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Hydrometeorological Data for the Experimental Lakes Area, Northwestern Ontario, 1969 through 1978 Part III

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HYDROMETEOROLOGICAL DATA FOR THE EXPERIMENTAL LAKES AREA, NORTHWESTERN ONTARIO, 1969 THROUGH 1978

PART III

by

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ABSTRACT

Beaty, K.G. 1981. Hydrometeorological data for the Experimental Lakes Area, Northwestern Ontario, 1969 through 1978 (In three parts). Can. Data Rep. Fish. Aquat. Sci. 285: vi + 1-97 (Part I); v + 98-316 (Part II); iv + 317-367 (Part III).

In 1969, hydrologic studies began at the Experimental Lakes Area in support of biological and limnological studies. This report, in three parts, presents hydrometeorological data collected during the 1969 to 1978 period of study, dealing with: precipitation, snow surveys, air temperature, wind, evaporation, relative humidity, bright sunshine, surface temperature, (Part I); streamflows, lake levels, (Part II); groundwater, and stream sediment transport, (Part III).

Key words: watershed hydrology; groundwater studies; climatological data; sediment transport; bedload.

RESUME

Beaty, K.G. 1981. Hydrometeorological data for the Experimental Lakes Area, Northwestern Ontario, 1969 through 1978 (In three parts). Can. Data Rep. Fish. Aquat. Sci. 285: vi + 1-97 (Part I); v + 98-316 (Part II); iv + 317-367 (Part III).

En 1969, des études hydrologiques devant servir de base à des études biologiques et limnologiques furent entreprises dans la Région des Lacs Expérimentaux. Le présent rapport, divisé en trois sections, contient des données hydrométéorologiques recueillies lors des études effectuées de 1969 à 1978 sur les précipitations, les relevés nivométriques, la température de l'air, le vent, l'évaporation, l'humidité relative, l'insolation, la température en surface, (premiére section); les débits d'eau, le niveau d'eau des lacs, (deuxième section); les eaux souterraines et le transport des sédiments dans les cours d'eau (troisième section).

Mots-clés: hydrologie des bassins hydrographiques; études des eaux souterraines; données climatologiques; transport des sédiments; charriages de fond.

APPENDIX 10

GROUNDWATER INVESTIGATIONS

Background

Groundwater investigations began in 1969 and were carried out mainly in the years 1969 through 1974. The major purpose of the groundwater program was to obtain a quantitative and qualitative understanding of the groundwater component within one of the experimental watersheds, and to assist in the study of the subsurface contributions of nutrients and major ions entering the lake. The Rawson Lake Watershed[1] serves as the index basin for both hydrologic and groundwater investigations.

Field assistance was provided to the principal groundwater investigator, Dr. John Cherry, who was at the Department of Earth Sciences at the University of Manitoba from 1969-1974, and is now at the University of Waterloo. Other investigators included two graduate students, Kennedy in 1971 and Bottomley in 1973.

This section of the report outlines the groundwater investigations which have taken place at the Experimental Lakes Area and serves to:

1) document the history of the study;
2) report data previously included or referred to in a series of unpublished University of Manitoba progress reports by Newbury, Cherry and Beaty (1969-75), and
3) summarize measurements and records that exist but could not be included in this report.

General geology

The geology and surficial deposits in the Experimental Lakes Area have been discussed by Brunskill and Schindler (1971), de Vries (1972), and Ellis and Mattice (1974). Descriptions dealing more specifically with the Rawson Lake Watershed, Northwest Subbasin and East Subbasin have been reported by Newbury and Beaty (1977), Kennedy (1974) and Bottomley (1974). Based on extensive drilling carried out in the Rawson Lake Watershed in 1969 through 1970, Cherry has described the basin general geology and surficial deposits (Newbury and Cherry, 1971 unpublished report).

A summary of Cherry's interpretation is as follows. The area is situated on the Precambrian Shield, approximately 90 miles (150 km) east of the Precambrian-Ordovician contact. The watershed is located on the south lobe of a granodiorite batholith (Davies and Pryslak 1967). Exposed bedrock outcrops in the ELA are relatively smooth and slightly weathered. Open fractures or joints are rare. From a hydrologic viewpoint, the bedrock in the watershed is considered to be impermeable. The Precambrian rock is overlain by a discontinuous veneer of glacial sediments which have rarely been observed to exceed 25 feet (8 metres) in thickness. The glacial sediments are composed of sandy till; glacio-fluvial sand and gravel; and glacio-lacustrine clay, silt and sand. Deposits of sand, gravel and boulders are composed almost entirely of quartz and feldspar, and fragments of Precambrian-derived rock. Rock fragments are almost exclusively composed of primary silicates.

Surficial geology

Methods

The nature and distribution of glacial sediments overlying the bedrock in the Rawson Lake Watershed were studied by test drilling and seismic refraction methods. Four study areas were identified as possible major groundwater inflow areas: the Northwest Subbasin, the northeast beach or Roddy trail beach, the East Subbasin and the field station/lake outflow area. These areas comprise the main segments of the basin having appreciable depth of overburden. Figure 51 shows each of these four areas and the location of all drilling in the basin. Figures 52 to 55 provide more detailed location of drilling and well installations in each of the four areas.

The first drilling was conducted in August 1969, with conventional diamond drilling techniques to determine the depth to bedrock in three portions of the watershed. Nine test holes were drilled several feet into bedrock; six in the Northwest Subbasin, two in the sandy spit lake outflow areas, and one in the field camp area. Piezometers were set in seven of the nine holes. All drill log data are summarized in Table 134. This method yielded poor samples and was less economic than the augering techniques which followed.

In September 1969, five test holes were drilled in the field station and lake outflow area using a truck-mounted drill with solid stem augers. This method was effective and yielded excellent samples of glacial sediments. Large boulders were rarely encountered and it appeared possible to determine the depth to bedrock with reasonable confidence. All drill log data for these holes are included in Table 135.

In September 1969, a survey of depth to bedrock along shoreline areas of Rawson Lake was conducted by the Geophysical Exploration Section of the Geological Survey of Canada. Depths to bedrock were determined using a hammer seismograph. Figure 56 shows seismic survey line locations and their identification numbers. Figures 57 to 60 provide plan and profile diagrams for each of these six survey lines. Each of the stations, for which a depth was determined, are shown on the plan diagrams. The bedrock location on the profile diagrams was based on the seismic data. The type of overburden was indicated on the profiles by projecting drill log data from nearby test hole and piezometer well locations onto the survey lines. Because these drill holes are not always on the survey lines, there is occasional disagreement in bedrock location. Table 142 provides a list of symbols used for this projected information.

From June 3 to 13, 1970, a hollow stem drill was used, which proved to be the most effective, as it allowed for easy placement of piezometer tubes at the same time as drilling samples. The drill was mounted on a tracked, all-terrain vehicle equipped with 7 inch diameter hollow stem augers.

1. Rawson Lake Watershed is referred to as the Kenora Research Watershed in some earlier reports.

In total, 127 piezometers and water table wells were installed. Tables 136 to 139 summarize all drill log data, as well as piezometer and water table well listings.

In 1973, the P80 series of piezometers were installed by Bottomley in the Northeast and East Subbasins.

Piezometers and groundwater wells

The piezometers and groundwater wells installed in the Rawson Lake Watershed provided direct means of obtaining hydrologic and hydrochemical data from the groundwater zone. Both types of wells are basically access tubes to the groundwater zone. The main difference is that piezometers permit the observation of the hydraulic head exerted by a particular groundwater zone, whereas, groundwater wells permit the observation of the free water table. Four specific purposes of the wells were:

1) to monitor changes in the water table,
2) to measure hydraulic gradients in the shoreline segments of the four areas mentioned,
3) to conduct in place permeability tests of the sediments, and
4) to obtain groundwater samples for chemical analysis.

Hydrochemistry data have not been included in this report, but have been reported by Kennedy (1974) and Bottomley (1974).

Piezometers used were the simple standpipe type having the bottom 1.5 feet (46 cm) slotted and wrapped with fiberglass cloth to prevent silting. Those installed in August 1969 (Table 134) were constructed of 1.5 inch (4 cm) inside diameter ABS plastic. Those installed in June 1970 were of .75 inch (2 cm) inside diameter semirigid polyvinylchloride (PVC) pipe. Those installed by hand in 1973 by Bottomley were 1.25 inch (3 cm) inside diameter steel pipe.

Water table wells were either 4 inch (10 cm) or .75 inch (2 cm) inside diameter PVC pipe and were slotted the entire length.

Groundwater data

Routine groundwater records

Groundwater well and piezometer well measurements have not been included in this report. The following table provides a summary of all piezometers and groundwater wells in the watershed.

	Piezometers	Water Table Wells
Northwest Subbasin	37	19
Northeast Subbasin	3	-
Roddy trail beach	10	5
East Subbasin	25	10
Field camp/lake outflow area	27	15
	102	49

Table 140 provides an index summary of each piezometer or water table well, and the number of manual water level measurements made in each for the 1970 to 1973 period of study. Measurements consisted of a depth to water measurement and an annual level survey of pipe top and ground surface elevation.

Table 141 provides an index summary of recording groundwater well data period of record. Stevens type F water level recorders with weekly charts were used.

Subsurface flow

The groundwater flow into Rawson Lake has been estimated by Cherry (Newbury and Cherry, 1971, unpublished report). Some of the data and results of those calculations have been included here. Estimates were made for segments of shoreline of the Northwest Subbasin, Roddy Lake trail area, East Subbasin field camp area and the Lake 239 outflow area (Table 133).

Seepage rates were computed using the Darcy equation of the simplified form,

$$Q = KA\frac{dh}{dl}$$

where Q is the seepage rate (L^3L^{-2})

K is the average hydraulic conductivity in the seepage cross-section (LT^{-1})

A is the cross-sectional area (L^2)

$\frac{dh}{dl}$ is the gradient of hydraulic head across the seepage area.

Hydraulic gradients for maximum and representative conditions were used and were calculated from water levels obtained from wells in each segment.

The cross sectional areas represent only portions of the seepage segments occupied by sandy deposits. Seepage through clay and silt units within the total cross-section areas was assumed negligible.

Maximum and representative hydraulic conductivities are listed in Table 133. They were determined:

1) by comparing drill samples to similar samples from other areas in west-central Canada from which conductivities have been determined in the Porous Media Laboratory of the University of Manitoba,
2) by evaluating the results of the Hvorslev response tests which were conducted in three of the seepage segments, and
3) by averaging the results over the sandy portion of the cross-sections.

In Table 133, the "maximum" values represent the largest values that could dominate flow through the given cross-sections. The "representative" values are the most reasonable estimates which could be derived from the available data. It should be noted that the "maximum" seepage value for the camp inflow area is unrealistically high and has been rejected for the following reasons:

1) the drainage area in which recharge to the seepage segment occurs is less than 1 percent of the terrestrial area of the Rawson Lake basin, and

2) the hydraulic gradient in the area was approximately 0 to negative (away from the lake) during most of the water level measurement period.

Soil moisture

Soil samples for determination of percent moisture content were taken from selected sites in the Rawson Lake Watershed to provide an index of basin wetness in storm runoff correlations. Figure 67 locates all sampling sites used. A description of the soil in the watershed has been provided by Kennedy (1974) and Bottomley (1974). Tables 143 to 146 provide all soil moisture data collected during 1971, 1972, 1973 and 1975.

Soil samples were collected either by shovel or by core tube, and placed in whirl pack bags for transport back to the field laboratory. In 1971, 1972 and 1973, the samples were from approximately one foot (30 cm) depth. In 1975, representative samples were obtained from each of 3 depth ranges; 0 to 3 inches, 3 to 6 inches, and 6 to 9 inches.

The moisture content of soil is the ratio of the weight of water divided by the weight of the dry soil, expressed as a percentage. The samples were weighed, dried to constant weight at 100-110^{o}C, and reweighed to determine weight of water and weight of dry soil.

Record retrieval

Further detailed records not reported here are stored in Winnipeg at the Freshwater Institute, 501 University Crescent, Winnipeg, Manitoba, R3T 2N6.

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Table 133 Summary of data used in calculations of seepage inflows and outflow of Rawson Lake. (Newbury and Cherry, 1971, unpublished report).

Seepage Segment	Comments	Cross-section area (ft^2)	Hydraulic Cond. ft./sec.		Hydraulic Gradient[2]		Seepage[3] (cfs)	
			Repres.	Maximum	Repres.	Maximum	Repres.[4]	Maximum[5]
Northwest Subbasin	Includes upper and lower sandy units, 3 Hvorslev tests[1]	$1x10^{3}$	$1x10^{-5}$	$1x10^{-4}$	0.02	0.03	$2x10^{-4}$	$3x10^{-3}$
Beach segments adjacent to Northwest Subbasin	Includes upper and lower sandy units, no gradient data no Hvorslev tests.	$3x10^{3}$	$1x10^{-5}$	$1x10^{-4}$	0.005^{E}	0.02^{E}	$1.5x10^{-4}$	$6x10^{-3}$
East Subbasin (total outlet segment)	Includes upper and lower sandy units no Hvorslev tests.	$1.5x10^{4}$	$1x10^{-5}$	$1x10^{-4}$	0.005	0.01	$7.5x10^{-4}$	$1.5x10^{-2}$
Roddy Lake Trail	Includes upper and lower sandy units no Hvorslev tests.	$2x10^{3}$	$1x10^{-5}$	$5x10^{-4}$	0.04	0.08	$4x10^{-3}$	$8x10^{-2}$
Field Camp area	Section all sand and gravel 6 Hvorslev tests	$2.5x10^{4}$	$5x10^{-4}$	$5x10^{-3}$	0	0.002	0	$2.5x10^{-1}$
Rawson-Hayes Lake spit	Section all sand 7 Hvorslev tests	$5x10^{3}$	$1x10^{-5}$	$1x10^{-4}$	0.004	0.008	$2x10^{-4}$	$4x10^{-3}$

1. Water level response tests conducted by the Hvorslev (1951) procedure.
2. Slope of the water table or potentiometric surface across the seepage area.
3. Calculated using the Darcy equation.
4. Resulting from use of representative condition and representative gradient in calculation.
5. Resulting from use of maximum condition and maximum gradient in calculation.
6. E - estimates only.

