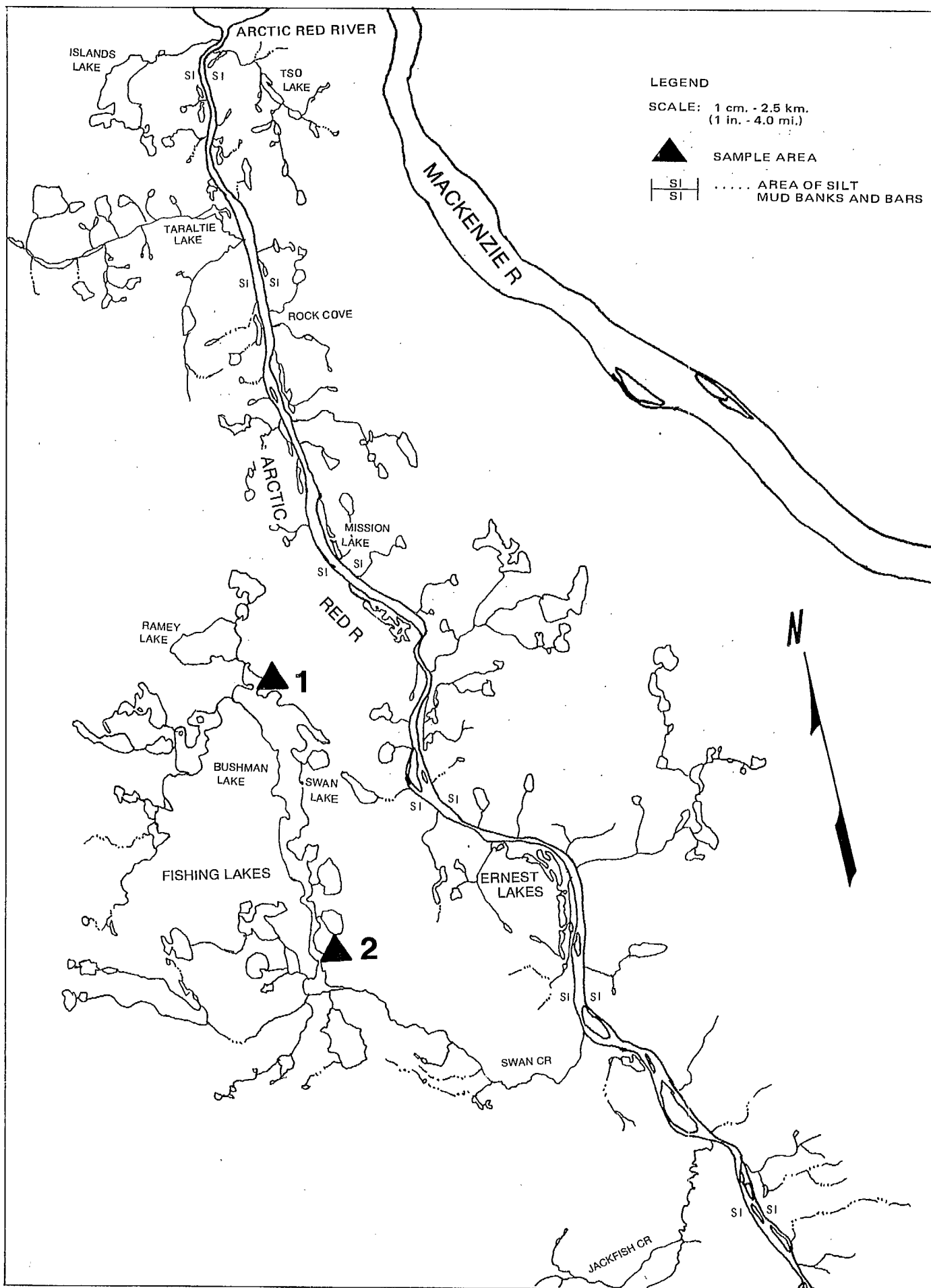
A. General Data:

Total length: 117 km (72 miles)

Length surveyed: 87 km (54 miles)
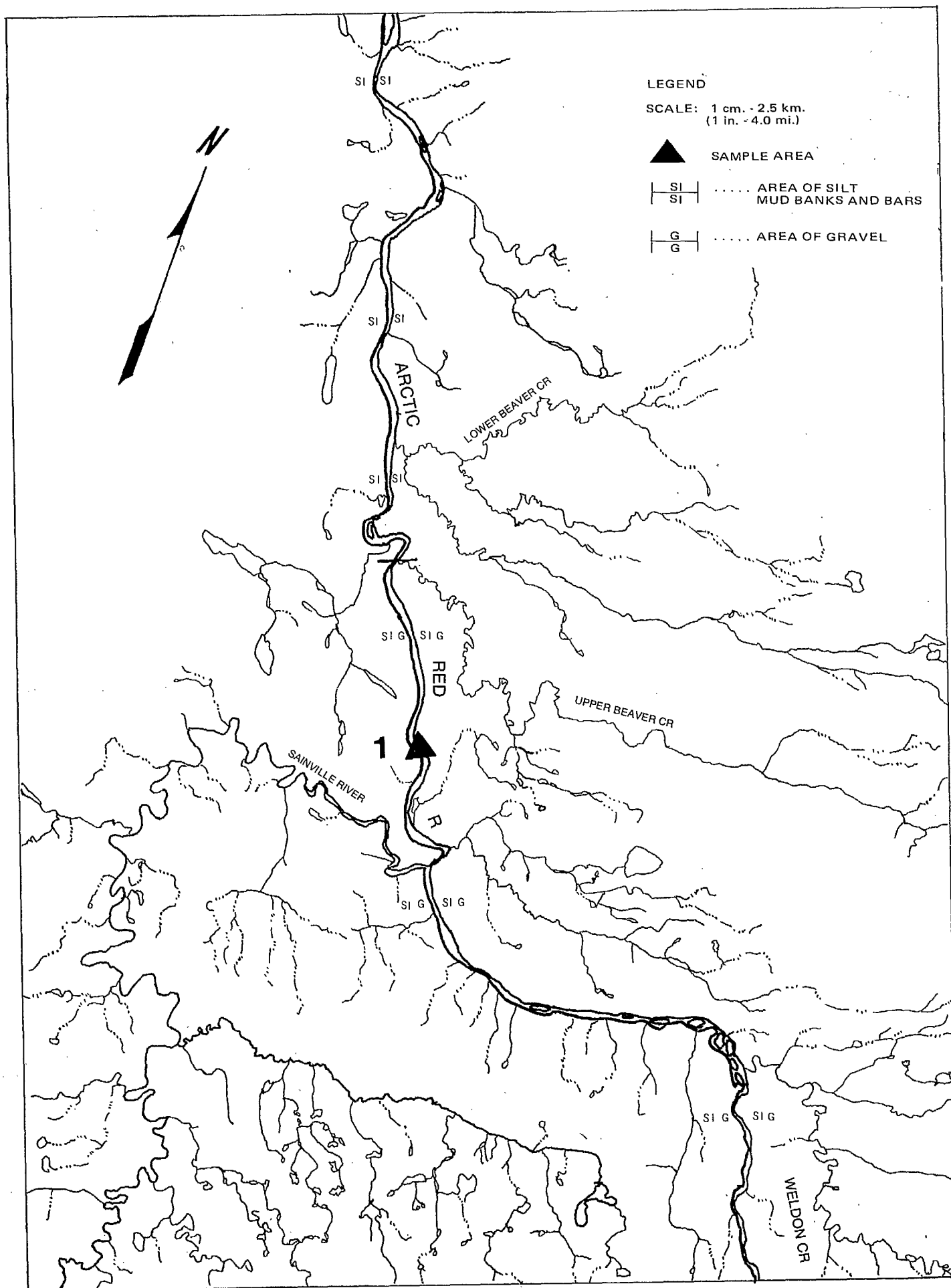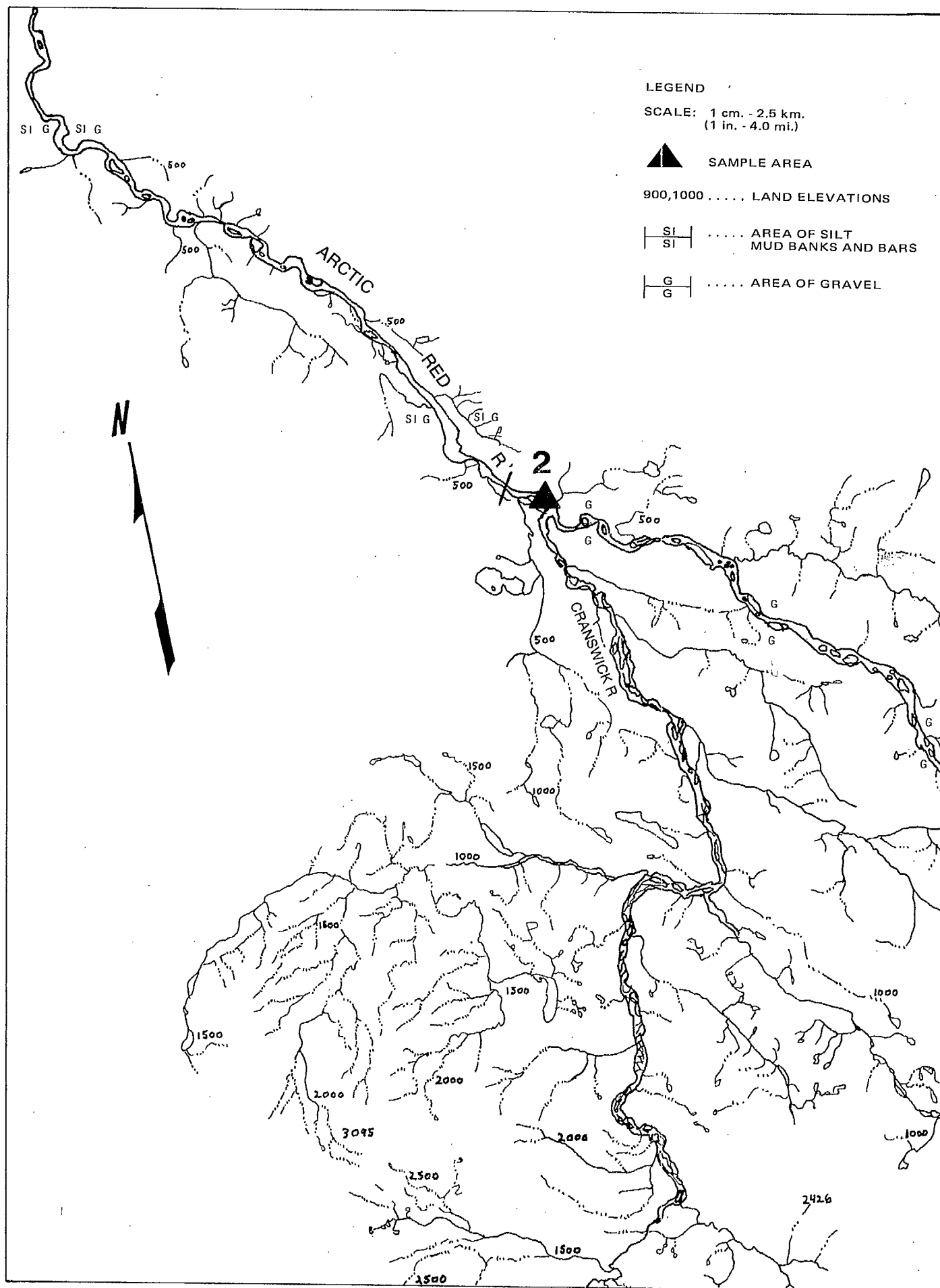
Drainage area: 1,742 sq km (672 sq miles)

Estimate of potential spawning area (gravel) in length of stream

surveyed: 351,000 sq m (422,000 sq yds).

Description:

The Rengleng River is primarily a clear flowing stream
characterized by high banks near its confluence with the Mackenzie
River. In the upper reaches it flows through a flat, low lying
muskeg type terrain. Gravel and shale chips along its course
provide excellent spawning potential. No obstructions to migra-
tion were evident.

LEGEND

SCALE: 1 cm. - 2.5 km.
(1 in. - 4.0 mi.)

▲ SAMPLE AREA

900,1000 . . . . . LAND ELEVATIONS

SI / SI	. . . . . AREA OF SILT MUD BANKS AND BARS
G / G	. . . . . AREA OF GRAVEL
SH / SH	. . . . . AREA OF SHALE

MACKENZIE R.

RENGLENG R.

TUNDRA LAKE

CARDINAL LAKE

BEAVER LAKE

TSITAL TREIN CR.

RENGLENG R

WOUNDED BEAR LAKE

IN AND OUT LAKE

MACKENZIE R.

N
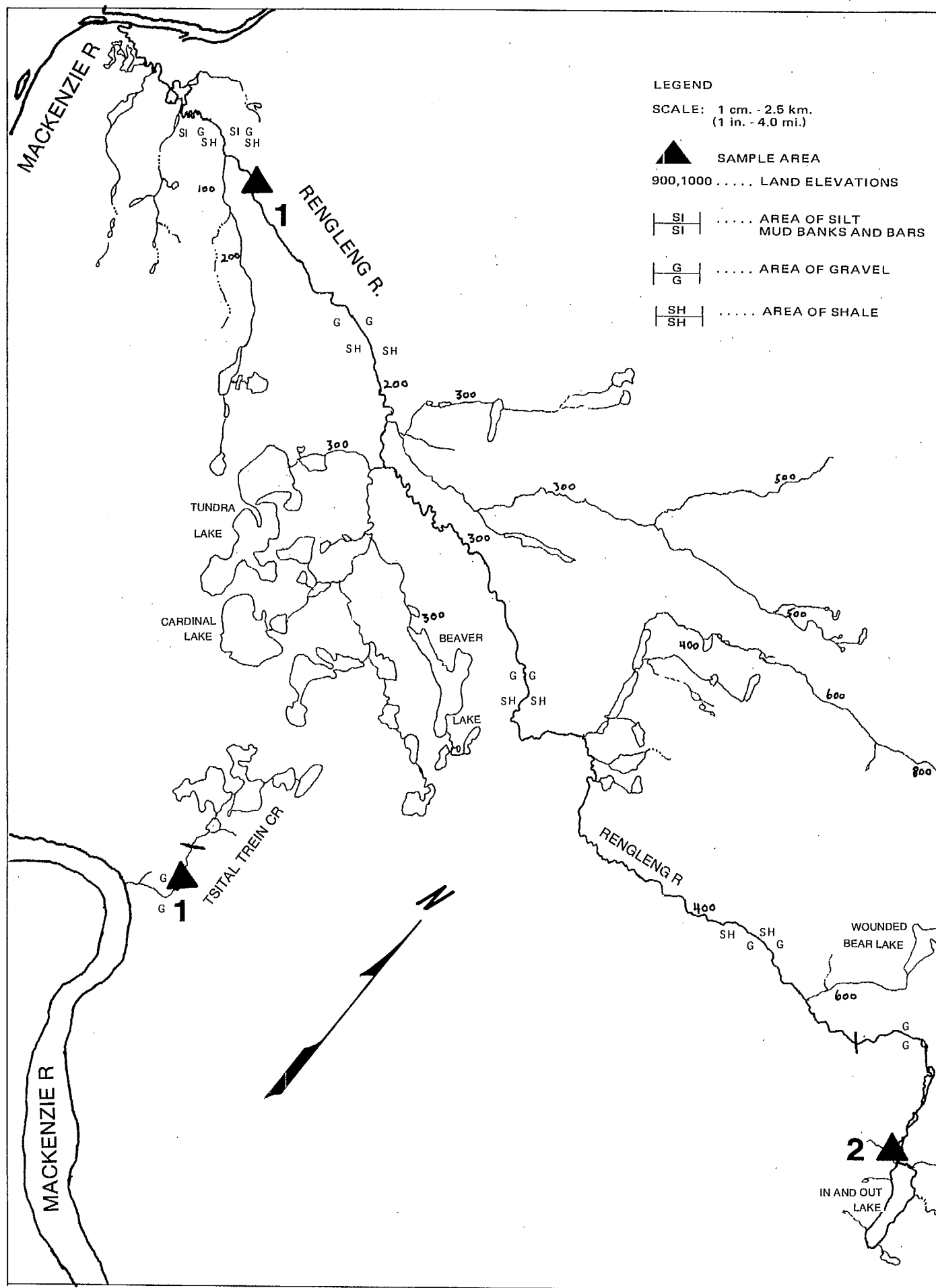
B. Sample Location Data: Rengleng River

Loc. # & Date	Bottom Type	Color	Air Water (C)	Invert Status	Catch Method	Species	#	Maturity
#1 July 9	Sand Silt	Light Rust	26 20	Eph.	S. O.	Neg. Grayling	-- 7	-- Yearling
#1 Aug. 11	Gravel	Clear	15 12	Eph. Tri. Ple.	O.	Grayling	1	Yearling
#1 Sept. 24	Shale	Light Rust	7 3	Neg.	--	UNABLE TO SEINE		
#2 July 9	Gravel	Clear	28 20	Eph. Tri	--	Slimy Sculpin	3	Yearling
#2 Aug. 2	Gravel Sand	Clear	10 10	Dip.	S.	Neg.	--	--
#2 Sept. 24	Gravel	Clear	6 5	Neg.	An.	Neg.	--	--

LEGEND:
Eph. - Ephemeroptera
Tri. - Tricoptera
Ple. - Plecoptera
Dip. - Diptera
S. - Seine
O. - Observation
An. - Angling

Tsital Trein Creek

A. General Data:

Total length: 13 km (8 miles)

Length surveyed: all

Drainage area: 72 sq km (28 sq miles)

Estimate of potential spawning area (gravel) in length of stream

surveyed: 18,000 sq m (21,000 sq yds).

Description:

The Tsital Trein Creek is a small clear creek with a good

gravel bottom near its mouth, and substantial flow of water in the

spring. However, this stream has almost no discharge by mid-August,

thus limiting its spawning potential.

B. Sample Location Data: Tsital Trein Creek

Loc. # & Date	Loc. Data Bottom Type	Color	Temp. Air Water (C)	Fish Data Invert Status	Catch Method	Species	#	Maturity
#1 July 7	Sand	Clear	22 14	--	--	--	--	--
# 1 Aug. 8	STATION DROPPED DUE TO DRIED UP CONDITION							

Arctic Red River

A. General Data:

Total length: 357 km (224 miles)

Length surveyed: 270 km (168 miles)

Drainage area: 31,707 sq km (12,239 sq miles)

Estimate of potential spawning area (gravel) in length of stream

surveyed: 8,870,000 sq m (10,687,000 sq yds).

Description:

The Arctic Red River is characterized by a heavy silt
load. Its course from Arctic Red River upstream to Martin House
is dotted with silt bars. Above Martin House, coarse gravel
bars become prevalent and the silt load remains heavy. This is
probably due to the turbulent nature of the Cranswick River,
one of its major tributaries. The Arctic Red, throughout the
length surveyed, was multi-channeled, with banks varying in
height from 25 feet in the north to 200 feet in the south.

ARCTIC RED RIVER

ISLANDS LAKE

TSO LAKE

MACKENZIE R

LEGEND

SCALE: 1 cm. - 2.5 km.
(1 in. - 4.0 mi.)

▲ SAMPLE AREA

⊢ SI / SI ⊣ ..... AREA OF SILT
MUD BANKS AND BARS

TARALTIE LAKE

ROCK COVE

ARCTIC

MISSION LAKE

RED R

RAMEY LAKE

▲ 1

N

BUSHMAN LAKE

SWAN LAKE

FISHING LAKES

ERNEST LAKES

▲ 2

SWAN CR

JACKFISH CR

LEGEND

SCALE: 1 cm. - 2.5 km.
(1 in. - 4.0 mi.)

▲   SAMPLE AREA

⊢ SI/SI ⊣ ..... AREA OF SILT MUD BANKS AND BARS

⊢ G/G ⊣ ..... AREA OF GRAVEL

LEGEND

SCALE: 1 cm. - 2.5 km.
(1 in. - 4.0 mi.)

▲ SAMPLE AREA

900,1000 . . . . . LAND ELEVATIONS

AREA OF SILT
MUD BANKS AND BARS

AREA OF GRAVEL

LEGEND

SCALE: 1 cm. - 2.5 km.
(1 in. - 4.0 mi.)

▲   SAMPLE AREA

    EXPOSED GRAVEL AREA

900,1000 . . . . . LAND ELEVATIONS

├G─G┤ . . . . . AREA OF GRAVEL

B. Sample Location Data: Arctic Red River

Loc. # & Date	Bottom Type	Color	Air Water (C)	Invert Status	Catch Method	Species	#	Maturity
#1 July 13	Silt	Heavy Silt	15 17	Neg.	S. S.	Lake Chub Trout-perch	2 6	Yearling Yearling
#1 Aug. 8	Silt	Light Rust	14 12	Neg		UNABLE TO SAMPLE DUE TO SOFT BOTTOM		
#1 Sept. 16						STATION NOT SAMPLED DUE TO EXTENSIVE MUD FLATS		
#2 July 13	Gravel	Heavy Silt	19 15	Neg.	S.	Trout-perch	1	Yearling
#2 Aug. 8	Gravel	Light Silt	19 12	Neg.	S. S.	Grayling Lake Chub	1 41	Yearling Yearling
#2 Sept. 23	Gravel	Light Silt	11 6	Neg.	S.	Lake Chub	5	Yearling
#3 July 7	Gravel	Green	22 16	Neg.	S.	Neg	--	--
#3 Aug. 7	Gravel	Light Silt	16 11	Neg.		UNABLE TO SEINE DUE TO STRONG CURRENT		
#3 Sept. 16	Gravel	Green	14 7	--	S.	Longnose Sucker	1	Yearling

LEGEND:
S. Seine

Swan Creek and Swan Lake

A. General Data:

Total length: 35 km (22 miles)

Length surveyed: all

Drainage area: 220 sq km (85 sq miles)

Estimate of potential spawning area (gravel) in length of stream

surveyed: indefinite.

Description:

Swan Creek is a fast-flowing, slightly meandering stream
that flows into the Arctic Red River approximately 38 miles
upstream from the Mackenzie River. No gravel areas were sighted in
the length surveyed to Swan Lake. Gill net sets in the lake
yielded substantial catches of grayling. The lake is primarily
shallow, with many reed areas but good gravel areas were noted
along its shores in a number of locations.

B. Sample Location Data: Swan Creek and Swan Lake

	Loc. Data		Temp.		Fish Data			
Loc. # & Date	Bottom Type	Color	Air Water (C)	Invert Status	Catch Method	Species	#	Maturity
#1 Aug. 16	Gravel	Light Rust	9 9	Tri. Ple. Leeches	G.N.	Grayling	19	Mature
#2 Aug. 16	Silt Sand	Light Rust	9 9	--	G.N. G.N.	Grayling Longnose Sucker	17 1	Mature Mature

LEGEND:

Tri. - Trichoptera
Ple. - Plecoptera
G.N. - Gill Net
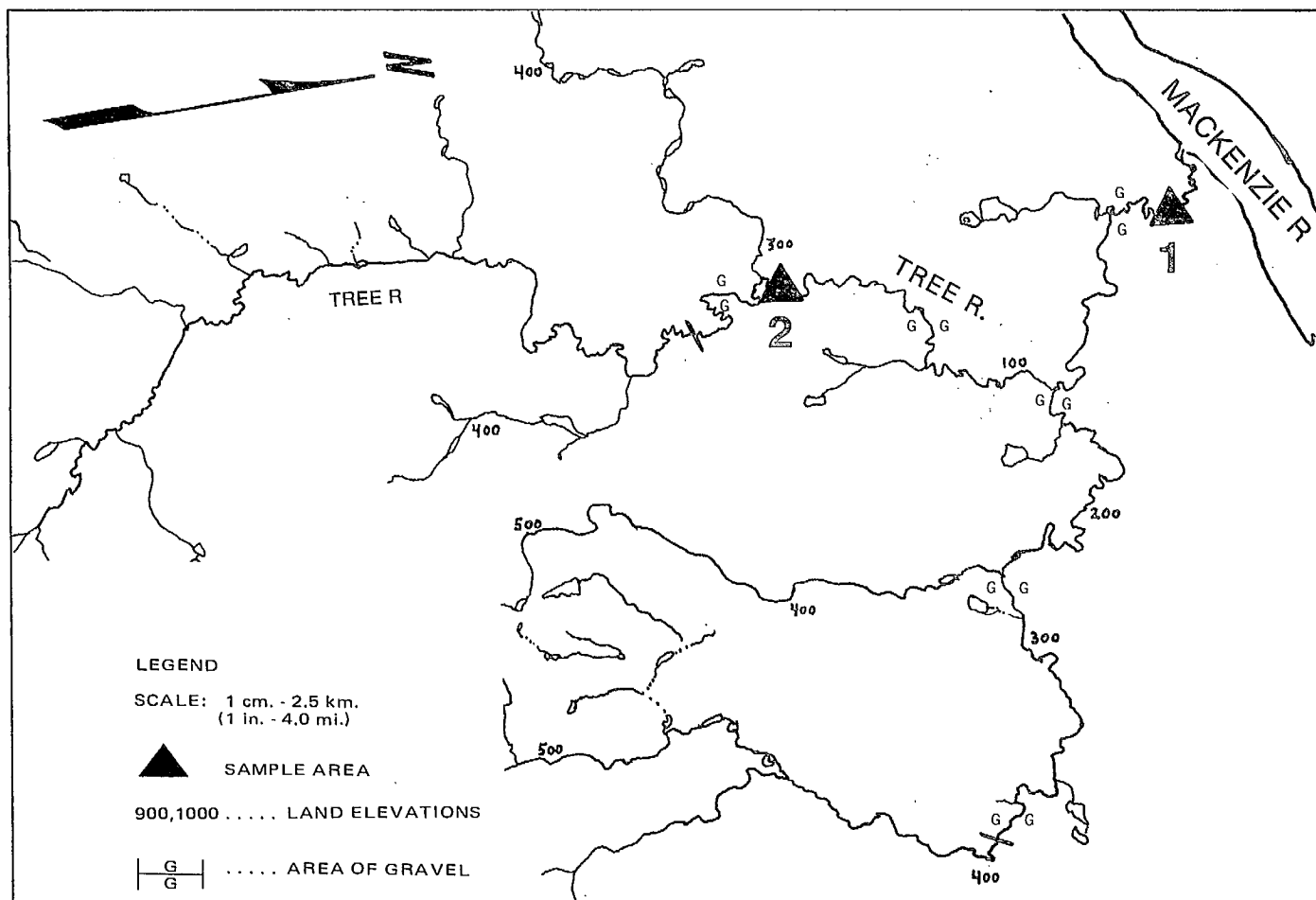
Pierre Creek

A. General Data:

Total length: 29 km (18 miles)

Length surveyed: all

Drainage area: 680 sq km (262 sq miles)

Estimate of potential spawning area (gravel) in length of stream

surveyed: indefinite.

Description:

Pierre Creek is a narrow meandering stream with heavy siltation at its mouth and in its middle stretches. There is some spawning potential in areas upstream towards Attoe Lake. A gill net station was placed on Attoe Lake during the August survey, the results of which are given below. Pierre Creek showed some obstructions such as log jams and beaver dams which could further limit its potential as a migration route and spawning area.
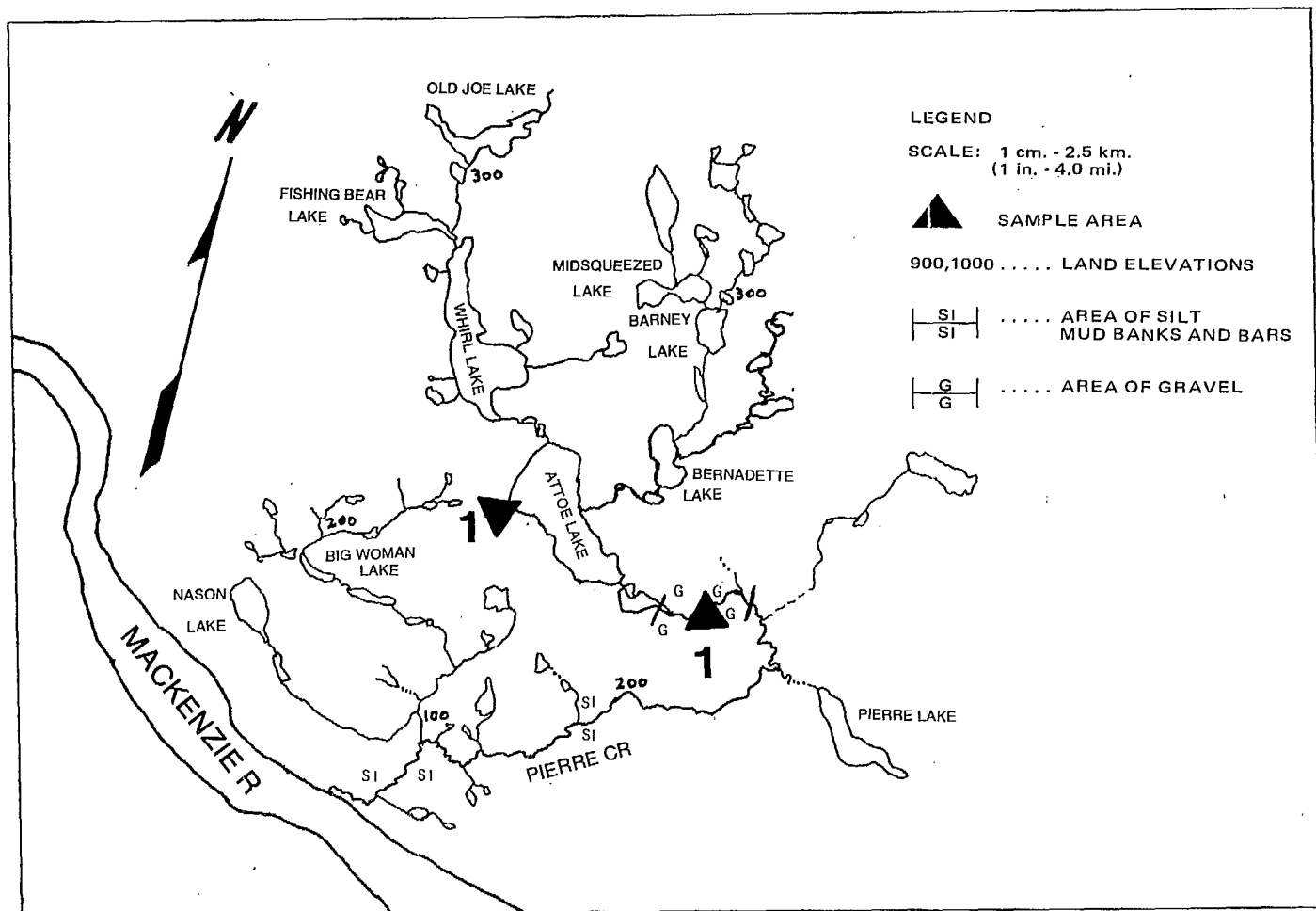
B. Sample Location Data: Pierre Creek

Loc. # & Date	Bottom Type	Color	Air Water (C)	Invert Status	Catch Method.	Species	#	Maturity
Pierre Creek:								
#1 July 7	Gravel	Clear	22 18	Ple.	S.	Grayling	20	Yearling
#1 Aug. 11	SAMPLING IMPRACTICABLE - LOW WATER LEVEL							
Attoe Lake:								
#1 Aug. 18	Sand Silt	Clear	14 12	Neg.	G.N. G.N.	Pike Broad White- fish	1 1	Mature Mature

LEGEND:
        Ple. - Plecoptera
         S. - Seine
        G.N. - Gill Net

Rabbit Hay River

A.   General Data:

Total length: 45 km (28 miles)

Length surveyed: 23 km (14 miles)

Drainage area: 383 sq km (148 sq miles)

Estimate of potential spawning area (gravel) in length of stream

surveyed: 58,000 sq m (70,000 sq yds).

Description:

The Rabbit Hay River is a slow-moving humic river, flowing

through a burned over area. Water is clear and it has numerous

gravel bars which may provide potential spawning areas. Several beaver

dams were noted which could act as obstacles to fish migrations.
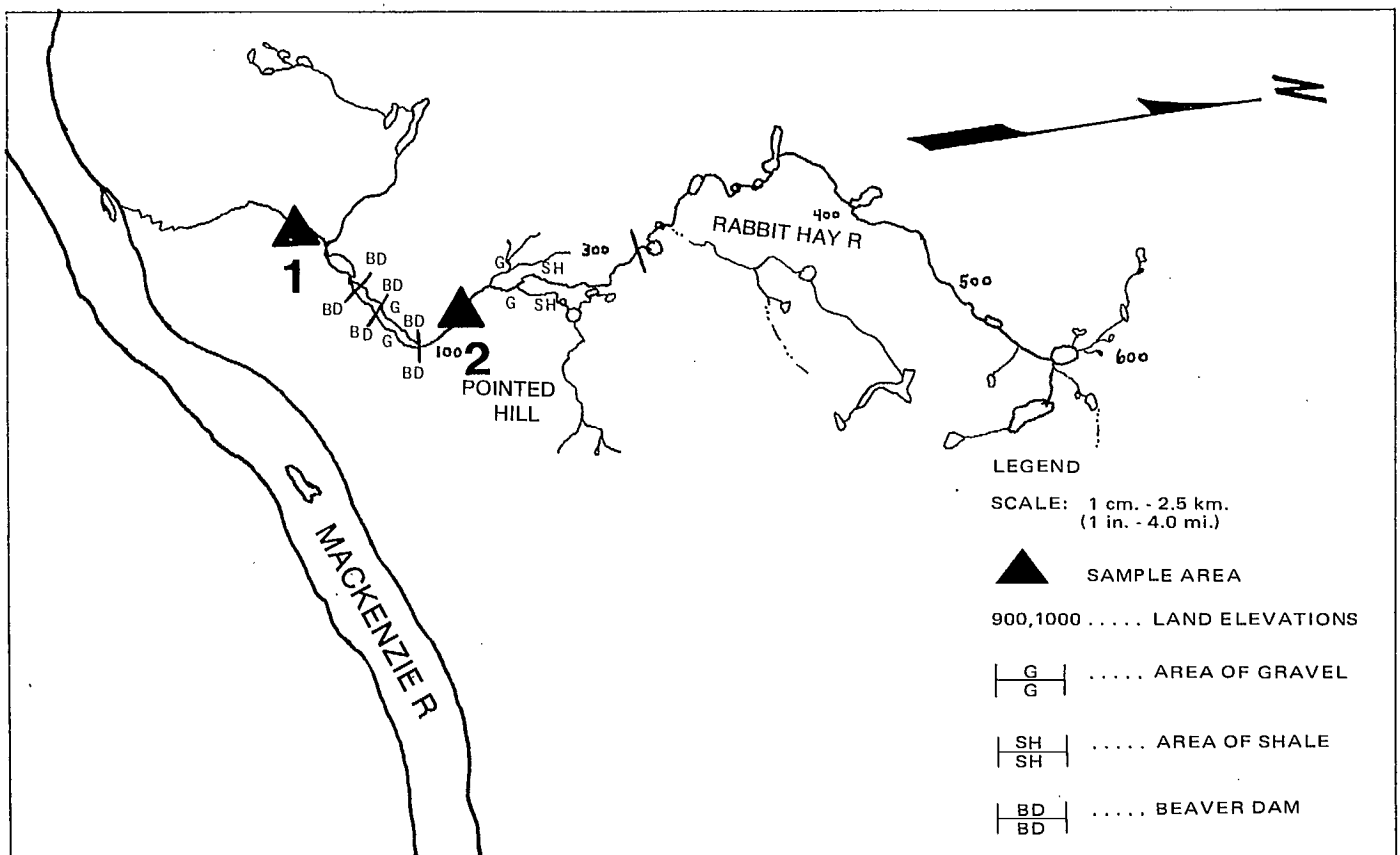
B. Sample Location Data: Rabbit Hay River

Loc. # & Date	Loc. Data		Temp. Air Water (C)	Fish Data				
	Bottom Type	Color		Invert Status	Catch Method	Species	#	Maturity
#1 July 7	Gravel	Clear	27 19	Dip. Tri. Eph.		NOT SUITABLE FOR SEINING		
#1 Aug. 11	STATION DROPPED							
#2 July 7	Gravel	Clear	27 16	Dip. Eph.	0.	Grayling	3	Immature
#2 Aug. 8	Gravel	Clear	10 10	Ple.		NOT SUITABLE FOR SEINING		

LEGEND:

    Dip. - Diptera
    Tri. - Trichoptera
    Eph. - Ephemeroptera
    Ple. - Plecoptera
      0. - Observation

Tree River

A. General Data:

   Total length: 83 km (52 miles)
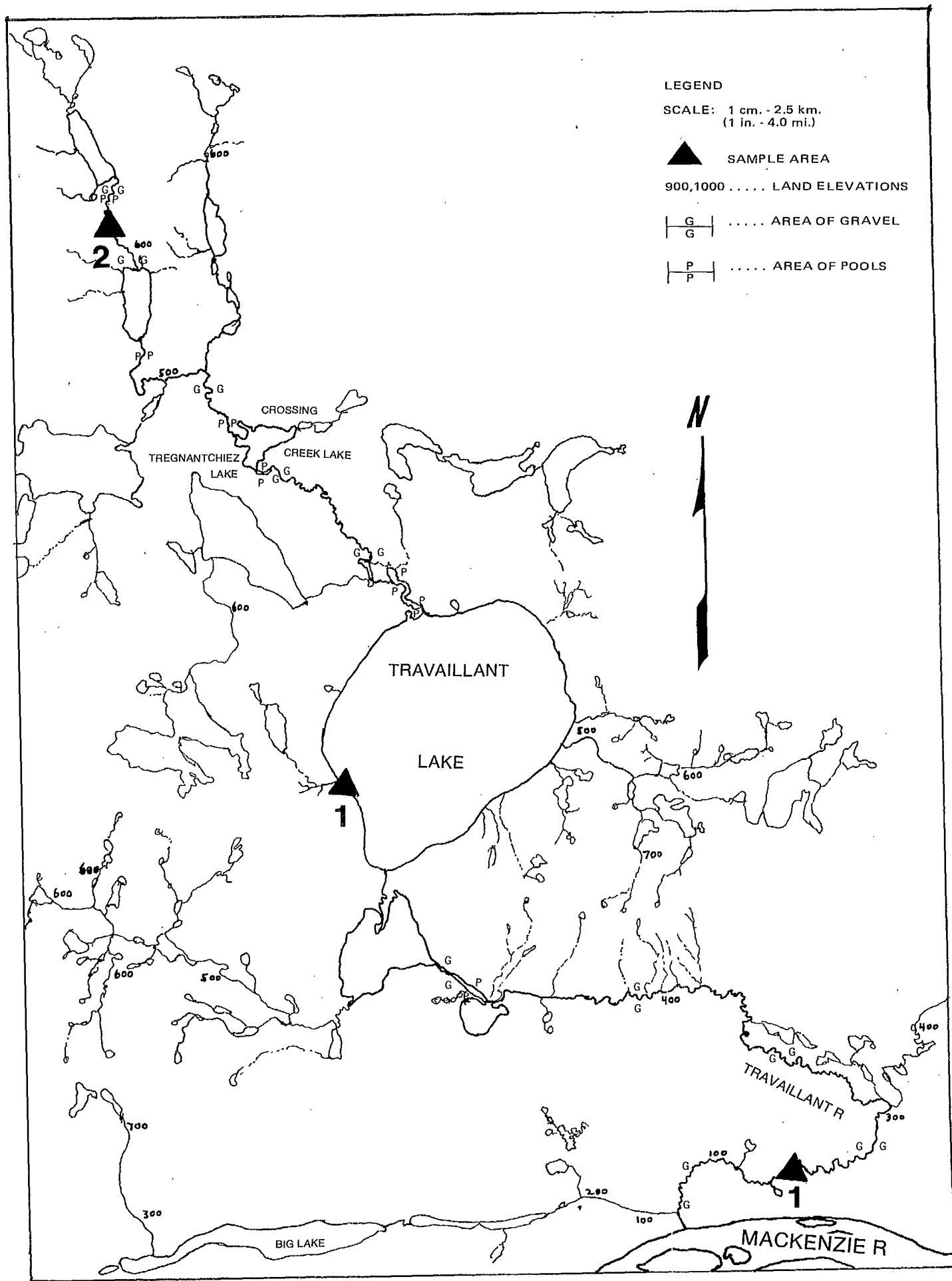
   Length surveyed: 39 km (24 miles)

   Drainage area: 3,609 sq km (1,393 sq miles)

   Estimate of potential spawning area (gravel) in length of stream

   surveyed: 292,000 sq m (352,000 sq yds).