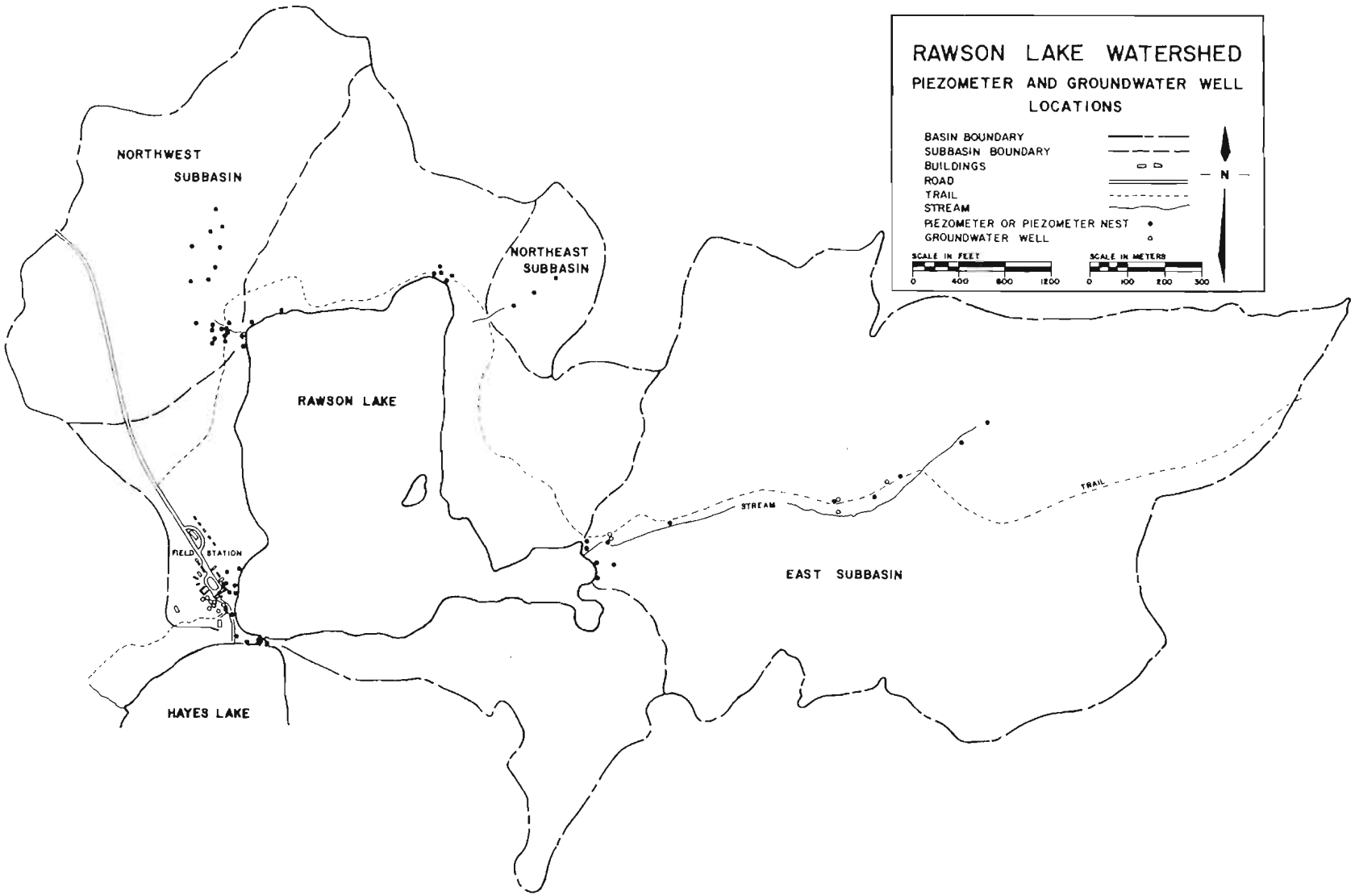


Fig. 51 Location plan showing locations of all piezometer nests and groundwater wells in the Rawson Lake Watershed.

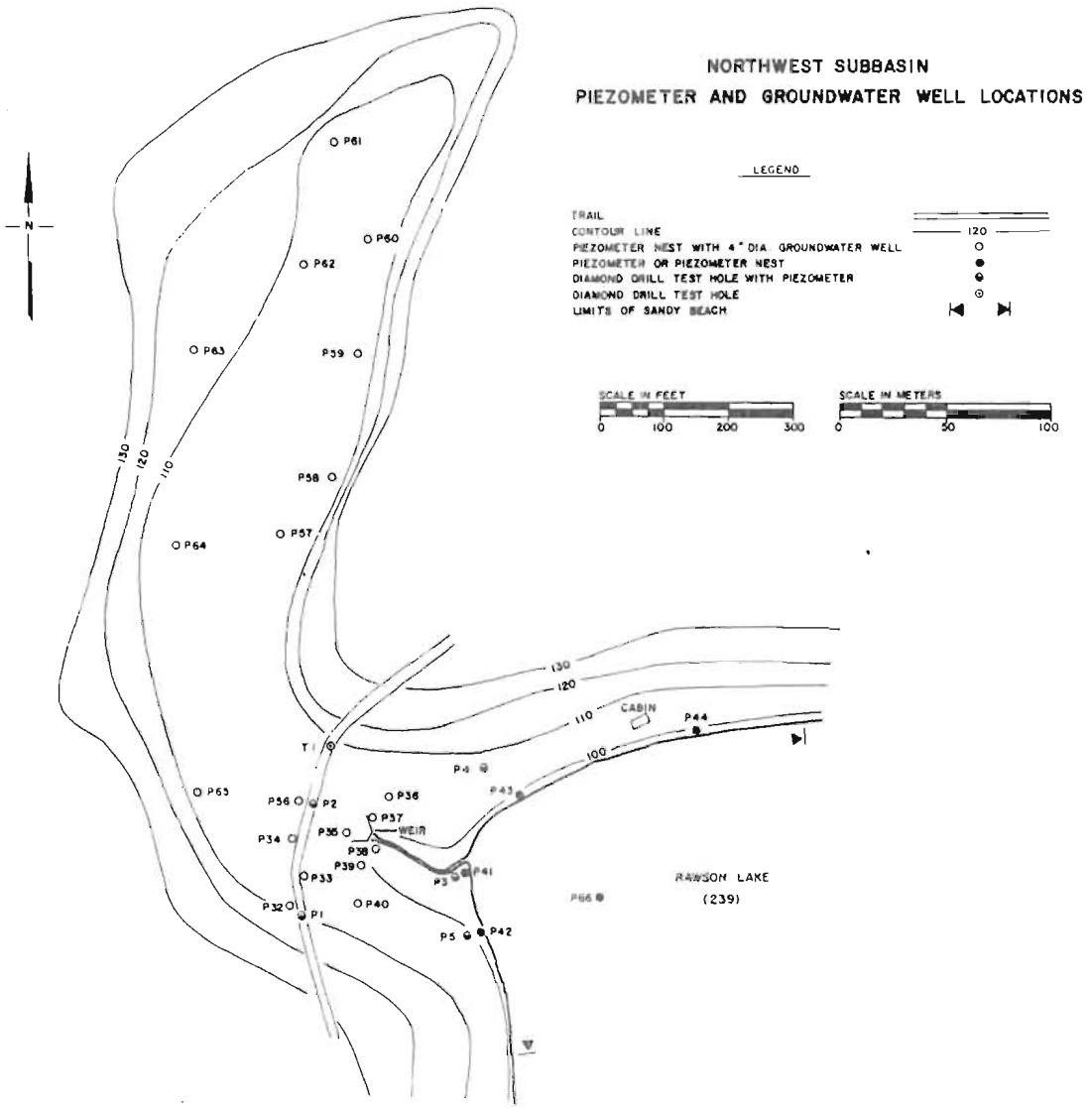


Fig. 52 Location plan of piezometer and groundwater well nests in the Northwest Subbasin of the Rawson Lake Watershed.

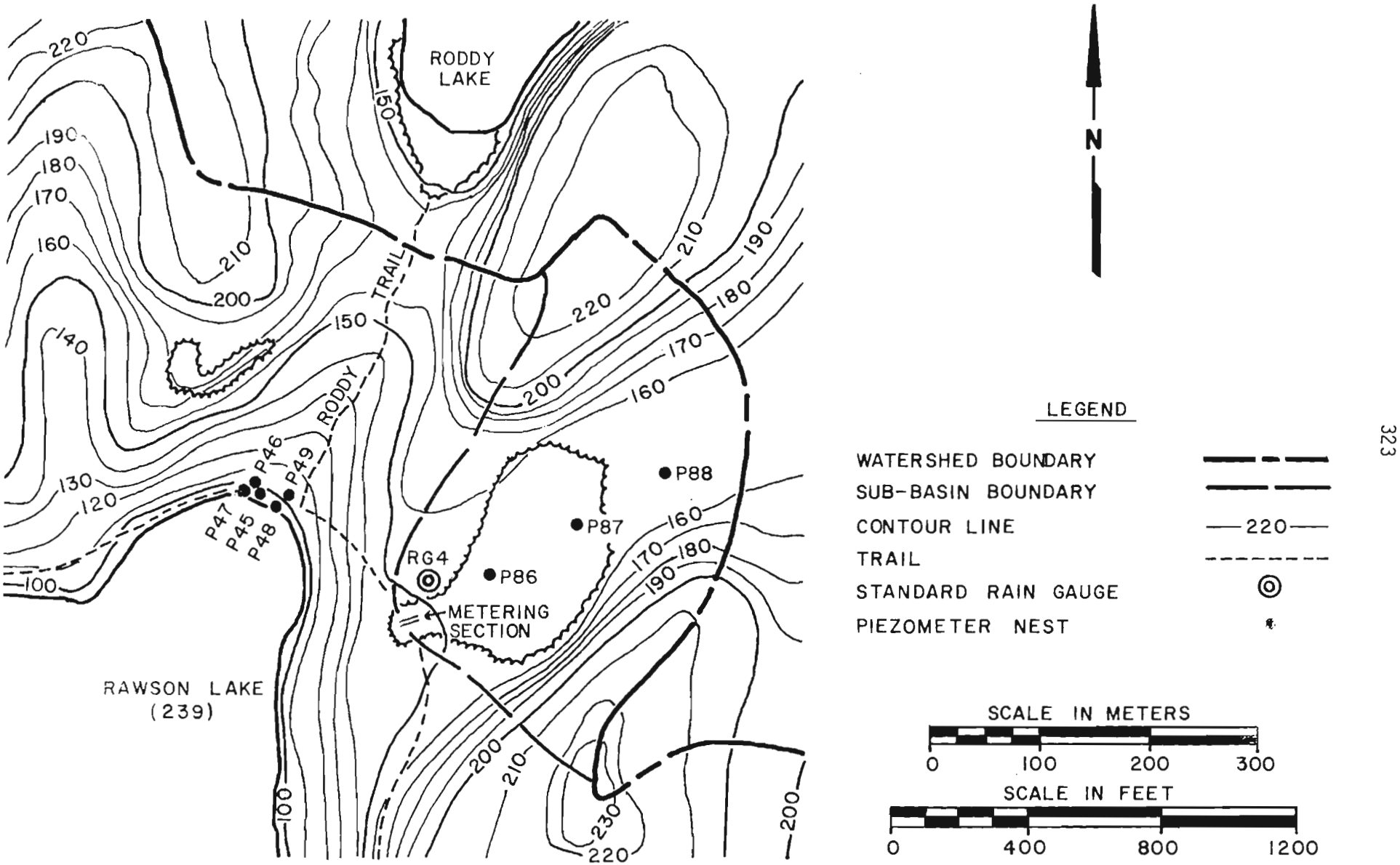


Fig. 53 Topographic map of the Northeast Subbasin and Roddy Trail beach area showing locations of all piezometer nests.

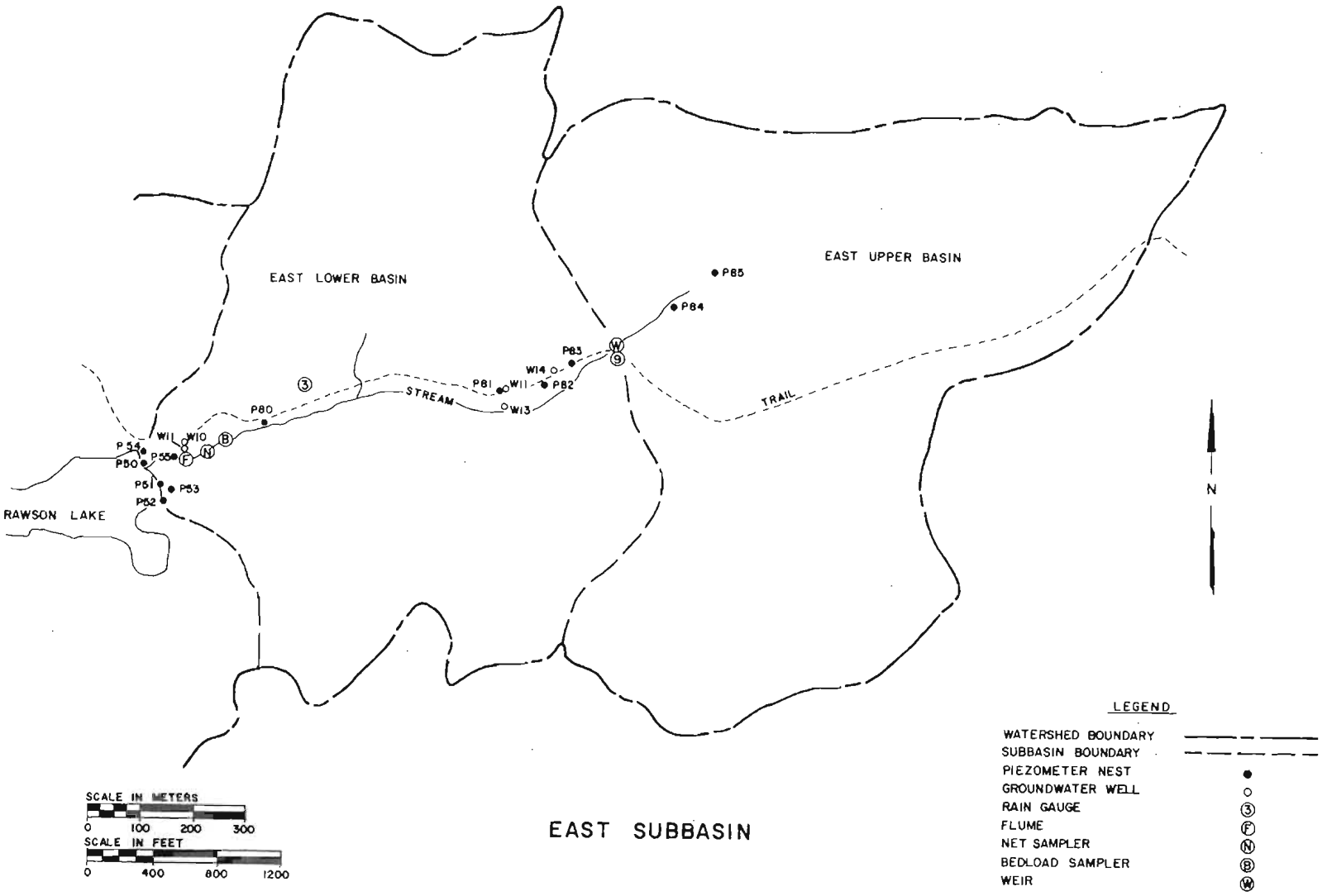
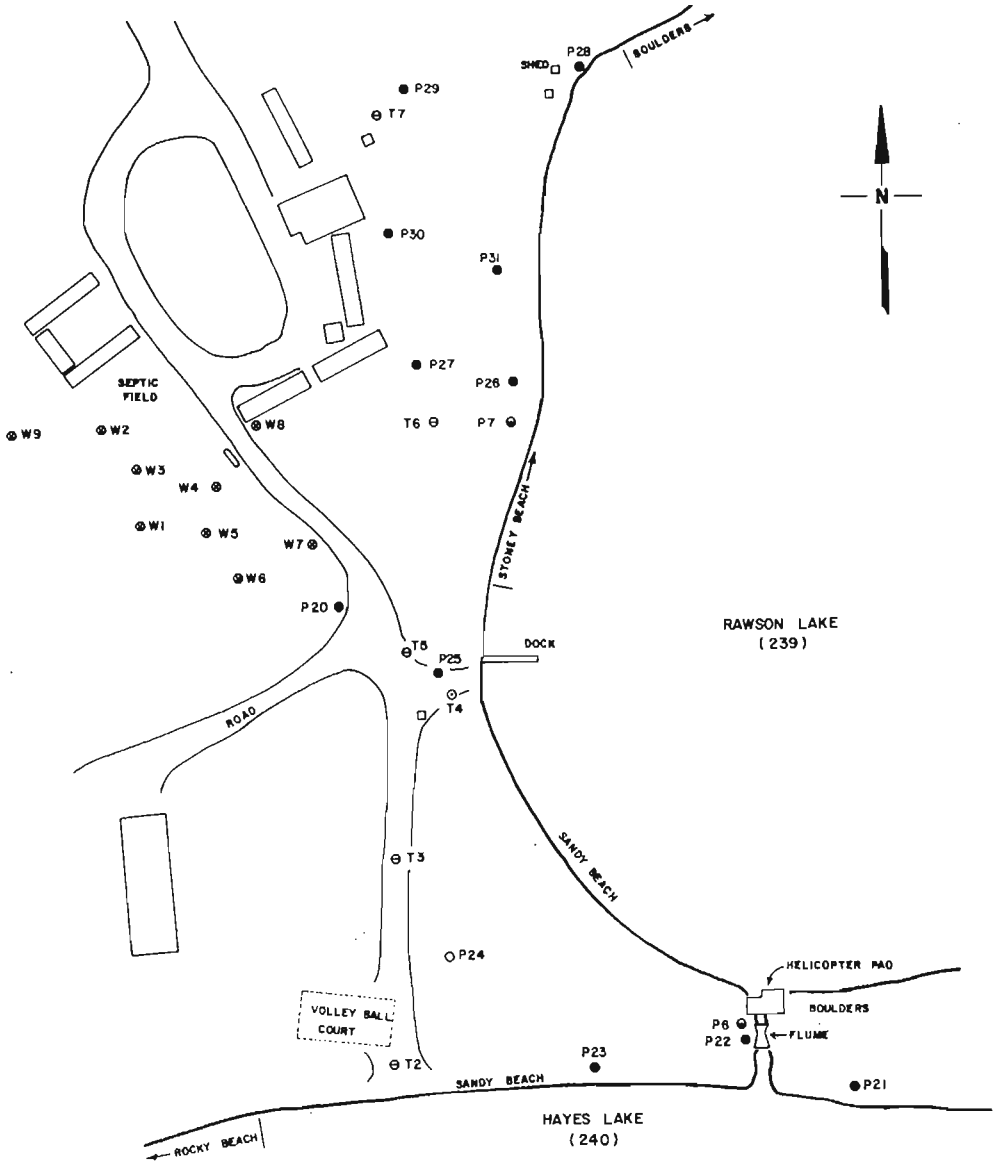


Fig. 54 Location plan of piezometer nests and groundwater wells in the East Subbasin of the Rawson Lake Watershed.



FIELD STATION AND LAKE 239 OUTFLOW AREA
GROUNDWATER WELL AND PIEZOMETER LOCATIONS

PIEZOMETER OR PIEZOMETER NEST
PIEZOMETER NEST WITH 4 IN. DIA. GROUNDWATER WELL
DIAMOND DRILL TEST HOLE
DIAMOND DRILL TEST HOLE WITH PIEZOMETER
AUGERED TEST HOLE
GROUNDWATER SAMPLING WELL , 3/4 IN. DIA.
BUILDINGS

SCALE IN FEET
0 50 100 200

SCALE IN METERS
0 50 75

Fig. 55 Location plan of drill holes and piezometer nests in the ELA field station/lake outflow area of the Rawson Lake Watershed.

Table 134 Soil profile logs for drilling carried out from August 21 to 27, 1969 in the Rawson Lake Watershed of the Experimental Lakes Area.

Hole Number	Drill Log		Remarks
	Depth(feet)	Description	
FRB-1 (P1)	0 - 1	solum, sandy	- piezometer set at 7 feet
	1 - 7	sand, very coarse, pebbly, poorly sorted, very granitic, no fine sand	- NW Subbasin
	7 - 7.5	clay, light gray-brown	
	7.5	bedrock, 0.5 feet of unweathered granite core sampled	
FRB-2 (P2)	0 - 1	solum	- piezometer set at 8.5 feet
	1 - 4	sands, interbedded, some silt	- NW Subbasin
	4 - 5	sand, very coarse, pebbly, very angular, unweathered, very poorly sorted	
	5 - 7.5	gravel, many boulders	
	9	bedrock, pink granite, 4 feet of bedrock core sample drilled	
FRB-3 (T1)	0 - 1	solum, organic, sandy	- depth to bedrock determined by probing
	1 -	bedrock, granite	- no piezometer set
			- NW Subbasin
FRB-4 (P3)	0 - 1	solum, sandy	- piezometer set at 13 feet
	2 - 2.5	sand	
	7 - 9	gravel, small rocks	
	9 -10	clay, gray	- when drilling at 16.5 feet water flowed up the pipe approx. 1 ft. above ground for 4 to 5 minutes
		top of core gray clay with gravel bottom of core gray greasy clay	
	13 -16	bedrock	- NW Subbasin
FRB-5 (P4)	0 - 1	solum	- piezometer set at 13.5 feet
	1 - 4.5	sand	- NW subbasin
	4.5-	fine clay and gravel mix	
	8.5-	coarse sand over fine clay	
	12 -13	fine clayey sand with some gravel mixed in	
	13.5-	badrock	
FRB-6 (P5)	0 - 1	solum	- piezometer set at 13 feet
	1 - 2	sand, coarse	- NW Subbasin
	2 - 7	sand	
	7 - 9	clay going to sand, top of sample was clay, dark gray with stones on top, bottom of sample was sand, coarse, dark gray with stones on bottom	
	9 -12	gravel	
	12 -13	sand, fine, well graded	
	13	badrock, granite, pink going to blue gray, 5 feet of core sample drilled	
FRB-7 (P6)	0 - 2	sand, fine, light gray, uniformly sorted	- piezometer set at 8.5 feet
	2 - 5	sand, well graded	- L.239 outflow area
	5 - 7	sand, fine, well graded, gray	
	7 - 8	sand, very fine, blue-gray	
	8.5	bedrock, 3 faet of core sample drilled	
FRB-8 (T4)	0 - 1	sand, coarse, well graded, brown	- due to complications drilling ceased on this hole without encountering bedrock or setting a piezometer
	3 - 4	sand, coarse, poorly gradad, large and small pebbles	
	6 - 8	sand, very fine, gray, well graded	
	10.5-12.5	sand, very fine	
	17	sand	- Field Station area
	25.5	sand	
FRB-9 (P7)	0 - 0.5	solum	- piezometer set at 23 feet 4 feet above bedrock
	1 - 6	sand, coarse, poorly graded	
	14	boulder	- Field Station area
	16 -27	gravel, coarse going to sand	
	27	bedrock, granite, core sample drilled	

1. Hole numbers : The FRB series, 1-9, were the original hole identification numbers and were used to identify soil and core samples which were retained for more detailed examination. The P(piezometer) and T(test hole) series refer to the location maps in this report.

2. Piezometers were constructed of 1.5 inch inside diameter ABS plastic pipe, slotted for one foot of length at the bottom.

3. Drilling was carried out under concract by Midwest Diamond Drilling Ltd. (Winnipeg) under supervision of J. Cherry and K. Beaty. The equipment was a diamond drill mounted on a tracked all terrain vehicle.

Table 135 Soil profile logs for drilling carried out September 9, 1969 in the Field Station and L.239 outflow areas of the Rawson Lake Watershed of the Experimental Lakes Area.

Hole Number	Drill Log		Remarks
	Depth(feet)	Description	
FRB-A1 (T2)	0 - 1.5	surface sand, disturbed, soily	- test hole only, no piezometers set
	1.5- 5	sand, medium sorted, coarse, no fines, oxidized, beach, no pebbles	
	5 - 6	sand, medium sorted, unoxidized, no fines, no pebbles	
	6 - 7	sand, pebbly, medium to coarse, silty, almost a sandy pebbly silty till	
	7 - 7.5	silty clay, unoxidized, gray	
	7.5	end on rock, solid, probably bedrock	
FRB-A2 (T3)	0 - 1	sandy soil	- test hole only, no piezometer set
	1 -15	sand, coarse and very coarse, poorly sorted, no fines, slightly pebbly in places	
	15 -18	sand, very coarse, very pebbly, very poorly sorted, very few fines	
	18 -18.5	till; silty, clayey sand with anguiar pebbles	
	18.5	bedrock or boulder	
FRB-A3 (T5)	0 - 1.5	solum	- test hole only, no piezometer set
	1.5- 5	interbedded silts, silty clays and fine and very fine sands, some medium sand units also ? lacustrine	
	5 -10	sand, medium to coarse, medium sorted, no fines	
	10 -24	sand, very coarse, gravel, very fine, poorly sorted, no fines, very granitic, subanguiar to angular grains common	
	24 -27.5	sand, medium to coarse, medium sorted, no fines	
	27.5	bedrock or boulder	
FRB-A4 (T6)	0 - 2	solum	- water table encountered at 13 feet
	2 -10	gravel, medium to coarse, bouldery, very oxidized, very poorly sorted, no fines	test hole only, no piezometers set
	10 -42	gravel, fine no fines, very few boulders or cobbles, pebbles ¼ inch to 3/4 inch granitic origin obvious, subanguiar to angular pebbles	
	42 -63	sand, coarse, poorly sorted, no fines, granules common, occasional pebbles, some medium sand also present in this unit, some boulders and large pebbles in the bottom 5 feet	
	63	bedrock	
FRB-A5 (T7)	0 - 1	solum, sandy	- water table encountered at 15 feet,
	1 - 3	sand, medium boulders	1 test hole only, no piezometers set
	3 -10	sand, coarse, medium sorting with very few pebbles or granules	
	10 -18	sand, coarse as above but grades to poor sorting, pebbiy, granuly, no fines	
	18 -25	sand, coarse as above but grades gradually to very poor sorting, no fines	
	25	bouldery, 1 inch to 3 inch diameter, almost gravel	
	25+	bedrock or boulder	

1. Hole numbers: The FRB series, A1 to A5, were original hole identification numbers and the T series, 1 to 7, refers to the location maps in this report.

2. Drilling was carried out under contract by Great Plains Augering Ltd. (Saskatoon) under supervision of J. Cherry and K. Beaty. The equipment used was a truck-mounted power auger equipped with 5 foot solid stem flights of six inch diameter.

Table 136 Soil profile and drill logs for drilling carried out from June 3 to 13, 1970 in the field station and outflow area of the Rawson Lake Watershed in the Experimental Lakes Area.