   Description:

        The Tree River is primarily a single channel stream with

   siltation near its mouth. Water in its upper reaches is a dark

   rust colour and flows over a bed of boulders and gravel. It has

   a moderate current with intermittent pools and should have a good

   spawning potential.

LEGEND

SCALE: 1 cm. - 2.5 km.
        (1 in. - 4.0 mi.)

▲   SAMPLE AREA

900,1000 . . . . . LAND ELEVATIONS

|─ G ─| . . . . . AREA OF GRAVEL
| G |

B. Sample Location Data: Tree River

Loc. # & Date	Bottom Type	Color	Air Water (C)	Invert Status	Catch Method	Species	#	Maturity
#1 July 8	Gravel	Clear	23 16	Eph. Tri.	S.	Lake Chub	28	Yearling
#1 Aug. 12	Gravel	Light Rust	11 12	Eph. Tri	S. S. S.	Longnose Sucker Lake Chub Trout-perch	118 2 2	Yearling Yearling Yearling
#1 Sept. 20	Gravel	Light Rust	13 7	Neg.	S. S.	Longnose Sucker Lake Chub	7 69	Yearling Yearling
#2 July 8		Clear	25 17	Eph. Tri. Dip	S.	Grayling	10	Yearling
#2 Aug. 12	Gravel	Clear	13 11	Eph. Tri.	S.	Grayling	3	Yearling
#2 Sept. 20	Gravel	Light Rust	15 7	Ple.	S.	Grayling	1	Yearling

LEGEND:

    Eph. - Ephemeroptera
    Tri. - Trichoptera
    Dip. - Diptera
    Ple. - Plecoptera
      S. - Seine

Travaillant River

A. General Data:

Total length: 126 km (78 miles)

Length surveyed: 103 km (64 miles)

Drainage area: 308 sq km (139 sq miles)

Estimate of potential spawning area (gravel) in length of stream

surveyed: 1,028,000 sq m (1,239,000 sq yds).

Description:

The Travaillant River is a fast-flowing, single-channeled river. Fine and coarse gravel prevail from the Mackenzie River to Travaillant Lake and further upstream into the chain of lakes which the river drains. Pools are more common in the upper reaches of the river and around Travaillant Lake. The river possesses an excellent spawning potential throughout the length surveyed. A sample location was located on Travaillant Lake and sampled twice during the survey.

LEGEND

SCALE: 1 cm. - 2.5 km.
(1 in. - 4.0 mi.)

▲   SAMPLE AREA

900,1000 . . . . . LAND ELEVATIONS

| G / G | . . . . . AREA OF GRAVEL

| P / P | . . . . . AREA OF POOLS

N

TRAVAILLANT

LAKE

CROSSING

CREEK LAKE

TREGNANTCHIEZ
LAKE

TRAVAILLANT R

MACKENZIE R

BIG LAKE

B. Sample Location Data: Travaillant River

Loc. # & Date	Bottom Type	Color	Air Water (C)	Invert Status	Catch Method	Species	#	Maturity
#2 July 14	Gravel	Clear	15 15	Eph. Tri. Ple. Dip.	S.	Grayling	4	Yearling
#2 Aug. 11	Gravel	Clear	7 8	Eph. Dip. Tri.	S.	Neg.	--	--
#2 Sept. 20	Gravel	Clear				LOCATION IN FLOOD STAGE - NOT SAMPLED		
#1 July 14	Gravel	Clear	20 17	Ple. Dip. Eph. Tri.	S. S. S.	Grayling Longnose Sucker Humpback Whitefish	1 9 4	Yearling Yearling Yearling
# 1 Aug. 11	Gravel	Green	8 11	Dip. Tri. Ple.	--	--	--	--
#1 Sept. 20	Gravel	Green	15 7	Dip. Tri.	0.	Longnose Sucker	8	Yearling

LEGEND:

Eph. - Ephemeroptera   S.- Seine
Tri. - Trichoptera   O.- Observation
Ple. - Plecoptera
Dip.- Diptera

C. Sample Location Data: Travaillant Lake

	Loc. Data		Temp.		Fish Data			
Loc. # & Date	Bottom Type	Color	Air Water (C)	Invert Status	Catch Method	Species	#	Maturity
#1 Aug. 12	Gravel	Clear	9 12	--	G.N.	Pike*	1	Mature
					S.	Grayling	8	Yearling
					S.	Longnose Sucker	26	Yearling
					S.	Ninespine Stickleback	1	Yearling
					S.	Broad Whitefish	1	Yearling
#1 Sept. 20	Gravel	Clear	13 4	Ple.	G.N.	Humpback Whitefish	3	Immature
					G.N.	Pike	1	Mature
					G.N.	Lake Trout	1	Mature
					S.	Grayling	5	Yearling
					S.	Longnose Sucker	5	Yearling
					S.	Least Cisco	1	Yearling
					S.	Pond Smelt	33	Yearling

* Stomach analysis revealed 1 walleye 3" long.

LEGEND:
      Ple. - Plecoptera
      G.N. - Gill Net
        S. - Seine

Ontaratue River

A. General Data:

   Total length: 166 km (103 miles)

   Length surveyed: 97 km (60 miles)
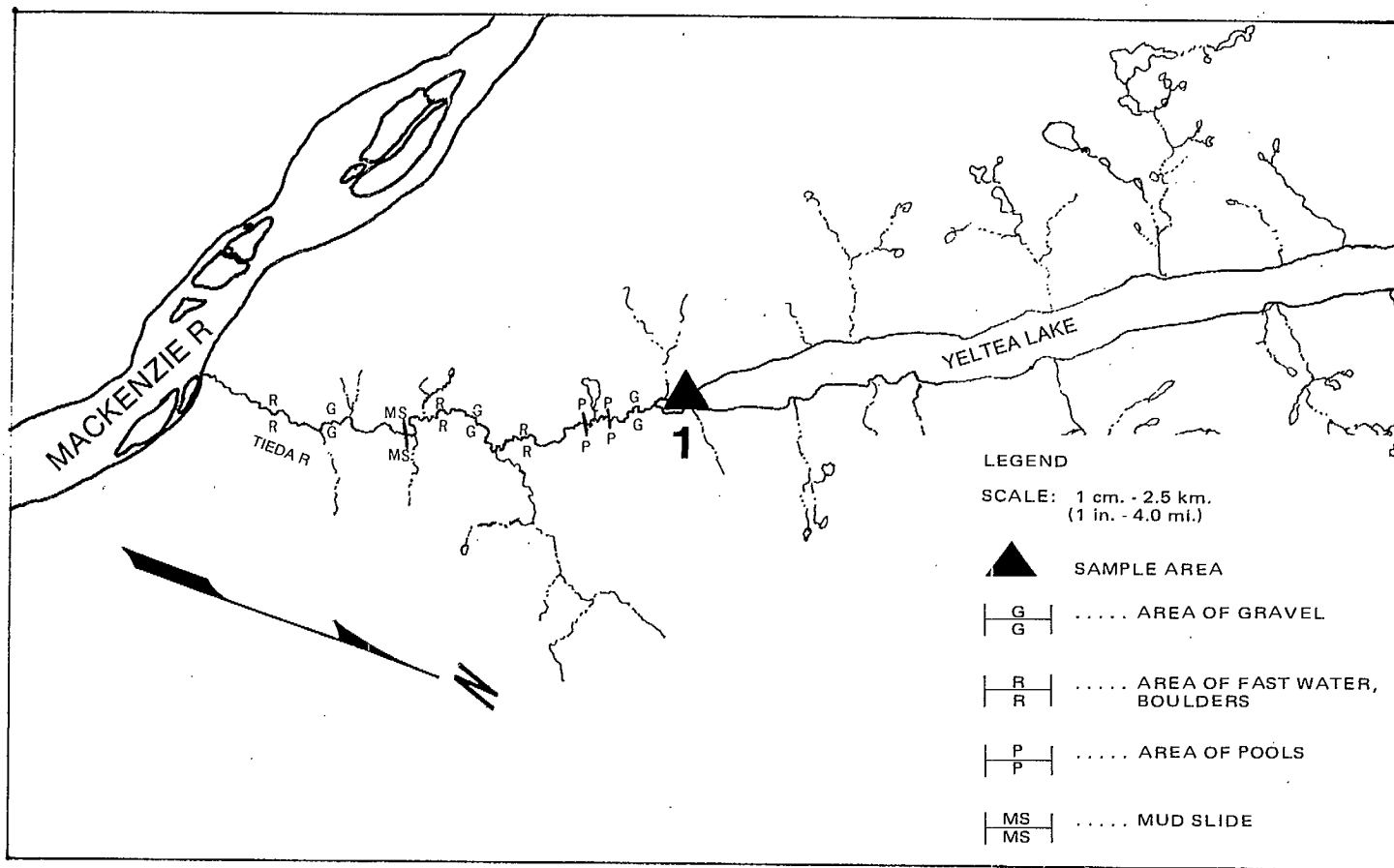
   Drainage area: 9,647 sq km (3,724 sq miles)

   Estimate of potential spawning area (gravel) in length of stream

   surveyed: 2,735,000 sq m (3,295,000 sq yds).

   Description:

       Near its mouth, the Ontaratue River is deep and gently

   meandering with gradual mud banks. Further upstream it is shallow

   and the river bottom is comprised mainly of gravel and shale.

   Although a number of rapids were noted, there appears to be no

   obstruction to migration. The spawning potential of this stream

   appears to be excellent.

       The river showed a marked increase in flow in September

   after periods of rain which flooded sampling areas and made seining

   infeasible.

LEGEND

SCALE: 1 cm. - 2.5 km.
(1 in. - 4.0 mi.)

▲ SAMPLE AREA

900,1000 . . . . . LAND ELEVATIONS

⊢ G/G ⊣ . . . . . AREA OF GRAVEL

⊢ R/R ⊣ . . . . . AREA OF FAST WATER, BOULDERS

⊢ P/P ⊣ . . . . . AREA OF POOLS

⊢ D/D ⊣ . . . . . AREA OF DEEP WATER

⊢ SH/SH ⊣ . . . . . AREA OF SHALE

MACKENZIE R

ONTARATUE R

N
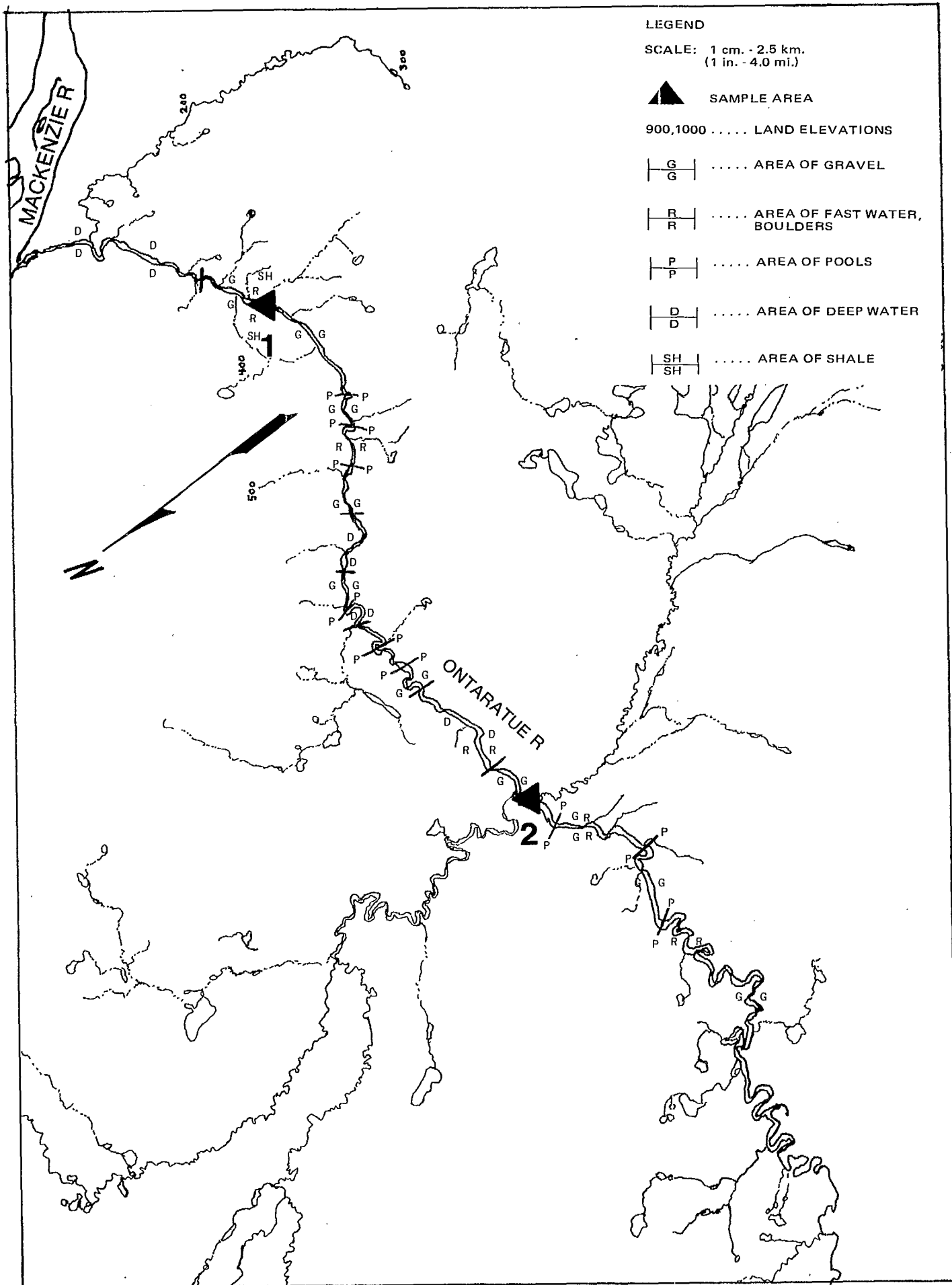
B. Sample Location Data: Ontaratue River

Loc. Data			Temp.	Fish Data				
Loc. # & Date	Bottom Type	Color	Air Water (C)	Invert Status	Catch Method	Species	#	Maturity
#1 July 7	Gravel	Clear	27 18	Eph. Ple. Dip.	S. O.	Slimy Sculpin Pike	1 6	Yearling Immature
#1 Aug. 6	Gravel	Clear	19 16	Dip. Eph. Ple. Tri.	S. O.	Neg. Pike	-- 2	-- Immature
#1 Sept. 16	Gravel	Light Rust	9 7	Neg.	--	STATION FLOODED		
#2 July 7	Boulders	Clear	29 16	Eph. Tri.	S. S.	Trout-perch Slimy Sculpin	1 1	Yearling Yearling
#2 Aug. 8	Gravel	Light Rust	18 18	Tri. Eph. Ple. Dip.	S. S. O.	Lake Chub Pike Pike	10 1 3	Yearling Yearling Immature
#2 Sept. 16	Gravel	Light Rust	9 7	Neg.		STATION FLOODED		

LEGEND:

Eph. - Ephemeroptera
Ple. - Plecoptera
Dip. - Diptera
Tri. - Trichoptera
S. - Seine
O. - Observation

Tieda River

A. General Data:

Total length: 23 km (14 miles)
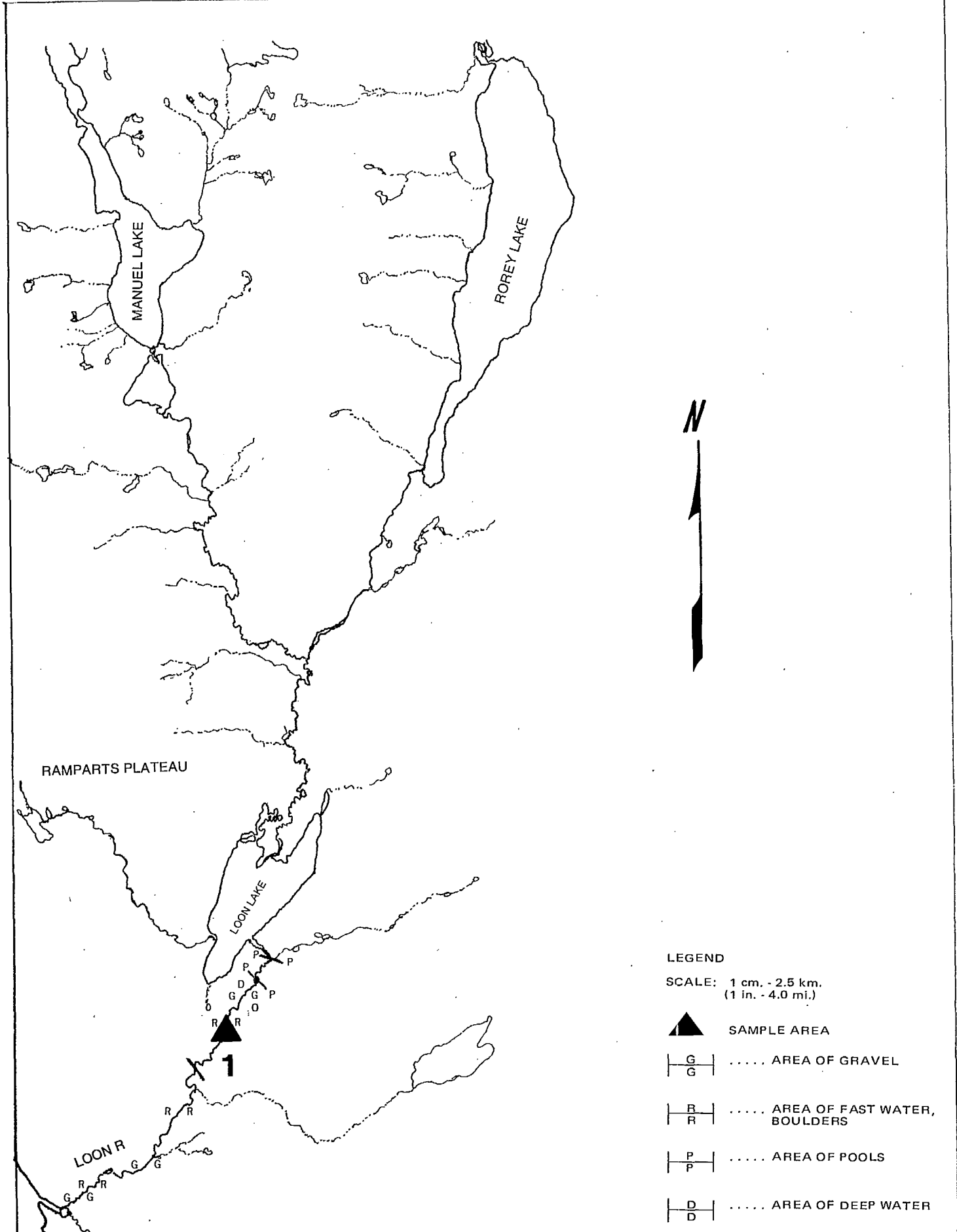
Length surveyed: all

Drainage area: 995 sq km (384 sq miles)

Estimate of potential spawning area (gravel) in length of stream

surveyed: 348,000 sq m (419,000 sq yds).

Description:

This is a very narrow meandering stream with several tree

falls across its lower reaches. Further upstream, fine gravel,

sand, and shallow water may indicate excellent spawning areas. In

pools, more common towards Yeltea Lake, grayling were abundant. A

partial blockage of the stream, caused by a large mud slide, was

noted in September, mid-way between the mouth of the river and

Yeltea Lake.

LEGEND

SCALE: 1 cm. - 2.5 km.
        (1 in. - 4.0 mi.)

▲   SAMPLE AREA

|—G—| . . . . . AREA OF GRAVEL
  G

|—R—| . . . . . AREA OF FAST WATER,
  R   BOULDERS

|—P—| . . . . . AREA OF POOLS
  P

|—MS—| . . . . . MUD SLIDE
  MS

B. Sample Location Data: Yeltea Lake

Loc. Data			Temp.	Fish Data				
Loc. # & Date	Bottom Type	Color	Air Water (C)	Invert Status	Catch Method	Species	#	Maturity

Yeltea Lake:

Loc. # & Date	Bottom Type	Color	Air Water (C)	Invert Status	Catch Method	Species	#	Maturity
#1 July 8	Sand	Clear	22 16	Neg.	An.	Pike	1	Unknown
#1 Aug. 8	Sand	Clear	9 15	--	O.	Pike	2	Unknown
#1 Sept. 9	Sand Gravel	Clear	10 9	Tri.	S.	Ninespine Stickleback	1	Yearling
				Ple.	G.N.	Humpback Whitefish	2	Mature
					G.N.	Lake Trout	3	Ripe

LEGEND:

Tri. - Trichoptera
Ple. - Plecoptera
An. - Angling
O. - Observation
S. - Seine
G.N. - Gill Net

Loon River

A. General Data:

Total length: 130 km (81 miles)

Length surveyed: 29 km (18 miles)

Drainage area: 3,598 sq km (1,389 sq miles)

Estimate of potential spawning area (gravel) in length of stream

surveyed: 460,000 sq m (554,000 sq yds).

Description:

This is a gently meandering stream with many areas of fine

gravel. Bars and shallow water are common throughout the length of

stream surveyed. A few deep pools were noted in the vicinity of

Loon Lake.

MANUEL LAKE

ROREY LAKE

N

RAMPARTS PLATEAU

LOON LAKE

P
P
D   P
G   D   G   P
O   G   G   O
R   R

X 1

R   R
LOON R   G   G
R
G   G

LEGEND

SCALE: 1 cm. - 2.5 km.
         (1 in. - 4.0 mi.)

SAMPLE AREA

| G |
| G | . . . . . AREA OF GRAVEL

| R |
| R | . . . . . AREA OF FAST WATER,
                   BOULDERS

| P |
| P | . . . . . AREA OF POOLS

| D |
| D | . . . . . AREA OF DEEP WATER

B. Sample Location Data: Loon River

Loc. Data			Temp.	Fish Data				
Loc. # & Date	Bottom Type	Color	Air Water (C)	Invert Status	Catch Method	Species	#	Maturity
#1 July 8	Gravel	Clear	21 14	Neg.	An.	UNABLE TO SEINE DUE TO FAST CURRENT Neg.		
#1 Aug. 8	Gravel	Clear	10 15	Eph. Tri. Ple. Dip.	0.	Longnose Sucker	20	--
#1 Sept. 17	Gravel	Clear	10 8	Neg.	S. S.	Pike Longnose Sucker	1 9	Yearling Yearling

LEGEND:

Eph. - Ephemeroptera
Tri. - Trichoptera
Ple. - Plecoptera
Dip. - Diptera
 0. - Observation
 S. - Seine
An. - Angling

Hare Indian River

A. General Data:

Total length: 243 km (151 miles)

Length surveyed: 154 km (96 miles)

Drainage area: 23,189 sq km (8,951 sq miles)

Estimate of potential spawning area (gravel) in length of stream

surveyed: 7,012,000 sq m (8,448,000 sq yds).

Description:

This river has a wide variety of bottom types ranging from

silt and sand near the mouth to areas of boulders, coarse and fine

gravel further upstream. With the occurrence of both fine and

coarse gravel in the headwaters of the stream, the spawning

potential appears to be good. The river, as a whole, is shallow and

gently meandering. Riffles are most common in areas where there are

several bends in succession. Bottom vegetation is common in several

areas of the river.

LEGEND

SCALE: 1 cm. - 2.5 km.
(1 in. - 4.0 mi.)

▲ SAMPLE AREA

900,1000 . . . . . LAND ELEVATIONS

| SI / SI | . . . . . AREA OF SILT MUD BANKS AND BARS

| G / G | . . . . . AREA OF GRAVEL

| R / R | . . . . AREA OF FAST WATER, BOULDERS

| D / D | . . . . . AREA OF DEEP WATER

LEGEND

SCALE: 1 cm. - 2.5 km.
(1 in. - 4.0 mi.)

▲   SAMPLE AREA

900,1000 . . . . . LAND ELEVATIONS

⊢ G/G ⊣   . . . . . AREA OF GRAVEL

⊢ V/V ⊣   . . . . . AREA OF SUBMERGENT
            VEGETATION

HARE INDIAN R.

HARE INDIAN R

LAC A JACQUES

2
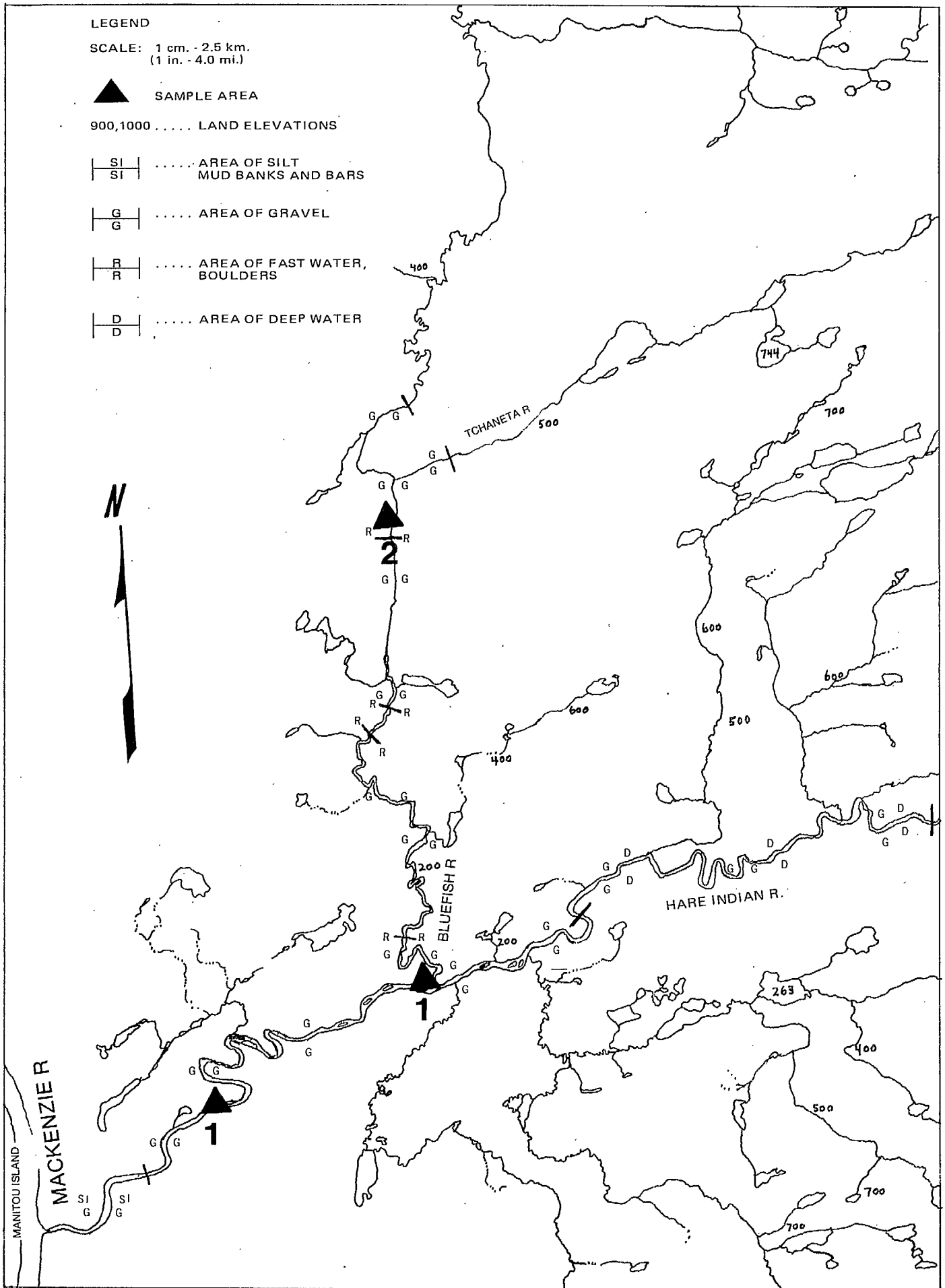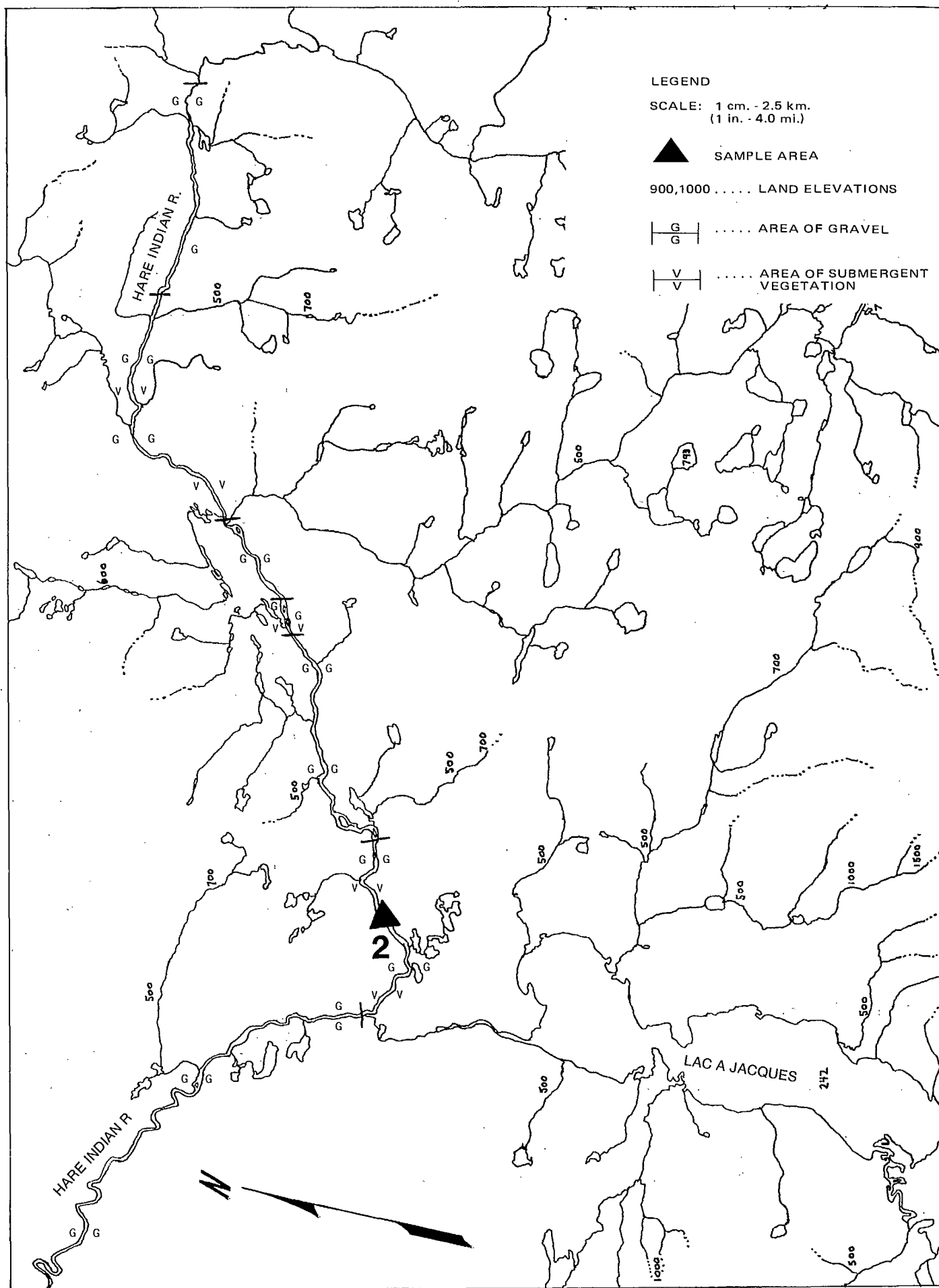
B. Sample Location Data: Hare Indian River

	Loc. Data		Temp.		Fish Data			
Loc. # & Date	Bottom Type	Color	Air Water (C)	Invert Status	Catch Method	Species	#	Maturity
#2 July 10	Gravel	Clear	22 16	Dip. Ple. Eph. Tri.	S. S.	Grayling Slimy Sculpin	11 2	Yearling Yearling
#2 Aug. 6	Gravel	Clear	12 12	Neg.	S. S.	Grayling Longnose Sucker	30 8	Yearling Yearling
#2 Sept. 18	Gravel	Light Rust	5 6	Neg.	S. S. S.	Grayling Lake Chub Slimy Sculpin	135 4 5	Yearling Yearling Yearling
#1 July 10	Gravel	Clear	24 16	Neg.	S. S. S.	Grayling White Sucker Burbot	12 2 1	Yearling Yearling Yearling
#1 Aug. 6	Gravel	Clear	10 14	Neg.	S. S. S. S. S.	Grayling Slimy Sculpin Humpback Whitefish Lake Chub Longnose Sucker	2 1 1 300 200	Yearling Yearling Yearling Yearling Yearling
#1 Sept. 18	Gravel	Light Rust	6 7	Neg.	S. S.	Lake Chub Longnose Sucker	61 5	Yearling Yearling

LEGEND:

Dip. - Diptera   Tri. - Trichoptera
Ple. - Plecoptera   S. - Seine
Eph. - Ephemeroptera

Bluefish River

A. General Data:

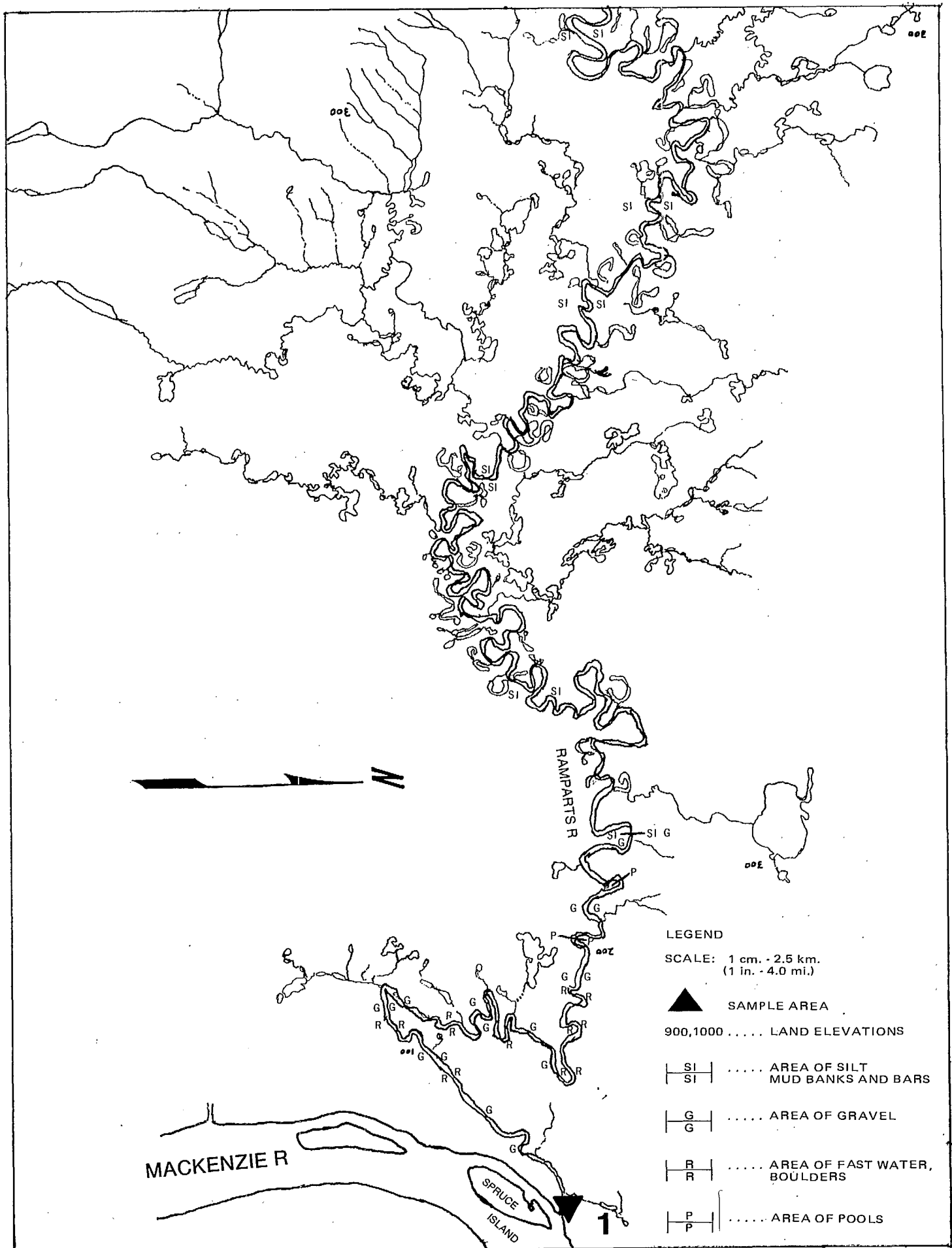Total length: 80 km (50 miles)

Length surveyed: 48 km (30 miles)
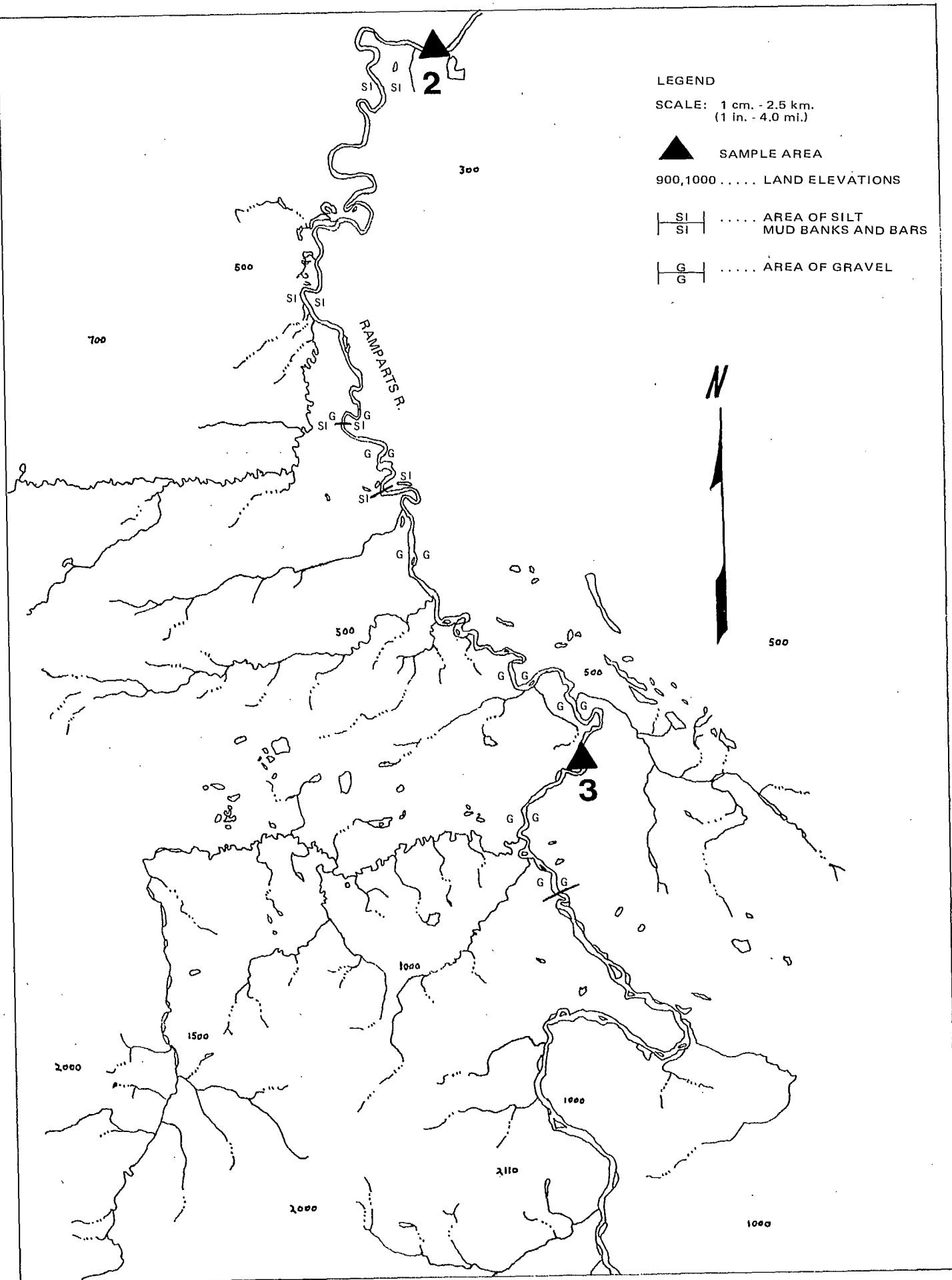
Drainage area: 1,569 sq km (606 sq miles)

Estimate of potential spawning area (gravel) in length of stream

surveyed: 1,183,000 sq m (1,426,000 sq yds).