Station or piezometer nest number	Depth (feet)	Drill Log Description	Remarks
P20	0 - 2	solum	- 4 piezometers set in nest:
	2 -24	very coarse sand and very fine gravel, with subangular pebbles and granules common, boulders rare, redish-brown colour	P20-30 P20-23 P20-15 P20-11
	24 -34	very sandy till, pebbles, no clay, very little silt, very poor sorting, medium gray	
	34	rock, probably bedrock	
P21	0 - 1	solum	- 1 piezometer set:
	1 - 5	sand, medium to coarse, poorly sorted, pebbly, oxidized, no clay, very little silt but much fine sand fraction	P21-6
	5	on boulders, second attempt also on boulders	
P22	0 - 1	solum	- 1 piezometer and 1-3/4 in. dia. well set in nest:
	1 -10	sand, medium to coarse, poorly sorted, no fines, occasional rounded and subrounded pebbles common	P22-10 W22-6
	10	end on boulders or rock	
P23	0 - 4±	sand, coarse to very coarse as on present beach, pebbly, unoxidized at 2 ft	- 2 piezometers and 1-3/4 in. dia. well set in nest:
	4 -14	sand, pebbly to medium fine, poorly sorted, gray, occasional rounded pebbles	P23-17 P23-10 W23-6
	14.5	boulders or bedrock	
P24	0 - 1	sandy soil	- 3 piezometers and 1-4 in. dia. well set in nest:
	1 -20	sand, very coarse, poor to medium sorting, occasional pebbles, rounded, no fines	P24-20 P24-14 P24-9 W24-5
	20	end on boulders	
P25	0 - 1	solum	- 3 piezometers and 1-3/4 in. dia. well set in nest:
	1 -32	sand, very coarse, pebbly, no fines, interbed of unoxidized clayey, silty, till at 10 feet	P25-29 P25-19 P25-9 W25-6.5
	32 -36	gravel, bouldery	
	36 -41	silt, slightly clayey, dark gray, lucustrine	
	41 -42	heavy boulder concentration	
	42	end on boulders, two holes	
P26	0 - 1	solum	- 4 piezometers set in nest:
	1 - 7	till, oxidized, olive-brown, sandy, silty	P26-27 P26-18 P26-12 P26-8
	7 -25	gravel, fine to coarse, no fines, also sand, very coarse, pebbly	
	30	end on coarse, bouldery gravel	
P27	0 - 1	solum	- 1 piezometer and 1-3/4 in. dia. well set in nest:
	1 -30	gravel, water table at 17 feet	P27-30 W27-20
	30	end on boulders or very coarse gravel	
P28	0 -16	very coarse sand and fine gravel, no fines	- 2 piezometers set in nest:
	16	end on concentrated boulders	P28-16 P28-7
P29	0 - 1	solum	- 1 dry hole piezometer set:
	1 -15	sand, very coarse, poorly sorted, no fines, pebbly	P29-15
	15	end on concentrated boulders	
P30	0 - 1	solum	- 1 piezometer set:
	1 -25	sand, coarse, pebbly, no fines, medium to poor sorting	P30-26
	25.5	end on boulders	
P31	0 - 1	solum	- 2 piezometers and 1-3/4 in. dia. well set in nest:
	1 -47.5	gravel, fine to coarse, no fines also sand, very coarse, no fines	P31-30 P31-21 W31-14
	47.5	end in gravel, could have gone deeper	
W1	0 -22	no records	- set 1-3/4 in. dia. sampling well:
	22	solid rock	W1-22
W2	0 -52	sand, fine, well graded, well compacted and from 48-50 feet almost silty	- set 1-3/4 in. dia. sampling well:
	52	boulders	W2-54
W3	0 -45	sand, medium with interbedded pebbles, layer of very fine hard packed gray clay from 35 to 40 feet	- set 1-3/4 in. dia. sampling well: W3-45
	45	solid rock	
W4	0 - 5	sand, very fine	- set 1-3/4 in. dia. sampling well:
	5 -25	sand, fine to medium, well graded	W4-25
	25	rock	

Table 136 (continued)

Station or piezometer nest number	Depth (feet)	Drill Log Description	Remarks
W5	0 -12	sand, medium, well graded	- set 1-3/4 in. dia. sampling well: W5-25
	12 -20	sand, medium to fine, well graded	
	20 -25	changes to gray clay, very fine, hard packed	
	25	rock	
W6	0 -30	sand, medium, well graded	- set 1-3/4 in. dia. sampling well: W6-30
	30	rock	
W7	0 -40	sand, very coarse, interbedded with small pebbles	- set 1-3/4 in. dia. sampling well: W7-40
	40	rock	
W8	0 -43	sand, varies from coarse to fine	- set 1-3/4 in. dia. sampling well: W8-43
	43	rock	
W9	0 -33	sand, fine to medium, well graded at 6 feet, very fine at 20 feet	- set 1-3/4 in. dia. sampling well: W9-33
	33	rock	

1. All drilling was carried out using a drill mounted on a tracked all-terrain vehicle. The drill was equipped with 7 inch (18 cm) diameter hollow stem augers which allowed for easy placement of piezometer tubes.

2. Station numbers are designated P for piezometer nest or W for sampling or water table well and are used on the location maps in this report. Piezometer nests usually consist of one or more piezometers and one water table well. A listing of correct tube numbers for each nest is given in the remarks column. For example, well numbers P31-30 and W31-14 indicate a piezometer set to a depth of 30 feet below ground and a water table well set to a depth of 14 feet below ground, respectively, both at piezometer nest 31.

3. Piezometers are constructed of 3/4 inch (2 cm) inside diameter polyvinylchloride (PVC) piping with a slotted intake zone in the lower 1.5 feet (0.45 m). The intake sections were wrapped with fine mesh fibre glass cloth to prevent sedimentation from occurring in the pipe. The bottom ends were plugged.

4. Groundwater wells are either 3/4 inch (2 cm) inside diameter PVC pipe for manual observations or 4 inch (10 cm) inside diameter PVC pipe suitable for water level recording equipment. Both types are slotted from the ground surface to the bottom.

Table 137 Soil profile and drill logs for drilling carried out from June 3 to 13, 1970 in the Northwest Subbasin of the Rawson Lake Watershed in the Experimental Lakes Area.

Station or Piezometer nest numbers	Drill Log Depth(feet)	Description	Remarks
P32	0 - 1	solum	- set 1 piezometer and 1-4 in. dia. well:
	1 - 4	silt, clayey silt, and fine sandy silt, oxidized, probably interbedded	P32-5
	4 - 5	sand, gravelly, very poorly sorted, includes silt fraction, possibly a till or dirty outwash	W32-5
	5	end on boulders, probably layered on bedrock	
P33	0 - 1	solum	- set 1 piezometer and 1-4 in. dia. well:
	1 - 5.5	clayey silt and silty clay, oxidized, interbedded, olive-browns, grays, bottom 1 foot somewhat sandy but still appears to be a silt	P33-5.5
	5.5	end on boulders	W33-4
P34	0 - 1.5	moss and solum	- set 2 piezometers and 1-4 in. dia. well:
	1 -10.5	interbedded sequence of silt, sandy silt, silty sand, clay, silty clay, appears to be lacustrine	P34-10.5
			P34-6
P35	0 - 1.5	moss and solum	- set 1 piezometer and 1-4 in. dia. well:
	1.5- 8	clay, silty clay and silty, very fine sand, clay predominant, interbedded sequence, lacustrine	P35-8
	8	end on boulders, probably bedrock	W35-4.5
P36	0 - 1	moss and solum	- set 1 piezometer and 1-4 in. dia. well:
	1 - 2.5	sand, coarse, very poorly sorted, fines, pebbly	P36-8.5
	2.5- 8	clay, slightly silty, dark gray, massive to slightly laminated, occasional pebbles, occasional very thin, sandy, fine laminations	W36-5
	8 - 8.5	boulders, and sandy gravel end on boulders	
P37	0 - 1	moss and soil, solum	- set 2 piezometers and 1-4 in. dia. well:
	1 - 4	sand, coarse to very coarse, very poorly sorted, some silt, dark gray to dark brown	P37-9.5
	4 - 9	clay, dark gray, massive to slightly laminated, some laminations silty and very fine sand	P37-4.5
	9 - 9.5	boulders, end on boulders	W37-4
P38	0 - 1	moss, soil	- set 2 piezometers and 1-4 in. dia. well:
	1 - 2.5	sand, coarse and very coarse, pebbly, very poorly sorted, appears to be beach sand, contains some silt and organic debris (black) accumulation	P38-10.5
	2.5-10	clay, silty clay and silt, interbedded clay predominates, also some interbeds of fine to very fine sand, clays are massive to laminated, occasional pebbles in clay are rounded to subrounded	P38-6
	10 -10.5	boulders, end on boulders	W38-3
P39	0 - 1	moss, soil	- set 1 piezometer and 1-4 in. dia. well:
	1 - 3	sand, coarse, medium and fine, interbedded, silty, fine sand predominates	P39-9.5
	3 - 9	clay, silty clay, silty fine sand, massive to laminated, interbedded, similar to P38 but less clay beds	W39-4.5
	9 -10	boulders, end on boulders	
P40	0 - 1	moss, soil	- set 1 piezometer and 1-4 in. dia. well:
	1 - 3.5	sand, fine, very fine, silty predominant, some medium to coarse, interbedded sequence, oxidized	P40-7.5
	3.5- 7	clay, silty clay, silt sequence unoxidized, dark gray, clay predominates, massive to laminated	W40-4
	7 - 7.5	boulders probably imbedded in coarse to very coarse sand	
P41	0 - 3.5	present beach, very coarse and coarse sand, poor sorting, organic rich	- set 2 piezometers:
	3.5- 5	sand, very fine and fine, laminated to massive, silty, gray, unoxidized	P41-12.5
	5 -12.5	clay, silty clay and clayey silt, interbedded, dark gray, massive to laminated, clay and silty clay predominate	P41-5
	12.5	end on boulders	
P42	0 - 3	present beach, sand, coarse to very coarse, very poorly sorted, much organic debris	- set 2 piezometers:
	3 - 5.5	sand, medium fine and very fine, gray, laminated, lacustrine, silty in places, grades finer with depth	P42-11.5
	5.5- 9	clay, silty clay and clayey silt, occasional fine sandy laminate, interbedded sequence, clay and silty clay predominate	P42-4.5
	9 -11.5	boulders concentrated in sand, coarse, fairly clean, occasional pebbles	
	11.5	end on boulders	
P43	0 - 5	sand, beach grades from coarse at top to medium and fine at the bottom, medium to poorly sorted, no fines	- set 2 piezometers:
	5 - 8.5	clay, silty clay and silt, probably some very fine sand also, interbedded lacustrine, gray, clay and silty clay predominant	P43-10
	8.5-10	boulders appear to be in sand, coarse very poorly sorted	P43-5
	10	end on solid rock	
P44	0 - 3	beach, sand, very coarse, gravelly to coarse sand	- set 1 piezometer:
	3 - 4.5	clay and silty clay as in P42 and P43	P44-4.5
	4.5	end on solid rock	

Table 137 (continued)

Station or Piezometer nest numbers	Drill Log Depth(feet)	Description	Remarks
P56	0 - 1	moss, soil	- set 1 piezometer and 1-4 in. dia. well:
	1 - 6	sand, coarse to medium, pebbly, very poorly sorted, slight silt concentration, almost like a very sandy till, brown-gray,	P56-7
	6	end on solid rock	W56-4
P57	0 - 1	moss	- set 2 piezometers and 1-4 in. dia. well:
	1 - 3	sand, very poorly sorted, dark brown, medium, slightly silty, occasional pebbles	P57-13
	3 - 6	sand, very fine, fine silts in places, oxidized, laminated	P57-8
	6 -13.5	silt, silty clay, clayey silt, interbedded silt and clayey silt predominate	W57-4
	13.5-	end on solid rock, no evidence of sand at bottom	
P58	0 - 1	moss	- set 1 piezometer and 1-4 in. dia. well:
	1 - 3	sandy, silty clay, pebbly, - looks like till but has laminated appearance	P58-5.5
	3 - 5.5	silt, clayey silt and very fine sand, laminated, oxidized	W58-5
	5.5	end on solid rock	
P59	0 - 1	moss	- set 1 piezometer and 1-4 in. dia. well:
	1 - 3	silt, sandy, occasionally pebbly - looks like till but laminated	P59-5
	3 - 5.5	silt, laminated with fine sandy layers, oxidized	W59-4.5
	5.5	end on solid rock	
P60	0 - 2	moss and soil	- set 1 piezometer and 1-4 in. dia. well:
	2 - 4	sand, fine and medium, silty, laminated, oxidized	P60-12
	4 - 12	silt, very fine sand, silty, very laminated, oxidized to about 8 feet, lacustrine, also some clayey silt	W60-5.5
	12	end on solid rock	
P61	0 - 2	moss, soil	- set 1 piezometer and 1-4 in. dia. well:
	2 - 5.5	sand, pebbly, coarse, silty, till-like, and sand, medium to fine, laminated with poor sorting	P61-9.5
	5.5- 9.5	clay and silty clay, oxidized, laminated	W61-5
	9.5	end on solid rock	
P62	0 - 1	moss, soil	- set 1 piezometer and 1-4 in. dia. well:
	1 - 2	organic, rich, dark-brown sand	P62-10.5
	2 - 5	silty fine sand, interbedded, oxidized, poor sorting	W62-4
	5 -10.5	clayey silt, silty clay and silt, unoxidized at 6 feet, interbedded clay and silty clay predominate no evidence of sand at bottom	
	10.5	end on solid rock	
P63	0 - 1.5	moss, soil	- set 1 piezometer and 1-4 in. dia. well:
	1.5- 3.5	sand, coarse, very poorly sorted, pebbly, oxidized, silty	P63-6.5
	3.5- 6	clay and silty clay, slightly oxidized olive gray	W63-4.5
	6 - 6.5	sand silty, gray	
	6.5	end on solid rock	
P64	0 - 1	moss, soil	- set 1 piezometer and 1-4 in. dia.
	1 - 2	sand, very coarse, pebbly, clean, oxidized	P64-11.5
	2 - 5.5	sand, fine and very fine, silty in places, oxidized	W64-5.5
	5.5-11.5	clay, silty clay and clayey silt, interbedded, gray and olive brown but may not be oxidized color	
	11.5	end on solid rock	
P65	0 - 1	moss and soil	- set 1 piezometer and 1-4 in. dia. well:
	1 - 3.5	silt and very fine sand, oxidized, interbedded, occasional clayey interbed	P65-4.5
	3.5- 6	clay, silty clay, and clayey silt, oxidized, interbedded with very fine sand interbeds, lacustrine	W65-5.5
	6.5	end on solid rock	
P66	0 -11	sand, coarse and very coarse, pebbly, no fines, medium to poor sorting, grades to medium sand at 7 feet, probably interbedded with some coarser sand	- set 1 piezometer and 1-3/4 in. dia. well approx. 200 feet offshore in 2.5 feet depth of water:
	12 -14	clay and silty clay, dark gray	P66-15
	14 -14.5	sand, coarse, gray, silty, till-like	W66-Lake
	14.5	end on solid rock	- both piezometers were damaged by lake ice in the first winter

1. Drilling was carried out using a drill mounted on a tracked all-terrain vehicle. The drill was equipped with 7 inch (18 cm) diameter hollow stem augers which allowed for easy placement of piezometer tubes.