Description:

The Bluefish River is primarily a clear, moderately

meandering stream flowing into the Hare Indian River. The river flows

through a muskeg type terrain through its upper reaches, then through

gently rolling hills until it reaches the Hare Indian. Numerous

gravel bars were noted along its length which could indicate good

spawning potential.

B. Sample Location Data: Bluefish River

Loc. # & Date	Bottom Type	Color	Air Water (C)	Invert Status	Catch Method	Species	#	Maturity
#2 July 9	Gravel	Clear	22 14	Neg.	An.	Neg.	--	--
#2 Aug. 8	Gravel	Clear	10 13	Ple. Eph. Tri.	S. S.	Grayling Slimy Sculpin	1 1	Yearling Yearling
					S.	Longnose Sucker	1	Yearling
#2 Sept. 17	Gravel	Light Rust	9 6	Neg.	S.	Neg	--	--
#1 July 9	Gravel	Clear	23 14	Dip. Ple.	S. S. S. O. An.	Slimy Sculpin Grayling Lake Chub Pike Neg.	2 4 2 1 --	Yearling Yearling Yearling Mature --
#1 Aug. 6	Gravel	Clear	10 16	Tri. Ple.	S. S. S.	Lake Chub Grayling Slimy Sculpin	10 3 3	Yearling Yearling Yearling
#1 Sept. 17	Gravel	Light Rust	9 7	Neg.	S.	Humpback Whitefish	1	Yearling

LEGEND:

Ple. - Plecoptera   S. - Seine
Eph. - Ephemeroptera   O. - Observation
Tri. - Trichoptera   An. - Angling
Dip. - Diptera

Ramparts River

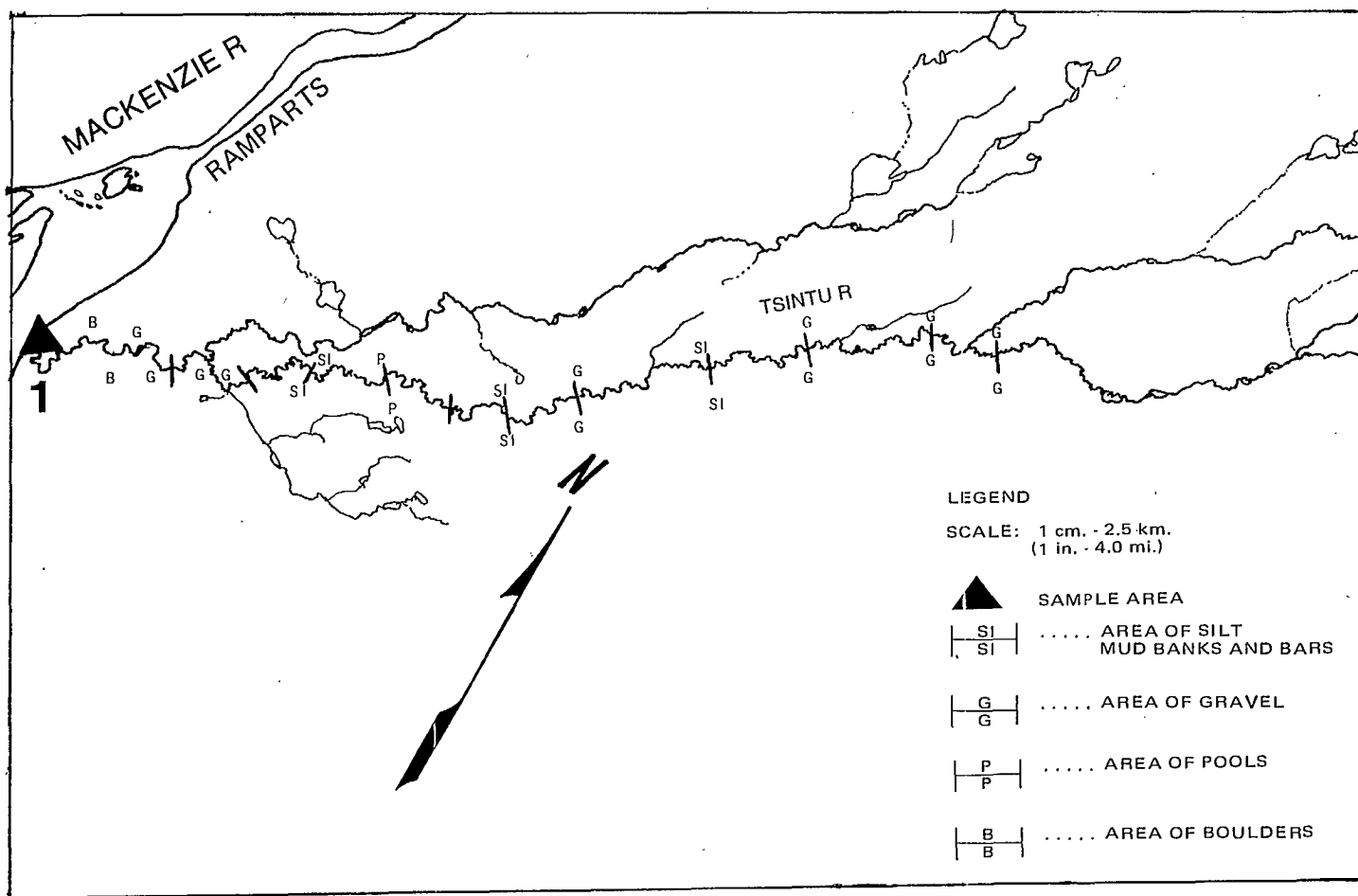A. General Data:

Total length: 312 km (194 miles)

Length surveyed: 257 km (160 miles)

Drainage area: 10, 681 sq km (4,125 sq miles)

Estimate of potential spawning area (gravel) in length of stream

surveyed: 2,577,000 sq m (3,105,000 sq yds).

Description:

The Ramparts River meanders greatly and has a heavy
silt load. It is subject to flooding following rains which greatly
increase its silt load. Some gravel and rock bars were noted near
its confluence with the Mackenzie River, but generally the river
bed is heavily silted. Scattered gravel bars were noted at locations
near the proposed pipeline crossing.

While the lower reaches of this stream appear to have only
a marginal spawning potential, the stream bed above the proposed
pipeline crossing shows a better potential due to more prevalent
gravel areas.

RAMPARTS R

MACKENZIE R

SPRUCE ISLAND

▲1

LEGEND

SCALE: 1 cm. - 2.5 km.
        (1 in. - 4.0 mi.)

▲   SAMPLE AREA

900,1000 . . . . . LAND ELEVATIONS

| SI |
| SI | . . . . . AREA OF SILT
          MUD BANKS AND BARS

| G |
| G | . . . . . AREA OF GRAVEL

| R |
| R | . . . . . AREA OF FAST WATER,
          BOULDERS

| P |
| P | . . . . . AREA OF POOLS

LEGEND

SCALE: 1 cm. - 2.5 km.
(1 in. - 4.0 mi.)

▲ SAMPLE AREA

900,1000 . . . . . LAND ELEVATIONS

SI
SI . . . . . AREA OF SILT
MUD BANKS AND BARS

G
G . . . . . AREA OF GRAVEL

B. Sample Location Data: Ramparts River

Loc. Data			Temp.		Fish Data			
Loc. # & Date	Bottom Type	Color	Air Water (C)	Invert Status	Catch Method	Species	#	Maturity
#1 July 6	Boulders	Green	22 19	Neg.	An. G.N.	Neg. Flathead Chub	-- 2	-- Ripe
#1 Aug. 6	Boulders	Heavy Silt	19 12	Neg.	G.N.	Flathead Chub	2	Mature
#1 Sept. 16	Boulders	Heavy Silt	11 8	Neg.	LOCATION IN SEMI-FLOOD STAGE			
#2 July 7	Silt Sand	Heavy Silt	21 17	Neg.	S. S.	Lake Chub White Sucker	1 2	Yearling Yearling
#2 Aug. 6	Silt Sand	Heavy Silt	18 12	Neg.	FLOOD CONDITIONS			
#2 Sept. 16	Silt Sand	Heavy Silt	11 8	Neg.	--	--	--	--
#3 July 7	Boulders Gravel	Green	22 18	Unident.	S. S.	Slimy Sculpin Grayling	1 2	Yearling Yearling
#3 Aug. 6	Gravel	Heavy Silt	19 12	Neg.	--	--	--	--
#3 Sept. 16	Gravel Silt	Heavy Silt	11 5	Neg.	S. S. S.	Lake Chub Longnose Sucker Slimy Sculpin	4 3 1	Yearling Yearling Yearling

LEGEND:
         An. - Angling
     G.N. - Gill Net
       S. - Seine

Tsintu River
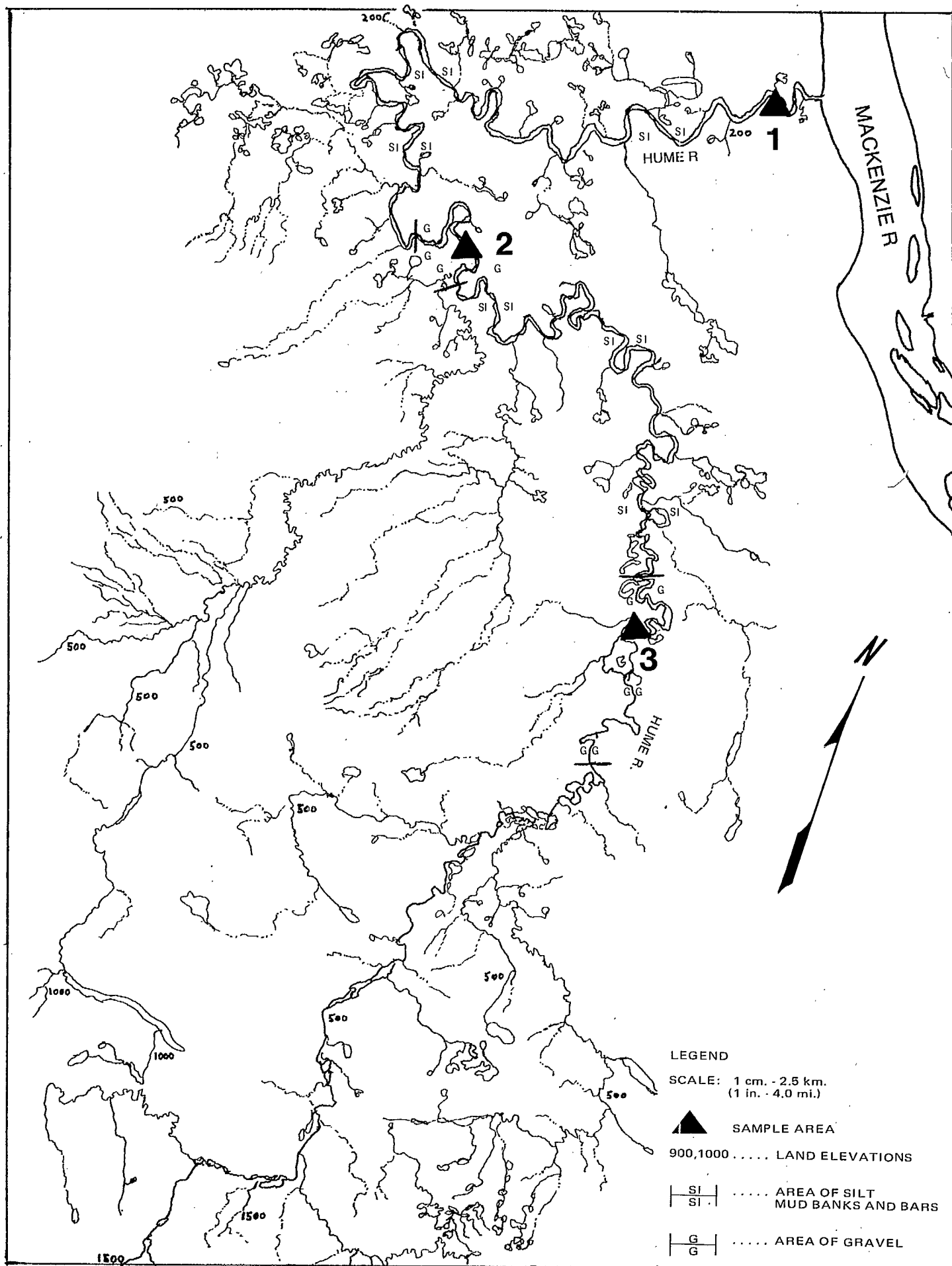
A. General Data:

Total length: 77 km (48 miles)

Length surveyed: '39 km (24 miles)

Drainage area: 1,369 sq km (528 sq miles)

Estimate of potential spawning area (gravel) in length of stream

surveyed: 286,000 sq m (345,000 sq yds).

Description:

The Tsintu River is a meandering stream with high banks
near its confluence with the Mackenzie River. Further upstream
it flows through a muskeg area with gentle slopes. The downstream
reaches have a large boulder-coarse gravel type of bottom, while
the upper reaches show evidence of fine gravel and sand bars at
scattered locations. No major obstructions to migration were noted.

LEGEND

SCALE: 1 cm. - 2.5 km.
(1 in. - 4.0 mi.)

SAMPLE AREA

SI / SI ..... AREA OF SILT MUD BANKS AND BARS

G / G ..... AREA OF GRAVEL

P / P ..... AREA OF POOLS

B / B ..... AREA OF BOULDERS

B. Sample Location Data: Tsintu River

Loc. # & Date	Loc. Data		Temp. Air Water (C)	Fish Data				
	Bottom Type	Color		Invert Status	Catch Method	Species	#	Maturity
#1 July 7	Boulders & Gravel	Clear	21 16	Eph.	--	--	--	--
#1 Aug. 8	Boulders & Gravel	Dark Rust	19 15	Neg.	S. S. S.	Lake Chub Walleye Longnose Sucker	19 24 18	Yearling Yearling Yearling
#1 Sept. 15	Boulders & Gravel	Dark Rust	12 6	Neg.	S. S.	Lake Chub Longnose Sucker	27 16	Yearling Yearling

LEGEND:

Eph. - Ephemeroptera
S. - Seine

Hume River

A. General Data:

Total length: 197 km (122 miles)

Length surveyed: 110 km (68 miles)

Drainage area: 5,120 sq km (1,976 sq miles)

Estimate of potential spawning area (gravel) in length of river

surveyed: 1,297,000 sq m (1,563,000 sq yds).

Description:

The Hume River meanders greatly and is given to rapid
fluctuations following rains. The lower reaches meander through a
low-lying muskeg terrain dotted with many small lakes draining into
the Hume River. Heavy siltation is evident along the entire length
surveyed limiting the spawning potential of observed gravel bars.
Landslide activity was evident accounting, in part, for the heavy
siltation.

LEGEND

SCALE: 1 cm. - 2.5 km.
(1 in. - 4.0 mi.)

▲   SAMPLE AREA

900,1000 . . . . . LAND ELEVATIONS

|—SI—|—SI—| . . . . . AREA OF SILT
MUD BANKS AND BARS

|—G—|—G—| . . . . . AREA OF GRAVEL

B.   Sample Location Data: Hume River

Loc. # & Date	Bottom Type	Color	Air Water (C)	Invert Status	Catch Method	Species	#	Maturity
#1 July 7	Sand & Silt	Green	22 18	Neg.	G.N. G.N.	White Sucker Pike	1 1	Ripe Ripe
#1 Aug. 6	Flooded							
#1 Sept. 15	Unclas- sified	Heavy Silt	10 6	UNABLE TO SAMPLE DUE TO FLOOD				
#2 July 7	Gravel	Green	19 18	Neg.	S.	Lake Chub	3	Yearling
#2 Aug. 6	Gravel	Heavy Silt	15 11	Neg.	S. S. S.	Lake Chub Longnose Sucker Trout-perch	42 11 1	Yearling Yearling Yearling
#2 Sept. 15	Gravel & Silt	Heavy Silt	10 6	Neg.	S. S. S.	Lake Chub Longnose Sucker Trout-perch	12 1 3	Yearling Yearling Yearling
#3 July 6	Gravel & Silt	Green	22	Neg.	S. S. S.	Lake Chub Trout-perch White Sucker	41 1 1	Yearling Yearling Yearling
#3 Aug. 6	Gravel	Heavy Silt	18 11	Neg.	UNABLE TO SAMPLE DUE TO FLOOD			
#3 Sept. 15	Gravel & Silt	Heavy Silt	12 5	Neg.	S. S. S. S.	Lake Chub Grayling Trout-perch Pike	163 3 1 1	Yearling Yearling Yearling Yearling

LEGDND:

        G.N. - Gill Net
         S. - Seine

Donnelly River
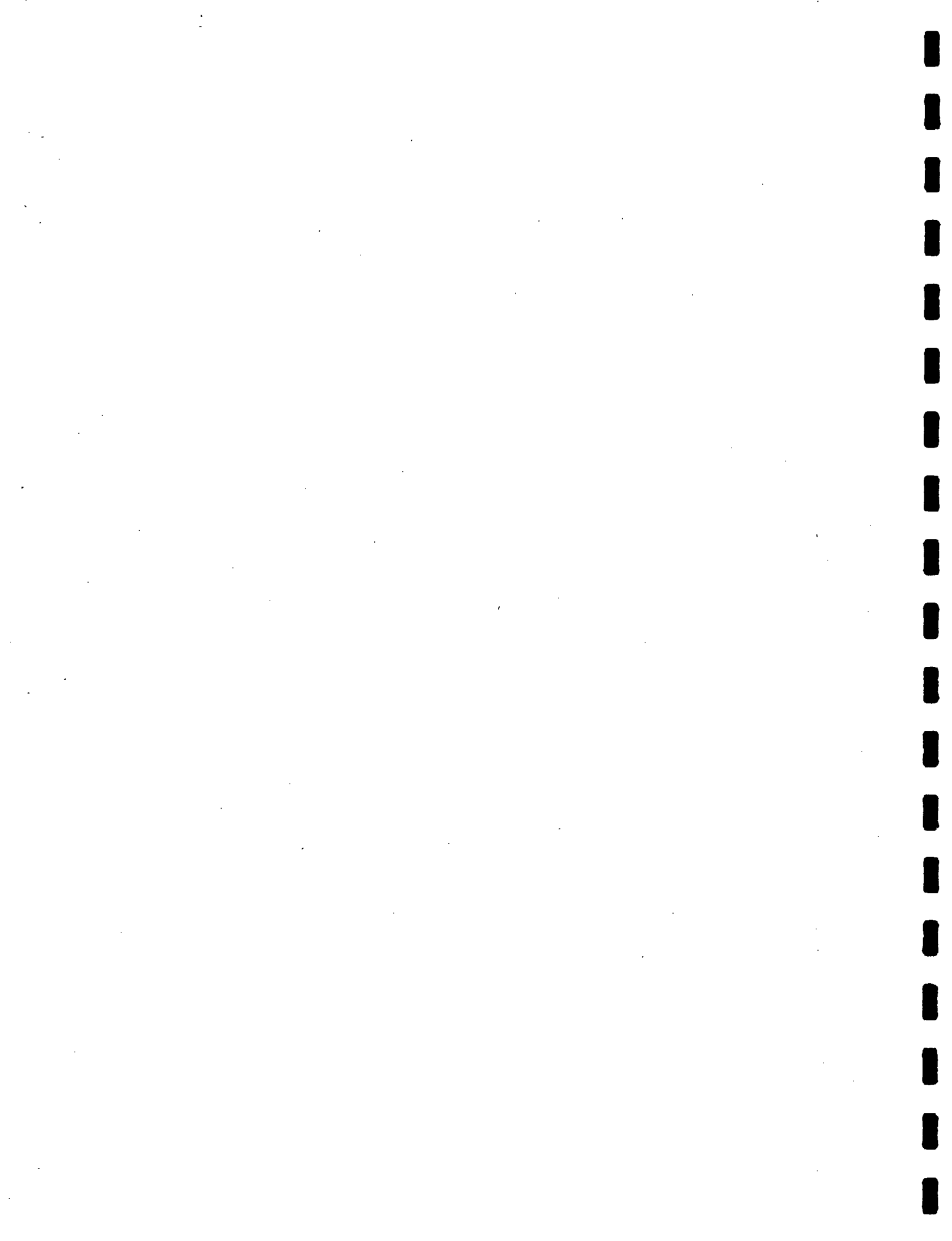
A.   General Data:

Total length: 115 km (71 miles)

Length surveyed: all

Drainage area: 2,862 sq km (1,105 sq miles)

Estimate of potential spawning area (gravel) in length of stream

surveyed: 158,000 sq m (190,000 sq yds).

Description: ·

The Donnelly River is a clear, fast-flowing stream.

Scattered gravel bars indicate some spawning potential. Steep

banks made sampling extremely difficult along its upper reaches.

LEGEND

SCALE: 1 cm. - 2.5 km.
        (1 in. - 4.0 mi.)

▲   SAMPLE AREA

├ G ┤ ..... AREA OF GRAVEL
  G

├ R ┤ ..... AREA OF FAST WATER,
  R   BOULDERS
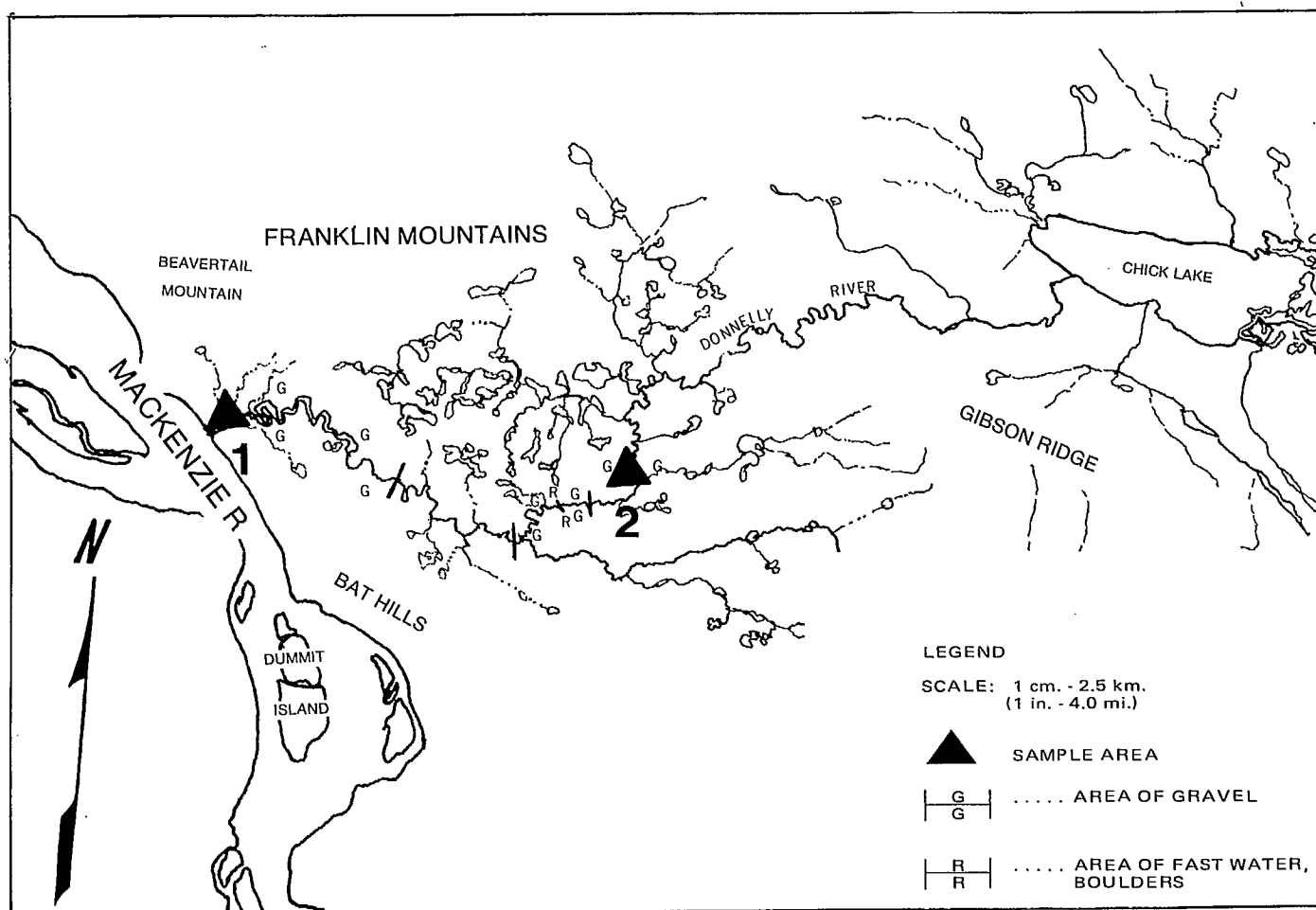
B. Sample Location Data: Donnelly River

	Loc. Data		Temp.			Fish Data		
Loc. # & Date	Bottom Type	Color	Air Water (C)	Invert Status	Catch Method	Species	#	Maturity
#1 July 5	Gravel	Clear	23 19	Dip.	S.	Lake Chub	26	Yearling
				Tri.	S.	Slimy Sculpin	1	Yearling
				Eph.	S.	White- fish sp.	4	Yearling
#1 July 31	Gravel & Sand	Green	20 18	Neg.	S.	Grayling	1	Yearling
					S.	Trout-perch	1	Yearling
					S.	Walleye	1	Yearling
					S.	Lake Chub	10	Yearling
					S.	Longnose Sucker	15	Yearling
					S.	Humpback Whitefish	1	Yearling
#1 Sept. 14	Gravel	Dark Rust	7 7	Neg.	--	--	--	--
#2 July 5	Coarse Gravel	Clear	18 16	Dip.	S. S.	Grayling Pike	11 1	Yearling Yearling
#2 July 31	Sand	Heavy Silt	20 18	Neg.	--	--	--	--
#2 Sept. 14	Sand	Dark Rust	7 7	Neg.	--	--	--	--

LEGEND:

    Dip. - Diptera
    Tri. - Trichoptera
    Eph. - Ephemeroptera
      S. - Seine

Hanna River

A. General Data:

Total length: 86 km (53 miles)

Length surveyed: 58 km (36 miles)

Drainage area: 1,876 sq km (724 sq miles)

Estimate of potential spawning area (gravel) in length of stream

surveyed: indefinite.

Description:

This stream flows through an area heavily burnt over by forest fires. Landslide activity is very evident and has partially blocked portions of the stream. As a consequence, the silt load carried by the water is fairly high, making spawning potential doubtful.

LEGEND

SCALE: 1 cm. - 2.5 km.
        (1 in. - 4.0 mi.)

▲   SAMPLE AREA

900,1000 . . . . . LAND ELEVATIONS
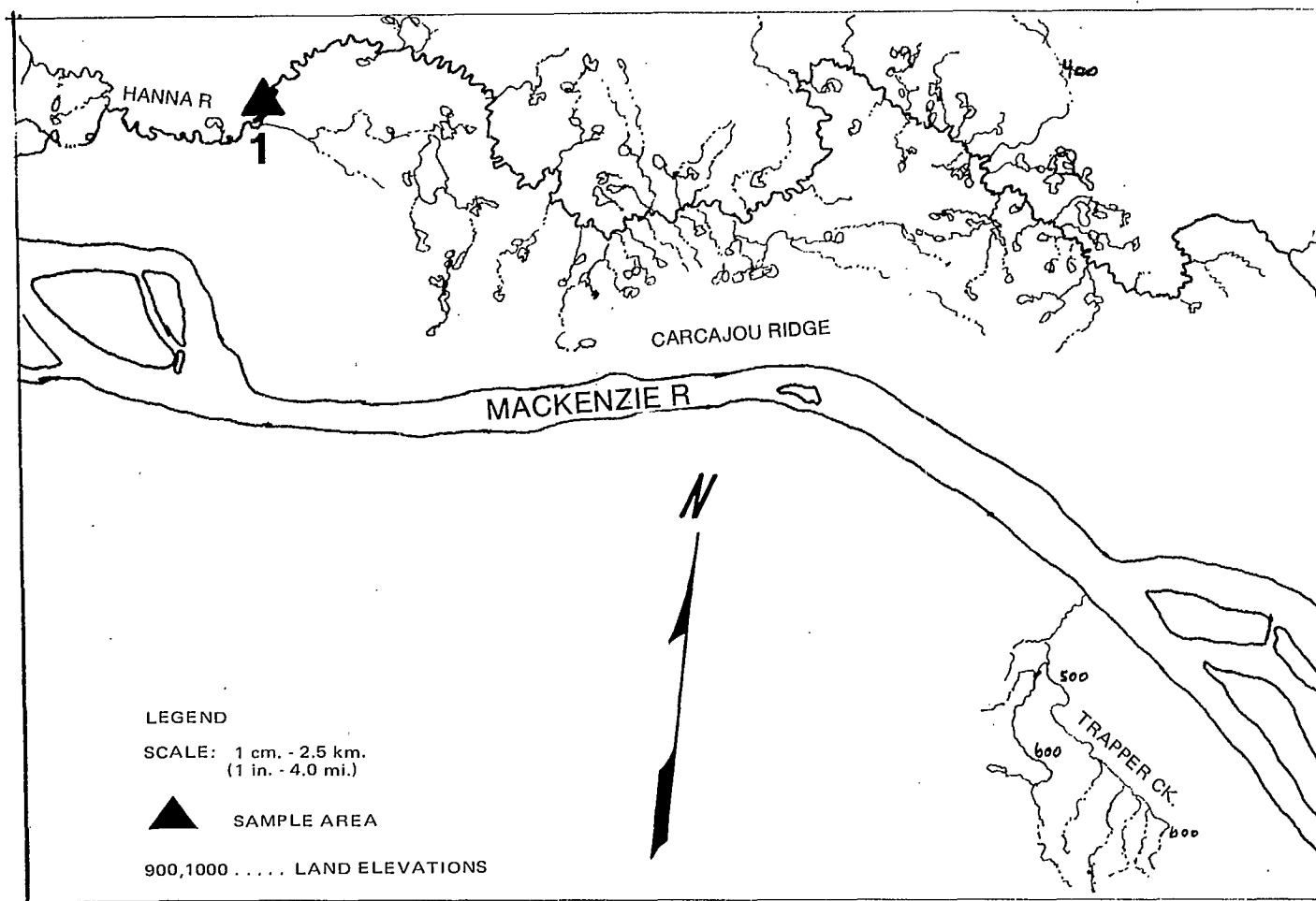
B.   Sample Location Data: Hanna River

Loc. # & Date	Loc. Data		Temp.	Fish Data				
	Bottom Type	Color	Air Water (C)	Invert Status	Catch Method	Species	#	Maturity
#1	Silt Sand	Silt	24 16	Ple.	S.	Neg.		

LOCATION DISCONTINUED DUE TO NATURE OF RIVER

LEGEND:

        Ple. - Plecoptera
         S. - Seine

Trapper Creek

A. General Data:

Total length: 10 km (6 miles)

Length surveyed: all

Drainage area: 49 sq km (19 sq miles)

Estimate of potential spawning area (gravel) in length of stream

surveyed: indefinite.

Description:

This stream has a minimal flow of water and appears to

be in a low discharge condition early in the summer. It has a few

deep pools with intermittent rapids. The bottom is comprised of

boulders and coarse gravel. Heavy woodstands along the banks made

it impossible to establish a sample location.

Mountain River

A. General Data:

Total length: 328 km (204 miles)
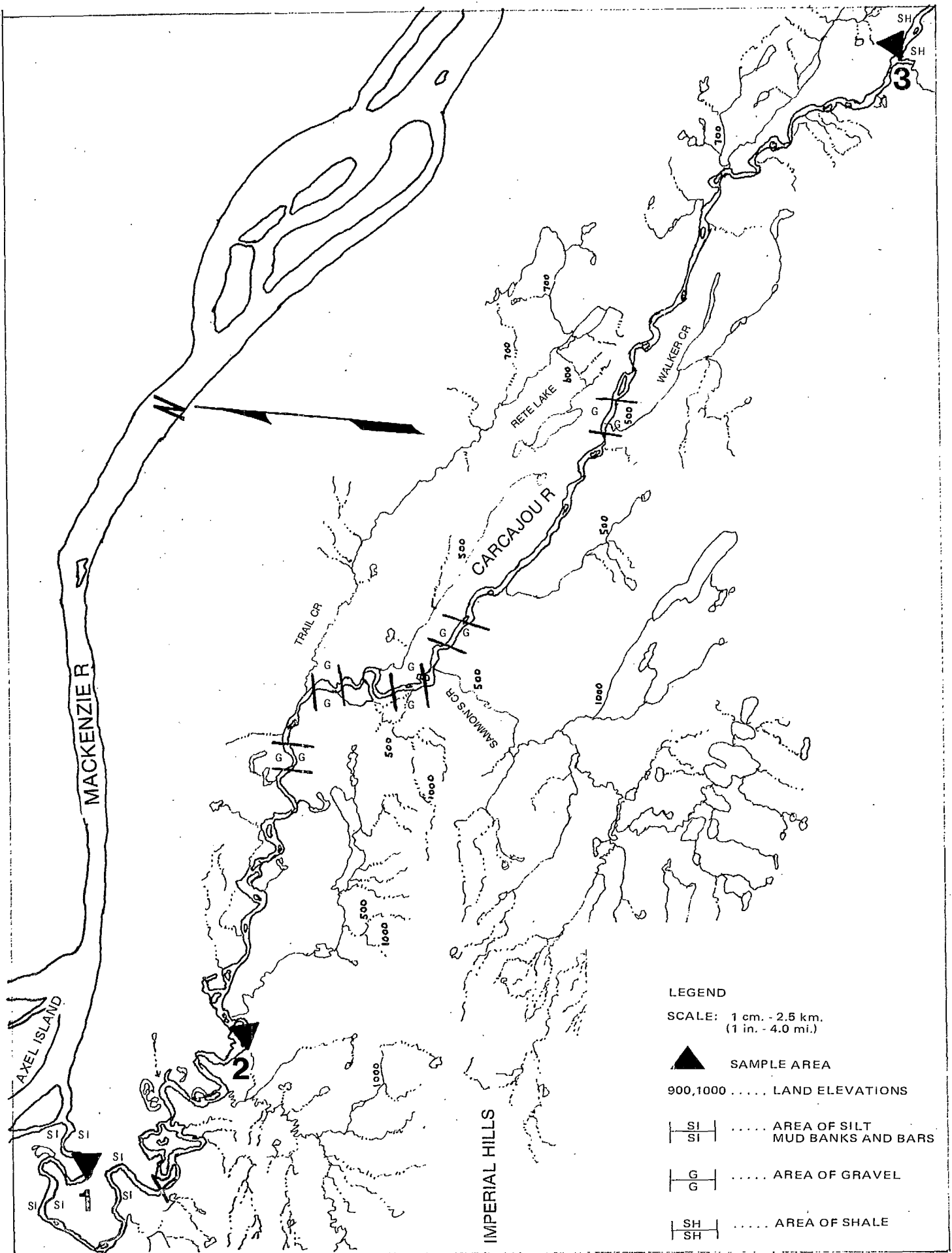
Length surveyed: 90 km (56 miles)

Drainage area: 22,299 sq km (8,507 sq miles)

Estimate of potential spawning area (gravel) in length of stream surveyed: 3,506,000 sq m (4,224,000 sq yds).

Description:

This is a multi-channeled stream with numerous silty gravel bars and islands. A strong current carrying a heavy silt load may make the bottom unsuitable for spawning. The shoreline is flat near the Mackenzie River but soon changes to canyon areas and rolling hills upstream.

Sampling locations were placed in smaller side channels where seining was feasible rather than in the swift, main channels of the river. Sample locations were also placed upstream on two major tributaries of the Mountain River, the Gayna River and Virgin Creek. Both proved to be infeasible for seining as they are rapid flowing. The Gayna River runs through a high steep-walled canyon. Its bottom consists of boulders and rapids were observed throughout its length. Virgin Creek flows through more even terrain but also flows swiftly and carries a heavy silt load.

LEGEND

SCALE: 1 cm. - 2.5 km.
         (1 in. - 4.0 mi.)

▲   SAMPLE AREA

▦   EXPOSED GRAVEL AREA

900,1000 . . . . . LAND ELEVATIONS

SI
SI	. . . . . AREA OF SILT
         MUD BANKS AND BARS

G
G	. . . . . AREA OF GRAVEL
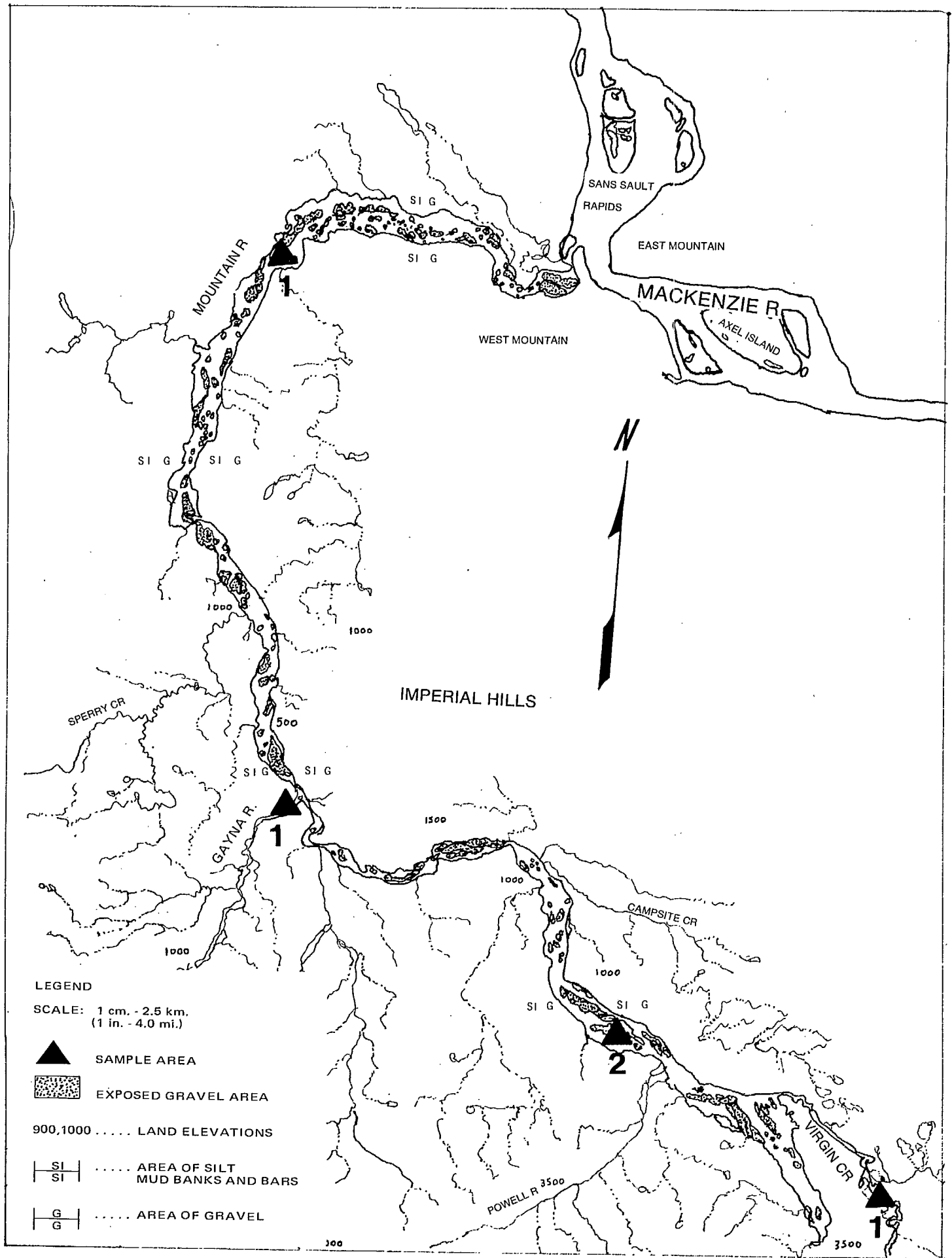
B. Sample Location Data: Mountain River

Loc. # & Date	Bottom Type	Color	Air Water (C)	Invert Status	Catch Method	Species	#	Maturity
#1 July 5	Gravel & Silt	Heavy Silt	18 15	Dip.	S. S. S.	Grayling Lake Chub White Sucker	16 6 2	Yearling Yearling Yearling
#1 Aug. 1	Gravel & Silt	Heavy Silt	16 17	Neg.	S. S. S.	Longnose Sucker Lake Chub Slimy Sculpin	21 41 1	Yearling Yearling Yearling
#1 Sept. 14	Gravel	Dark Rust	8 7	Neg.	S. S. S.	Longnose Sucker Lake Chub Slimy Sculpin	10 1 1	Yearling Yearling Yearling
#2 July 5	Gravel & Silt	Heavy Silt	14 11	Neg.	S. S.	Lake Chub White Sucker	6 6	Yearling Yearling
#2 Aug. 1	Gravel	Heavy Silt	16 15	Neg.	S.	Grayling	1	Yearling
#2 Sept. 14	Gravel & Silt	Light Silt	12 7	Neg.	S.	Longnose Sucker	3	Yearling

LEGEND:

S. - Seine
Dip. - Diptera

B. Sample Location Data: Gayna River and Virgin Creek

	Loc. Data		Temp.	Fish Data				
Loc. # & Date	Bottom Type	Color	Air Water (C)	Invert Status	Catch Method	Species	#	Maturity
Gayna River								
#1 July 5	Boulders	Silt	16 9		Neg.	Neg.		
Aug. 2	Boulders	Silt	16 12		Neg.	Neg.		
Sept. 14	Boulders	Silt	8 6		Neg.	Neg.		
Virgin Creek:								
#1 July 5	Silt Sand	Silt	14 11		Neg.	Neg.		
Aug. 1	Silt Sand	Silt	16 12		Neg.	Neg.		
Sept. 14	Silt Sand	Silt	12 7		Neg.	Neg.		

Carcajou River

A. General Data:

Total length: 192 km (119 miles)

Length surveyed: 116 km (72 miles)

Drainage area: 7,369 sq km (2,844 sq miles) .

Estimate of potential spawning area (gravel) in length of stream

surveyed: 958,000 sq m (1,155,000 sq yds).

Description:

This is a meandering river with many islands dotting the
main channel. It has many long shallow pools and intermittent
riffles. Lower reaches of the stream have many oxbows and silt bars.
Extensive mud flats were observed near its mouth.

Water colour throughout the length of stream surveyed is
murky. Heavy silt deposits are evident along the edges. Few areas
of good spawning potential were observed due to the high silt
composition of the gravel.

LEGEND

SCALE: 1 cm. - 2.5 km.
(1 in. - 4.0 mi.)

▲   SAMPLE AREA

900,1000 . . . . . LAND ELEVATIONS

├ SI ┤ . . . . . AREA OF SILT
├ SI ┤   MUD BANKS AND BARS

├ G ┤ . . . . . AREA OF GRAVEL
├ G ┤

├ SH ┤ . . . . . AREA OF SHALE
├ SH ┤

MACKENZIE R

AXEL ISLAND

CARCAJOU R

RETE LAKE

WALKER CR

TRAIL CR

SAMMON'S CR

IMPERIAL HILLS

B.   Sample Location Data: Carcajou River

	Loc. Data		Temp.		Fish Data			
Loc. # & Date	Bottom Type	Color	Air Water (C)	Invert Status	Catch Method	Species	#	Maturity
#3 July 2	Fine Gravel	Heavy Silt	19 12	Neg.	An. S.	Neg. Lake Chub	-- 13	-- Yearling
#3 July 31	Silt & Sand	Heavy Silt	25 13	Neg.	S. S. S. S.	Trout-perch Slimy Sculpin Lake Chub Grayling	2 5 2 3	Yearling Yearling Yearling Yearling
#3 Sept. 12	Unclas- sified	Light Silt	7 6	Neg.	S. S. S.	Grayling Longnose Sucker Lake Chub	3 1 3	Yearling Yearling Yearling
#2 July 2	Coarse Gravel	Heavy Silt	17 13	Neg.	An. S. S.	Neg. Lake Chub Longnose Sucker	76 3	Yearling Yearling Yearling
#2 July 31	Silt & Sand	Heavy Silt	18 17	Neg.	S. S.	Longnose Sucker Trout-perch	101 50	Yearling Yearling
#2 Sept. 14	Gravel Silt & Sand	Light Silt	11 8	Neg.	S. S.	Lake Chub Trout-perch	3 2	Yearling Yearling
#1 July 2	Silt & Sand	Heavy Silt	17 17	Neg.	S. S. S. S.	Lake Chub Longnose Sucker Ninespine Stickleback Humpback Whitefish	126 40 1 4	Yearling Yearling Yearling Yearling

#3
July 31   UNABLE TO SAMPLE DUE TO EXTENSIVE MUD FLATS

#3
Sept. 3   UNABLE TO SAMPLE DUE TO EXTENSIVE MUD FLATS

LEGEND:
        An. - Angling   S. - Seine
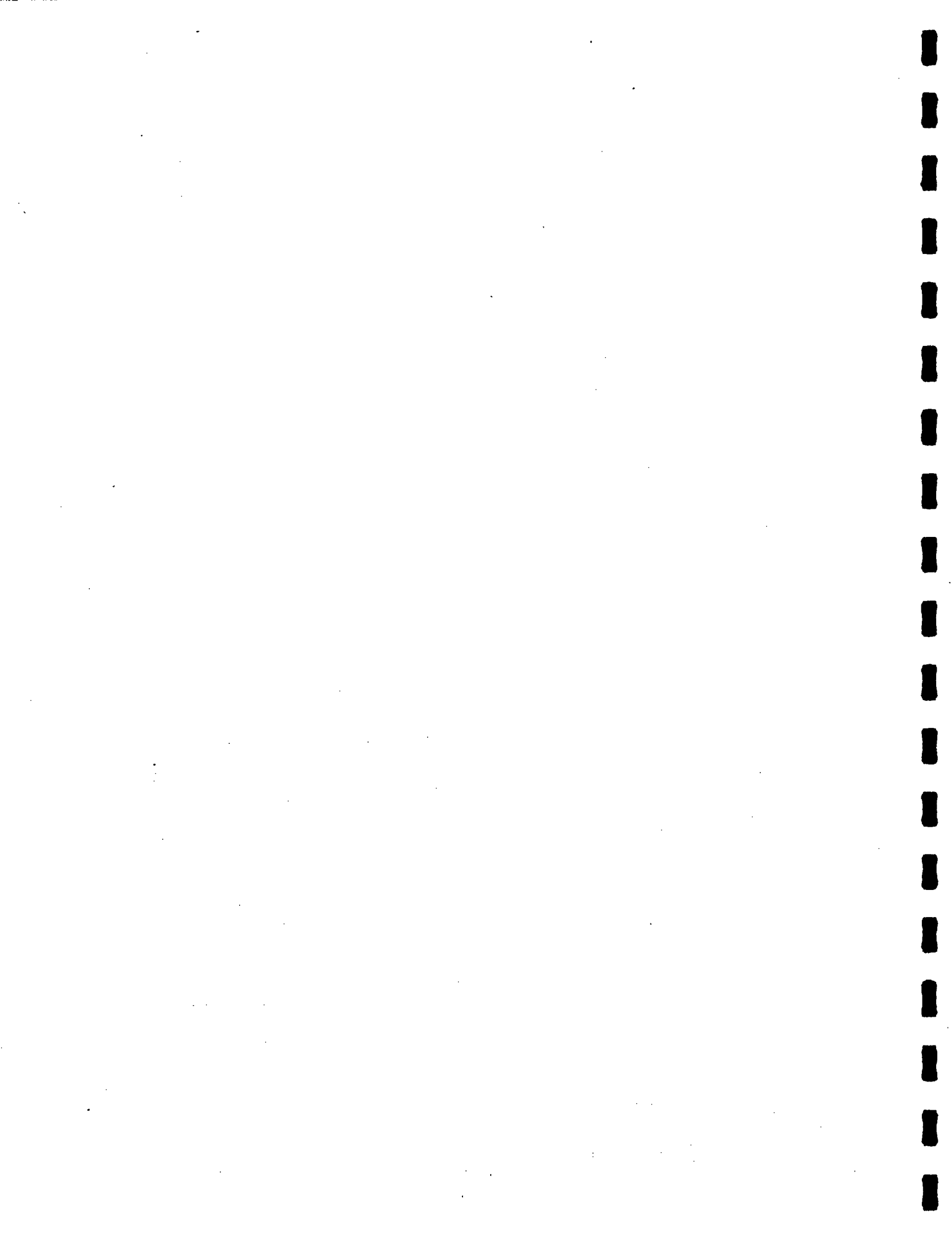
Oscar Creek
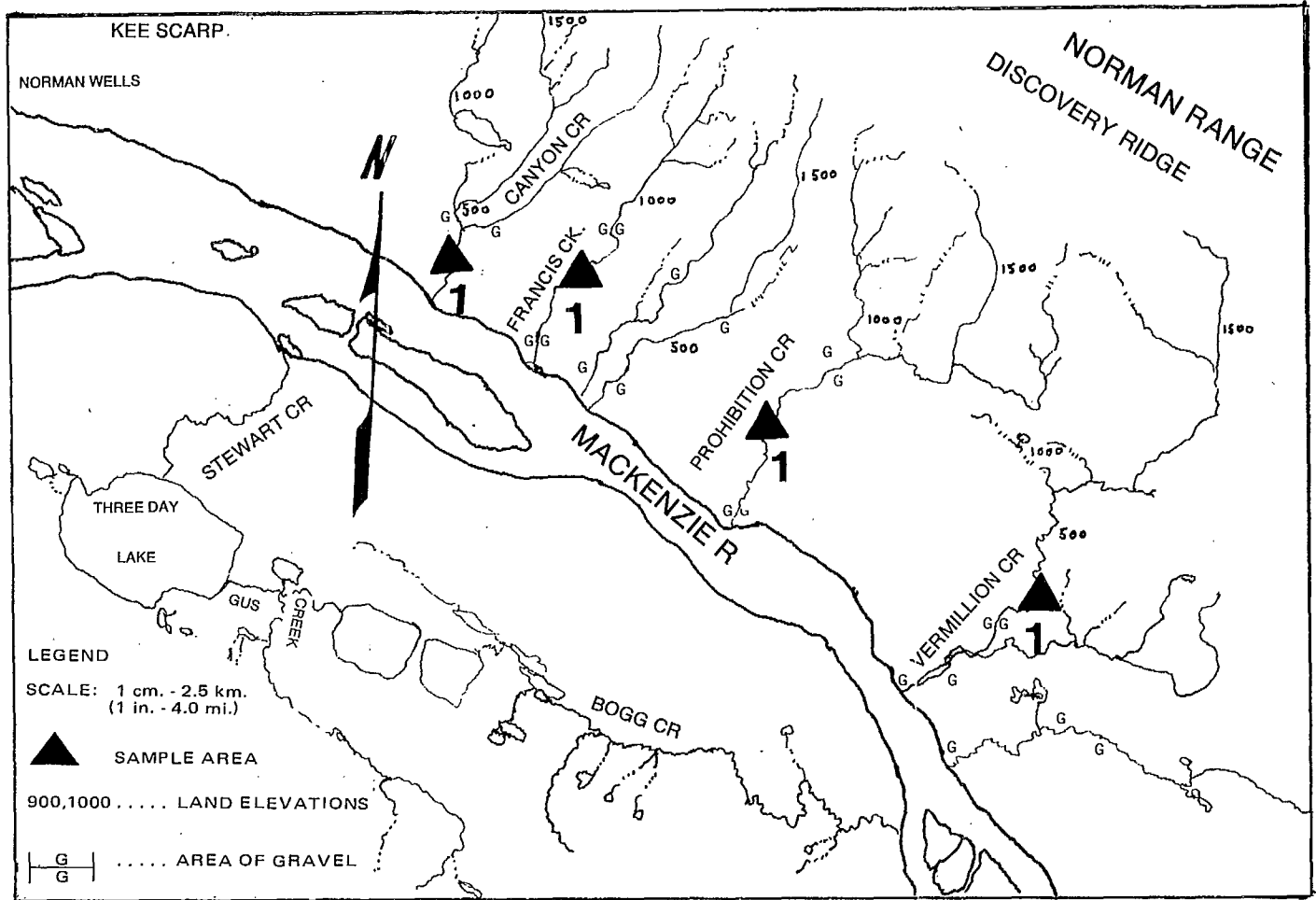
A. General Data

Total length: 75 km (47 miles)

Length surveyed: 45 km (28 miles)

Drainage area: 737 sq km (284 sq miles)

Estimate of potential spawning area (gravel) in length of stream

surveyed: 307,000 sq m (370,000 sq yds).

Description:

Oscar Creek is a moderately flowing stream with many areas of suitable spawning gravel. The stream flows through the low lying terrain east of the Norman Range and enters the Mackenzie through Oscar Creek Gap. Evidence of mud slides and bank erosion was evident in the middle section of the river between the rapids and Oscar Lake. This tended to make the water silty in the immediate area of such activity, however, the silt settles out before reaching the Mackenzie River.
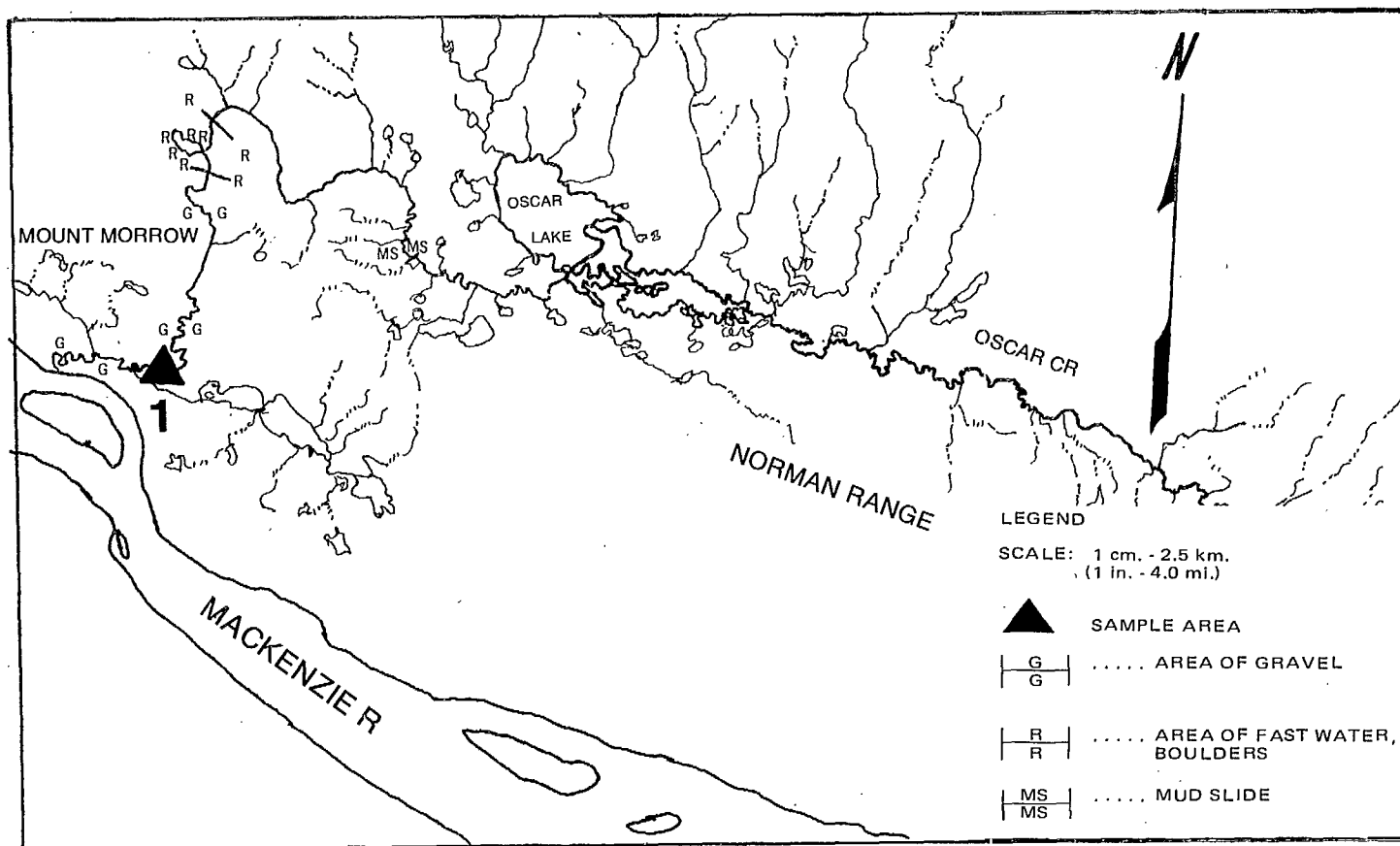
B. Sample Location Data: Oscar Creek

Loc. # & Date	Bottom Type	Color	Air Water (C)	Invert Status	Catch Method	Species	#	Maturity
#1 Aug.	Gravel & Sand	Light Rust	20 14	Tri.	S.	Grayling	2	Yearling
				Ple.	S.	Longnose Sucker	85	Yearling
					S.	Trout-perch	6	Yearling
					S.	Longnose Dace	3	Yearling
					S.	Slimy Sculpin	1	Yearling
#1 Sept. 12	Gravel	Light Rust	8 8	Ple.	S.	Grayling	1	Yearling
					S.	Slimy Sculpin	1	Yearling

LEGEND:

Tri. - Trichoptera
Ple. - Plecoptera
  S. - Seine

Stewart Creek

A. General Data:

Total length: 6 km (4 miles)

Length surveyed: all

Drainage area: 479 sq km (185 sq miles)

Estimate of potential spawning area (gravel) in length of stream

surveyed: indefinite.

Description:

Stewart Creek is a very muddy stream, with many tree falls

lying across it. Residents in the area report that grayling travel

upstream to Three Day Lake. It was infeasible to establish a sample

location on this stream.

Canyon Creek

A. General Data:

Total length: 19 km (12 miles)

Length surveyed: all

Drainage area: 75 sq km (29 sq miles)

Estimate of potential spawning area (gravel) in length of stream

surveyed: 18,000 sq m (21,000 sq yds).

Description:

Canyon Creek is a shallow stream, which dries up in the
early summer. Coarse gravel bars are common in the lower reaches
of the stream. A sample area was established but was discontinued
due to low water conditions.

Francis Creek

A. General Data:

Total length: 19 km (12 miles)

Length surveyed: all

Drainage area: 32 sq km (12 sq miles)

Estimate of potential spawning area (gravel) in length of stream

surveyed: 18,000 sq m (21,000 sq yds).

Description:

Francis Creek is a shallow-flowing stream with a gravel

bottom. The stream dries up by late July.

Christina Creek

A. General Data:

Total length: 13 km (8 miles)

Length surveyed: all

Drainage area: 29 sq km (11 sq miles)

Estimate of potential spawning area (gravel) in length of stream

surveyed: 18,000 sq m (21,000 sq yds).

Description:

As is characteristic of streams in this area, Christina

Creek is a multi-channeled, gravel bottomed stream which dries up

early in the season. Water in the upper reaches is reddish in colour

during run-off periods. Sampling stations were not feasible on this

stream.

Helava Creek

A. General Data:

Total length: 13 km (8 miles)

Length flown: all

Drainage area: 28 sq km (11 sq miles)

Estimate of potential spawning area (gravel) in length of stream surveyed: 18,000 sq m (21,000 sq yds).

Description:

Helava Creek is a very narrow, gravel bottomed creek which dries up by late July.

Prohibition Creek

A. General Data:

Total length: 19 km (12 miles)

Length surveyed: all

Drainage area: 104 sq km (40 sq miles)

Estimate of potential spawning area (gravel) in length of stream surveyed: 18,000 sq m (21,000 sq yds).

Description:

This is a gravel bottomed, multi-channeled stream in its lower reaches. The upper reaches have high steep banks, with the bottom comprised of boulders and some bedrock. This stream dries up by late July.

Vermilion Creek

A. General Data:

Total length: 13 km (8 miles)

Length surveyed: all

Drainage area: 186 sq km (72 sq miles)

Estimate of potential spawning area (gravel) in length of stream

surveyed: 18,000 sq m (21,000 sq. yds).

Description:

       Vermilion Creek is a multi-channeled meandering stream with

extremely steep banks toward the head of the stream. Wide areas of

gravel are present near the mouth of the stream. The remainder of

the river bottom is comprised of boulders and bedrock. The upper

reaches of this river are dry by late July.

Jungle Ridge Creek

A. General Data:

Total length: 13 km (8 miles)
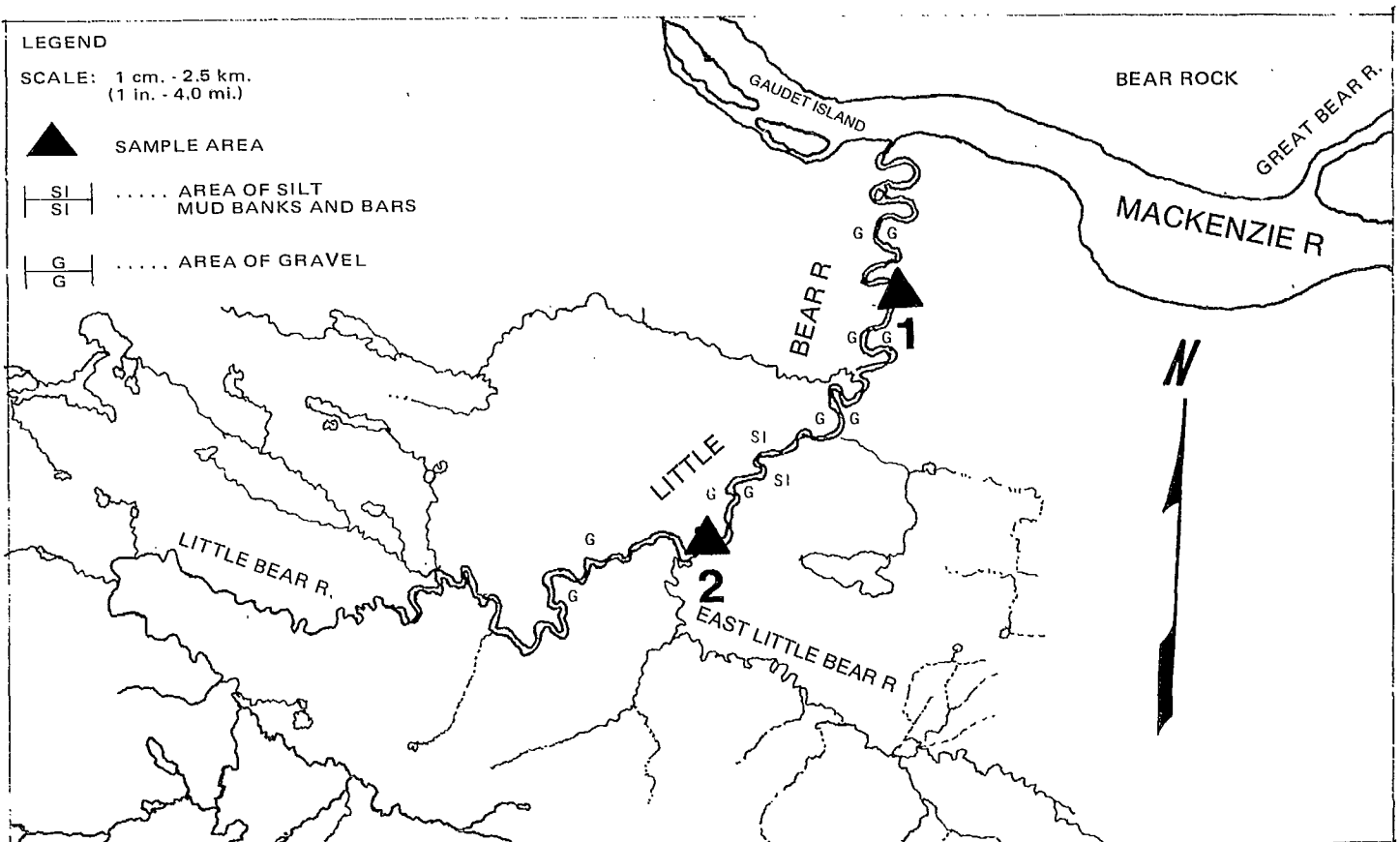
Length surveyed: all

Drainage area: 75 sq km (29 sq miles)

Estimate of potential spawning area (gravel) in length of stream

surveyed: 18,000 sq m (21,000 sq yds)

Description:

       This is a very narrow stream which was dry by mid-summer.

No sample location was established.

Bogg Creek

A. General Data:

Total length: 19 km (12 miles)

Length surveyed: all

Drainage area: 181 sq km (70 sq miles)

Estimate of potential spawning area (gravel) in length of stream

surveyed: indefinite.

Description:

Bogg Creek is a slow-flowing narrow stream with much of its
bottom being unclassifiable. Numerous fallen trees lying across its
course were evident and made it infeasible to establish a sample loca-
tion.

Little Bear River

A. General Data:

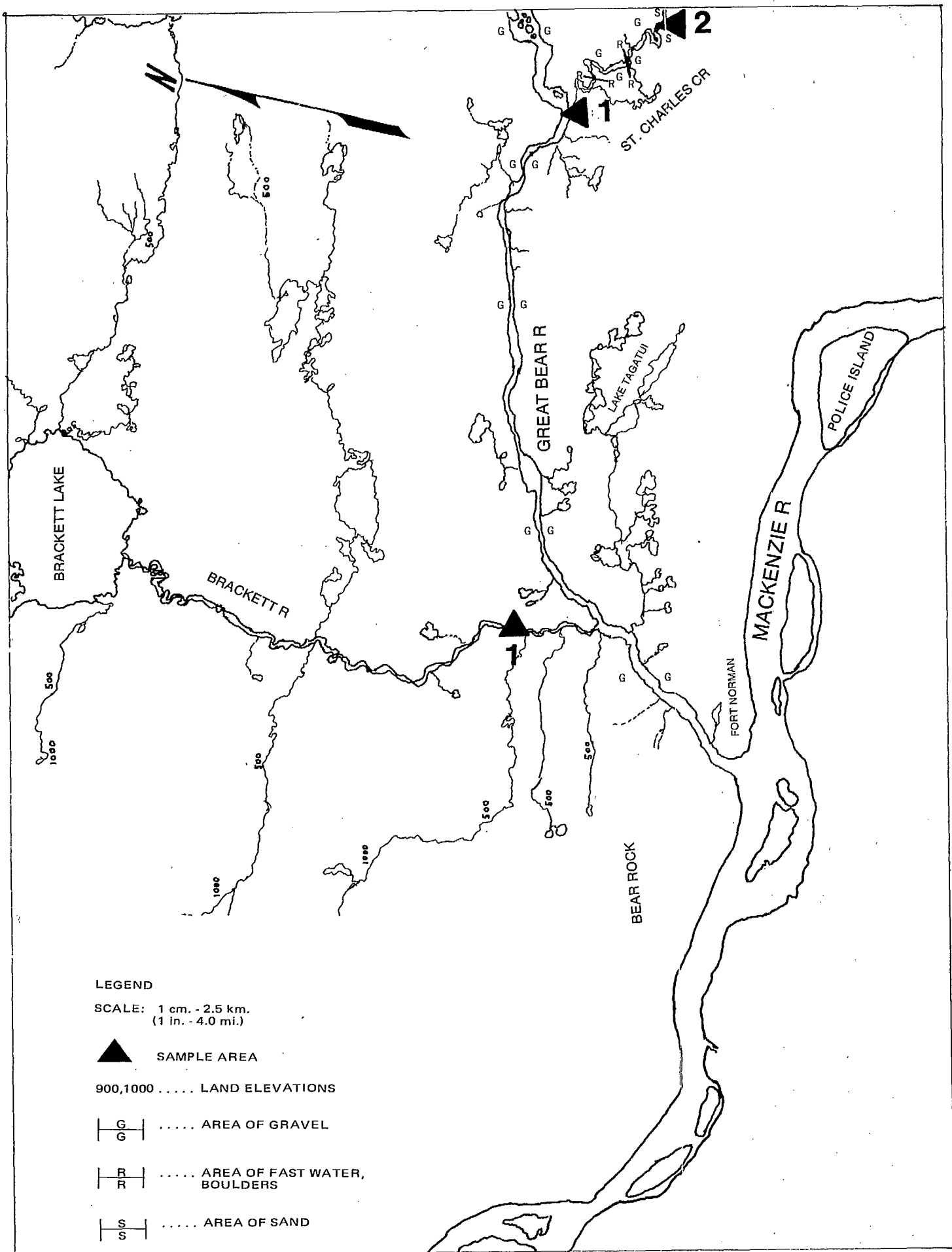Total length: 122 km (76 miles)

Length surveyed: 32 km (20 miles)
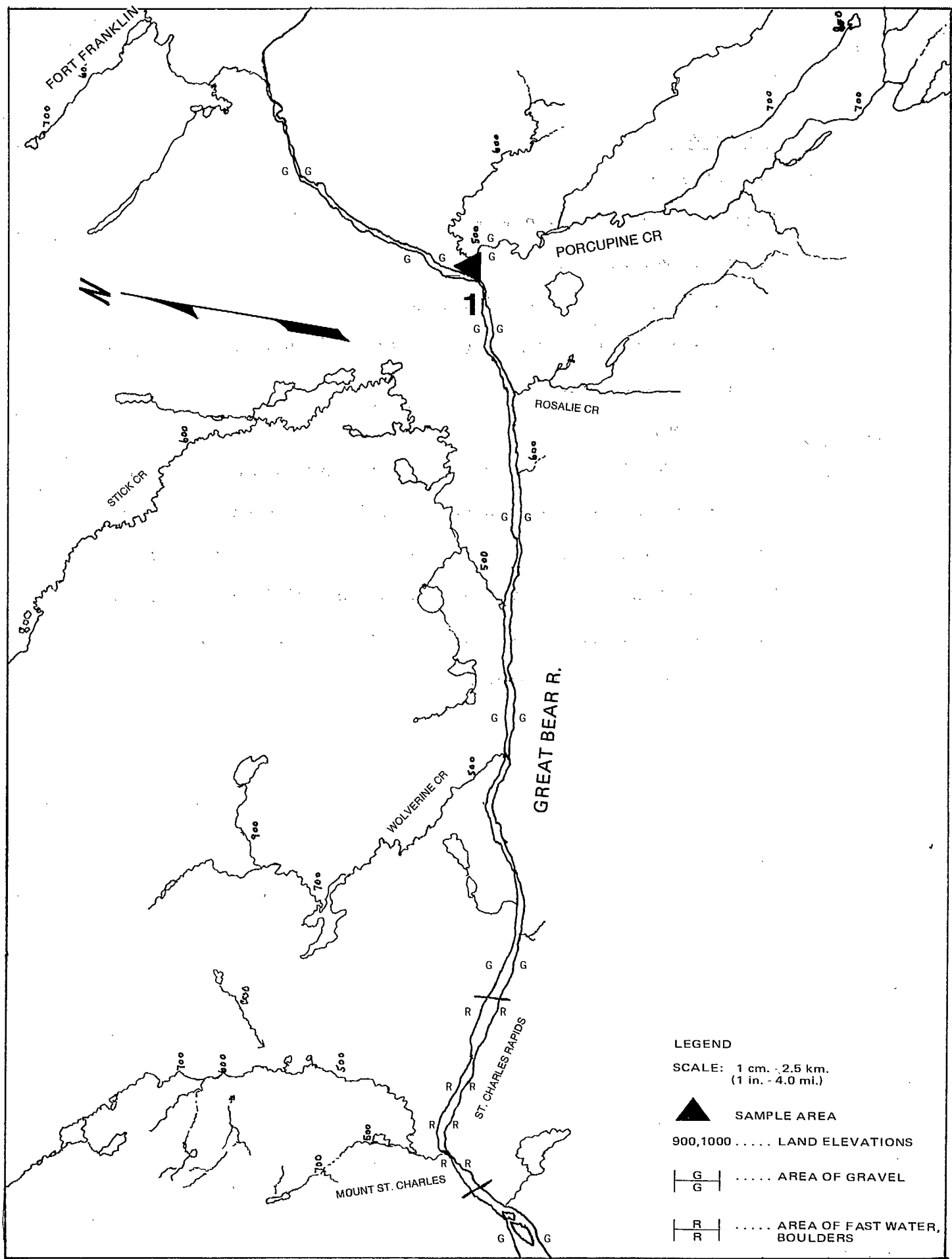
Drainage area: 3,197 sq km (1,234 sq miles)

Estimate of potential spawning area (gravel) in length of stream

surveyed: 1,008,000 sq m (1,214,000 sq yds).

Description:

The Little Bear River is a deep river which flows through

the relatively low-lying area north of the MacKay Range. In spite

of the fact that this river carries a heavy silt load some good

areas of gravel were noted. Both velocity and depth fluctuate

greatly due to storm runoff from the mountains after periods of

rain.

B. Sample Location Data: Little Bear River

	Loc. Data		Temp.		Fish Data			
Loc. # & Date	Bottom Type	Color	Air Water (C)	Invert Status	Catch Method	Species	#	Maturity
#1 July	Coarse Gravel	Light Rust	18 15	Eph.	S. S.	Longnose Sucker Lake Chub	1 17	Yearling Yearling
					S.	Slimy Sculpin	1	Yearling
					S.	Longnose Dace	1	Yearling
#1 Aug. 5	Fine Gravel	Heavy Silt	18 11	Dip. Tri. Ple.	S. S. S.	Flathead Chub Lake Chub Grayling	41 300 3	Yearling Yearling Yearling
					S.	Longnose Sucker	95	Yearling
					S.	Slimy Sculpin	6	Yearling
					S.	Burbot	6	Yearling
					S.	Humpback Whitefish	1	Yearling
					S.	Longnose Dace	2	Yearling
#1 Sept. 10	Fine Gravel	Heavy Silt	13 6	Eph. Ple.	S.	Lake Chub	44	Yearling
					S.	Longnose Sucker	1	Mature
#2 July 3	Coarse Gravel	Light Rust	19 12	Neg.	S.	Lake Chub	2	Yearling
					S.	Slimy Sculpin	7	Yearling
#2 Aug. 5	Fine Gravel	Light Silt	18 9	Neg.	S.	Grayling	2	Yearling
					S.	Longnose Sucker	4	Yearling
					S.	Lake Chub	15	Yearling
#2 Sept. 10	Gravel	Heavy Silt	11 6	Neg.	--	--	--	--

LEGEND:

Eph. - Ephemeroptera	Ple. - Plecoptera
Dip. - Diptera	S. - Seine

Great Bear River

A. General Data:

Total length: 123 km (76 miles)

Length surveyed: all

Drainage area: 142,968 sq km (55,200 sq miles)

Estimate of potential spawning area (gravel) in length of stream

surveyed: 13,147,000 sq m (15,840,000 sq yds).

Description:

The Great Bear River has an excellent spawning potential along its entire length. The bottom consists of coarse to fine gravel providing excellent spawning areas. The river is comparatively shallow except for a narrow channel used for barge travel. The St. Charles Rapids (8 miles long) do not appear to present any obstacle to migration of fish. The water flow was fast, clear and cold throughout the summer.

Sample locations were not placed on the Great Bear River due to its fast current rendering them impracticable. However, sample locations were placed near the mouths of some of its larger tributaries.

LEGEND

SCALE: 1 cm. - 2.5 km.
(1 in. - 4.0 mi.)

▲   SAMPLE AREA

900,1000 . . . . . LAND ELEVATIONS

⊢ G/G ⊣ . . . . . AREA OF GRAVEL

⊢ R/R ⊣ . . . . . AREA OF FAST WATER, BOULDERS

⊢ S/S ⊣ . . . . . AREA OF SAND

FORT FRANKLIN

PORCUPINE CR

ROSALIE CR

GREAT BEAR R.

STICK CR

WOLVERINE CR

ST. CHARLES RAPIDS

MOUNT ST. CHARLES

1

LEGEND

SCALE: 1 cm. - 2.5 km.
        (1 in. - 4.0 mi.)

▲   SAMPLE AREA

900,1000 . . . . . LAND ELEVATIONS

G
G	. . . . . AREA OF GRAVEL

R
R	. . . . . AREA OF FAST WATER,
                  BOULDERS

Brackett River

A. General Data:

Total length: 42 km (26 miles)

Length surveyed: all

Drainage area: 592 sq km (229 sq miles)

Estimate of potential spawning area (gravel) in length of stream

surveyed: indefinite.

Description:

The Brackett River is characterized by a moderate flow of water which carries a substantial silt load. The upper reaches of the stream flow through low lying muskeg terrain surrounding Brackett Lake. It then cuts its way through the foot hills of the Norman Range to its junction with the Great Bear River. Few gravel areas were evident along the river.

B. Sample Location Data: Brackett River

Loc. Data			Temp.	Fish Data				
Loc. # & Date	Bottom Type	Color	Air Water (C)	Invert Status	Catch Method	Species	#	Maturity
#1 July 3	Coarse Gravel	Light Silt	21 14	Dip. Tri.	S.	Grayling	2	Yearling
#1 Aug. 5	Coarse Gravel	Light Silt	17 14	Dip. Eph. Tri.	--	--	--	--
#1 Sept. 9	Station Dropped							

LEGEND:

Dip. - Diptera
Tri. - Trichoptera
Eph. - Ephemeroptera
  S. - Seine

St. Charles Creek

A. General Data:

Total length: 103 km (64 miles)

Length surveyed: 19 km (12 miles)
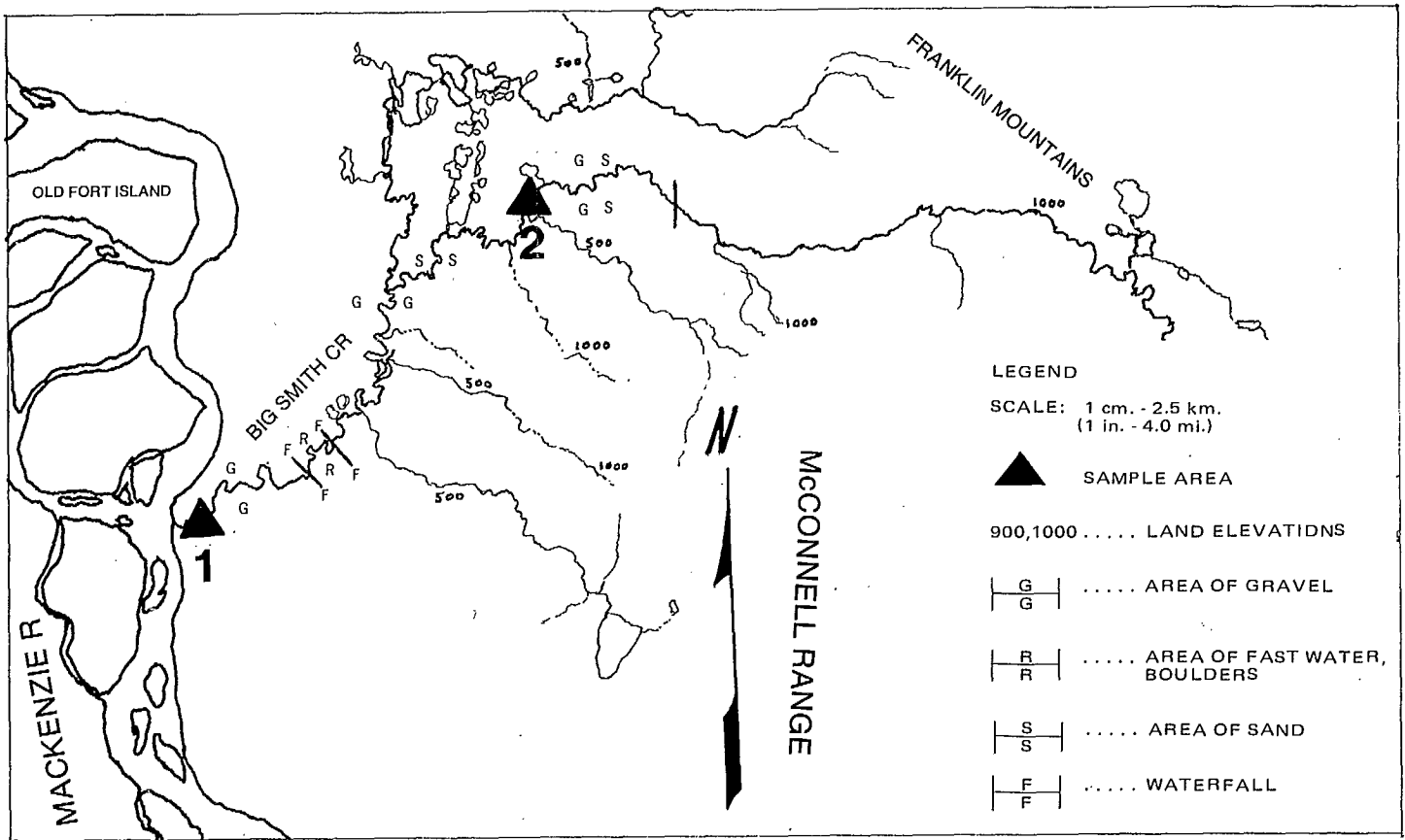
Drainage area: 639 sq km (247 sq miles)

Estimate of potential spawning area (gravel) in length of stream

surveyed: 351,000 sq m (422,000 sq yds).