2. Station numbers are designated P for "piezometer nest". Usually a piezometer nest consists of one or more piezometer tubes and one water table well. A listing of correct tube numbers for each nest is given in the remarks colum. For example, tube number P65-4.5 and W65-5.5 indicate a piezometer set to a depth of 4.5 feet below ground and a water table well set to a depth of 5.5 feet below ground, respectively, both at piezometer nest 65.

3. Piezometers are constructed of 3/4 in. (2 cm) inside diameter polyvinyl chloride (PVC) piping with a slotted intake zone in the lower 1.5 feet (0.45 metre). The intake sections are wrapped with fine mesh fiberglass cloth to prevent sedimentation from occurring in the pipe. The bottom ends are plugged.

4. Groundwater wells are either 3/4 in. (2 cm) inside diameter (PVC) pipe for manual observations or 4 in. (10 cm) inside diameter PVC pipe suitable for standard water level recording equipment. Both types are slotted from ground surface to the bottom.

Table 138 Soil profile and drill logs for drilling and piezometer well installations carried out from June 3 - 13, 1970 in the Roddy trail beach area of the Rawson Lake Watershed in the Experimental Lakes Area.

Station or piezometer nest number	Depth(feet)	Drill Log Description	Remarks
P45	0 - 6	beach sand, coarse to very coarse, poorly sorted, interbedded, gravelly in places, becomes medium to fine at the base	- 2 piezometers and 1-3/4 in. dia. water table well were set in a nest:
	6 -10	clay and silty clay, with some silty very fine sand, interbedded, massive to laminated, lacustrine sequence	P45-10.5
	10 -10.5	boulders with possible coarse sand	P45-6
	10.5	end on solid rock	W45-4
P46	0 - 1	moss and soil	- 2 piezometers and 1-4 in. dia. water table well were set in a nest:
	1 - 8	sand, coarse and very coarse above, at 4 feet grades to fine and medium sand slightly silty in places	
	8 -11	clay, silty clay and sand; very fine, silty, clay and silty clay predominant	P46-12
	11 -11.5	sand, medium and fine, poorly sorted, slightly silty, slightly pebbly in places	P46-7.5
	12.5	end on solid rock	W46-5.5
P47	0 - 8	beach sand, very coarse and coarse to 4 feet, grades to coarse and medium, very poorly sorted, pebbly, slightly silty in places	- 2 piezometers and 1-4 in. dia. water table well were set in a nest:
	8 -10	clay, silty clay and some interbeds of very fine sand, laminated and massive clays, lacustrine sequence, clay predominants	P47-11
	10 -11	sand, coarse, pebbly, very poorly sorted, silty	P47-7.5
	11	end on solid rock	W47-4
P48	0 - 8	beach sand, coarse and very coarse, grades to medium and coarse at the base, poorly sorted, slightly silty in places, pebbly, stratified	- 2 piezometers and 1-4 in. dia. water table well were set in a nest:
	8 -10	clay and silty clay, dark gray, massive to laminated, lacustrine	P48-12
	10 -12	sand, medium to coarse, very poorly sorted, slightly silty, pebbly	P48-7.5
	12	end on solid rock	W48-3
P49	0 - 1	moss and soil	- 2 piezometers and 1-4 in. dia. water table well were set in a nest:
	1 - 8	sand, very coarse, coarse, pebbly, very poorly sorted, slight silt fraction, stratified	
	8 -10	silty clay, and clayey silt, olive and gray, massive, probably interbedded with very fine silty sand	P49-10
	10	end on solid rock	P49-7.5
			W49-5

1. All drilling was carried out using a drill mounted on a tracked all-terrain vehicle. The drill was equipped with 7 inch (18 cm) diameter hollow stem augers which allowed for easy placement of piezometer tubes.

2. Station numbers are designated P for piezometer nest or W for sampling or water table well and are used on the location maps in this report. Piezometer nests usually consist of one or more piezometers and one water table well. A listing of correct tube numbers for each nest is given in the remarks colum. For example, tube numbers P48-12 and W48-3 indicate a piezometer set to a depth of 12 feet below ground and a water table well set to a depth of 3 feet below ground, respectively, both at piezometer nest 48.

3. Piezometers were constructed of 3/4 inch (2 cm) inside diameter polyvinylchloride (PVC) piping with a slotted intake zone in the lower 1.5 feet (0.45 meter). The intake sections were wrapped with fine mesh fibre glass cloth to prevent sedimentation from occurring in the pipe. The bottom ends were plugged.

4. Groundwater wells were either 3/4 inch (2 cm) inside diameter PVC pipe for manual observations or 4 inch (10 cm) inside diameter PVC pipe suitable for water level recording equipment. Both types were slotted from the ground surface to the bottom.

Table 139 Soil profile and drill logs for drilling carried out from June 3 to 13, 1970 in the East Subbasin of the Rawson Lake Watershed in the Experimental Lakes Area.

Station of piezometer nest number	Drill Log Depth(feet)	Description	Remarks
P50	0 -15	sand, very coarse and coarse, poorly sorted, pebbles, dark gray-brown, occasional shell fragments, organic rich in places	- 4 piezometers and 1-3/4 in. dia. water table well were set in a nest: P50-37, P50-25, P50-13, P50-8, W50-4.5
	15 -17	sandy silt, very poorly sorted, very organic, rich dark brown with shell fragments	
	17 -24	interbedded sequence of clayey silt, fine sand to coarse sand	
	24 -35	silty clay and/or clayey silt, dark gray, massive, lacustrine, laminated in places	
	35	sand, very coarse, pebbly, poorly sorted, no fines	
	38	end on solid rock	
P51	0 -17	sand, coarse and very coarse, pebbly, poorly sorted, no fines	- 3 piezometers and 1-3/4 in. dia. water table well were set in a nest: P51-30, P51-17, P51-9.5, W51-5.5
	17 -20	sand, medium to fine, interbedded	
	20 -33	interbedded sequence of silt, silty clay, very fine sand, medium sands and some coarser sands, lacustrine, fine sand and silt predominant	
	33	end in gravel and boulder concentration	
P52	0 -17	sand, coarse and very coarse, pebbly, poorly sorted, no fines, gray	- 1 piezometer and 1-3/4 in. dia. water table well were set: P52-23.5, W52-5
	17 -20	grades from fine to medium sand, poor sorting	
	20 -24	silt and clay, clay predominant, dark gray, interbedded with very fine and fine sand, lacustrine	
	24	end in boulders	
P53	0 -17	sand, very coarse, pebbly, gray, no fines	- 3 piezometers and 1-3/4 in. dia. water table well set in a nest: P53-42, P53-20, P53-11, W53-5
	17 -25	sand, fine to very fine and sandy silt, interbedded, gray	
	25 -38	interbedded sequence of sands, silts, and clayey silt, gray and dark gray, lacustrine, total clay - silt thickness probably not greater than 5 feet, sands may be coarse in some beds	
	38 -41.5	sand, very coarse, very dense, pebbly, poorly sorted, light gray to light gray-brown, no fines	
	41.5	end in boulders	
P54	0 -13	sand, very coarse to coarse, pebbly, very poorly sorted, slight content of fines in places, almost a pebbly sandy till at base	- 1 piezometers and 1-3/4 in. dia. water table well set in a nest: P54-13, W54-5
	13	end on boulders	
P55	0 -15	sand, very coarse and coarse, pebbly, very poor sorting, gray, no fines	- 3 piezometers were set in a nest: P55-33, P55-13, P55-4.5
	15 -28	sand, interbedded, very coarse, coarse, medium and fine, very poorly sorted, occasional silty fine sand beds and possibly some thin silt interbeds	
	28 -33	silt, clayey silt and silty clay, massive to laminated, dark gray, interbedded	
	33	end on solid rock or very large boulder	

1. All drilling was carried out using a drill mounted on a tracked all-terrain vehicle. The drill was equipped with 7 inch (18 cm) diameter hollow stem augers which allowed for easy placement of piezometers.

2. Station numbers are designated P for piezometer nest or W for sampling or water table well and are used on the location maps in this report. Piezometer nests usually consist of 1 or more piezometers and 1 water table well. A listing of correct tube numbers for each nest is given in the remarks column. For example, tube number P54-13 and W54-5 indicate a piezometer set to a depth of 13 feet below ground and a water table well set to a depth of 5 feet below ground, respectively, both at piezometer nest 54.

3. Piezometers were constructed of 3/4 inch (2 cm) inside diameter, polyvinylchloride (PVC) piping with a slotted intake zone in the lower 1.5 feet (0.45 metre). The intake sections were wrapped with fine mesh fibre glass cloth to prevent sedimentation from occurring in the pipe. The bottom ends were plugged.

4. The water table wells listed in this table were all made of 3/4 inch (2 cm) PVC pipe for manual observations only. The wells were slotted continuously from the ground surface to the bottom.

Table 140 Complete listing of all piezometer wells, water table wells and sampling wells installed in the Rawson Lake Watershed of the Experimental Lakes Area. This table serves as an index of the number of all direct groundwater measurements made during the period of record (1970 to 1973). Actual water level data have not been included in this report but are on file in the ELA hydrologic studies office.

Piezometer or well number	Number of measurements in 1970	1971	1972	1973	Notes
Field Station and lake outflow area					
W1-22	0	0	D	D	(2)
W2-54	0	0	D	D	(2)
W3-45	0	0	D	D	(2)
W4-25	0	0	9	0	
W5-25	0	0	9	0	
W6-30	0	0	D	D	(2)
W7-40	0	0	9	0	
W8-43	0	0	7	0	
W9-43	0	0	D	D	(2)
P20-30	8	22	10	0	
P20-23	8	22	10	0	
P20-15	8	22	10	0	
P20-11	8	22	10	0	
P21-6	8	23	10	0	
P22-10	8	21	10	0	
W22-6	8	22	10	0	
P23-17	8	23	10	0	
P23-10	8	23	10	0	
W23-6	8	23	10	0	
P24-20	8	22	10	0	
P24-14	8	22	10	0	
P24-9	8	22	10	0	
W24-5	8	22	10	0	
P25-29	8	23	10	0	
P25-19	8	24	10	0	
P25-9	8	24	10	0	
W25-6.5	8	24	10	0	
P26-27	8	19	10	0	
P26-18	8	21	10	0	
P26-12	8	21	10	0	
P26-8	8	20	10	0	
P27-30	8	21	10	0	
W27-20	8	21	10	0	
P28-16	8	18	10	0	
P28-7	8	18	10	0	
P29-15	8	21	10	0	
P30-26	8	21	10	0	
P31-30	8	21	10	0	
P31-21	8	21	10	0	
W31-14	8	21	10	0	
P6	0	0	0	0	
P7	0	0	0	0	
Northwest Subbasin					
P1	0	0	0	0	
P2	0	0	0	0	
P3	0	0	0	0	
P4	0	0	0	0	
P5	0	0	0	0	
P32-5	17	24	12	8	
W32-5	17	24	12	8	
P33-5.5	17	24	12	7	
W33-4	17	24	12	8	
P34-10.5	18	24	12	9	
P34-6	18	24	12	9	
W34-4.75	18	24	12	9	
P35-8	17	24	12	9	
W35-4.5	17	24	12	9	
P36-8.5	16	25	12	9	
W36-5	16	25R	12	9	
P37-9.5	17	22	12	9	
P37-4.5	17	23	12	9	
W37-4	17	24	12	9	
P38-10.5	19	25	12	9	
P38-6	19	25	12	9	
W38-3	19	25	12	9	
P39-9.5	19	25	17	7	
W39-4.5	19R	25R	27R	5R	(4,6)
P40-7.5	16	24	12	9	
W40-4	16	23	12	9	
P41-12.5	19	24	13	9	
P41-5	19	24	13	9	
P42-11.5	18	25	34	47	
P42-4.5	18	25	34	47	
P43-10	18	24	12	9	
P43-5	18	24	12	9	
P44-4.5	6	22	10	9	
P56-7	19	24	13	9	
W56-4	19R	23R	13	9	
P57-13	10	25	12	9	
P57-8	11	25	12	9	
W57-4	11R	25R	12	9	
P58-5.5	11	25	12	9	
W58-5	11	25	12	9	
P59-5	11	25	12	9	
W59-4.5	11R	25R	33	9	
P60-12	11	25	12	9	
W60-5.5	11	25	12	9	
P61-9.5	11	25	17	9	
W61-5	11R	25R	32R	9R	(3)
P62-10.5	11	25	12	9	
W62-4	11	25	12	9	
P63-6.5	11	25	17	9	
W63-4.5	10	25R	31R	9R	
P64-11.5	11	25	15	9	
W64-5.5	11	23R	23R	4R	(5)
P65-6.5	11	22	15	9	
W65-5.5	11	23	25R	9	
P66-18	17	D	D	D	(3)
P66-L	11	D	D	D	(3)
Roddy trail beach area (NE corner of L.239)					
P45-10.5	8	25	109	47	
P45-6	8	25	108	47	
W45-4	8	25	108	47	
P46-12	8	25	10	9	
P46-7.5	8	25	10	9	
W46-5	5	25	10	9	
P47-11	8	25	10	9	
P47-7.5	8	25	10	9	
W47-4	8	25	10	9	
P48-12	8	25	10	9	
P48-7.5	8	25	10	9	
W48-3	8	25	10	9	
P49-10	8	25	10	9	
P49-7.5	8	25	10	9	
W49-5	8	25	10	9	