Description:

This stream possesses a moderate flow of clear water over

a fine gravel and sand bottom. Upstream there are many bends and

bars comprised of fine sand. The entire length of stream flown

showed good spawning potential.

B. Sample Location Data: St. Charles Creek

Loc. Data			Temp.	Fish Data				
Loc. # & Date	Bottom Type	Color	Air Water (C)	Invert Status	Catch Method	Species	#	Maturity
#2 July 2	Gravel & Sand	Clear	20 11	Ple.	S. An.	Lake Chub Neg.	28 --	Yearling --
#2 Aug. 2	Sand	Clear	23 19	--	S. S.	Lake Chub Longnose Sucker	54 72	Yearling Yearling
#2 Sept. 9	Sand	Dark Rust	10 9	--	--	--	--	--
#1 July 2	Unclas- sified	Dark Rust	20 12	Neg.	G.N.	Pike Grayling	1 1	Mature Ripe
#1 Aug. 2	Sand & Gravel	Light Silt	19 15	Neg.	G.N. G.N. G.N. G.N.	Pike Grayling Humpback Whitefish Inconnu	5 1 1 2	Mature Mature Immature Ripe
#2 Sept. 10	Sand & Gravel	Dark Rust	10 9	--	G.N.	Pike	2	Mature

LEGEND:
      S. - Seine
     An. - Angling
    G.N. - Gill Net
    Ple. - Plecoptera

Porcupine River

A. General Data

Total length: 58 km (36 miles)

Drainage area: not calculated

Potential spawning area: indefinite

Description:

Although not surveyed, a sample station was located on
this river at its mouth. The river flows through a predominately
bog-type terrain. The bottom type in the headwaters of the river
is comprised of fine and coarse gravel. The river widens at its
mouth and forms a deep channel where it meets the Great Bear River.
Bottom type at this location was primarily fine gravel.

B. Sample Location Data: Porcupine River

Loc. Data			Temp.		Fish Data			
Loc. # & Date	Bottom Type	Color	Air Water (C)	Invert Status	Catch Method	Species	#	Maturity
#1 July 7	Gravel & Sand	Clear	14 10	Eph.	An. S. S.	Pike Pike Grayling	3 1 9	Mature Yearling Yearling
#1 Aug. 8	Gravel & Sand	Light Rust	18 17	Neg.	S. S.	Grayling Ninespine Stickleback	1 17	Yearling Yearling
#1 Sept. 9	Boulders & Gravel	Dark Rust	10 6	Tri.	S. An.	Ninespine Stickleback Grayling	2 1	Yearling Mature

LEGEND:
An. - Angling
S. - Seine
Tri. - Trichoptera
Eph. - Ephemeroptera

Big Smith Creek

A. General Data:

Total length: 82 km (51 miles)
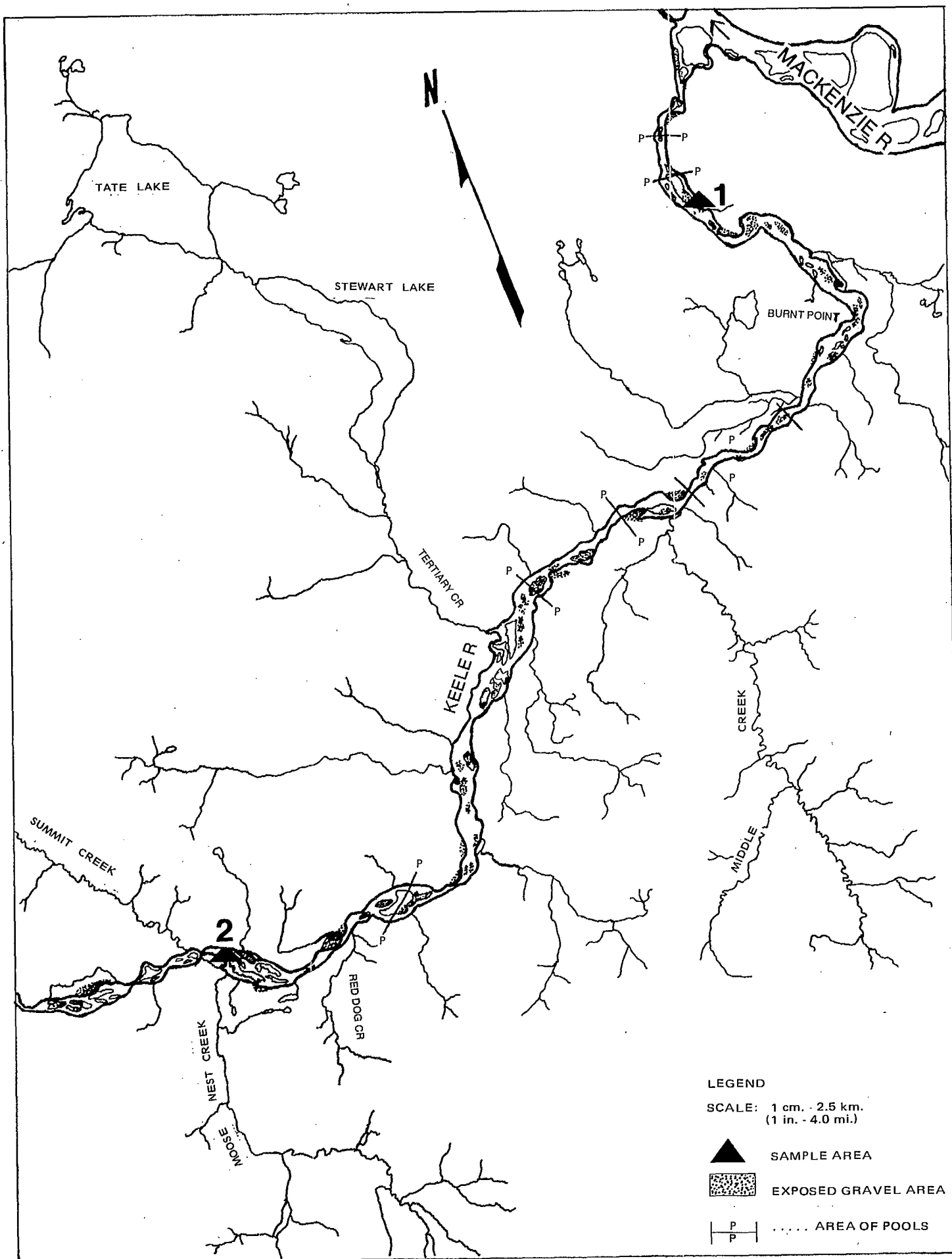
Length surveyed: 40 km (25 miles)

Drainage area: 1,589 sq km (613 miles)

Estimate of potential spawning area (gravel) in length of stream

surveyed: 307,000 sq m (370,000 sq yds).

Description:

A 10 foot fall approximately 6 miles upstream from the

Mackenzie River presents the only obstacle to an otherwise excellent

spawning area. Above the falls the river bottom consists of sand

bars and shoals, and the river follows a very meandering course.

Below the falls the bottom consists of a coarse gravel type with good

spawning potential. The current along the length of stream surveyed

is fast flowing and the water is very clear.

OLD FORT ISLAND

FRANKLIN MOUNTAINS

MACKENZIE R.

BIG SMITH CR.

McCONNELL RANGE

N

LEGEND

SCALE: 1 cm. - 2.5 km.
(1 in. - 4.0 mi.)

▲   SAMPLE AREA

900,1000 . . . . . LAND ELEVATIONS

| G | . . . . . AREA OF GRAVEL
| G |

| R | . . . . . AREA OF FAST WATER,
| R | BOULDERS

| S | . . . . . AREA OF SAND
| S |

| F | . . . . . WATERFALL
| F |

B. Sample Location Data: Big Smith Creek

Loc. # & Date	Bottom Type	Color	Air Water (C)	Invert Status	Catch Method	Species	#	Maturity
	Loc. Data		Temp.	Fish Data				
#1 July 3	Gravel	Clear	21 17	Neg.	S.	Neg.		
#1 July 31	Gravel	Light Rust	23 17	Tri				
#1 Sept. 10	Gravel	Dark Rust	13 8	Tri.				
#2 July 3	Gravel Sand	Clear	17 14	Neg.	S.	Neg.		
#2 July 31	LOCATION DISCONTINUED - AREA APPEARS INACCESSIBLE TO FISH DUE TO FALLS DOWNSTREAM							

LEGEND:

Tri. - Trichoptera
S. - Seine

Keele River

A. General Data:

   Total length: 398 km (247 miles)
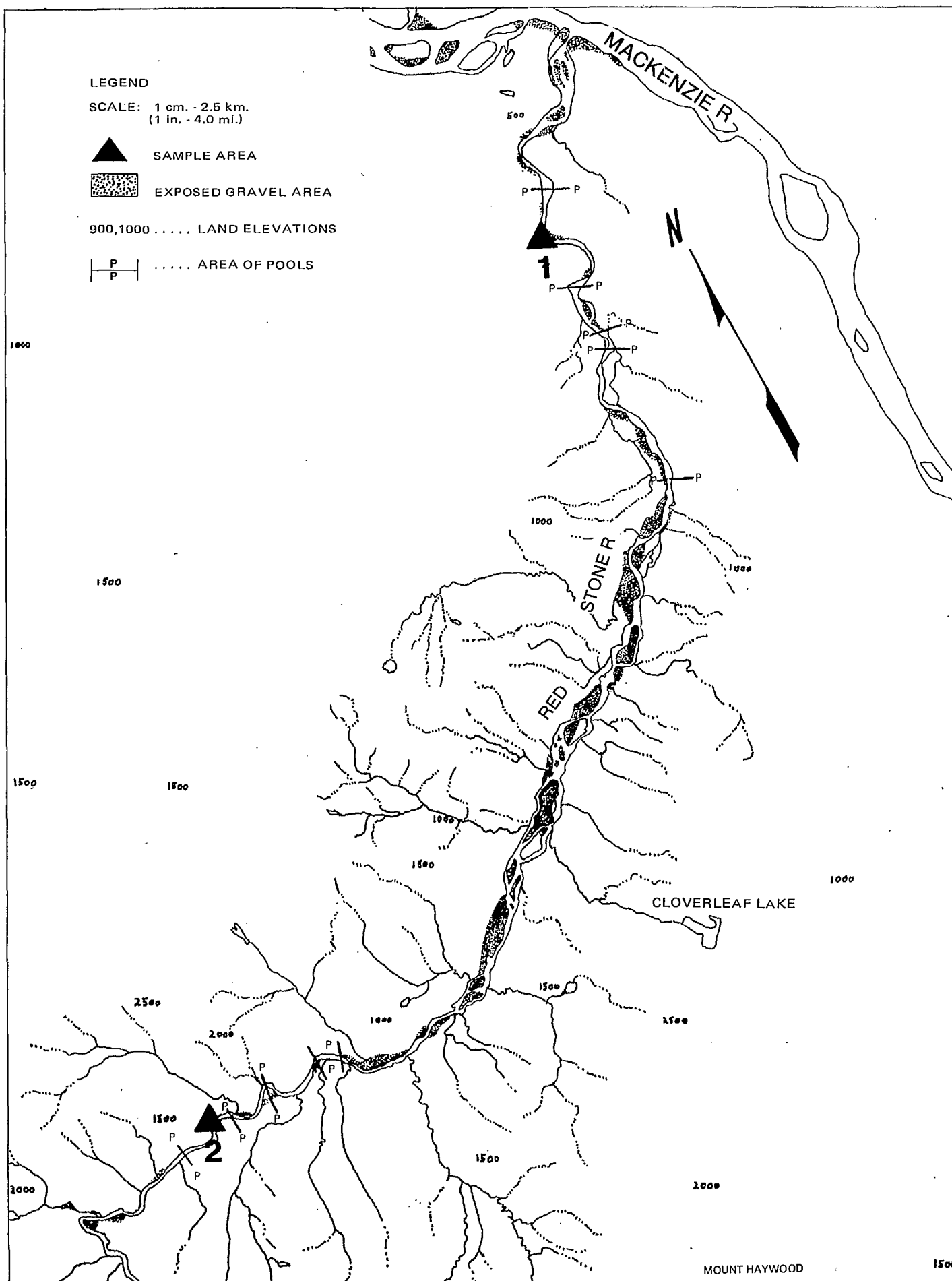
   Length surveyed: 80 km (50 miles)

   Drainage area: 24,548 sq km (9,476 sq miles)

   Estimate of potential spawning area (gravel) in length of stream

   surveyed: 7,771,000 sq m (9,363,000 sq yds).

   Description:

   Characteristic of many rivers flowing into the Mackenzie from the west, the Keele is a multi-channeled stream, which is dotted with many islands and silt-gravel bars. It is a shallow stream with a fast current. It carries a heavy silt load which is largely deposited along the stream bed. Pools were few and sample locations were placed in areas where secondary channels made sampling more feasible.

LEGEND

SCALE: 1 cm. - 2.5 km.
(1 in. - 4.0 mi.)

▲ SAMPLE AREA

▨ EXPOSED GRAVEL AREA

|—P⎯P—| ..... AREA OF POOLS

B. Sample Location Data: Keele River

Loc. # & Date	Bottom Type	Color	Air Water (C)	Invert Status	Catch Method	Species	#	Maturity
	Loc. Data		Temp.		Fish Data			
#2 July 2	Gravel & Silt	Heavy Silt	20 12	Eph.	S.	Neg.	--	--
#2 July 31	Gravel	Light Silt	22 14	Neg.	--	--	--	--
#2 Sept. 10	Gravel & Silt	Green	8 8	Neg.	O. O.	Grayling Slimy Sculpin	1 1	Yearling Yearling
#1 July 2	Gravel	Heavy Silt	18 12	Eph.	S. S. S. S.	Longnose Sucker Burbot Pike Lake Chub	1 1 1 1	Yearling Yearling Yearling Yearling
#1 July 31	Boulders & Gravel	Light Silt	20 11	Neg.	An.	Neg.	--	--
#1 Sept. 10	Gravel	Green	10 8	Neg.	S. S.	Lake Chub Grayling	4 2	Yearling Yearling

LEGEND:

Eph. - Ephemeroptera
S. - Seine
O. - Observation
An. - Angling

Redstone River

A. General Data:

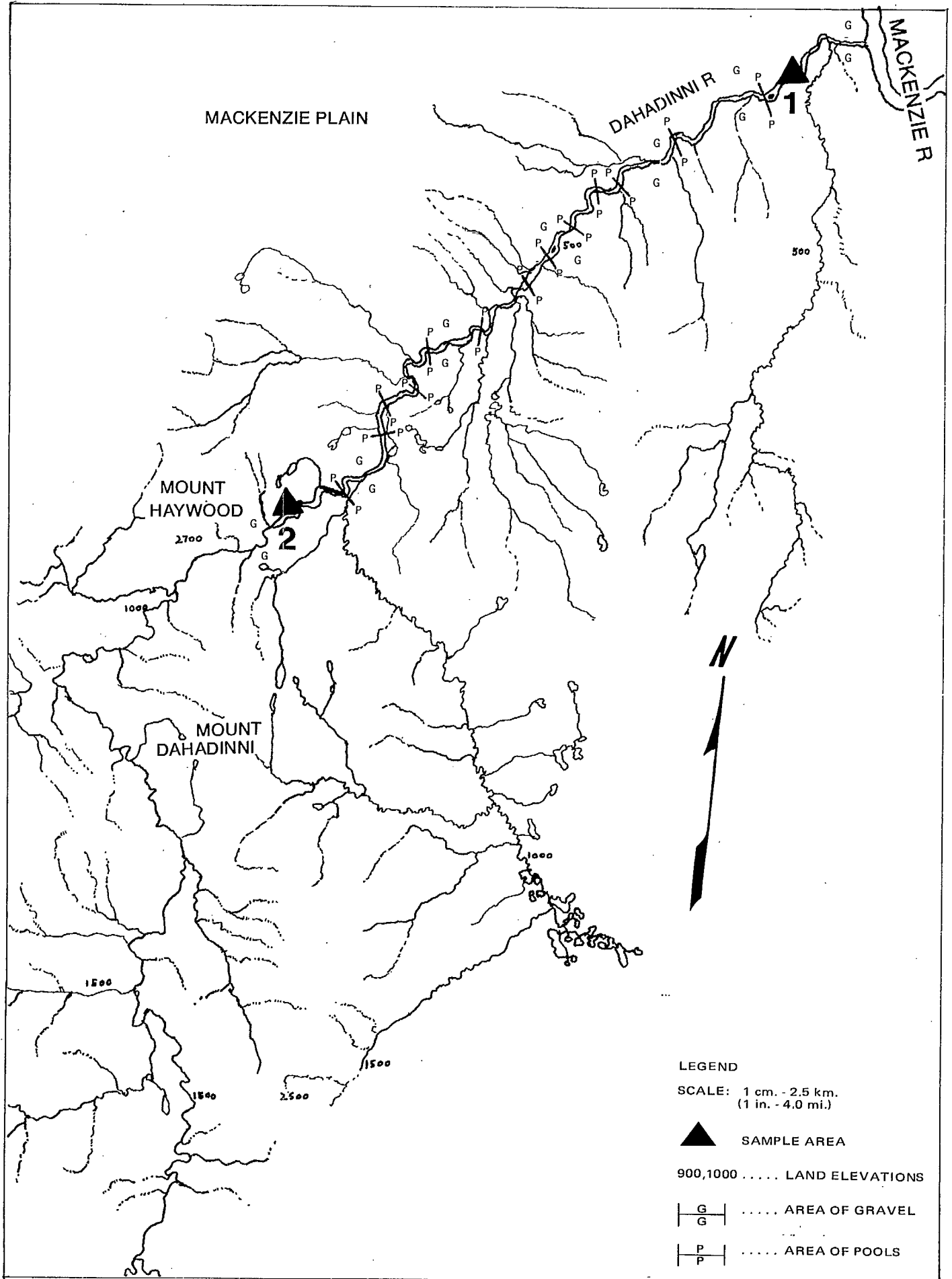Total length: 290 km (180 miles)

Length surveyed: 80 km (50 miles)

Drainage area: 24,347 sq km (9,408 sq miles)

Estimate of potential spawning area (gravel) in length of stream

surveyed: 2,805,000 sq m (3,379,000 sq yds).

Description:

This river is multi-channeled with areas of delta forma-

tions and islands. Gravel bars were evident along the entire

length flown. The river is fast flowing but tends to be very

shallow. Many rapids and riffles were noted. Most of the channels

which carry water in early summer dry up by the end of August.

Sample locations were placed on secondary channels where

water current and bottom compositions made sampling more feasible

than in the swift main channels of the river.

LEGEND

SCALE: 1 cm. - 2.5 km.
(1 in. - 4.0 mi.)

▲ SAMPLE AREA

EXPOSED GRAVEL AREA

900,1000 . . . . . LAND ELEVATIONS

P
P   . . . . . AREA OF POOLS

MACKENZIE R.

N

STONER R.

RED

CLOVERLEAF LAKE

MOUNT HAYWOOD

B. Sample Location Data: Redstone River

Loc. Data			Temp.	Fish Data				
Loc. # & Date	Bottom Type	Color	Air Water (C)	Invert Status	Catch Method	Species	#	Maturity
#2 July 1	Coarse Gravel	Heavy Silt	20 12	Eph.	--	--	--	--
#2 July 30	Boulders	Light Silt	18 13	Neg.	--	--	--	--
#2 Sept. 4	Boulders	Green	17 9	Neg.	An.	Neg.	--	--
#1 July 1	Coarse Gravel	Heavy Silt	21 13	Eph.	S. S.	Flathead Chub Broad Whitefish	3 2	Yearling Yearling
#1 July 30	Coarse Gravel	Green	17 15	Neg.	--	--	--	--
#1 Sept. 10	Coarse Gravel	Green	17 9	Neg.	An.	Neg.	--	--

LEGEND:

Eph. - Ephemeroptera
An. - Angling
S. - Seining

Dahadinni River

A. General Data:

Total length: 139 km (85 miles)

Length surveyed: 48 km (30 miles)

Drainage area: 3,972 sq km (1,533 sq miles)

Estimate of potential spawning area (gravel) in length of stream
surveyed: 1,132,000 sq m (1,364,000 sq yds).

Description:

The Dahadinni River is a meandering stream with many
gravel and silt bars. It is generally narrow with many shallow
areas and riffles. A heavy silt load is evident during the early
part of the summer and after heavy rains. Pools and deeper areas
are most prevalent on sharp bends in the river as were back eddies.

MACKENZIE PLAIN

DAHADINNI R

MACKENZIE R

MOUNT HAYWOOD

2700

MOUNT DAHADINNI

N

LEGEND

SCALE: 1 cm. - 2.5 km.
(1 in. - 4.0 mi.)

▲   SAMPLE AREA

900,1000 . . . . . LAND ELEVATIONS

G		
G		

. . . . . AREA OF GRAVEL

P		
P		

. . . . . AREA OF POOLS

B. Sample Location Data: Dahadinni River

Loc. Data			Temp.	Fish Data				
Loc. # & Date	Bottom Type	Color	Air Water (C)	Invert Status	Catch Method	Species	#	Maturity
#1 July 1	Boulders	Heavy Silt	22 12	Neg.	S. S.	Broad Whitefish Lake Chub	1 3	Yearling Yearling
#1 July 30	Boulders	Green	20 15	Eph.	--	--	--	--
#1 Sept. 4	Boulders	Dark Rust	19 12	Eph.	--	--	--	--
#2 July 1	Coarse Gravel	Heavy Silt	18 13	Neg.	S. H.	Neg. Unknown	-- 2	-- Fry
#2 July 30	Fine Gravel	Light Silt	16 15	Eph. Ple.	S.	Neg.	--	--
#2 Sept. 4	Gravel	Green	16 9	Eph.	S.	Grayling	1	Yearling

LEGEND:

Eph. - Ephemeroptera
Ple. - Plecoptera
H. - Hand
S. - Seine

Blackwater River

A.   General Data:

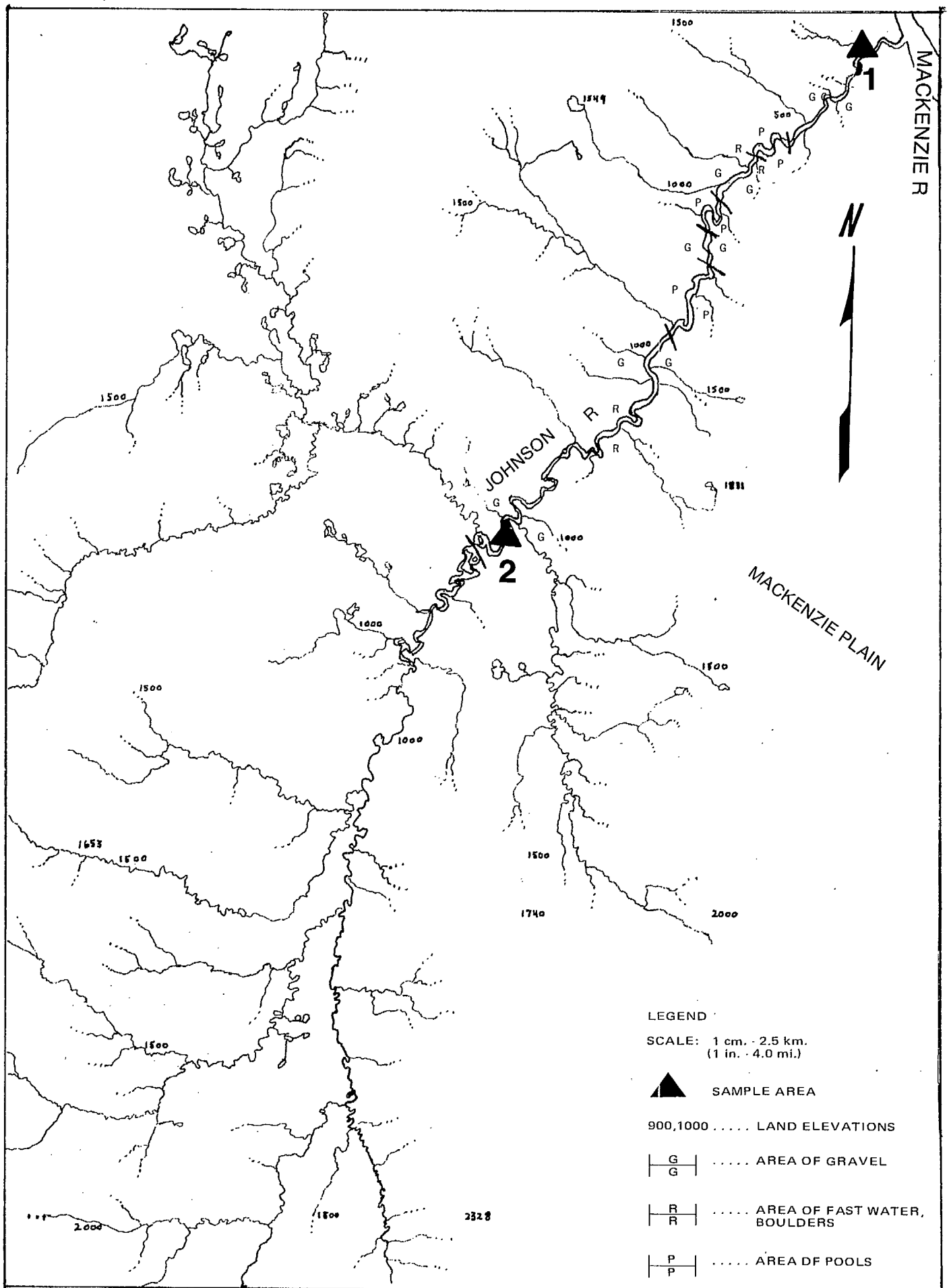Total length: 218 km (135 miles)

Length surveyed: 48 km (30 miles)

Drainage area: 15,341 sq km (5,932 sq miles)

Estimate of potential spawning area (gravel) in length of stream

surveyed: 1,579,000 sq m (1,903,000 sq yds).

Description:

This river has excellent spawning potential along the

length surveyed from its mouth to Blackwater Lake. The water is

cold, clear and fast with intermittent rocky and sandy gravel areas.

Pools and long stretches of deep water are common along its length.
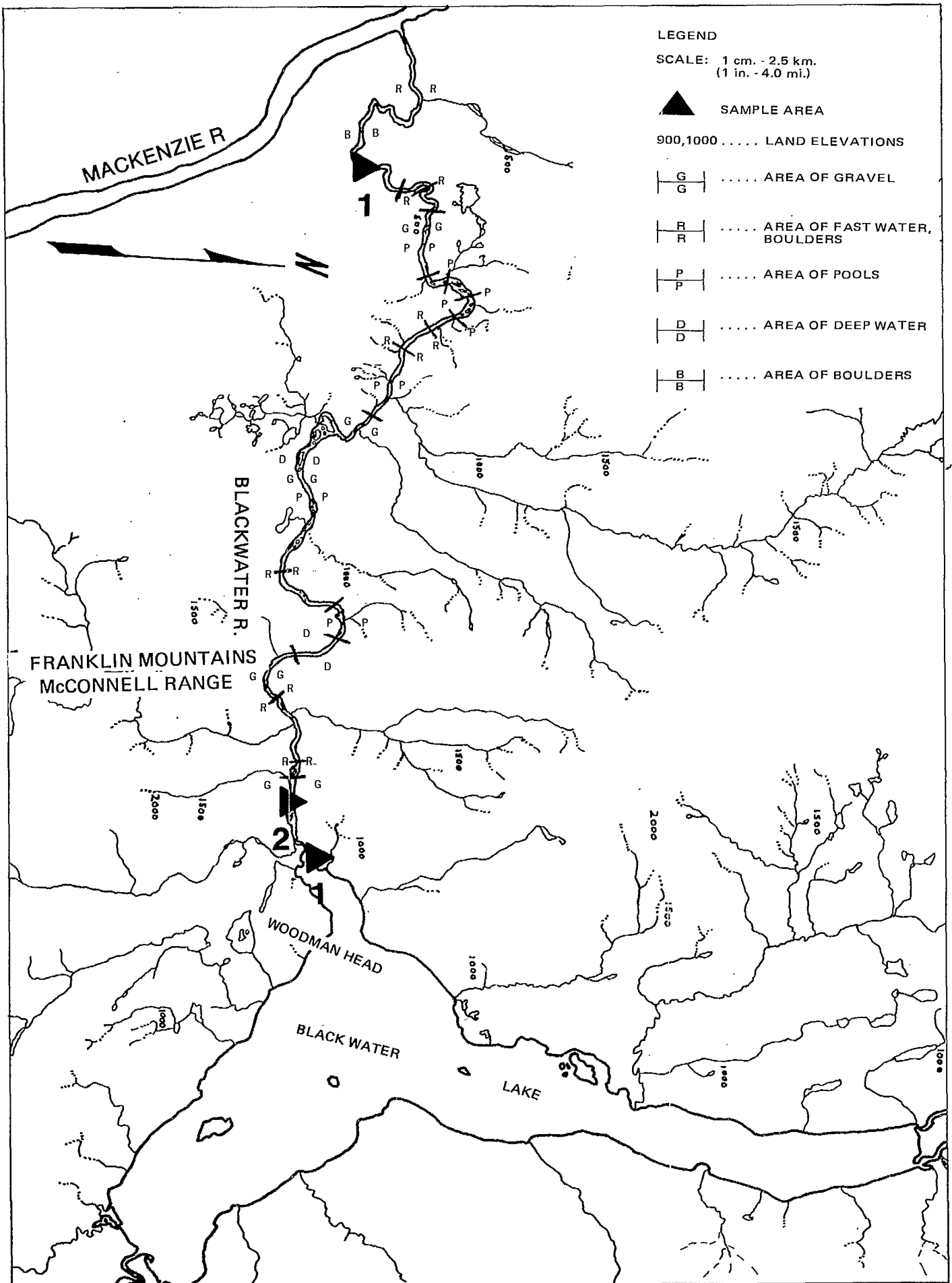
B.   Sample Location Data: Blackwater River

Loc. # & Date	Bottom Type	Color	Air Water (C)	Invert Status	Catch Method	Species	#	Maturity
			Temp.			Fish Data		
#1 June 27	Boulders	Clear	14 7	Eph. Tri.	An.	Neg.	--	--
#1 July 29	Boulders	Light Rust	21 17	Eph. Ple. Tri.	--	--	--	--
#1 Sept. 6	Gravel & Sand	Light Rust	14 11	Ple	S.	Grayling	4	Yearling
				Eph Tri.	S.	Longnose Sucker	2	Yearling
#2 June 27	Coarse Gravel	Clear	15 5	Tri. Eph.	An.	Grayling	2	Mature
#2 July 29	Fine Gravel	Light Rust	18 13	Eph. Ple. Tri.	S. An.	Neg. Grayling	-- 6	-- Mature
#2 Sept. 6	Fine Gravel	Light Rust	11 11	Neg.	An.	Grayling	1	Mature

LEGEND:
Eph. - Ephemeroptera
Tri. - Trichoptera
Ple. - Plecoptera
An. - Angling
S. - Seine

C.   Sample Location: Blackwater Lake

       A sample location was situated at the outlet of Blackwater
Lake, (the Blackwater River).   Gill netting was conducted during
each survey, the results of which are as follows:

June 27	-	4 pike
	-	1 longnose sucker
	-	2 humpback whitefish
July 29	-	3 pike
September 6	-	2 pike
		6 humpback whitefish
		1 longnose sucker

Johnson River

A. General Data:

Total length: 88 km (55 miles)

Length surveyed: 51 km (32 miles)

Drainage area: 3,407 sq km (1,415 sq miles)

Estimate of potential spawning area (gravel) in length of stream

surveyed: 748,000 sq m (901,000 sq yds).

Description:

The Johnson River is a meandering stream which carries a heavy silt load. It flows across the relatively low-lying Mackenzie Plain. Coarse gravel and boulders are common along the edge of the watercourse while the river bottom appears to be comprised of silt and sand. Silt deposits are quite noticeable around the boulders along the edge of the stream indicating a heavy silt load during the spring run-off. Many pools were observed in the length of river surveyed. The river would appear to have only a marginal spawning potential.

LEGEND

SCALE: 1 cm. - 2.5 km.
(1 in. - 4.0 mi.)

▲   SAMPLE AREA

900,1000 . . . . . LAND ELEVATIONS

|—G—| . . . . . AREA OF GRAVEL
    G

|—R—| . . . . . AREA OF FAST WATER,
    R   BOULDERS

|—P—| . . . . . AREA OF POOLS
    P

B. Sample Location Data: Johnson River

Loc. # & Date	Bottom Type	Color	Air Water (C)	Invert Status	Catch Method	Species	#	Maturity
#2 June 27	Fine Gravel	Clear	13 14	Eph.	--	--	--	--
#2 July 29	Fine Gravel	Light Rust	21 20	Eph. Dip.	S. S.	Longnose Sucker Lake Chub	1 8	Yearling Yearling
#2 Sept. 4	Fine Gravel	Dark Rust	15 10	Eph.	S. S. S.	Longnose Sucker Trout-perch Lake Chub	22 1 1	Yearling Yearling Yearling
#1 June 27	Coarse Gravel	Heavy Silt	14 14	Eph.	--	--	--	--
#1 July 29	Gravel & Sand	Green	21 20	Eph.	S.	Pike	1	Yearling
#1 Sept. 4	Boulders & Gravel	Dark Rust	20 12	Neg.	--	--	--	--

LEGEND:

Eph. - Ephemeroptera
Dip. - Diptera
S. - Seine

Ochre River

A. General Data:
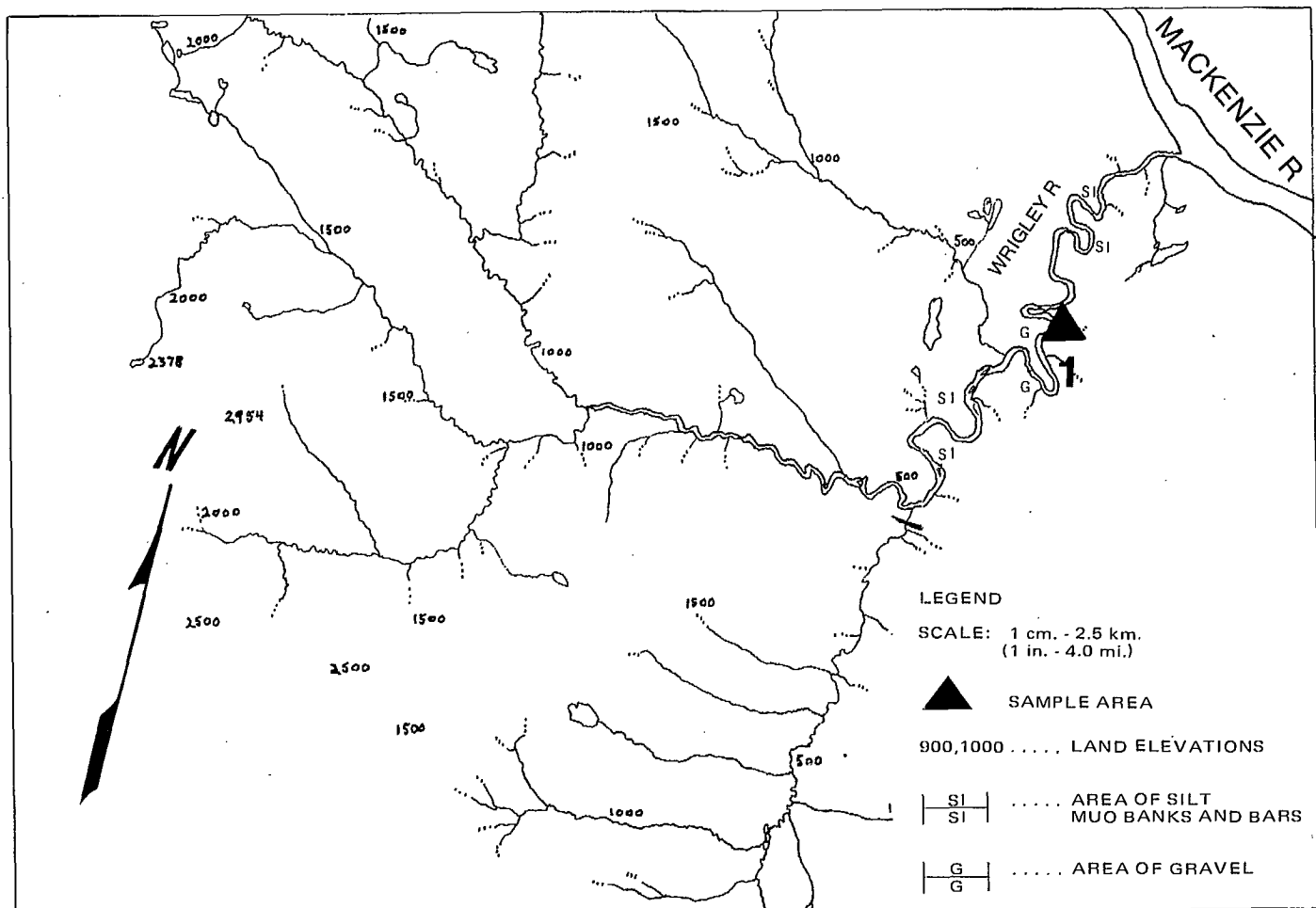
Total length: 77 km (48 miles)

Length surveyed: 39 km (24 miles

Drainage area: 1,847 sq km (711 sq miles)

Estimate of potential spawning area (gravel) in length of stream

surveyed: 263,000 sq m (317,000 sq yds).

Description:

The Ochre River is a multi-channeled stream flowing

through a mountain valley from the low-lying area to the east of the

Franklin Mountains. It has many rapids and occasional deep pools.