Table 140 (continued)

Piezometer or well number	Number of measurements in 1970	1971	1972	1973	Notes
			Northeast Subbasin		
P86	-	-	0	0	(7)
P87	-	-	0	0	(7)
P88	-	-	0	0	(7)
			East Subbasin		
P50-37	10	25	11	9	
P50-25	10	25	11	9	
P50-13	10	25	11	9	
P50-8	9	25	11	9	
W50-4.5	9	25	11	9	
P51-30	10	21	11	9	
P51-17	10	25	11	9	
P51-9.5	10	25	11	9	
W51-5.5	10	25	11	9	
P52-23.5	10	25	11	9	
W52-5	10	25	11	9	
P53-42	10	25	11	9	
P53-20	10	25	11	9	
P53-11	10	25	11	9	
W53-5	10	25	11	9	
P54-13	10	25	11	8	
W54-5	10	25	11	8	
P55-33	10	25	112	49	
P55-13	10	25	108	49	
P55-4.5	10	25	108	49	
P80-18	-	-	10	9	
P80-12	-	-	10	3	
P80-6	-	-	10	9	
P81-10	-	-	10	9	
P81-5	-	-	10	9	
P82-8	-	-	10	9	
P83-9	-	-	10	7	
P83-4	-	-	10	7	
P84-2.5	-	-	0	0	(7)
P85-4	-	-	0	0	(7)
W10-5	-	-	R	R	
W11-5.5	-	-	R	R	
W12	-	-	-	R	
W13	-	-	-	R	
W14	-	-	-	R	

1. Station numbers describe the type of well, its location and the depth of pipe below ground surface. For example, P31-30 and W31-14 indicate a piezometer set to a depth of 30 feet and a water table well set to a depth of 14 feet, respectively, both at piezometer nest 31. The location maps included in this section of report locate each station.

2. D - destroyed during septic field construction.

3. D - destroyed by ice.

4. W39-4.5 changed to W39-5.5 on July 21, 1972.

5. W64-4.5 changed to W64-5.5 in October, 1972.

6. R - recording groundwater well station. Data period of record is indexed in Table 141.

7. Groundwater chemistry sampling only.

Table 141 Summary of recording groundwater well records for stations in the Rawson Lake Watershed of the Experimental Lakes Area for the period 1969 to 1978. This table serves as an index of existing record. Actual data has not been included in this report but is on file.

Year	Water table well	Location	Period of record
1969	-	-	no record
1970	W39-4.5	NW Subbasin	September 8 - November 2
	W56-4	" "	September 9 - November 2
	W57-4	" "	September 14 - November 3
	W59-4.5	" "	September 14 - November 4
	W61-5	" "	September 21 - November 4
1971	W36-5	NW Subbasin	June 2 - September 15
	W39-4.5	" "	May 21 - October 27
	W56-4	" "	May 26 - October 27
	W57-4	" "	May 22 - October 27
	W59-4.5	" "	May 22 - October 27
	W61-5	" "	July 14 - October 27
	W63-4.5	" "	June 2 - October 27
	W64-4.5	" "	May 27 - October 21
1972	W39-4.5	NW Subbasin	May 11 - October 25
	W59-4.5	" "	May 24 - October 18
	W61-5	" "	May 11 - October 18
	W63-4.5	" "	May 11 - October 18
	W64-4.5	" "	June 7 - August 9
	W64-5.5	" "	October 4 - October 18
	W65-5.5	" "	June 14 - October 25
	W10-5	East Subbasin	June 17 - October 25
	W11-5.5	" "	August 9 - October 18
1973	W39-5.5	NW Subbasin	May 9 - November 6
	W61-5	" "	May 9 - August 29
	W63-4.5	" "	May 23 - August 24
	W64-5.5	" "	May 30 - June 27
	W10-5	East Subbasin	May 3 - November 6
	W11-5.5	" "	May 3 - November 6
	W12-4	" "	May 15 - November 6
	W13	" "	June 29 - August 22
	W14	" "	July 2 - August 22
1974	W39-5.5	NW Subbasin	May 28 - August 19
	W10-5	East Subbasin	May 24 - November 6
	W11-5.5	" "	May 15 - October 10
1975	W39-5.5	NW Subbasin	May 8 - November 4
	W10-5	East Subbasin	May 7 - October 21
	W11-5.5	" "	May 7 - October 14
1976	W39-5.5	NW Subbasin	July 8 - October 18
	W10-5	East Subbasin	May 18 - October 19
	W11-5.5	" "	May 18 - October 19
1977	-	-	no records
1978	-	-	no records

1. The above station numbers describe the type of well, its location and the depth of well below ground surface. For example, W39-4.5 indicates a water table well at station 39, having a slotted pipe to a depth of 4.5 feet. The station numbers refer to the location maps in this section of report.

2. Wells were constructed of 4 inch inside diameter polyvinylchloride (PVC) pipe having intake slots from ground surface to the pipe bottom.

3. Stevens type F water level recorders with weekly charts were used.

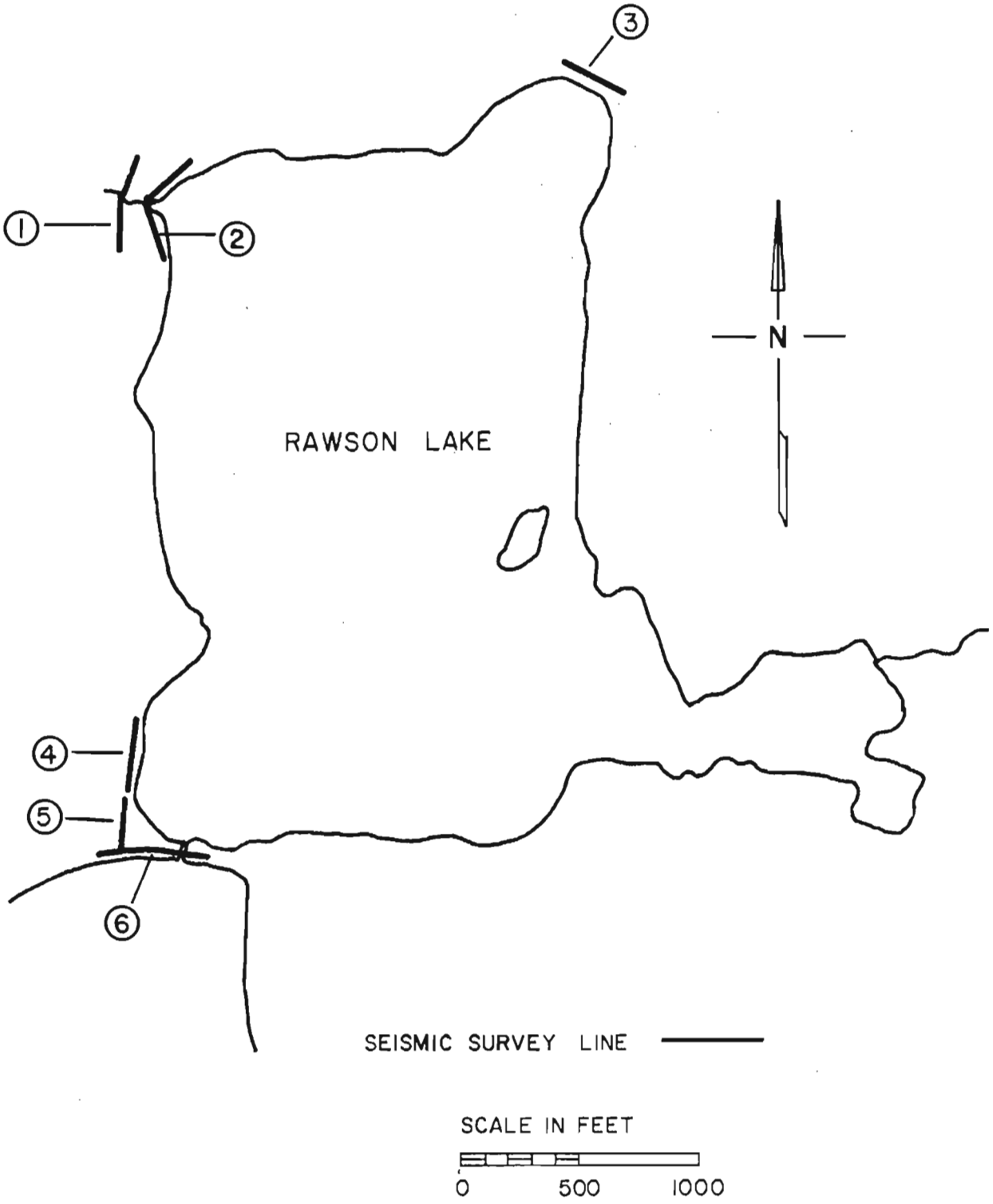


Fig. 56 Location plan of bedrock profiles determined by hammer seismograph survey in September 1969.

Table 142 Legend of symbols used in bedrock profile and drill log diagrams.

	Interbedded sand, fine to very coarse, silt and clay, undifferentiated; sands appear to be predominant.
	Sand, very coarse, and fine gravel.
	Sand, medium.
	Sand, fine.
	Silt and clay.
	Soil and organics
XXXX	Bedrock
	Apparent bedrock contact indicated by diamond drilling.
	Apparent bedrock contact indicated by augering.
○	Diamond drill test hole.
●	Diamond drill test hole with piezometer.
⊗	Auger test hole.
◉	Seismic station.

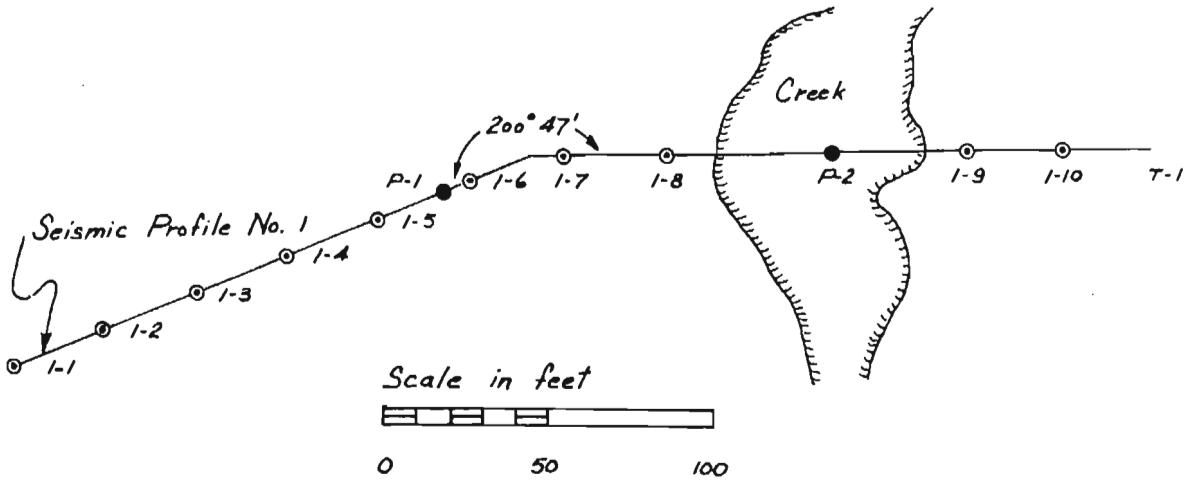


Fig. 57 Plan of seismic bedrock profile no. 1 in the northwest subbasin. All points are in the center of the main trail and are located in reference to P-1, P-2 and T-1.

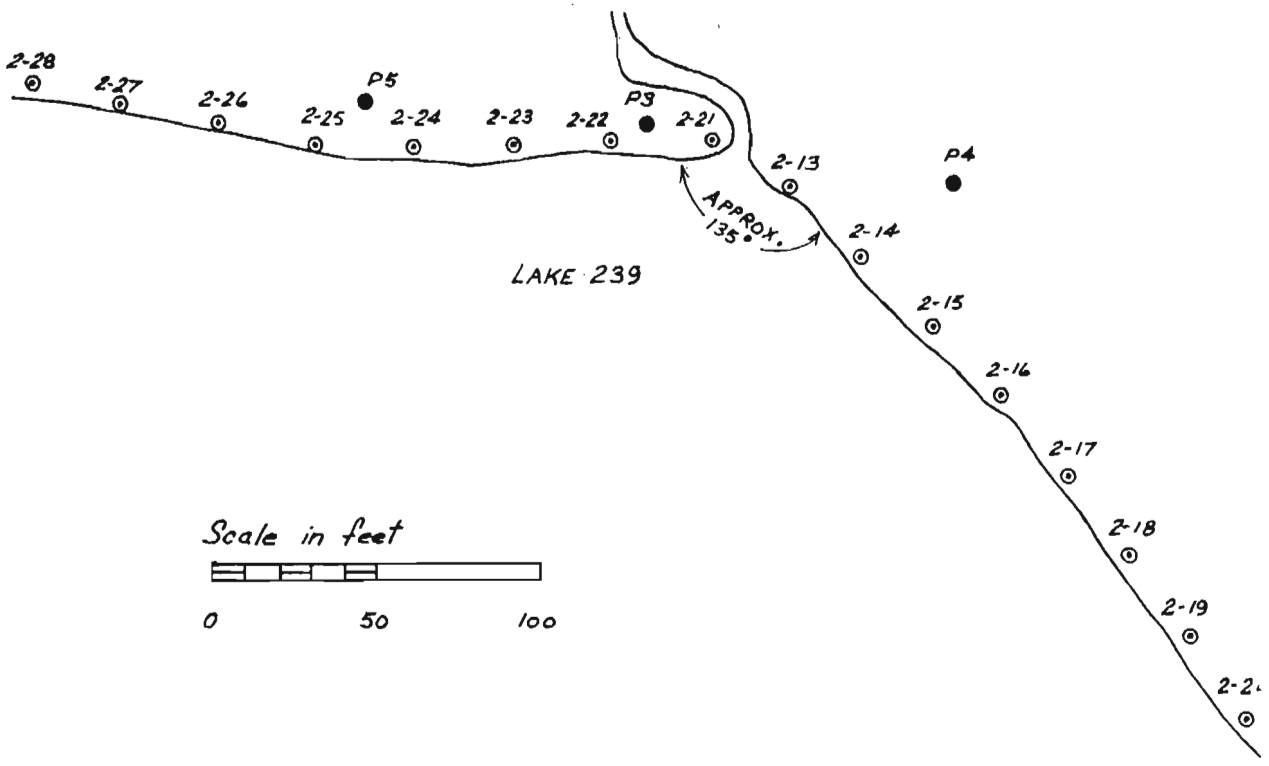


Fig. 58 Plan of seismic bedrock profile no. 2 in the Northwest Subbasin. All points are along the beach and are located in reference to P3, P4 and P5.

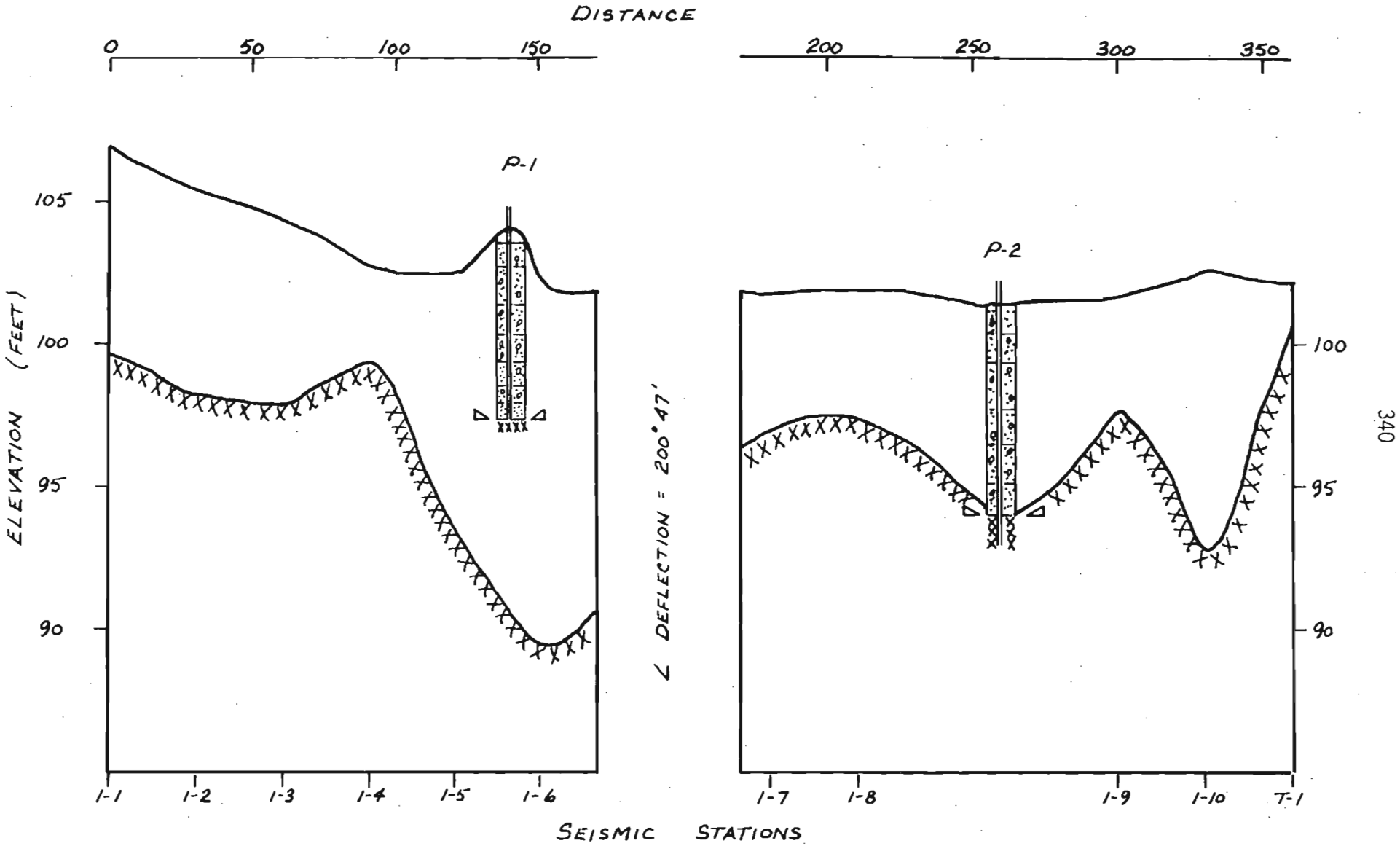


Fig. 59. Bedrock interpretation and test hole logs along seismic profile No. 1 in the Northwest Subbasin (see Fig. 57). Distances and elevations are in feet.

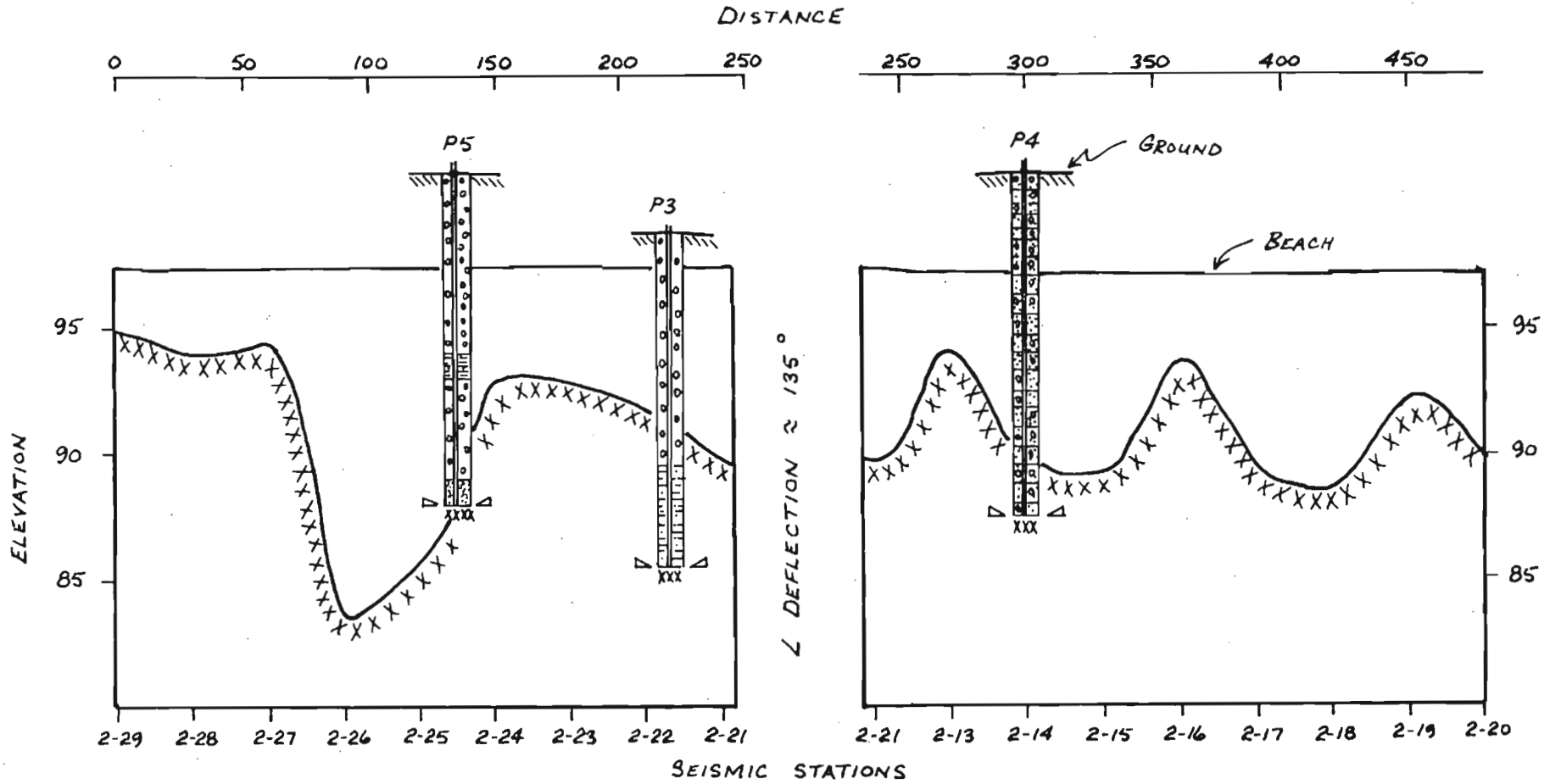


Fig. 60. Bedrock interpretation and test hole logs along seismic profile No. 2 in the Northwest Subbasin. Piezometers P3, P4 and P5 are shown as projections on seismic line (see Fig. 58). Distances and elevation are in feet.

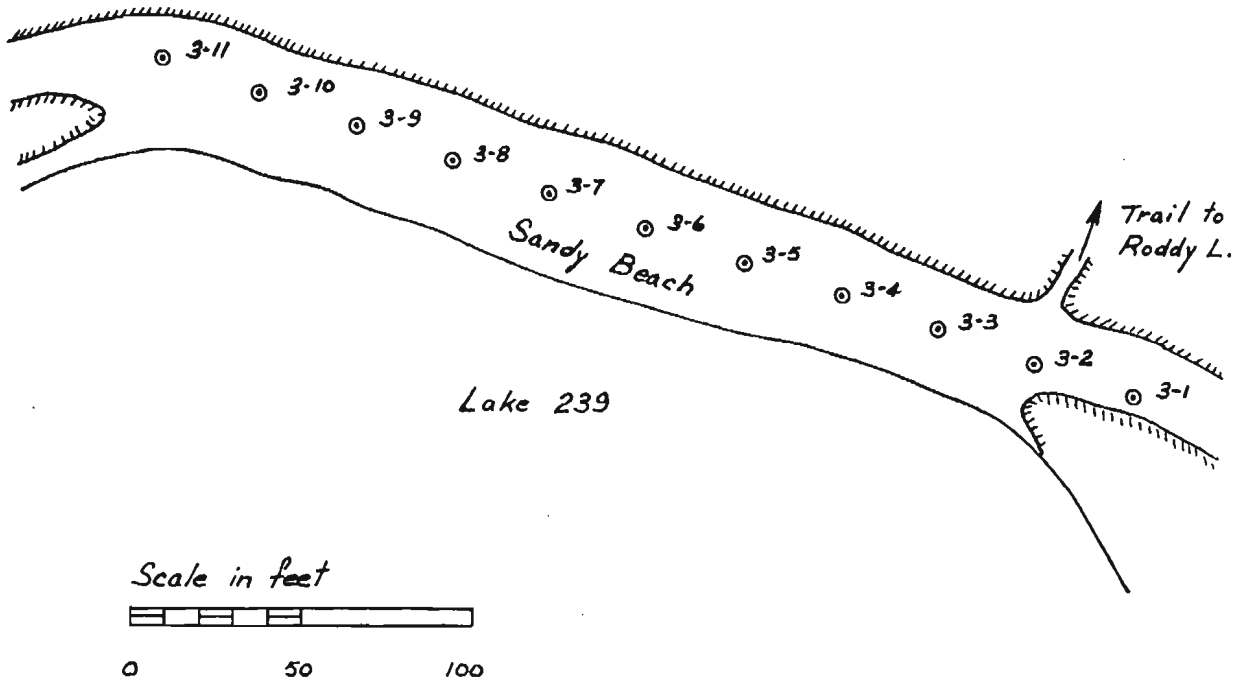


Fig. 61 Plan of seismic bedrock profile no. 3 on the sandy beach seepage area on the northeast beach of Lake 239.

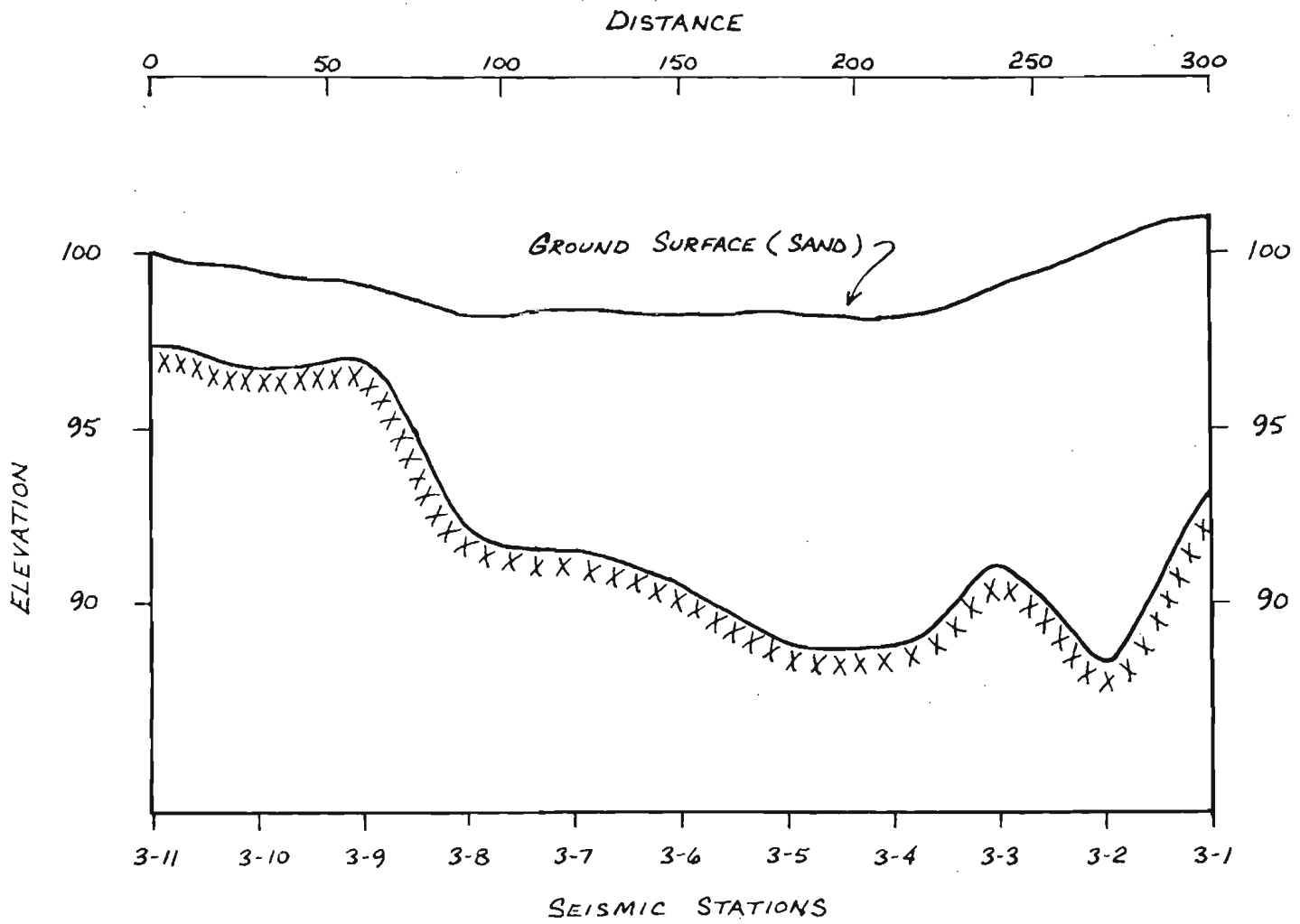


Fig. 62. Bedrock interpretation along seismic profile No. 3 on the northeast beach of Lake 239 (see Fig. 61). Distances and elevations are in feet.