While there are several areas of excellent spawning gravel, most of

the stream bed is comprised of large boulders. Severe fire damage

was noted at various locations along the river where numerous land-

slides were evident. East of the Franklin Mountains the river

changes from its shallow channel flow to a deep, highly meandering

course.
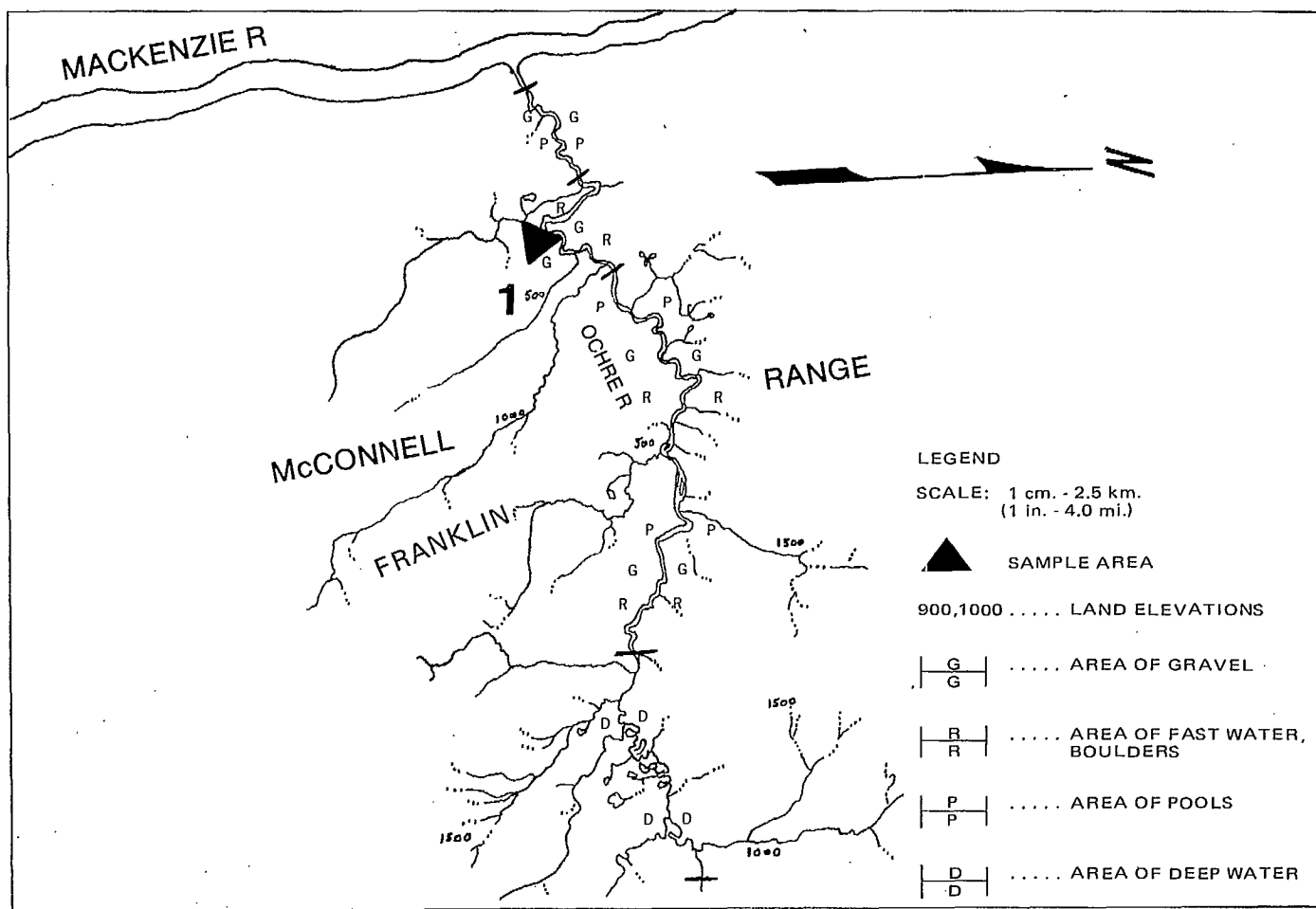
B. Sample Location Data: Ochre River

Loc. Data			Temp.	Fish Data				
Loc. # & Date	Bottom Type	Color	Air Water (C)	Invert Status	Catch Method	Species	#	Maturity
#1 June 27	Boulders	Dark Rust	15 16	Eph.	--	--	--	--
#1 July 29	Coarse Gravel	Light Rust	16 17	Eph.	S.	Lake Chub	65	Yearling
				Tri.	S.	Longnose Sucker	1	Yearling
#1 Sept. 6	Gravel	Dark Rust	14 9	Eph.	S.	Longnose Sucker	3	Yearling

LEGEND:

Eph. - Ephemeroptera
Tri. - Trichoptera
S. - Seine

Wrigley River

A. General Data:

Total length: 62 km (39 miles)

Length surveyed: all

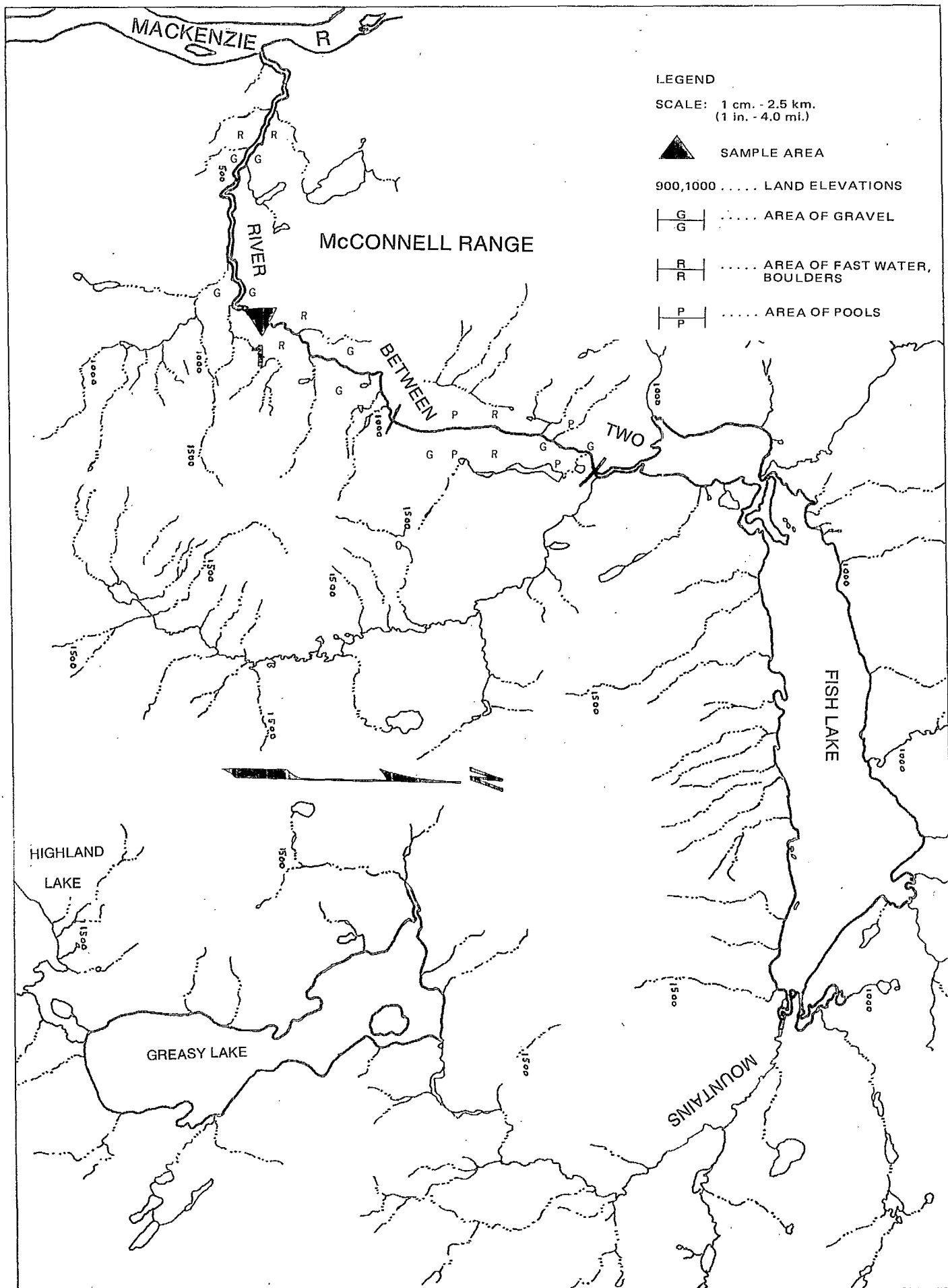Drainage area: 2,163 sq km (835 sq miles)

Estimate of potential spawning area (gravel) in length of stream

surveyed: 789,000 sq m (950,000 sq yds).

Description:

The Wrigley River, a moderately meandering stream, is shallow with a moderate current. Many bars and shoals (consisting of fine to coarse gravel) were noted. Some light siltation was evident, particularly along the lower reaches of the stream.

LEGEND

SCALE: 1 cm. - 2.5 km.
(1 in. - 4.0 mi.)

▲   SAMPLE AREA

900,1000 . . . . . LAND ELEVATIONS

| SI |
| SI | . . . . . AREA OF SILT MUO BANKS AND BARS

| G |
| G | . . . . . AREA OF GRAVEL

B.   Sample Location Data: Wrigley River

Loc. # & Date	Bottom Type	Color	Air Water (C)	Invert Status	Catch Method	Species	#	Maturity
#1 July 30	Fine Gravel, Silt & Sand	Green	23 20	Eph.	S.	Lake Chub	1	Yearling
#1 Sept. 3	Gravel, Silt & Sand	Light Rust	14 10	Dip. Eph. Ple.	S.	Lake Chub	4	Yearling

Header grouping: "Loc. Data" spans Loc. #/Date, Bottom Type, Color; "Temp." spans Air Water (C); "Fish Data" spans Invert Status, Catch Method, Species, #, Maturity.

LEGEND:

         Dip. - Diptera
         Eph. - Ephemeroptera
         Ple. - Plecoptera
           S. - Seine

River between two Mountains

A. General Data:

Total length: 149 km (93 miles)
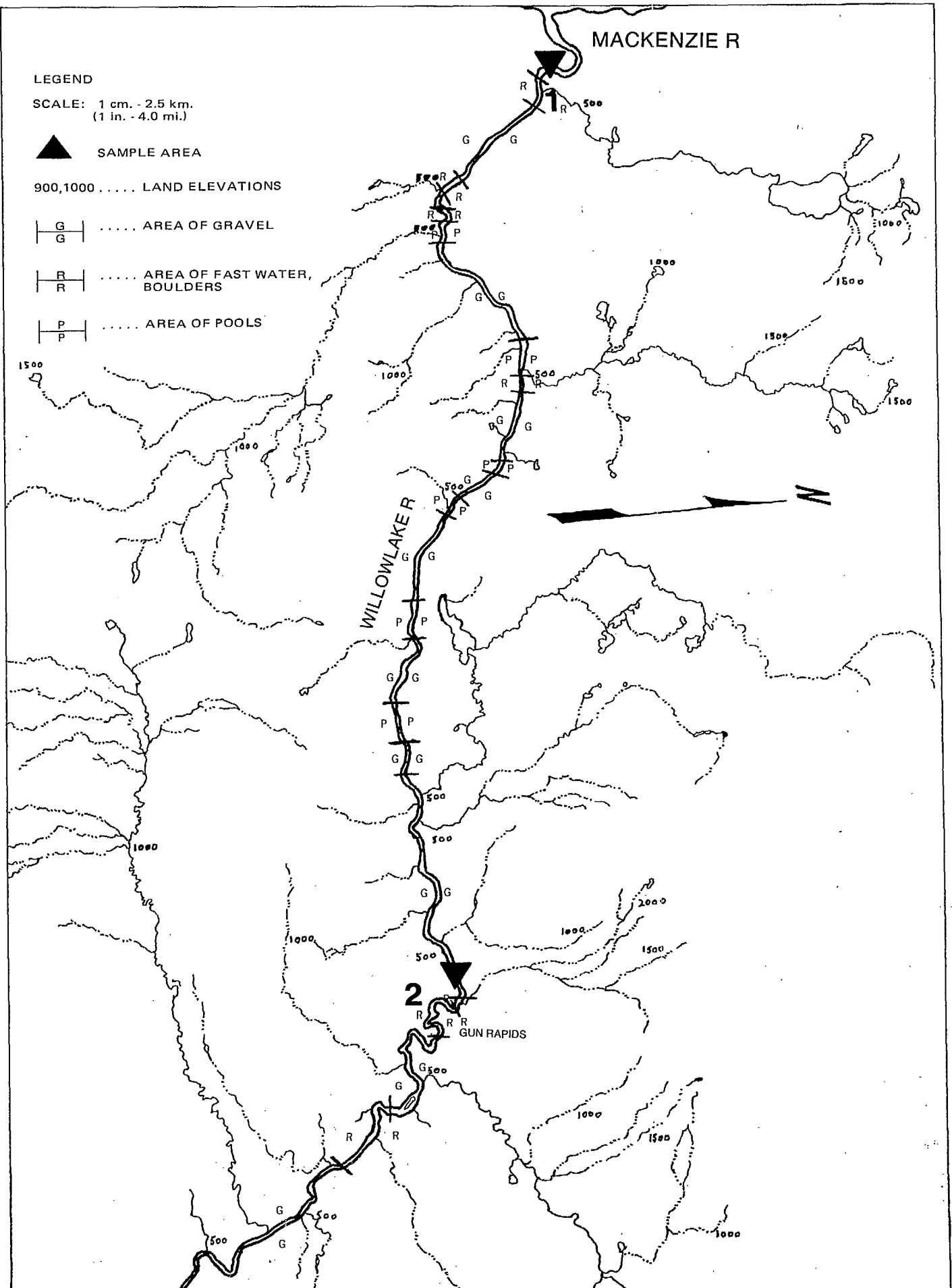
Length surveyed: 40 km (25 miles)

Drainage area: 4,527 sq km (1,727 sq miles)

Estimate of potential spawning area (gravel) in length of stream

surveyed: 701,000 sq m (845,000 sq yds).

Description:

This is a fast-flowing river with numerous rapids and
intermittent pools. The river bottom consists of areas of excellent
spawning gravel and large boulders. No obstacles to migration were
noted along the length of river surveyed.

Residents of the settlement of Wrigley report that pike,
whitefish, walleye and grayling are taken in Fish Lake which bisects
the River between two Mountains on its course from Greasy Lake to
the Mackenzie River.

LEGEND

SCALE: 1 cm. - 2.5 km.
(1 in. - 4.0 mi.)

▲ SAMPLE AREA

900,1000 . . . . . LAND ELEVATIONS

├─G─┤
├─G─┤ . . . . . AREA OF GRAVEL

├─R─┤
├─R─┤ . . . . AREA OF FAST WATER,
BOULDERS

├─P─┤
├─P─┤ . . . . . AREA OF POOLS

MACKENZIE R

McCONNELL RANGE

RIVER

BETWEEN

TWO

MOUNTAINS

FISH LAKE

HIGHLAND
LAKE

GREASY LAKE

B. Sample Location Data: River between two Mountains

Loc. # & Date	Bottom Type	Color	Air Water (C)	Invert Status	Catch Method	Species	#	Maturity
#1 June 26	Fine Gravel	Dark Rust	19 16	--	An.	Grayling	1	Immature
#1 July 28	Coarse Gravel	Light Rust	31 21	Eph. Tri. Ple.	--	--	--	--
#1 Sept. 2	Boulders & Gravel	Light Rust	12 12	Eph. Tri. Ple.	--	--	--	--

LEGEND:
    Eph. - Ephemeroptera
    Tri. - Trichoptera
    Ple. - Plecoptera
     An. - Angling
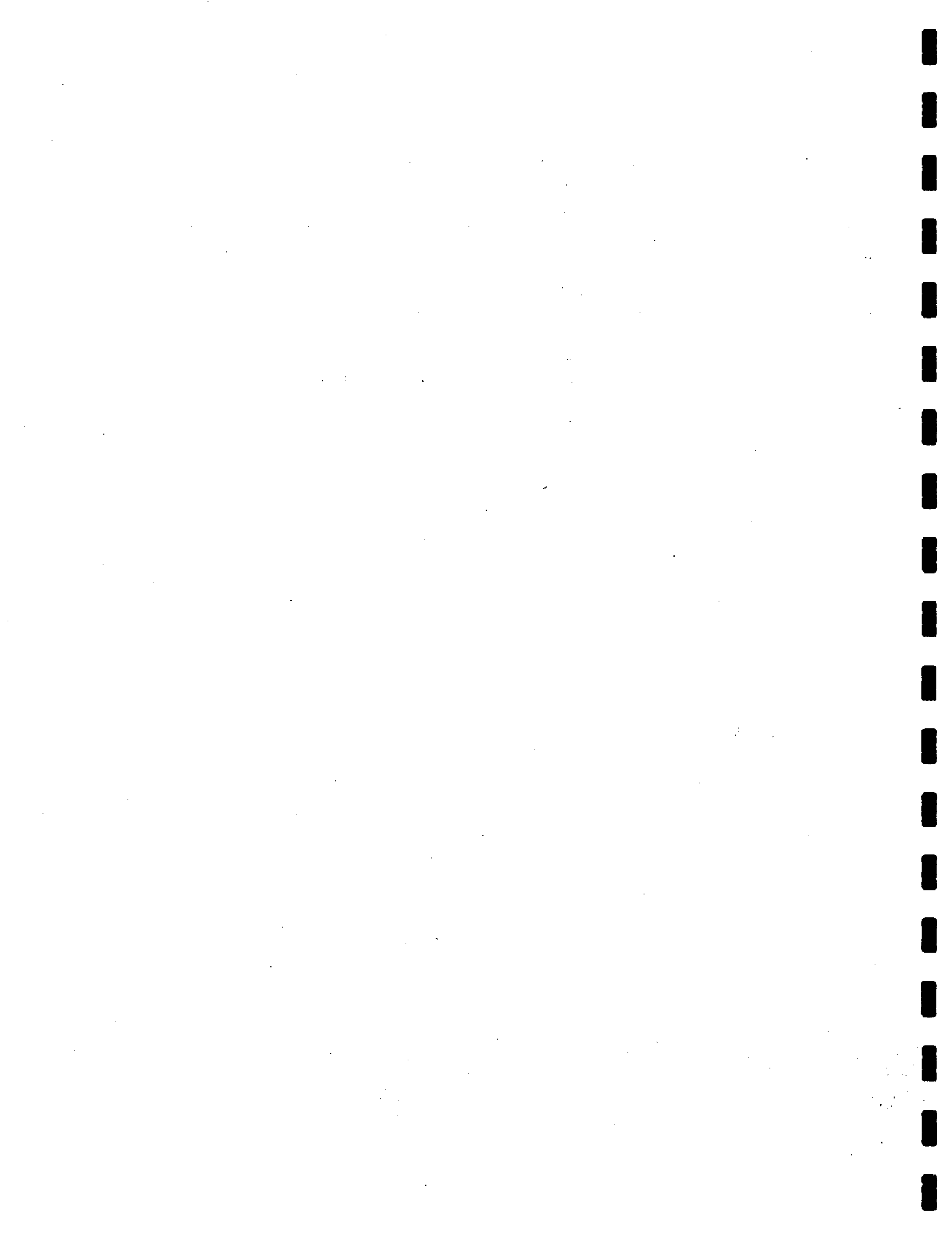
Willowlake River

A. General Data:

Total length: 312 km (194 miles)

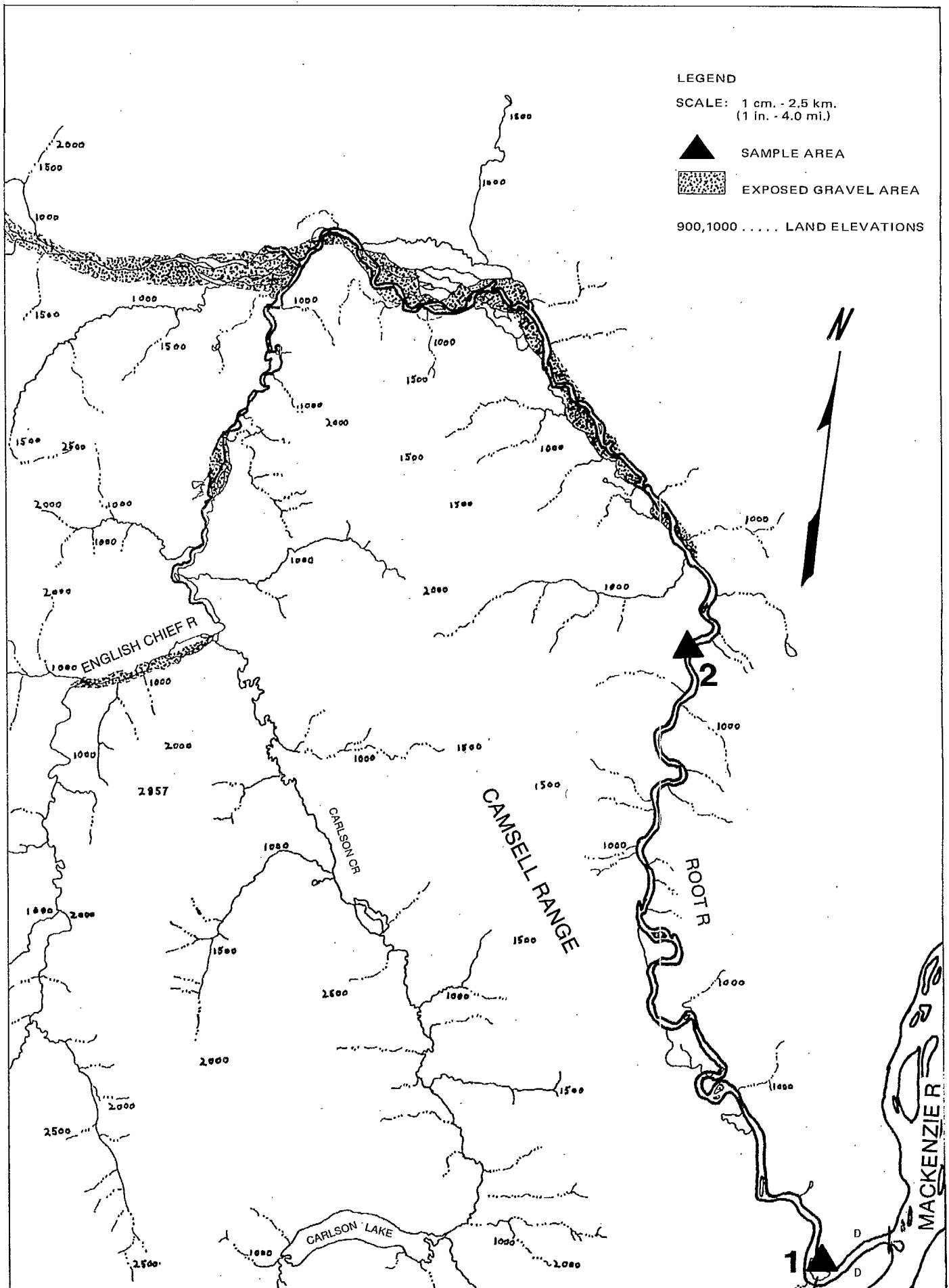Length surveyed: 51 km (32 miles)

Drainage area: 20,463 sq km (7,899 sq miles)

Estimate of potential spawning area (gravel) in length of stream surveyed: 2,228,000 sq m (2,684,000 sq yds)

Description:

This river appears to have excellent spawning gravel along the entire length surveyed. Many pools and intermittent rapids were also noted. The flow of water is fast and generally clear through a gently rolling terrain. Natives report that sucker spp., walleye, pike and burbot were taken near its mouth.

LEGEND

SCALE: 1 cm. - 2.5 km.
(1 in. - 4.0 mi.)

▲ SAMPLE AREA

900,1000 . . . . . LAND ELEVATIONS

| G / G | . . . . . AREA OF GRAVEL

| R / R | . . . . . AREA OF FAST WATER, BOULDERS

| P / P | . . . . . AREA OF POOLS

MACKENZIE R

WILLOWLAKE R

GUN RAPIDS

N

B.   Sample Location Data: Willowlake River

Loc. # & Date	Bottom Type	Color	Air Water (C)	Invert Status	Catch Method	Species	#	Maturity
#1 June 26	Silt & Sand	Heavy Silt	19 16.	--	S. G.N. G.N. G.N.	Neg. Grayling Pike Longnose Sucker	-- 1 2 1	-- Mature Mature Mature
#1 July 27	Coarse Gravel	Light Rust	26 21	--	G.N. O.	Neg. Pike	-- 1	-- Immature
#1 Sept. 2	Boulders & Silt	Light Rust	13 12	Ple. Eph.	G.N. G.N.	Longnose Sucker Pike	1 1	Mature Mature
#2 June 26	Coarse Gravel	Clear	19 16	--	--	--	--	--
#2 July 27	Boulders & Coarse Gravel	Clear	25 21	Tri. Eph. Ple.	--	--	--	
#2 Sept. 2	Gravel Silt & Sand	Light Rust	14 13	Eph. Tri. Ple.	S.	Grayling	1	Yearling

LEGEND:

S.	- Seine	Ple.	- Plecoptera
G.N.	- Gill Net	Tri.	- Trichoptera
O.	- Observation	Eph.	- Ephemeroptera

Root River

A. General Data:

Total length: 238 km (148 miles)

Length surveyed: 80 km (50 miles)

Drainage area: 14,375 sq km (5,549 sq miles)

Estimate of potential spawning area (gravel) in length of stream

surveyed: 2,702,000 sq m (3,256,000 sq yds).

Description:

This is a moderately flowing river with few rapids and many areas of good spawning gravel. No major obstacles to fish migration were observed.

The river consists of a deep channel with gravel banks for the first 4 miles upstream from its mouth. A large island and a sharp bend then tend to divide the river into smaller shallow channels which are characteristic of the river for the remainder of its course upstream. Spawning potential in this river appears to be good.

LEGEND

SCALE: 1 cm. - 2.5 km.
        (1 in. - 4.0 mi.)

▲   SAMPLE AREA

         EXPOSED GRAVEL AREA

900,1000 . . . . . LAND ELEVATIONS

N

ENGLISH CHIEF R

CAMSELL RANGE

CARLSON CR

ROOT R

MACKENZIE R

CARLSON LAKE

1

2

B.   Sample Location Data - Root River

Loc. # & Date	Bottom Type	Color	Air Water (C)	Invert Status	Catch Method	Species	#	Maturity
Loc. Data			**Temp.**	**Fish Data**				
#1 June 25	Silt & Sand	Green	17 13	Neg.	An. G.N. G.N. G.N.	Neg. Inconnu Pike Flathead Chub	8 3 7	Immature & Mature Mature Mature
#1 July 25	Fine Gravel	Green	32 22	Neg.	--	--	--	--
#1 Sept. 25	Gravel Silt & Sand	Green	10 11	--	G.N. S. S.	Neg. Longnose Sucker Lake Chub	-- 3 6	-- Yearling Yearling
#2 June 25	Coarse Gravel	--	16 11	Neg.	An. S. S.	Neg. Slimy Sculpin Lake Chub	1 15	Yearling Yearling
#2 July 28	Coarse Gravel	Green	32 20	Neg.	S.	Neg.	--	--
#2 Sept. 2	Gravel Silt & Sand	Green	12 11	Neg.	S.	Lake Chub	5	Yearling

LEGEND:

S.   - Seine
G.N. - Gill Net
An. - Angling

North Nahanni River

A. General Data

Total length: 112 km (70 miles)

Length surveyed: 64 km (40 miles)

Drainage area: 13,895 sq km (5,363 sq miles)

Estimate of potential spawning area (gravel) in length of stream

surveyed: 3,331,000 sq m (4,013,000 sq yds).

Description:

This is a shallow, multi-channeled river with many

exposed sand and gravel bars. A swift current carries a heavy silt

load which may limit spawning potential. Sample locations were

situated on smaller side channels where seining was more practical

than in the swift-flowing main channels.

B$_1$. Sample Location Data: North Nahanni River

Loc. # & Date	Bottom Type	Color	Air Water (C)	Invert Status	Catch Method	Species	#	Maturity
#1 June 23	Fine Gravel	--	20 14	--	--	--	--	--
#1 July 28	Coarse Gravel	Heavy Silt	32 20	Neg.	--	--	--	--
*#1 Aug. 30	Gravel Silt & Sand	Green	22 13	Ple.	S.	Longnose Sucker	4	Yearling
					S.	Flathead Chub	1	Yearling
					S.	Lake Chub	9	Yearling
					S.	Slimy Sculpin	2	Yearling
#2 June 25	Coarse Gravel	Green	13 8	Neg.	S.	Neg.	--	--
					An.	Neg.	--	--
#2 July 28	Coarse Gravel	Clear	27 16	Neg.	--	--	--	--
#2 Aug. 30	Gravel & Silt	Green	22 12	Neg.	S.	Longnose Dace	1	Yearling

* Station Relocated

LEGEND:
        Ple. - Plecoptera
          S. - Seine
         An. - Angling

B_2. Sample Location #1 Water Chemistry: North Nahanni River

Date: 23-06-71

Time: 09:30 hr

Turbidity: 160 J.T.U.

Lead: Dissolved (Pb) .005 ppm

Hardness: Total ($CaCO_3$) 148 mg/l

Alkalinity: Total ($CaCO_3$) 111 mg/l

Specific Conductance: (umho/cm) 308

Temperature (C): Air - Water: 20; 14

Copper: Dissolved (Cu) .003 ppm

Zinc: Dissolved (Zn) .003 ppm

Trail River

A. General Data:

   Total length: 48 km (30 miles)
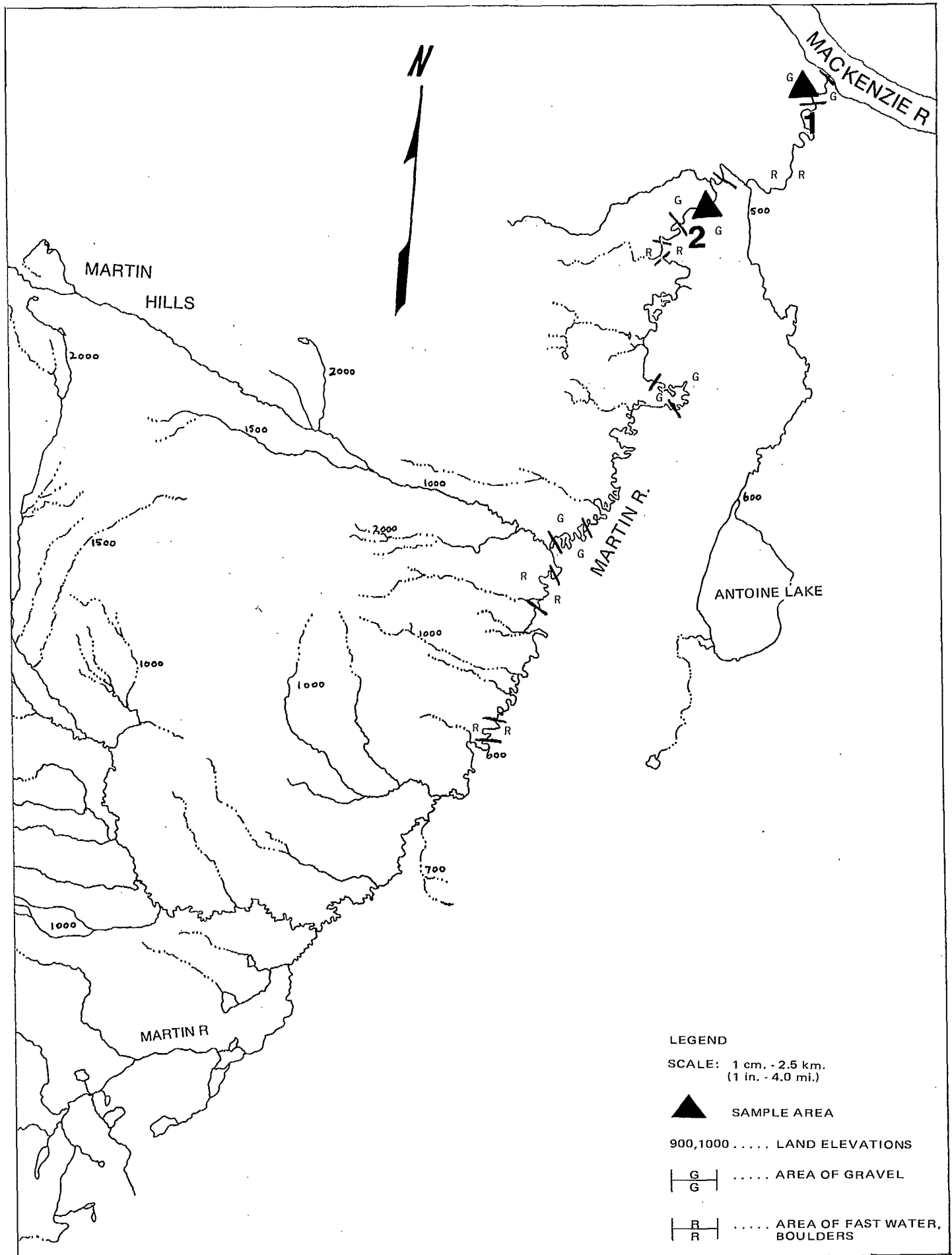
   Length surveyed: all

   Drainage area: 756 sq km (292 sq miles)

   Estimate of potential spawning area (gravel) in length of stream

   surveyed: indefinite.

   Description:

   .The Trail River is a shallow stream with intermittent

   rapids. Bottom composition generally appeared to be of mud and silt.

   Areas of gravel noted appeared too coarse to be suitable for spawn-

   ing. By late August the water level and flow at the mouth were low.
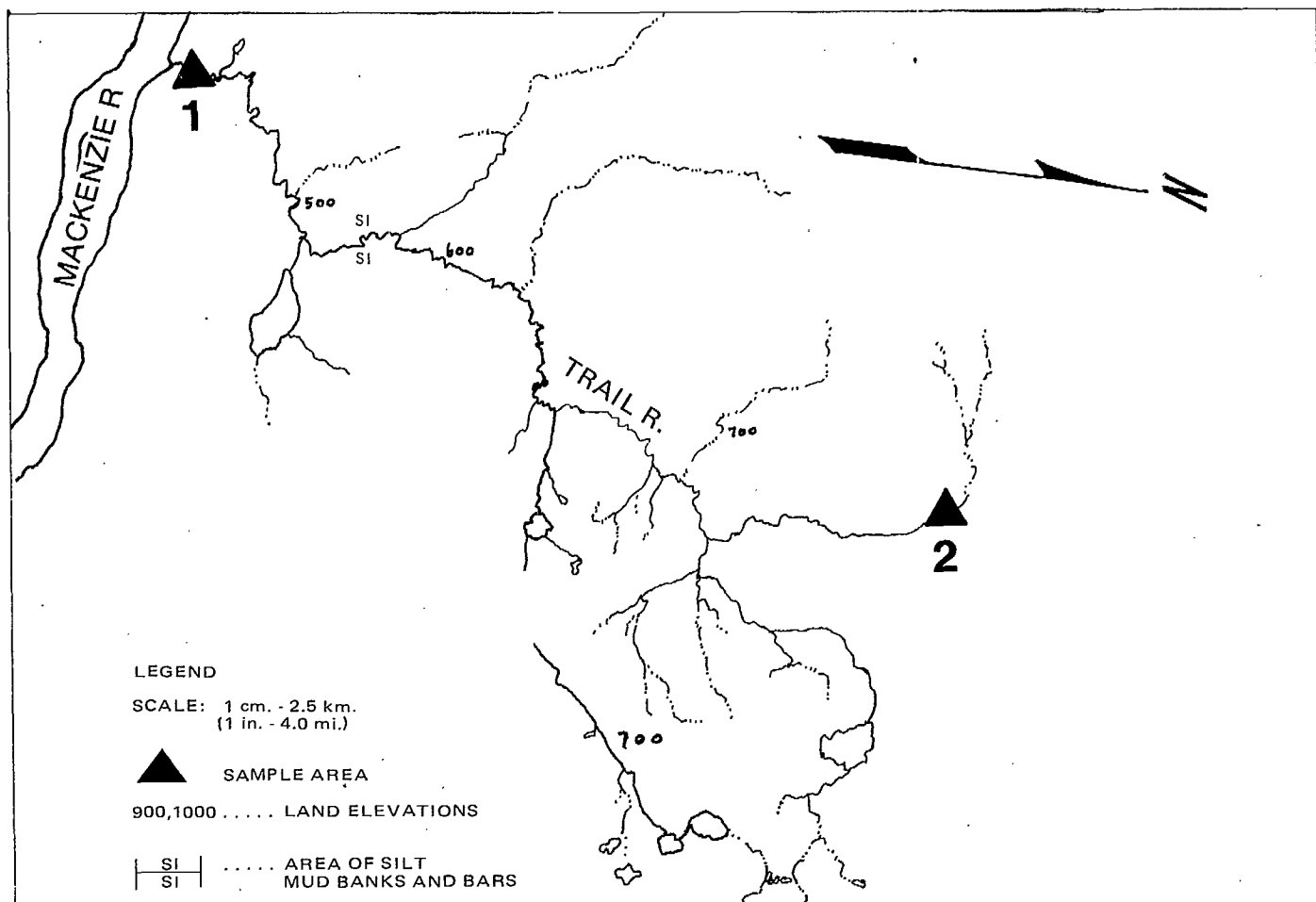
B. Sample Location Data: Trail River

Loc. # & Date	Bottom Type	Color	Air Water (C)	Invert Status	Catch Method	Species	#	Maturity
#2 June 21	Coarse Gravel	Dark Rust	24 18	Tri. Eph.	An. S.	Neg. Neg.	-- --	-- --
#1 June 21	Unclas- sified	Dark Rust	20 12	--	An.	Neg.	--	--
#1 July 27	Unclas- sified	Dark Rust	25 22	--	--	--	--	--

LEGEND:

    Tri. - Trichoptera
    Eph. - Ephemeroptera
     An. - Angling
      S. - Seine

Martin River

A. General Data:

Total length: 120 km (75 miles)

Length surveyed: 48 km (30 miles)

Drainage area: 2,919 sq km (1,127 sq miles)

Estimate of potential spawning area (gravel) in length of stream surveyed: 327,000 sq m (394,000 sq yds).

Description:

This river maintains a tortuous course for its entire length. It is characterized by many oxbows and long stretches of slow-flowing water interspersed with rapids. Most gravel observed appeared to be too coarse for spawning use. Bottom composition generally appeared to be mud and silt.

N

MACKENZIE R

MARTIN
HILLS

2000

2000

1500

1000

2000

1500

1500

1000

1000

1000

1000

1000

600

700

500

600

MARTIN R.

ANTOINE LAKE

G
G

R
R

G

R
R

G

G
G

G
G

R

R

R
R

MARTIN R

LEGEND

SCALE: 1 cm. - 2.5 km.
        (1 in. - 4.0 mi.)

▲   SAMPLE AREA

900,1000 . . . . . LAND ELEVATIONS

├ G ┤
├ G ┤   . . . . . AREA OF GRAVEL

├ R ┤
├ R ┤   . . . . . AREA OF FAST WATER,
                  BOULDERS

B. Sample Location Data: Martin River

Loc. # & Date	Bottom Type	Color	Air Water (C)	Invert Status	Catch Method	Species	#	Maturity
#2 June 21	Silt & Sand	Dark Rust	22 21	Tri. Eph.	S.	Neg	--	--
*#2 July 23	Boulders & Gravel	 Clear	19 17	 Ple.	S. S.	Grayling Trout-perch	1 1	Yearling Yearling
#2 Aug. 31	Boulders & Gravel	Light Rust	27 15	Tri. Eph.	 S.	Slimy Sculpin	 2	 Yearling
#1 June 21	Unclas- sified	Dark Rust	26 23	 --	An. S. S. S. S. S. S.	Pike Char sp. Broad Whitefish Trout-perch White Sucker Goldeye Spottail Shiner	1 1 24 34 18 1 3	Immature Yearling Yearling Yearling Yearling Yearling Yearling

The table is organized under three main headings: "Loc. Data" (covering Loc. #/Date, Bottom Type, Color), "Temp." (covering Air/Water (C)), and "Fish Data" (covering Invert Status, Catch Method, Species, #, Maturity).

* Sample Loc. Site Moved to a New Location.

LEGEND:
Tri. - Trichoptera
Ple. - Plecoptera
Eph. - Ephemeroptera
S. - Seine
An. - Angling

Harris River

A. General Data:

   Total length: 66 km (41 miles)

   Length surveyed: all

   Drainage area: 1,474 sq km (569 sq miles)

   Estimate of potential spawning area (gravel) in length of stream

   surveyed: 58,000 sq m (70,000 sq yds).

   Description:

   The Harris River is a slow-flowing, shallow stream
characterized by a bottom type of coarse gravel and large boulders.
Intermittent rapids were evident during the early part of the
summer but by mid-July the stream was almost dry, making sampling
impractical.

Map of Harris River sample locations showing MACKENZIE R., HARRIS R., sample areas 1 and 2, land elevations (500, 600, 700, 800, 900, 1000).

LEGEND

SCALE: 1 cm. - 2.5 km.
(1 in. - 4.0 mi.)

▲ SAMPLE AREA

900, 1000 . . . . . LAND ELEVATIONS

|—G/G—| . . . . . AREA OF GRAVEL

|—B/B—| . . . . . AREA OF BOULDERS
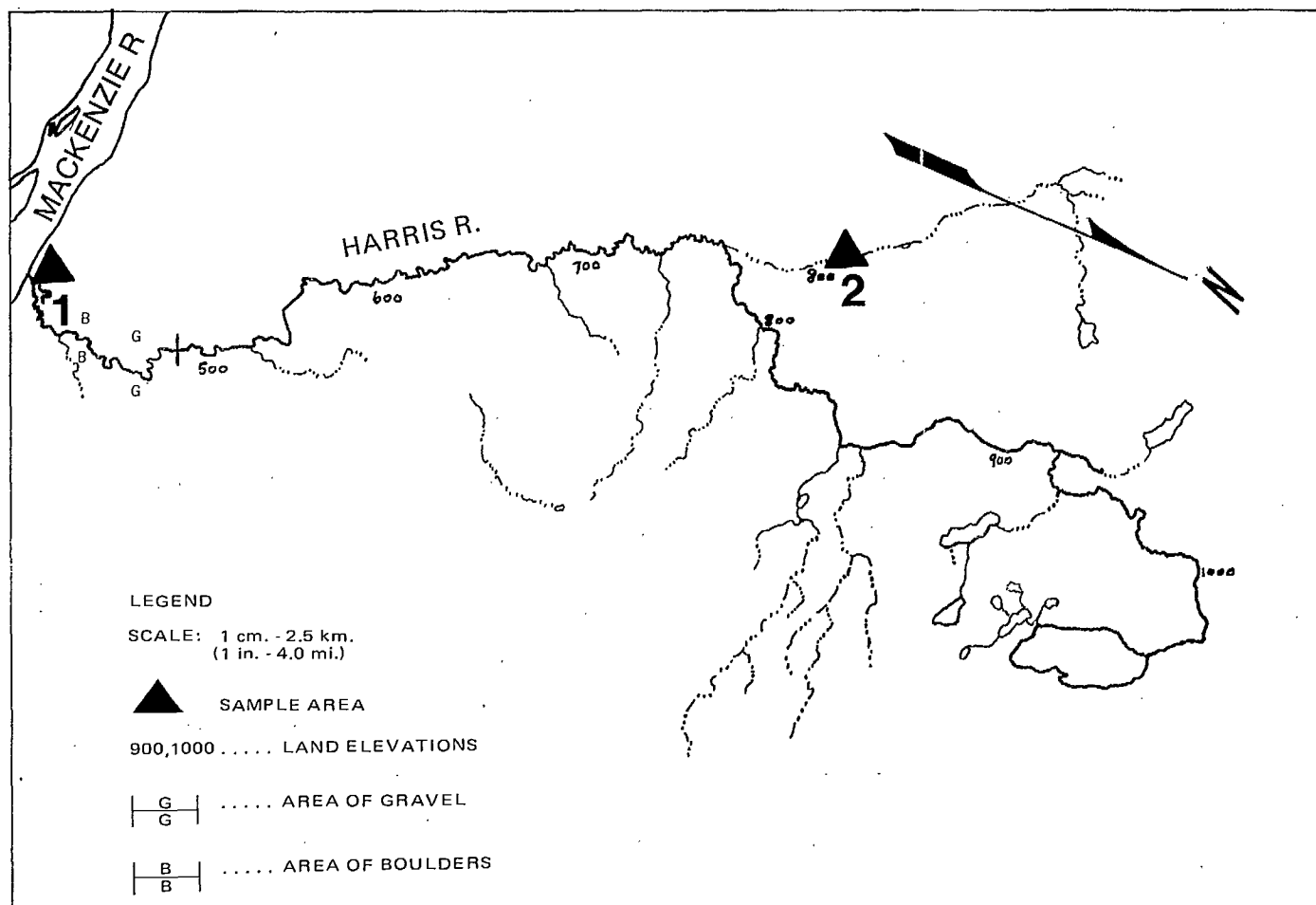
B. Sample Location Data: Harris River

	Loc. Data		Temp.		Fish Data			
Loc. # & Date	Bottom Type	Color	Air Water (C)	Invert Status	Catch Method	Species	#	Maturity
#2 June 6	Unclas- sified	Dark Rust	21 19	--	An.	Neg.	--	--
#2 July 27	Unclas- sified	Dark Rust	21 14	--	--	--	--	--
#1 June 6	Unclas- sified	Dark Rust	19 19	--	An. S. S.	Neg. Pike Grayling	1 3	Yearling Yearling

LEGEND:

An. - Angling
S. - Seine

Liard River System

In the length surveyed (Mackenzie River to Nahanni Butte), no
sampling stations were placed on the Liard River due to absence of
suitable sampling sites. The river carries a high silt load and gravel
areas are scarce. The river has mud banks and occasional mud bars.
Sampling stations were however placed upstream on the major tributaries
near their mouths on the Liard River. Here gravel areas were more
prevalent and sampling could be more intensive. During May, June and
early July, when water levels are high in the Liard, water is backed up
into the major tributary mouths. Gill nets set upstream from the
mouths of these tributaries over gravel yielded good catches of walleye
and pike, indicating possible spawning and feeding areas of these
species in these areas. These fish apparently return to the Liard when
the runoff waters subside in mid-July. Verbal reports indicate similar
conditions existing upstream on the Liard around Fort Liard. The Fort
Simpson base caught a great diversity of fish species at the mouth of
the Liard indicating that the river may serve as a migratory route for
spawning fish.

Poplar River

A. General Data:

Total length: 100 km (62 miles)

Length surveyed: 64 km (40 miles)

Drainage area: 1,137 sq km (439 sq miles)

Estimate of potential spawning area (gravel) in length of stream

surveyed: 654,000 sq m (788,000 sq yds).

Description:

This is a gently winding river characterized by high banks

along the reaches near the Liard River, while further upstream it

flows through a black spruce muskeg area. In early summer, this

river has extensive pools with intermittent rapids. Excellent

potential spawning gravel areas were observed along the course sur-

veyed.

LIARD R.

1

POPLAR R

LEGEND

SCALE: 1 cm. - 2.5 km.
(1 in. - 4.0 mi.)

▲   SAMPLE AREA

900,1000 . . . . . LAND ELEVATIONS

├─G─┤ . . . . . AREA OF GRAVEL
└─G─┘

G   G

G   G

G   G

1000

1000

1000

2

1100

N

1500

1600

1500

C O R M A C K

1711

L A K E

1

1837

1500

1500
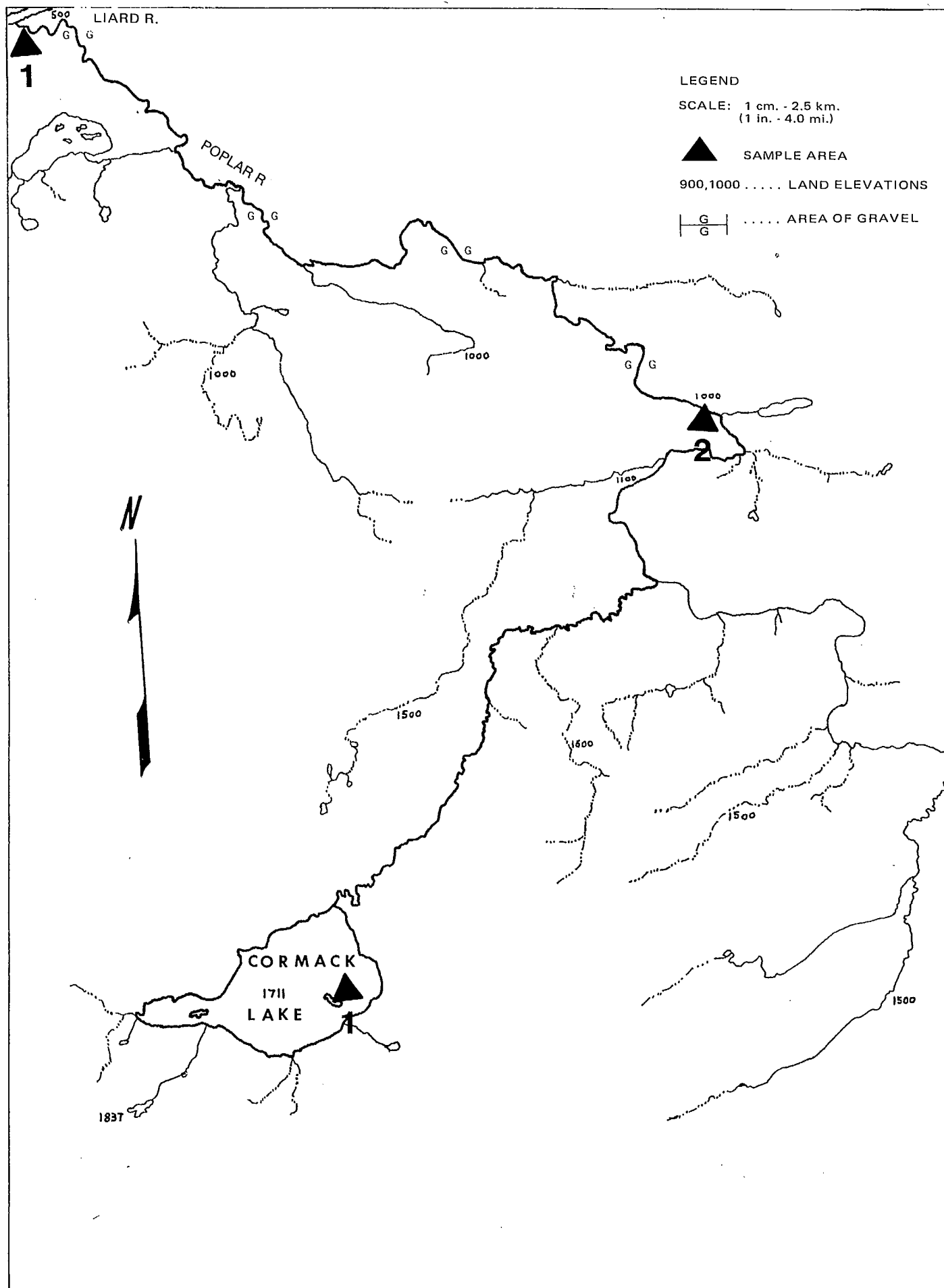
B_1. Sample Location Data: Poplar River

Loc. # & Date	Loc. Data Bottom Type	Color	Temp. Air Water (C)	Invert Status	Catch Method	Fish Data Species	#	Maturity
#1 June 23	Gravel	Light Rust	23 30	Eph.	An.	Pike	1	Mature
#1 July 24	Boulders	Clear	26 30	Neg.	O	Burbot	1	Mature
#1 Aug. 26	Boulders	--	--	--	--	--	--	--
#2 June 23	Gravel	Dark Rust	23 21	Eph.	An.	Pike	2	Mature
#2 July 24	Boulders & Gravel	Dark Rust	24 17	Tri.	S. S. S. S.	Longnose Sucker Longnose Dace Grayling Trout-perch	3 2 3 1	Yearling Yearling Yearling Yearling
#2 Aug. 26	Boulders & Gravel	Light Rust	18 14	Ple. Tri. Eph.	--	--	--	--

LEGEND:

An. - Angling
O. - Observation
S. - Seine
Eph. - Ephemeroptera
Tri. - Trichoptera
Ple. - Plecoptera

B_2. Sample Location Water Chemistry

Location: Poplar River Location 1

Date: 24-07-71
Temperature (C): Air - Water: 26; 20
Dissolved Oxygen (D.O.): 10 ppm
pH: 8.0
Alkalinity: Total ($CaCO_3$) 171 ppm
Hardness: Total ($CaCO_3$) 136.8 ppm

Location: Poplar River Location 2

Date: 24-07-71
Temperature (C): Air - Water: 24; 17
Dissolved Oxygen (D.O.): 9 ppm
pH: 8.0
Alkalinity: Total ($CaCO_3$) 119.7 ppm
Hardness: Total ($CaCO_3$) 119.7 ppm

C. Sample Location Data: Cormack Lake

	Loc. Data		Temp.		Fish Data			
Loc. # & Date	Bottom Type	Color	Air Water (C)	Invert Status	Catch Method	Species	#	Maturity
#1 Aug. 25	Boulders & Gravel	Light Rust	19 14	--	G.N.	Pike	4	Mature
					G.N.	Longnose Sucker	4	Mature
					G.N.	White Sucker	1	Mature

LEGEND:
       G.N. - Gill Net
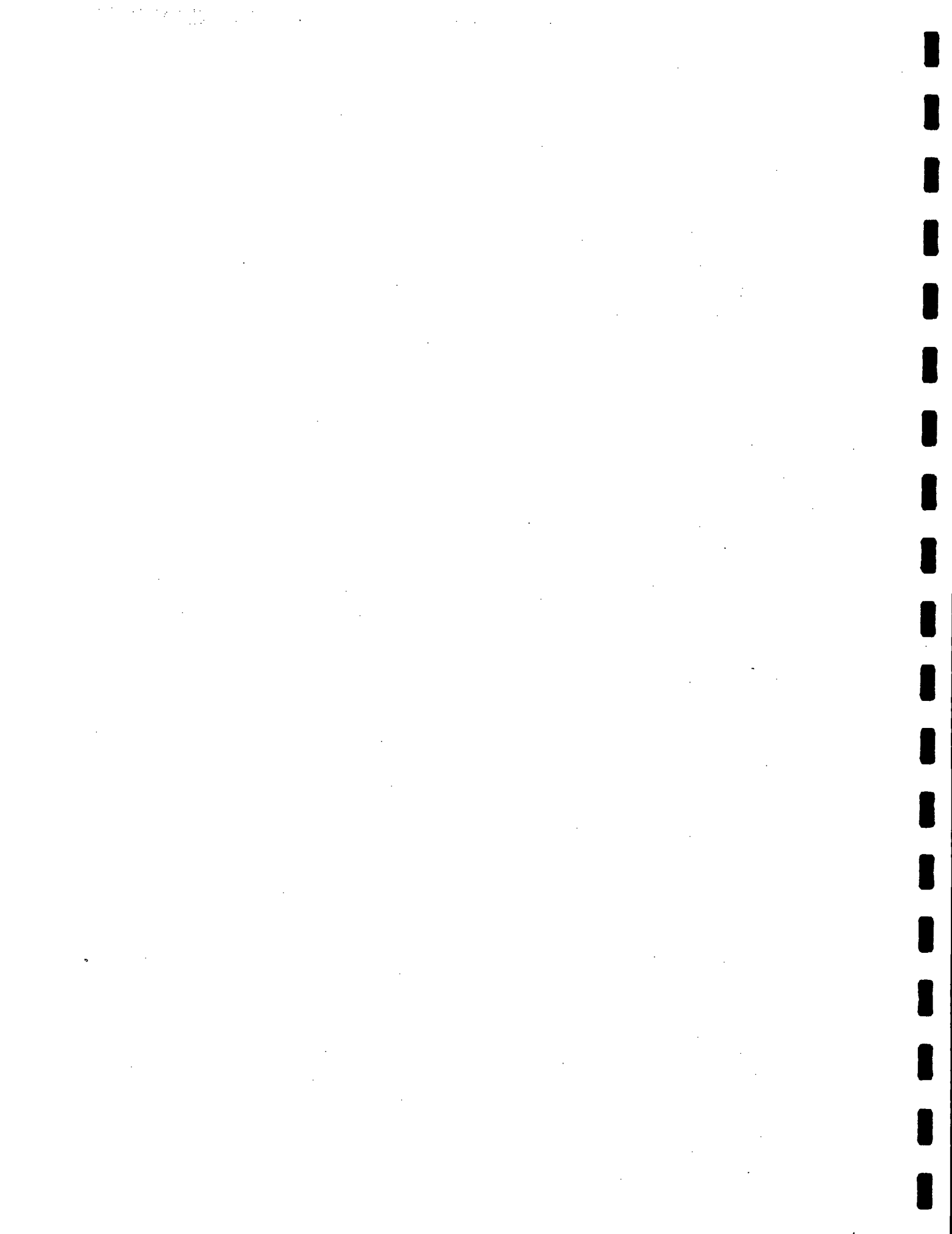
Birch River

A. General Data:

Total length: 59 km (37 miles)

Length surveyed: all

Drainage area: 392 sq km (151 miles)

Estimate of potential spawning area (gravel) in length of stream

surveyed: 53,000 sq m (63,000 sq yds)

Description:

This is a meandering stream characterized by high, steep
cliffs along its course. A fall approximately 10 feet in height
situated 8 km upstream from the mouth, presents a barrier to fish
migrations as do numerous beaver dams. The spawning potential of
this stream appears to be rather minimal due to absence of suitable
gravel beds and low water levels after mid-summer. One notable
exception is the area 5 km upstream from the Liard River.

LIARD R.

705

904

G

G

G

G

FALLS

BIRCH R

1

N

2

1000

1000

LEGEND

SCALE: 1 cm. - 2.5 km.
        (1 in. - 4.0 mi.)

SAMPLE AREA

900,1000 . . . . . LAND ELEVATIONS

G
―|――|― . . . . . AREA OF GRAVEL
G
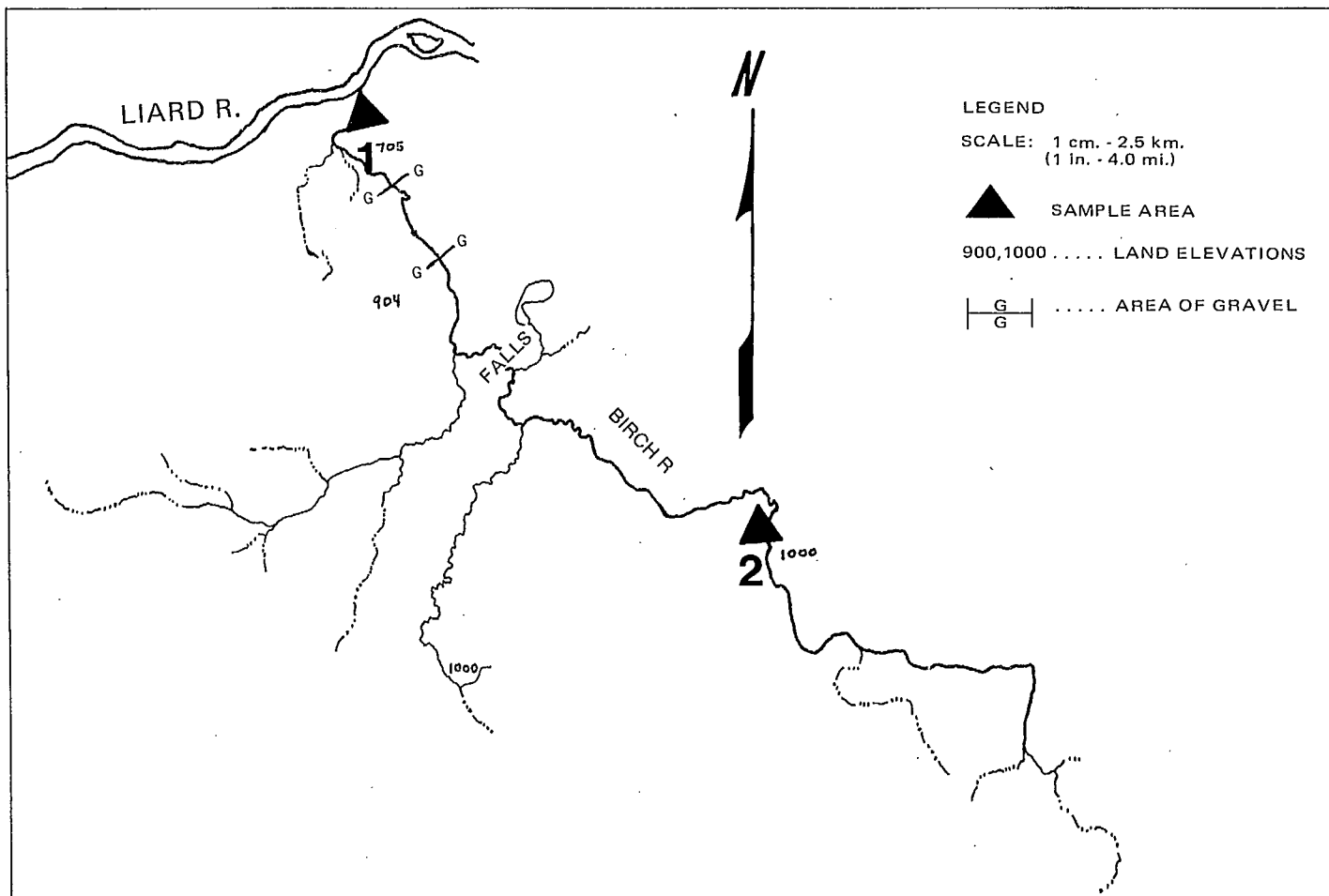
B_1. Sample Location Data: Birch River

Loc. # & Date	Bottom Type	Color	Air Water (C)	Invert Status	Catch Method	Species	#	Maturity
*#2 June 23	Silt & Sand	Dark Rust	25 21	Tri. Eph.	S.	Lake Chub	14	Yearling
					S.	Brook Stickleback	9	Yearling
#1 June 23	Boulders	Dark Rust	26 21	Tri. Eph.	S. S.	Trout-perch Lake Chub	1 18	Yearling Yearling
#1 July 24	Boulders & Gravel	Clear	25 20	--	S.	Grayling	7	Yearling
					S.	Longnose Sucker	2	Yearling
					S.	Slimy Sculpin	8	Yearling
					S.	Longnose Dace	6	Yearling
#1 Aug. 26	Boulders & Gravel	Dark Rust	18 16	--		Longnose		
					S.	Sucker	2	Yearling
					S.	Trout-perch	4	Yearling
					S.	Slimy Sculpin	2	Yearling
					S.	Longnose Dace	5	Yearling

LEGEND:
Tri. - Trichoptera
Eph. - Ephemeroptera
S. - Seine

* Discontinued due to low water levels.

B_2. Sample Location Water Chemistry: Birch River

Date: 24-07-71
Temperature (C): Air - Water: 25; 20
Dissolved Oxygen (D.O.) ppm: 9
pH: 8.0
Alkalinity: Total $CaCO_3$ 171.0 ppm
Hardness: Total $CaCO_3$ 136.8 ppm
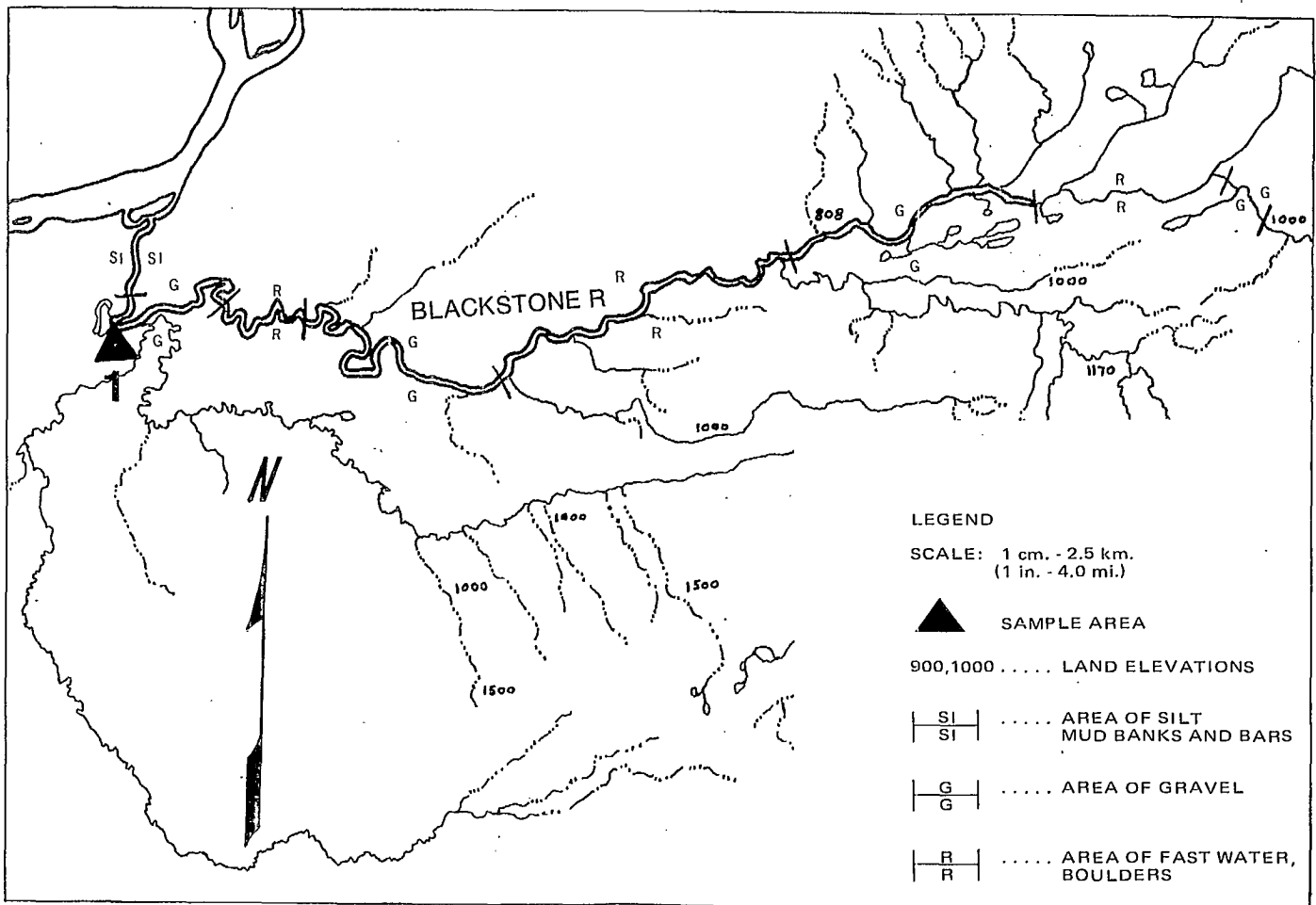
Matou River

A. General Data:

Total length: 82 km (51 miles)

Length surveyed: all

Drainage area: 557 sq km (216 sq miles)

Estimate of potential spawning area (gravel) in length of stream

surveyed: indefinite

Description:

The Matou River is a winding stream having a large boulder
type bottom with low water levels after the spring runoff period. No
significant areas of spawning gravel were evident.

Back up of Liard River water in May, June and early July
produces a deep area near the mouth of this river.

LIARD R.

MATOU R

GRAVEL AND BOULDERS

1

LEGEND

SCALE: 1 cm. - 2.5 km.
(1 in. - 4.0 mi.)

▲   SAMPLE AREA

⊢ G �⊣ ..... AREA OF GRAVEL
  G

⊢ R �⊣ ..... AREA OF FAST WATER,
  R   BOULDERS
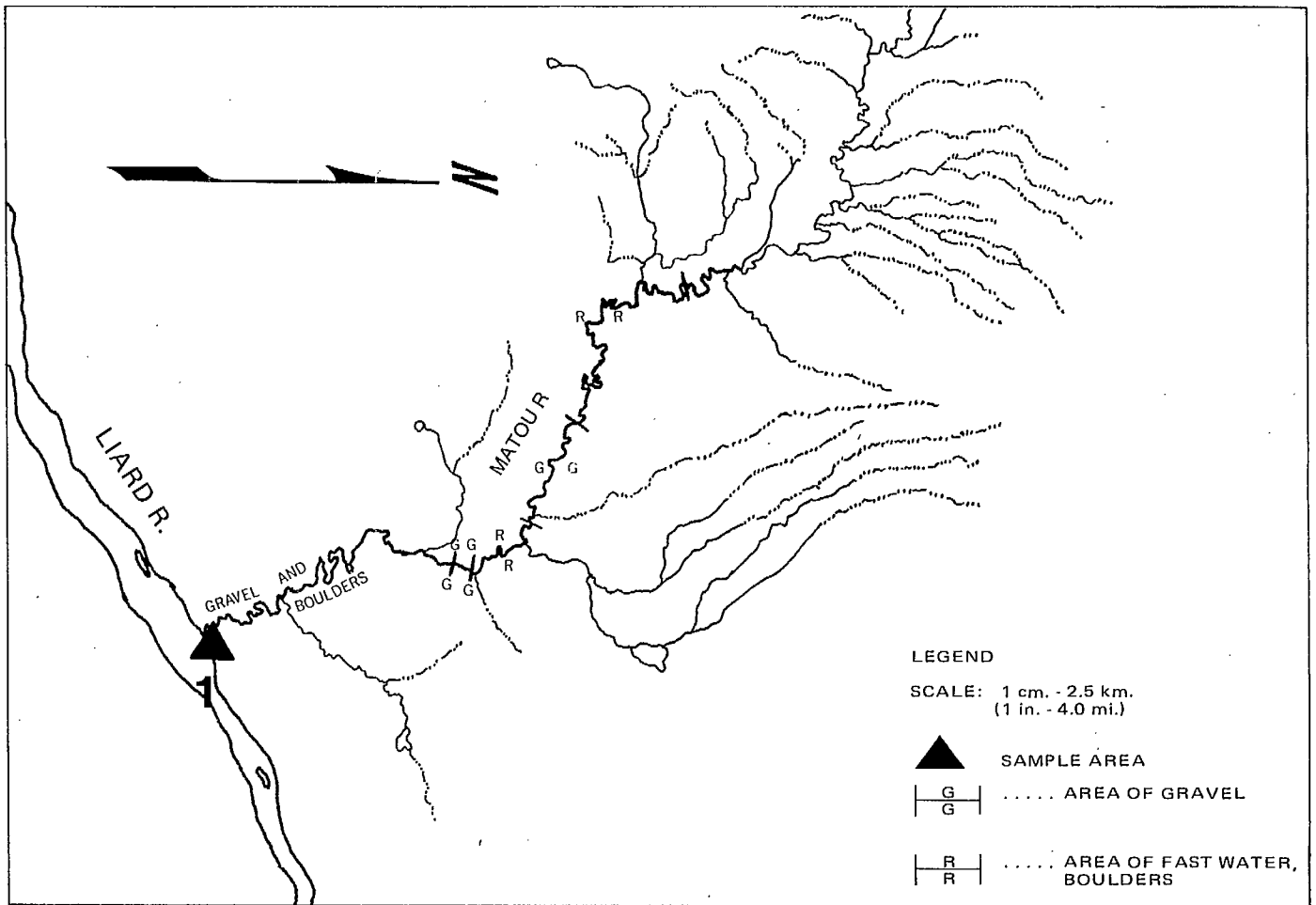
B.   Sample Location Data: Matou River

Loc. Data			Temp.	Fish Data					
Loc. # & Date	Bottom Type	Color	Air Water (C)	Invert Status	Catch Method	Species	#	Maturity
#1 June 26	Boulders	Clear	24 23	Tri. Eph.	G.N. G.N. G.N. S.	Lake-trout Pike Walleye Longnose Sucker	1 4 2 40	Mature Mature Mature Fry
#1 July 26	Silt & Sand	Heavy Silt	29 24	--	G.N. S. S. S. S. S. S.	Pike Longnose Sucker Trout-perch Spottail Shiner Humpback Whitefish Lake Chub Emerald Shiner	1 36 8 4 1 10 2	Immature Fry Fry Fry Fry Fry Fry

LEGEND:

        S.   - Seine
    Tri. - Trichoptera
    Eph. - Ephemeroptera
    G.N. - Gill Net

B_2.   Sample Location Water Chemistry

Date: 22-06-71
Time: 0930 hr
Turbidity: 2.5 J.T.U.
Lead: Dissolved (Pb) .005 ppm
Hardness: Total $(CaCO_3)$ 107 mg/l

Alkalinity: Total $(CaCO_3$ 93.1 mg/l
Specific Conductance: (umho/cm) 208
Temperature (C):   Air - Water: 21; 22
Copper: Dissolved (Cu) .001 ppm
Zinc: Dissolved (Zn) .003 ppm

Blackstone River

A. General Data:

Total length: 97 km (60 miles)

Length surveyed: all

Drainage area: 1,327 sq km (512 sq miles)

Estimate of potential spawning area (gravel) in length of stream

surveyed: 964,000 sq m (1,162,000 sq yds)

Description:

This river has many good gravel areas along its course but
low water levels make its spawning potential rather marginal. An
exception to this is a gravel area located 3 km upstream from the
Liard River. This area has high water levels through May, June and
early July, due to the back up of the Liard River.

LEGEND

SCALE: 1 cm. - 2.5 km.
         (1 in. - 4.0 mi.)

▲   SAMPLE AREA

900,1000 . . . . . LAND ELEVATIONS

| SI |
| SI | . . . . . AREA OF SILT
              MUD BANKS AND BARS

| G |
| G | . . . . . AREA OF GRAVEL

| R |
| R | . . . . . AREA OF FAST WATER,
              BOULDERS

B_1. Sample Location Data: Blackstone River

	Loc. Data		Temp.		Fish Data			
Loc. # & Date	Bottom Type	Color	Air Water (C)	Invert Status	Catch Method	Species	#	Maturity
#1 June 21	Gravel, Silt & Sand	--	30 24	Ple.	An. S. G.N. G.N.	Neg. Neg. Pike Walleye	-- -- 3 8	-- -- Mature Mature
#1 July 26	Gravel, Silt & Sand	Heavy Silt	29 25	Neg.	S. S. S. S.	Longnose Sucker Trout-perch Spottail Shiner Emerald Shiner	.84 6 5 6	Yearling Yearling Yearling Yearling
#1 Aug. 26	Silt & Gravel	Clear	16 16	Ple. Eph.	S. An.	Neg. Pike	-- 1	-- Mature

LEGEND:

    Ple. - Plecoptera
    Eph. - Ephemeroptera
     An. - Angling
      S. - Seine
    G.N. - Gill Net

B_2. Sample Location Water Chemistry

Date: 22-06-71
Time: 1130 hr
Turbidity: 0.7 J.T.U.
Lead: Dissolved (Pb) 0.011 ppm
Hardness: Total ($CaCO_3$) 160 mg/l

Alkalinity: Total ($CaCO_3$) 146 mg/l
Specific Conductance: (umho/cm) 322
Temperature (C): Air - Water: 20; 22
Copper: Dissolved (Cu) .001 ppm
Zinc: Dissolved (Zn) .001 ppm
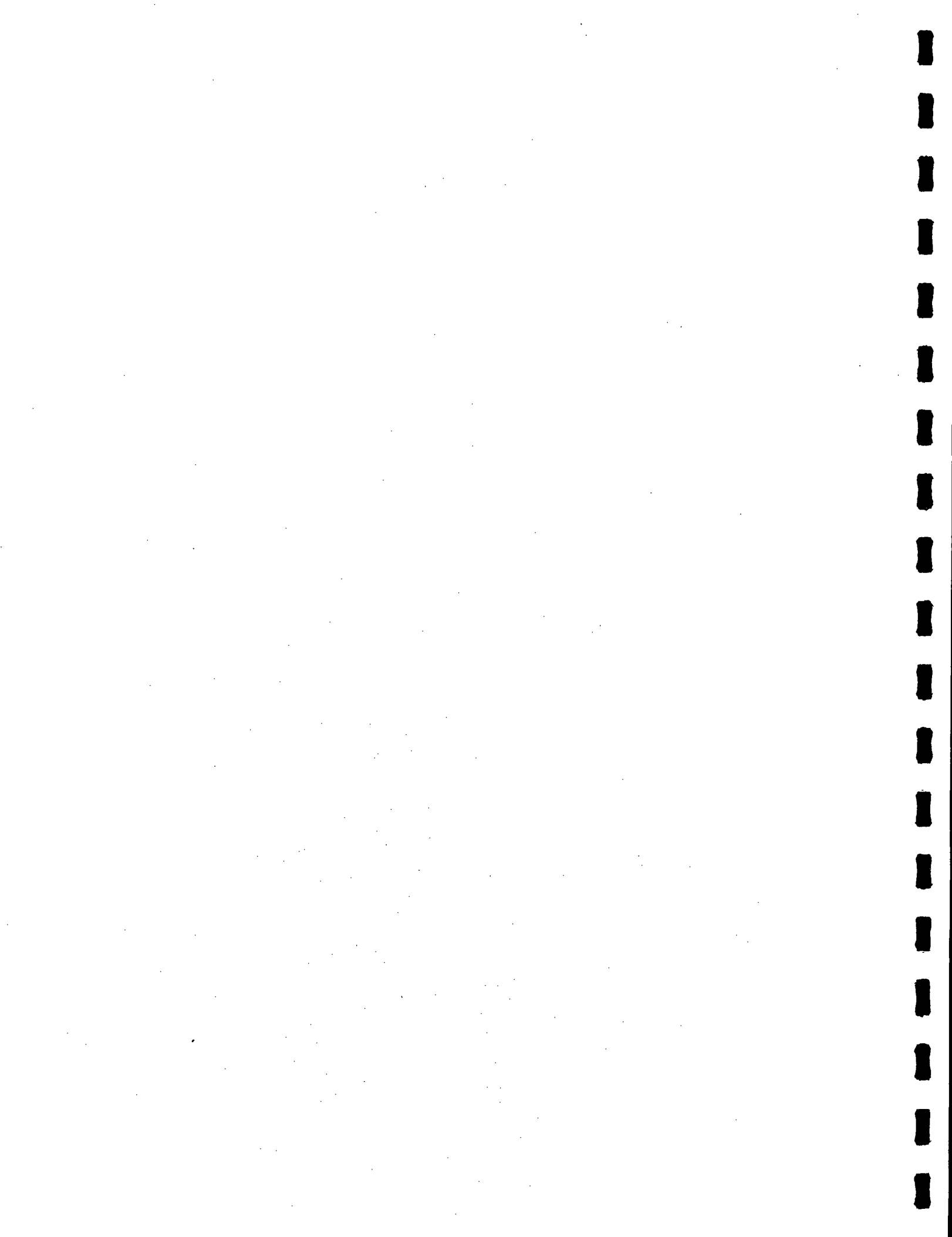
Grainger River
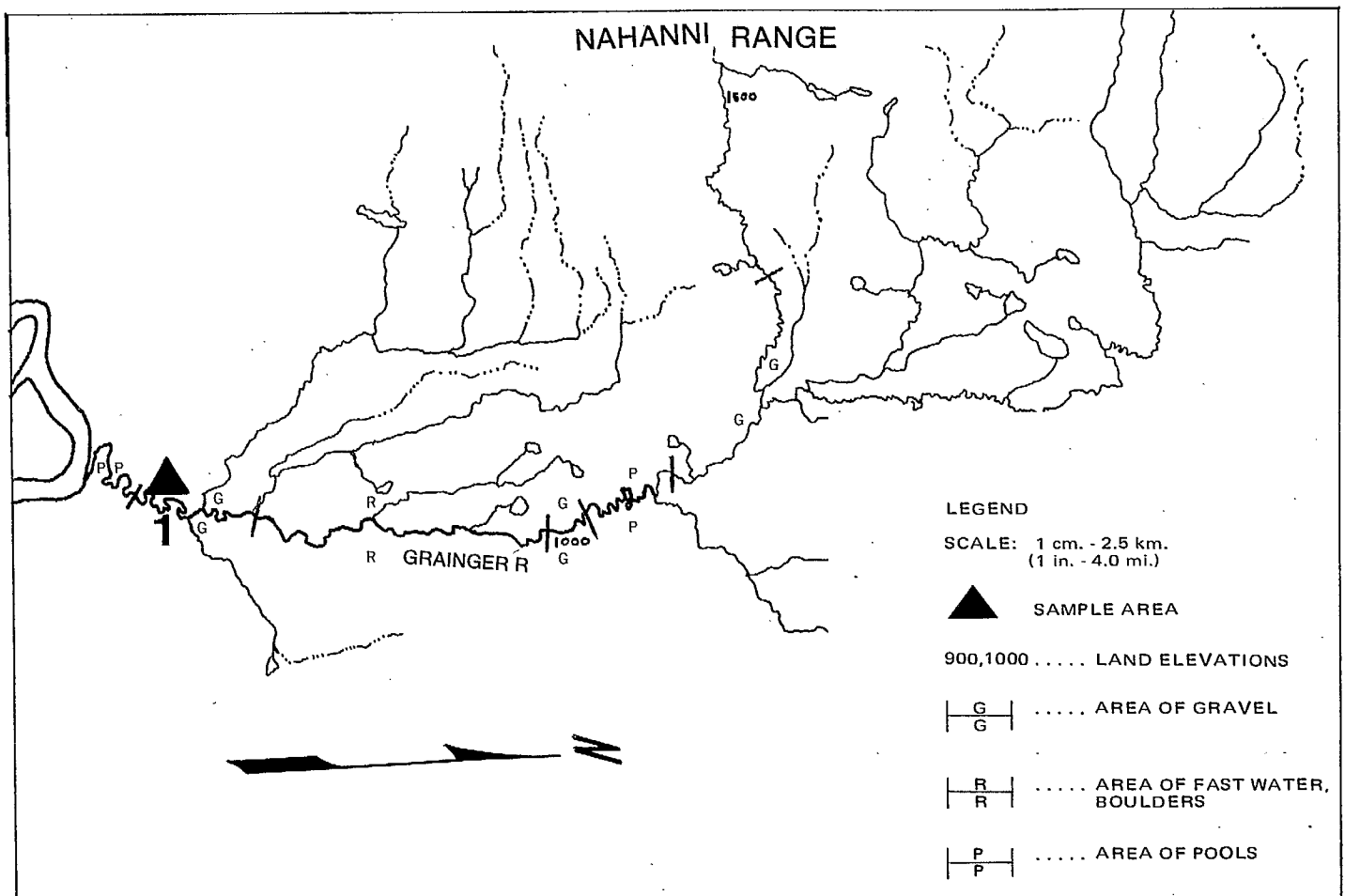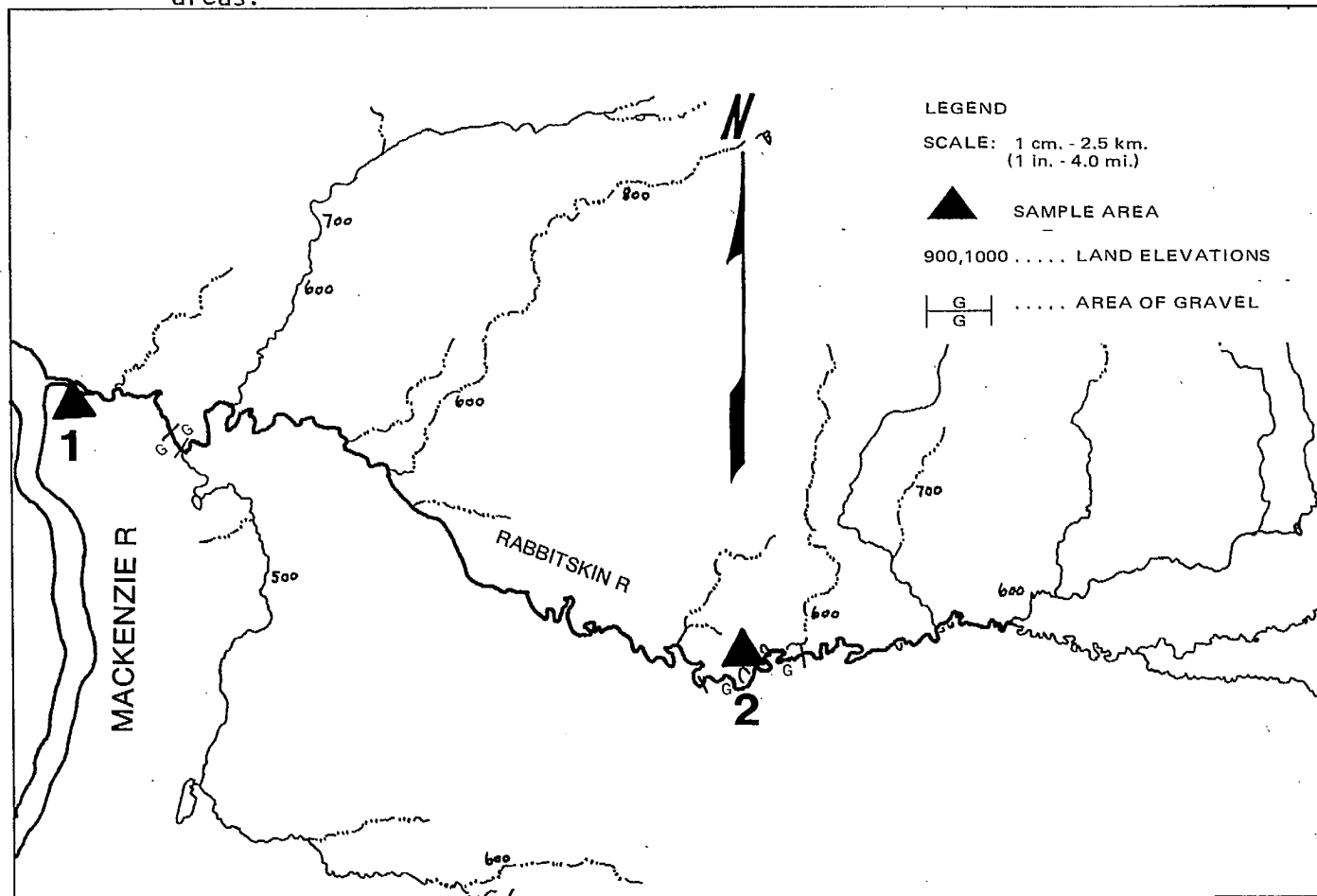
A. General Data:

Total length: 68 km (42 miles)

Length surveyed: all

Drainage area: 562 sq km (217 sq miles)

Estimate of potential spawning area (gravel) in length of stream

surveyed: 225,000 sq m (271,000 sq yds)

Description:

This stream has extensive areas of boulder type bottom

interspersed with the occasional gravel area. Low water levels

prevail after mid-July. Some beaver activity was noted which could

prove to be an obstacle to fish migrations.

LEGEND

SCALE: 1 cm. - 2.5 km.
         (1 in. - 4.0 mi.)

▲   SAMPLE AREA

900,1000 . . . . . LAND ELEVATIONS

⊦ G/G ⊦ . . . . . AREA OF GRAVEL

⊦ R/R ⊦ . . . . . AREA OF FAST WATER,
                  BOULDERS

⊦ P/P ⊦ . . . . . AREA OF POOLS

B. Sample Location Data: Grainger River

	Loc. Data		Temp.		Fish Data			
Loc. # & Date	Bottom Type	Color	Air Water (C)	Invert Status	Catch Method	Species	#	Maturity
#1 June 21	Coarse Gravel	--	28 22	Eph. Tri. Ple.	S.	Longnose Sucker	200	Yearling
#1 July 26	Fine Gravel	Clear	28 22	Neg.	S. S. O. S.	Longnose Sucker Grayling Pike Longnose Dace	23 1 1 2	Yearling Yearling Immature Yearling
#1 Aug. 26	Fine Gravel & Sand	Light Rust	15 15	Tri. Ple.	S.	Longnose Dace	2	Yearling

LEGEND:

Eph. - Ephemeroptera
Tri. - Trichoptera
Ple. - Plecoptera
S. - Seine
O. - Observation

Rabbitskin River

A. General Data:

    Total length: 107 km (66 miles)

    Length surveyed: all

    Drainage area: 3,696 sq km (1,427 sq miles)

    Estimate of potential spawning area (gravel) in length of stream

    surveyed: 95,000 sq m (114,000 sq yds)

    Description:

        This is a slow moving meandering stream flowing through a

low-lying muskeg type terrain. Beaver dams, fallen trees and debris

were common along the river which could present obstacles to fish

migration. Water levels were generally low with few good spawning

areas.

LEGEND

SCALE: 1 cm. - 2.5 km.
       (1 in. - 4.0 mi.)

▲ SAMPLE AREA

900,1000 ..... LAND ELEVATIONS

|—G—G—| ..... AREA OF GRAVEL

B. Sample Location Data: Rabbitskin River

Loc. # & Date	Bottom Type	Color	Air Water (C)	Invert Status	Catch Method	Species	#	Maturity
#1 June 6	Gravel	Dark Rust	24 21	Tri. Eph.	An. S. S. S.	Walleye Lake Chub Pike Longnose Sucker	1 23 1 1	Mature Yearling Yearling Yearling
#2 June 6	Unclas- sified	Dark Rust	24 21	--	--	--	--	--
#2 July 26	Fine Gravel	Light Rust	26 17	Ple. Eph.	S.	Pike	2	Yearling
*#2 Aug. 28	Boulders & Gravel	Dark Rust	22 17		O.	Pike	1	Immature

* Station Relocated

LEGEND:
Tri. - Trichoptera
Eph. - Ephemeroptera
Ple. - Plecoptera
An. - Angling
S. - Seine
O. - Observation

Spence River
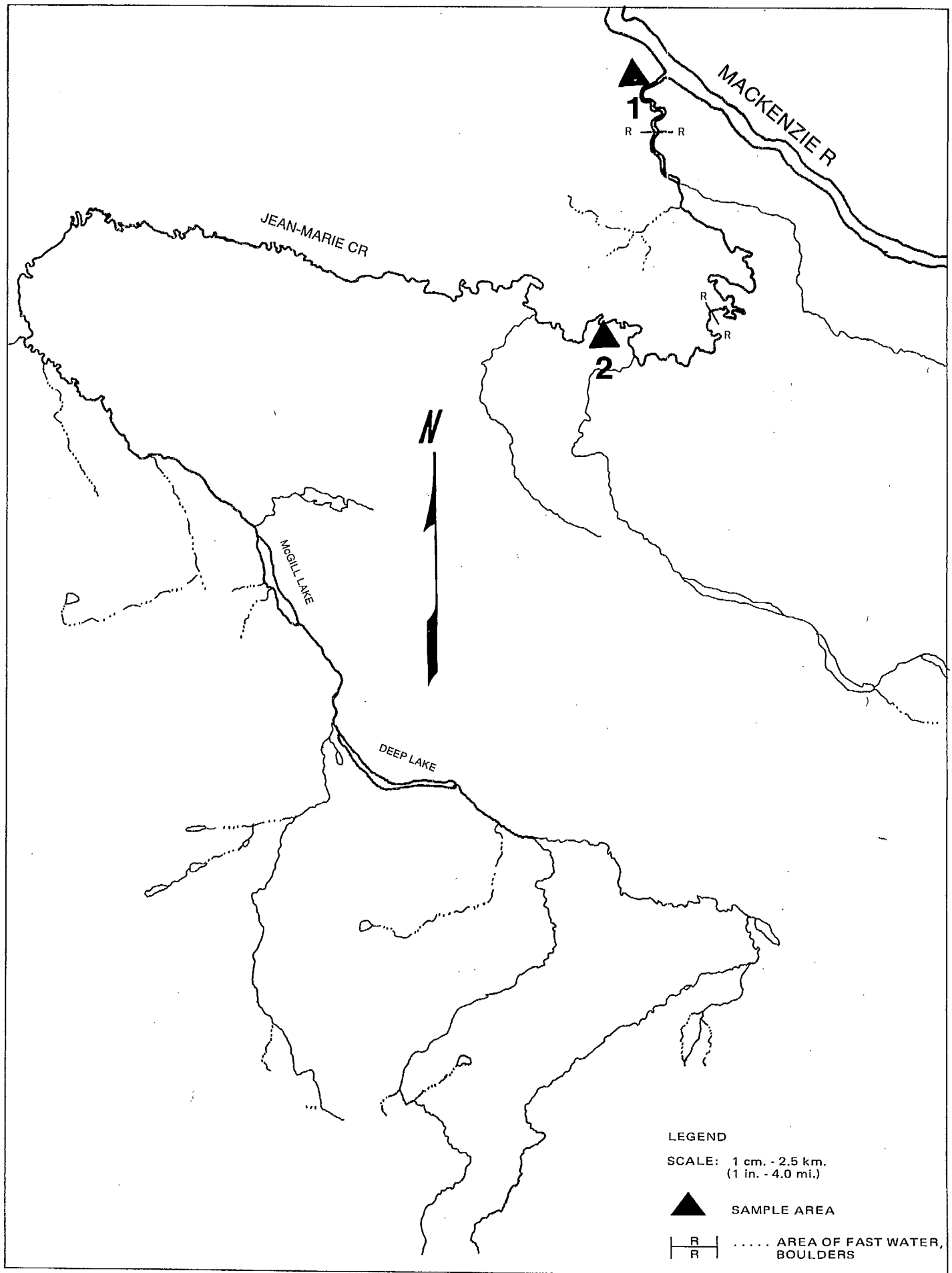
A.   General Data:

Total length: 69 km (43 miles)

Length surveyed: 32 km (20 miles)

Drainage area: 565 sq km (218 sq miles)

Estimate of potential spawning area (gravel) in length of stream

surveyed: indefinite

Description:

Running from a bog area westward to the Mackenzie River,

the Spence has many obstructions consisting of beaver dams and tree

falls. It tends to become virtually stagnant making spawning

potential doubtful.
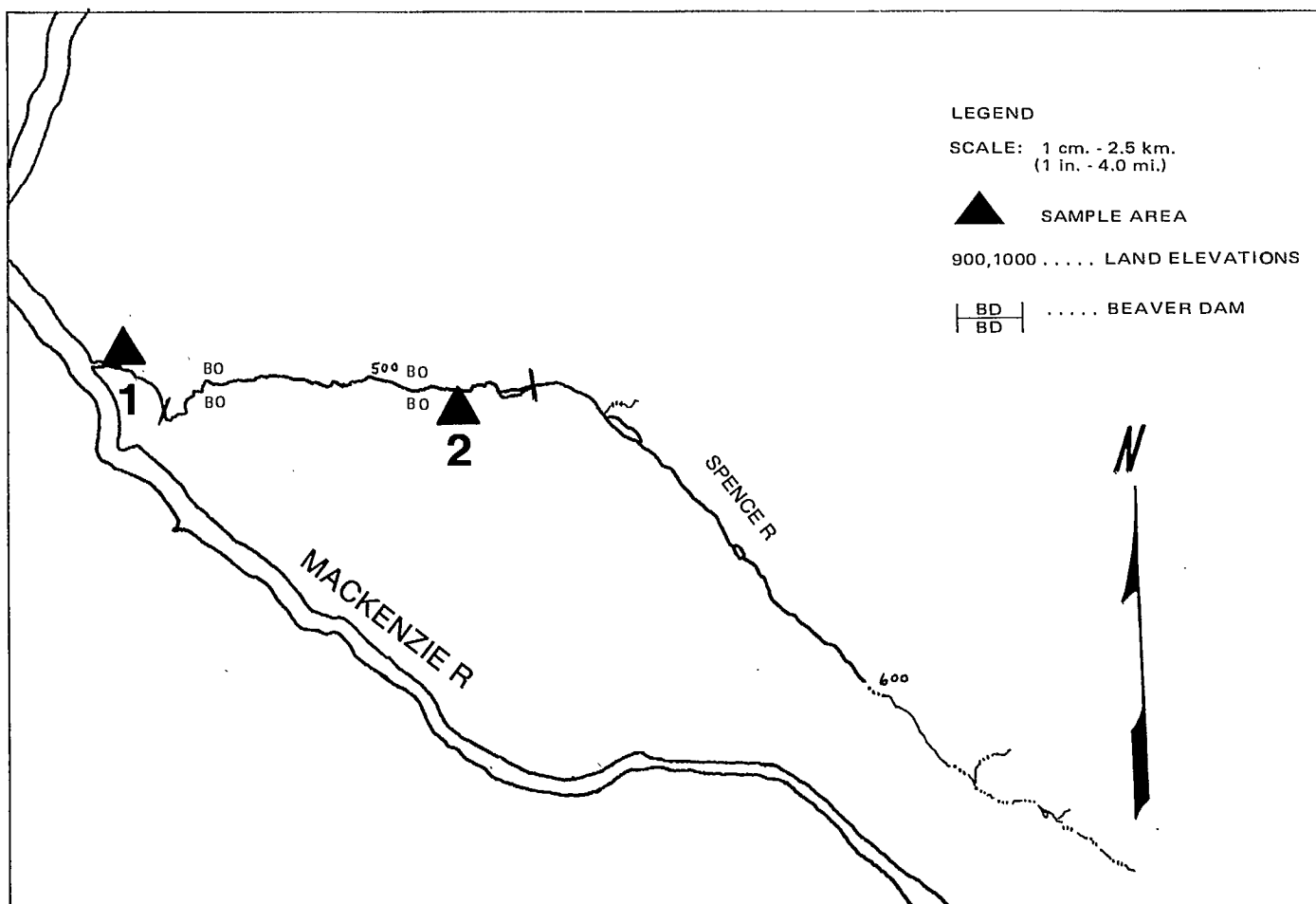
B. Sample Location Data: Spence River

Loc. Data			Temp.	Fish Data				
Loc. # & Date	Bottom Type	Color	Air Water (C)	Invert Status	Catch Method	Species	#	Maturity
#1 June 22	Unclassi- fied	Clear	24 21	Neg.	S.	Pike	14	Yearling

SUBSEQUENT LOCATION # 1 SAMPLING CONDUCTED BY FORT SIMPSON BASE

Loc. Data			Temp.	Fish Data				
#2 June 22	Sand Silt	Dark Rust	24 22	Neg.	Neg.			
#2 July 26	Sand Silt	Light Rust	27 22	Neg.	Neg.			

#2
August 28   STATION NOT SAMPLED DUE TO POOR SITE - SLOUGH AREA.

LEGEND: S. - Seine

Jean-Marie Creek

A. General Data:

Total length: 253 km (157 miles)

Length surveyed: 160 km (100 miles)

Drainage area: 3,713 sq km (1,433 sq miles)

Estimate of potential spawning area (gravel) in length of stream

surveyed: 92,000 sq m (111,000 sq yds)

Description:

This stream is slow moving with occasional areas of rapids.

Small pockets of gravel were observed but most appeared unsuitable

for spawning. Very few deep pools were observed along its course.

While a few beaver dams were evident, none appeared an obstacle to

migration.

MACKENZIE R

JEAN-MARIE CR

McGILL LAKE

DEEP LAKE

N

LEGEND

SCALE: 1 cm. - 2.5 km.
        (1 in. - 4.0 mi.)

▲   SAMPLE AREA

├─R─┤ ..... AREA OF FAST WATER,
├─R─┤   BOULDERS

B. Sample Location Data: Jean-Marie Creek

Loc. # & Date	Bottom Type	Color	Air Water (C)	Invert Status	Catch Method	Species	#	Maturity
#1 June 19	Boulders	Clear	19 21	Neg.	An. G.N.	Pike Walleye	4 4	Mature Mature
#2 June 19	Gravel	Light Rust	19 18	Ple. Dip.	-- --	-- --	-- --	-- --
#2 July 23	Boulders	Clear	17 15	Dip.	--	--	--	--
#2 Aug. 28	Boulders	Clear	20 16	Ple. Eph.	-- --	-- --	-- --	-- --

LEGEND:

  Ple. - Plecoptera
  Dip. - Diptera
  Eph. - Ephemeroptera
   An. - Angling
  G.N. - Gill Net

Trout River

A. General Data:

Total length: 275 km (171 miles)

Length surveyed: all

Drainage area: 13,170 sq km. (5,084 sq miles)

Estimate of potential spawning area (gravel) in length of stream

surveyed: 16,639,000 sq m (20,046,000 sq yds)

Description:

This is a single channel river with a moderate current

flowing over a primarily gravel bottom. The river appears to

possess an excellent spawning potential from its mouth at the

Mackenzie upstream to Whittaker and Coral Falls 26 km (16 miles)

upstream. These falls present a major obstacle to upstream fish

movements. Above the falls the river narrows and becomes more

meandering with many beaver dams in the upper reaches. Near the

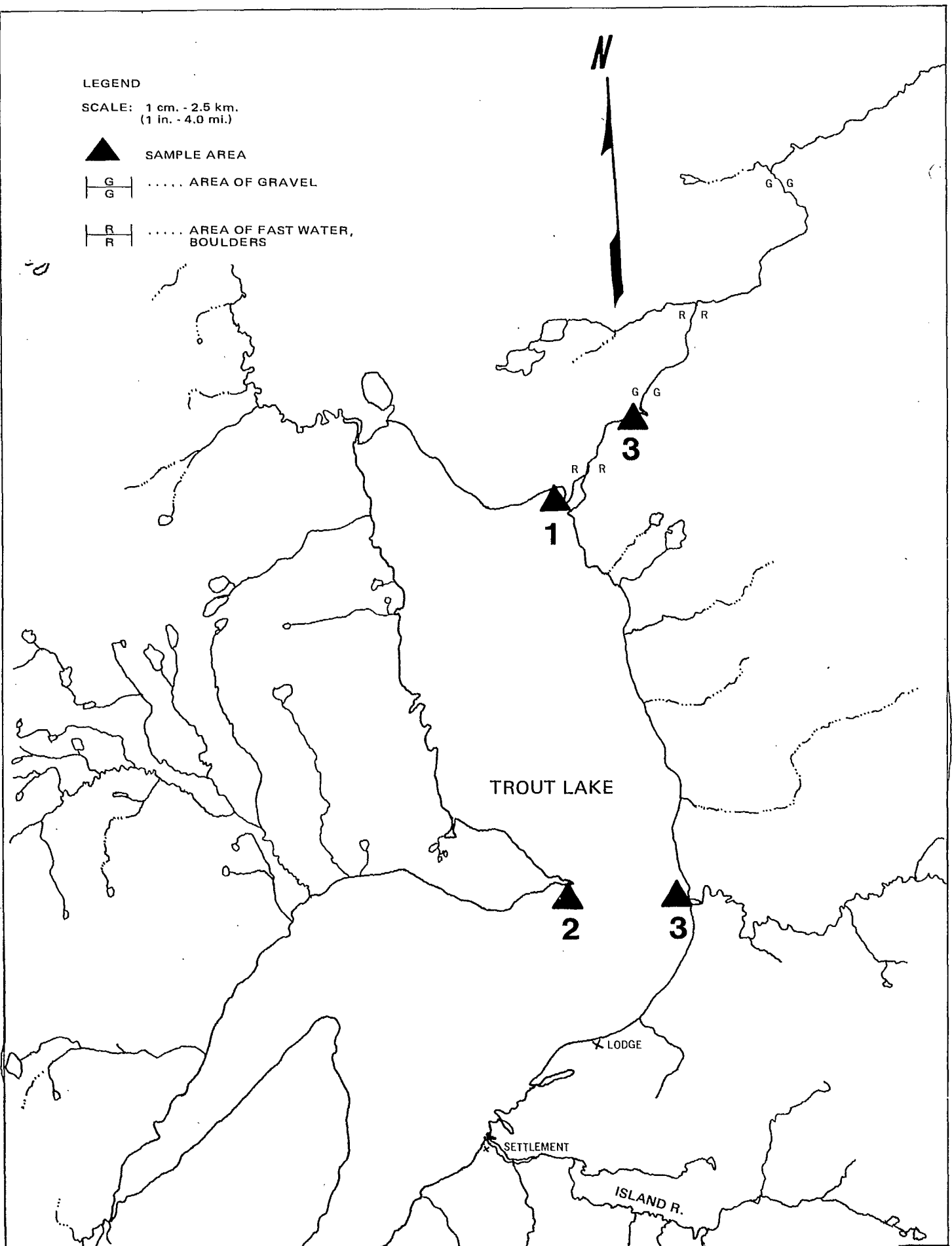Trout Lake outlet the gravel bottom consists of large boulders.
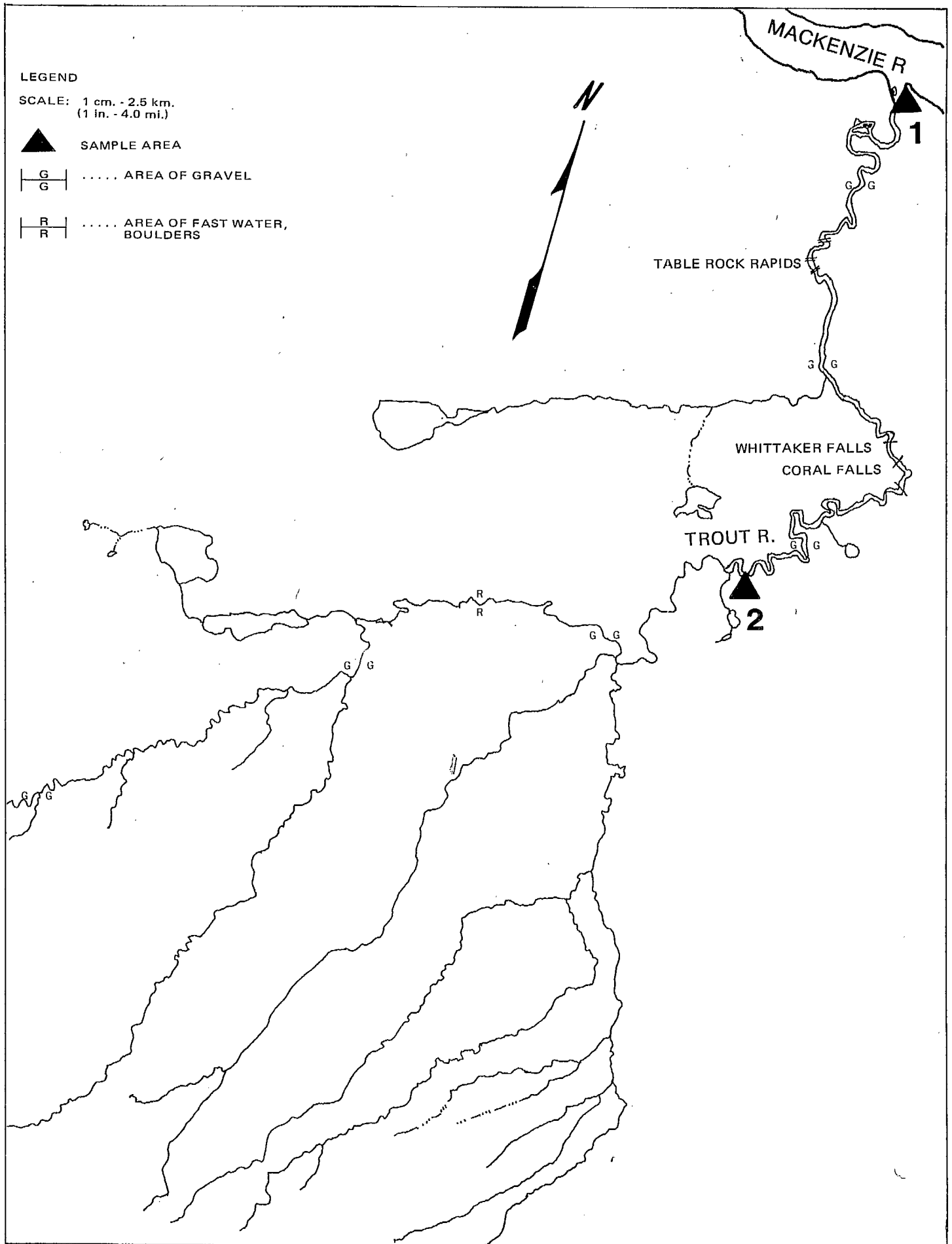
LEGEND

SCALE: 1 cm. - 2.5 km.
(1 in. - 4.0 mi.)

▲ SAMPLE AREA

⊢G/G⊣ ..... AREA OF GRAVEL

⊢R/R⊣ ..... AREA OF FAST WATER,
BOULDERS

N

MACKENZIE R

▲**1**

G G

TABLE ROCK RAPIDS

G G

WHITTAKER FALLS

CORAL FALLS

TROUT R.

G G

▲**2**

R
R

G G

G G

G G

LEGEND

SCALE: 1 cm. - 2.5 km.
(1 in. - 4.0 mi.)

▲ SAMPLE AREA

⊢ G/G ⊣ ..... AREA OF GRAVEL

⊢ R/R ⊣ ..... AREA OF FAST WATER,
BOULDERS

N

G G

R R

G G

3

R R

1

TROUT LAKE

2   3

X LODGE

X SETTLEMENT

ISLAND R.

B. Sample Location Data: Trout River

	Loc. Data		Temp.	Fish Data				
Loc. # & Date	Bottom Type	Color	Air Water (C)	Invert Status	Catch Method	Species	#	Maturity
#1 June 19	Gravel	Clear	16 14	Neg.	S. S.	Grayling Pike	50 30	Yearling Yearling
LOCATION #1 DISCONTINUED								
#2 June 19	Gravel	Clear	12 14	Eph. Dip. Ple.	An.	--	Neg.	--
#2 July 27	Gravel	Clear	25 20	Neg.	S. S. S.	Grayling Longnose Sucker Lake Chub	2 2 2	Yearling Yearling Yearling
#2 Aug. 28	Gravel	Clear	17 18	Eph. Ple. Tri.	S.	--	Neg.	--
#3 July 27	Gravel	Clear	30 19	Neg.	S. S.	Longnose Sucker Grayling	7 1	Yearling Yearling
#3 Aug. 23	Gravel	Clear	21 16	Eph. Ple. Tri.	S. S. S.	Longnose Sucker Lake Chub Longnose Dace	160 16 4	Yearling Yearling Yearling

LEGEND:

    Dip. - Diptera
    Eph. - Ephemeroptera
    Ple. - Plecoptera
    Tri. - Trichoptera
      S. - Seine
     An. - Angling

C. Sample Location Data: Trout Lake

Loc. # & Date	Bottom Type	Color	Air Water (C)	Invert Status	Catch Method	Species	#	Maturity
#1 Aug. 24	Gravel Sand	Clear	17 16	--	G.N.	Humpback Whitefish	1	Mature
#2 Aug. 24	Boulders Gravel	Clear	17 16	--	G.N. G.N. G.N.	Humpback Whitefish Pike Walleye	2 4 1	Mature Mature Mature
#3 Aug. 25	Boulders Sand	Clear	16 17	--	G.N. G.N. G.N.	Longnose Sucker Round Whitefish Lake Trout	1 2 5	Mature Mature Mature
Lodge Aug. 24	Fine Gravel & Sand	Clear	--	--	S. S. S.	Longnose Sucker Humpback Whitefish Walleye	1 8 12	Yearling Yearling Immature

LEGEND:

    G.N. - Gill Net
    S. - Seine

Horn River

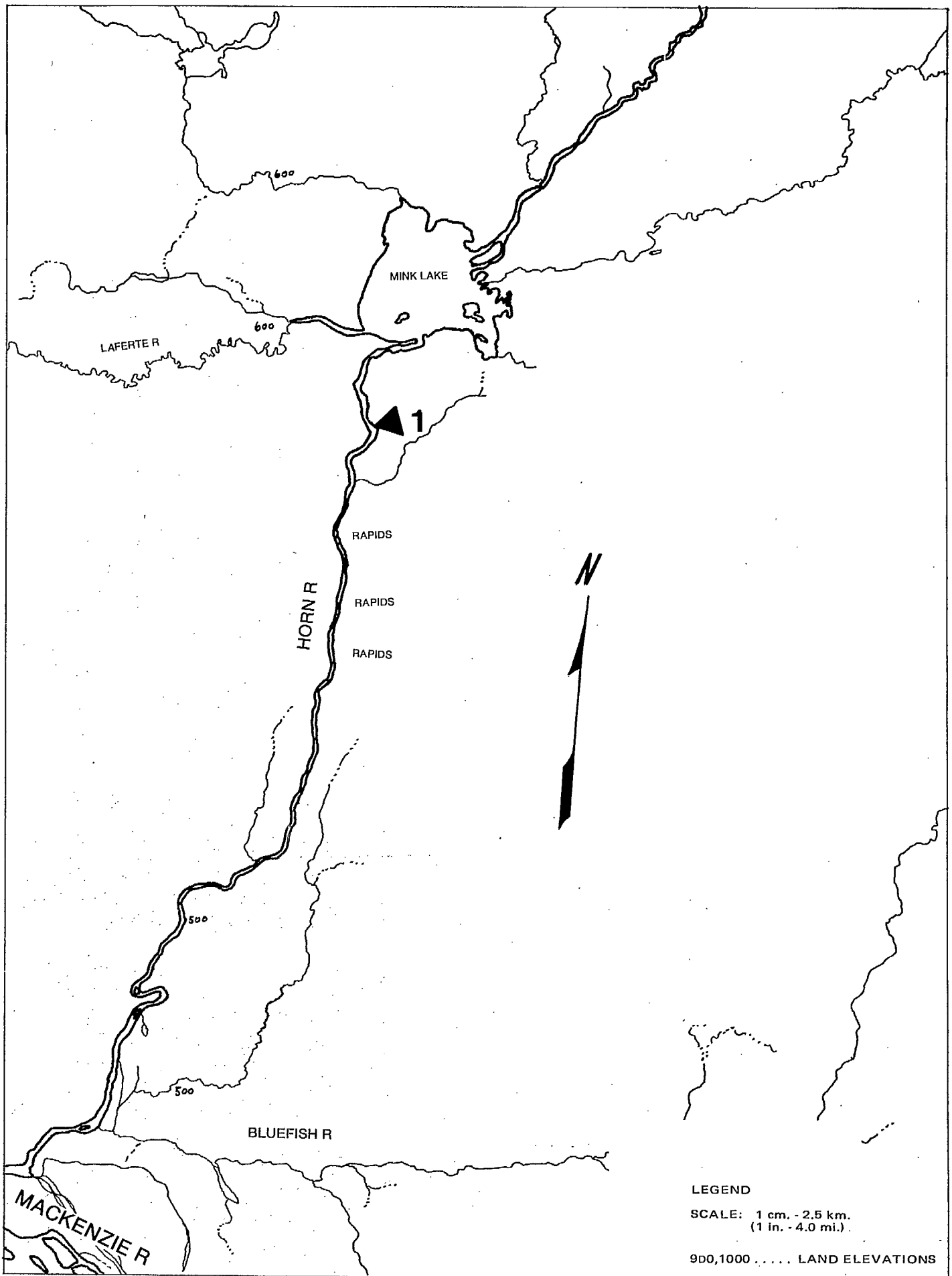A. General Data:

Total length: 397 km (247 miles)

Length surveyed: 58 km (36 miles)

Drainage area: 19,154 sq. km (7,393 sq miles)

Estimate of potential spawning area (gravel) in length of stream

surveyed: indefinite

Description:

Generally single channeled, this fast-flowing river has a

high incidence of submergent vegetation. Few areas of gravel were

sighted along the length flown to Mink Lake. Local reports indicated

that the river is fished at the mouth for pike, yellow walleye,

sucker spp., and whitefish spp.

MINK LAKE

LAFERTE R

HORN R

RAPIDS

RAPIDS

RAPIDS

BLUEFISH R

MACKENZIE R

N

LEGEND

SCALE: 1 cm. - 2.5 km.
              (1 in. - 4.0 mi.)

9D0,1000 . . . . . LAND ELEVATIONS

B. Sample Location Data: Horn River

Loc. Data			Temp.	Fish Data					
Loc. # & Date	Bottom Type	Color	Air Water (C)	Invert Status	Catch Method	Species	#	Maturity
#1 June 22	Boulders	Clear	21 22	--	--	--	--	--

July Station Discontinued.

B$_2$. Sample location water chemistry:

Time: 16:45 hrs
Turbidity: 3.7 J.T.U.
Lead: Dissolved (Pb) .005 ppm
Hardness: Total (CaCO$_3$) 156 mg/l
Alkalinity: Total (CaCO$_3$) 93.8 mg/l

Specific Conductance: (umho/cm.) 449
Temperature (C): Air - Water: 21; 22
Copper: Dissolved (Cu) .001 ppm
Zinc: Dissolved (Zn) .004 ppm

Kakisa River

A. General Data:

Total length: 496 km (308 miles)

Length surveyed: 58 km (36 miles)

Drainage area: 1,440 sq km (556 sq miles)

Estimate of potential spawning area (gravel) in length of stream

surveyed: 1,753,000 sq m (2,112,000 sq yds)

Description:

This is primarily a single channel river with an excellent spawning potential throughout its course from Kakisa Lake. The 40 foot Lady Evelyn Falls presents an obstacle to fish migration up the river to Kakisa Lake. Excellent grayling catches are recorded from the base of the falls. Fine gravel and clear water are prevalent in the river from the Mackenzie River to Kakisa Lake. Commercial fishing on the lake yields suckers, whitefish spp., northern pike and yellow walleye.

In its course from Tathlina Lake to Kakisa Lake, the Kakisa River is extremely turbid with a muddy brown colour. Spawning potential for fish in this stretch is doubtful.
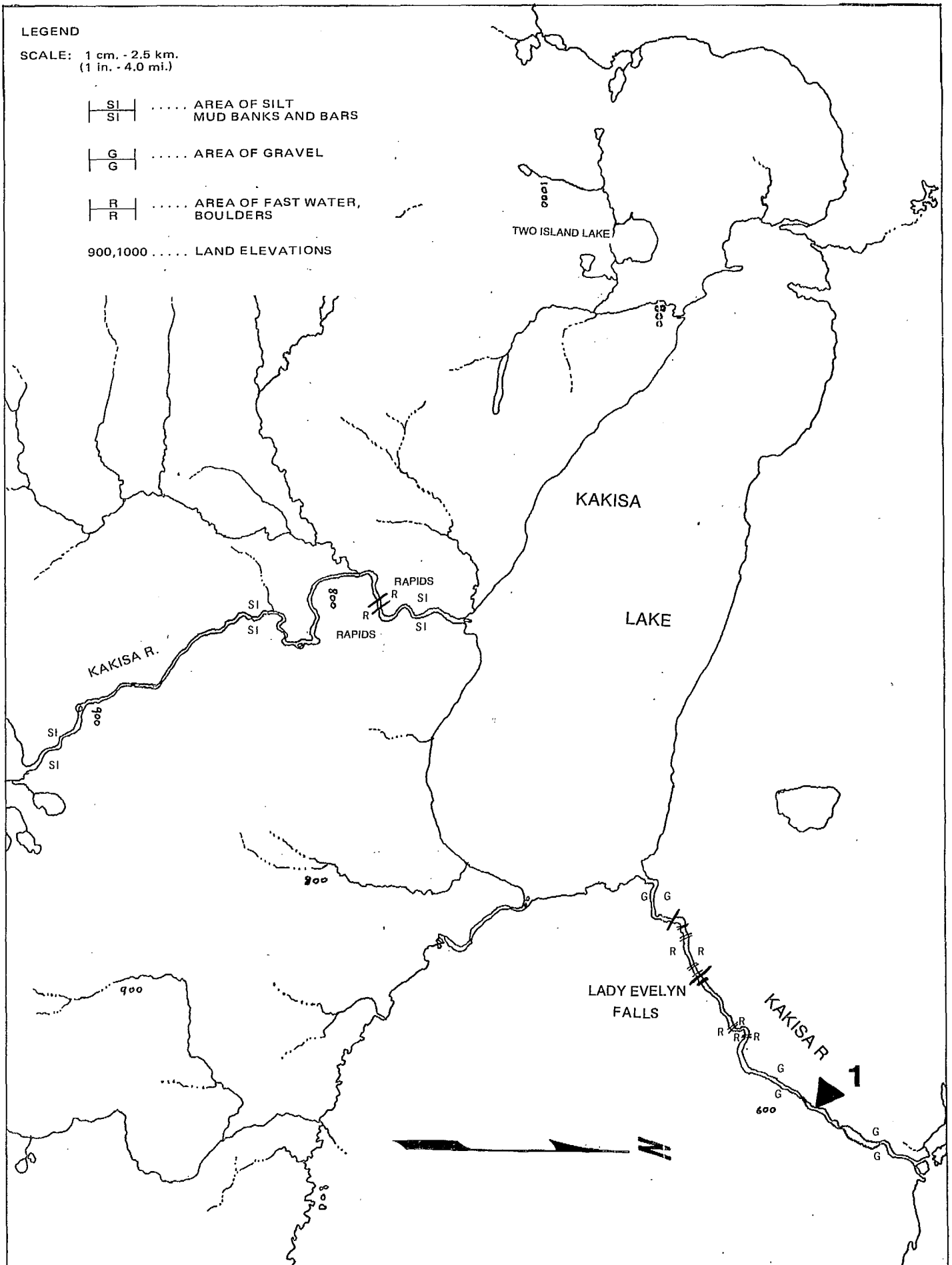
LEGEND

SCALE: 1 cm. - 2.5 km.
(1 in. - 4.0 mi.)

| SI / SI | ..... AREA OF SILT MUD BANKS AND BARS |

| G / G | ..... AREA OF GRAVEL |

| R / R | ..... AREA OF FAST WATER, BOULDERS |

900,1000 ..... LAND ELEVATIONS

TWO ISLAND LAKE

KAKISA

LAKE

RAPIDS
R SI
R
SI
RAPIDS SI
SI
SI
KAKISA R.
SI
SI

800

900

900

900

G G

R R

LADY EVELYN
FALLS

R R
R R R

KAKISA R

G

G

600

1

N

G

G

B. Sample Location Data: Kakisa River

Loc. Data			Temp.	Fish Data				
Loc. # & Date	Bottom Type	Color	Air Water (C)	Invert Status	Catch Method	Species	#	Maturity
#1 June 18	Gravel	Clear	18 20	Tri. Eph. Ple.	A.	Grayling	3	Mature

SUBSEQUENT SAMPLING DISCONTINUED DUE TO MANAGEMENT STUDY AT LADY
EVELYN FALLS

LEGEND:
Tri. - Trichoptera
Eph. - Ephemeroptera
Ple. - Plecoptera
A. - Angling

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