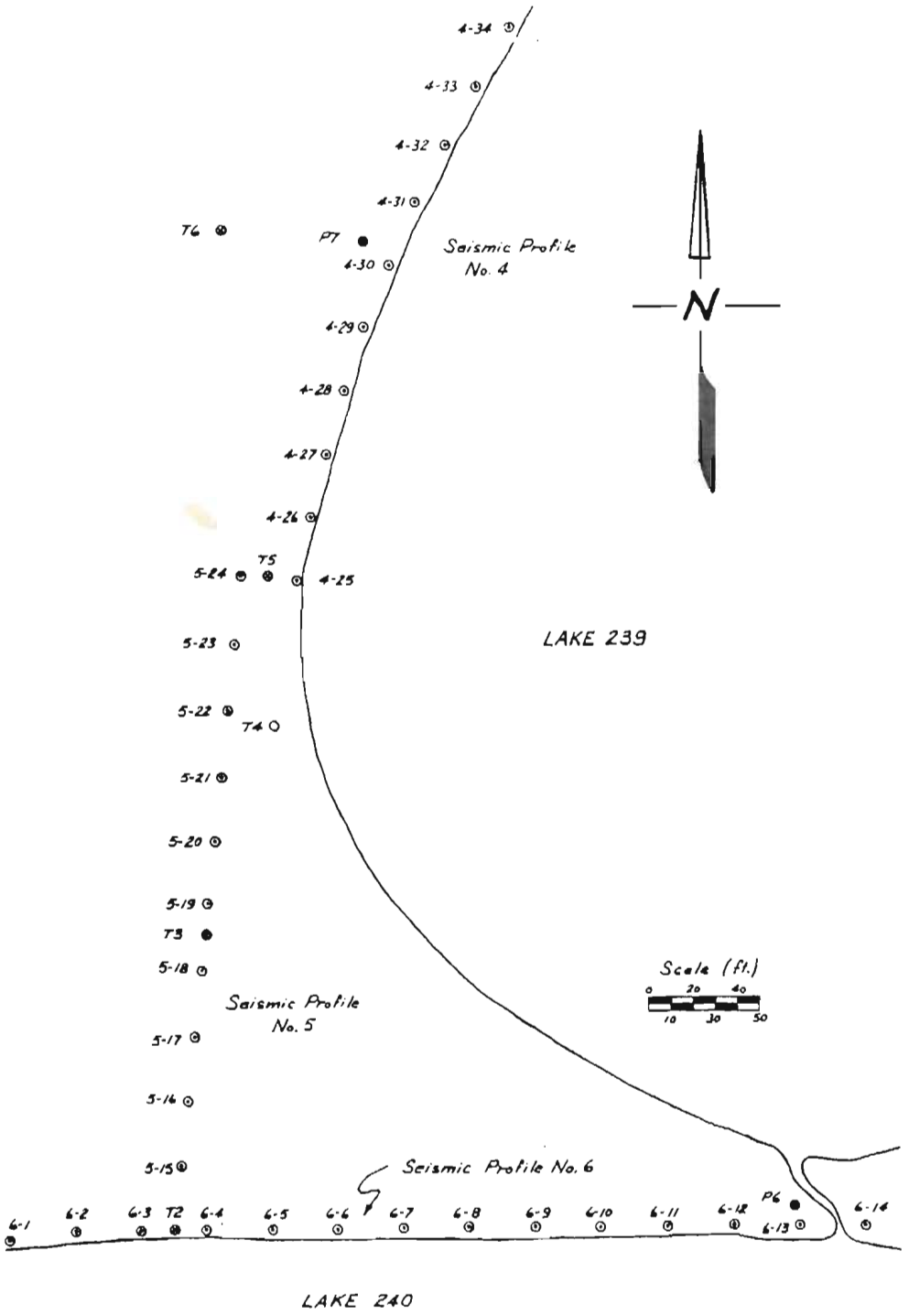


Fig. 63 Plan of seismic bedrock profile no.'s 4, 5 and 6 in the field camp and outflow area of Lake 239. Line 5 is down the center of the main roadway. Line 4 and 6 is along beach.

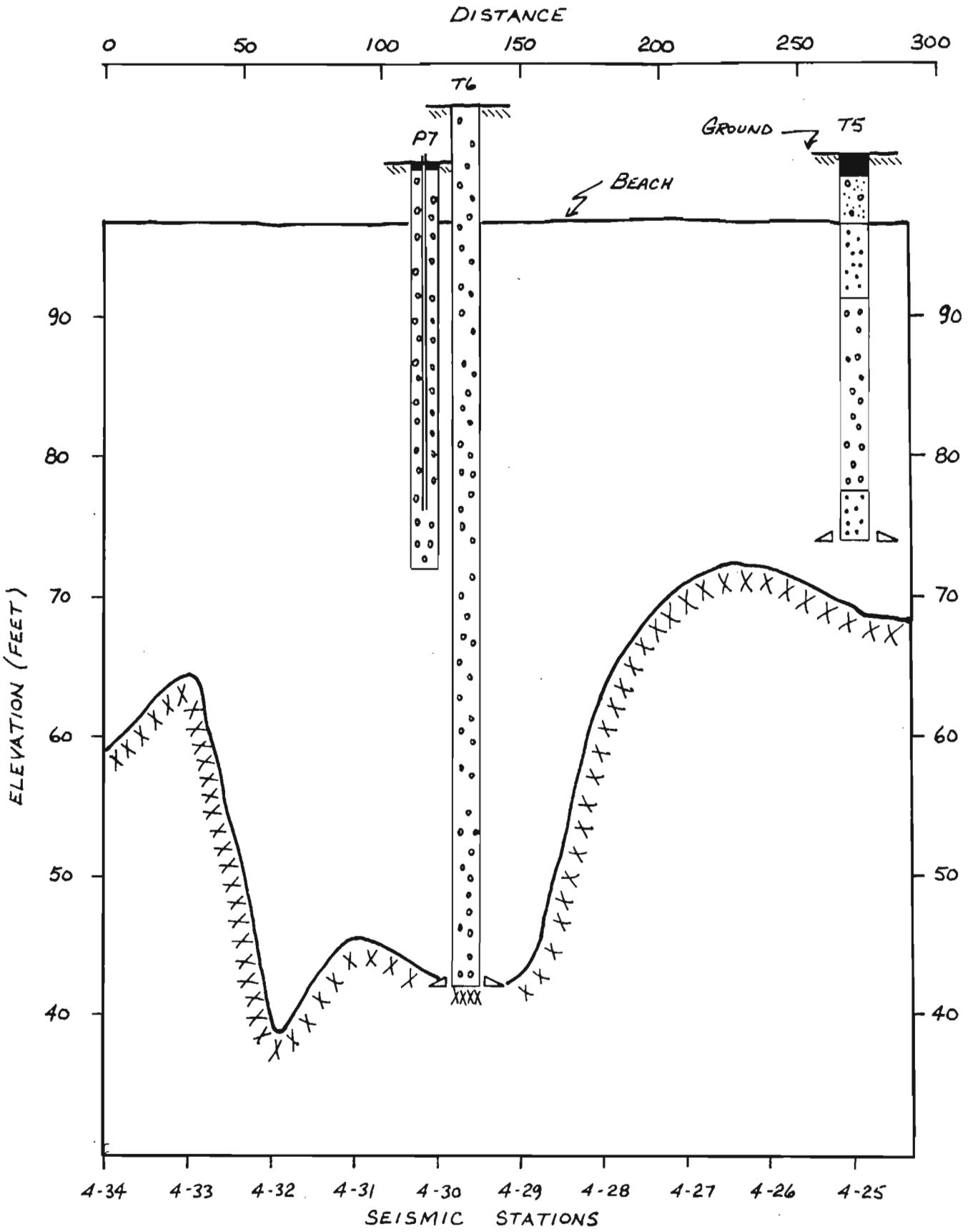


Fig. 64. Bedrock interpretation of test hole logs along seismic profile No. 4. Test holes T5 and T6 and piezometer P7 are shown as projections on the seismic line (see Fig. 63). Distances and elevation are in feet.

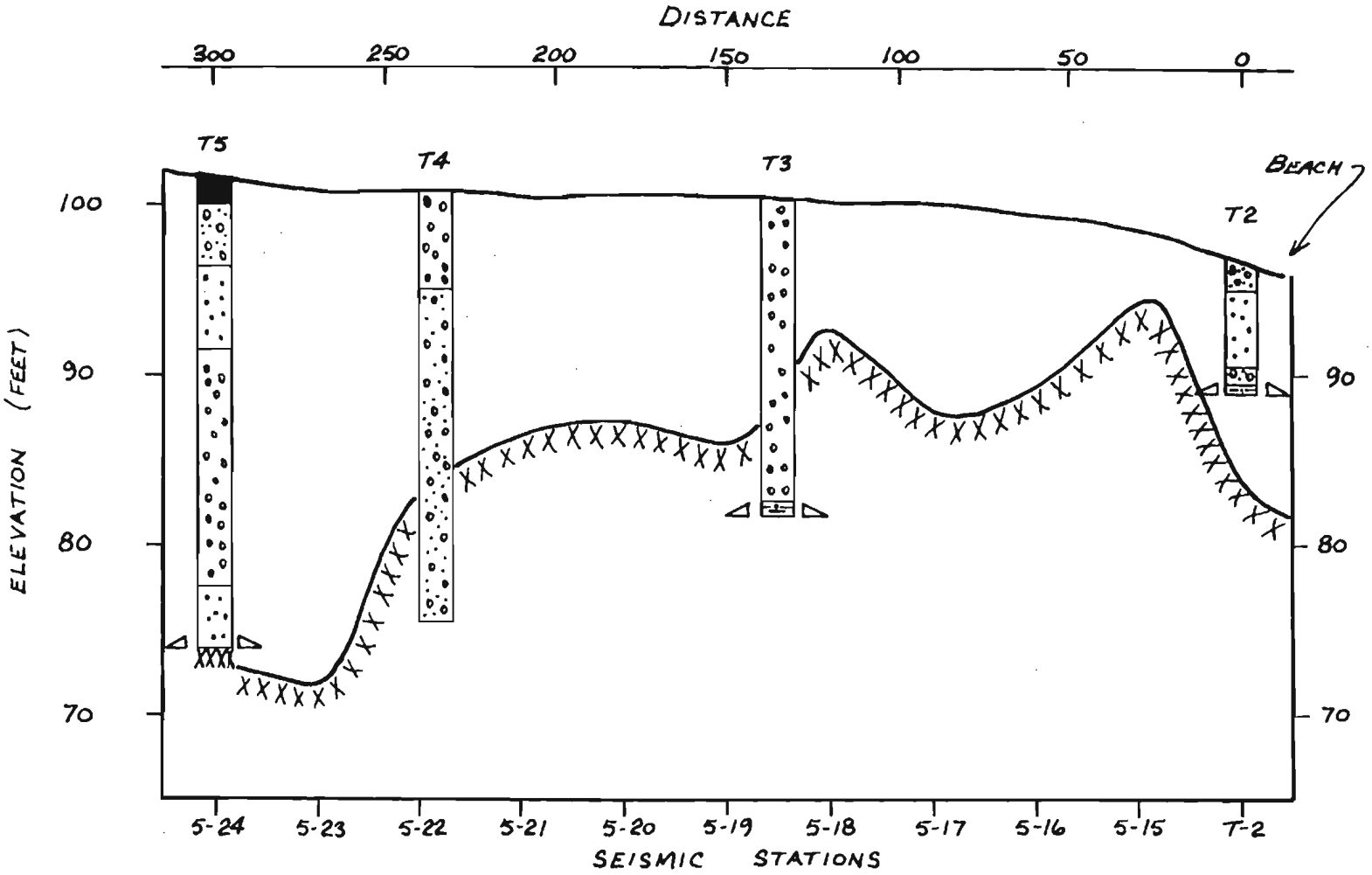


Fig. 65. Bedrock interpretation and test hole logs along seismic profile line No. 5. Test holes T4 and T5 are shown as projections on the seismic line (see Fig. 63). Distances and elevations are in feet.

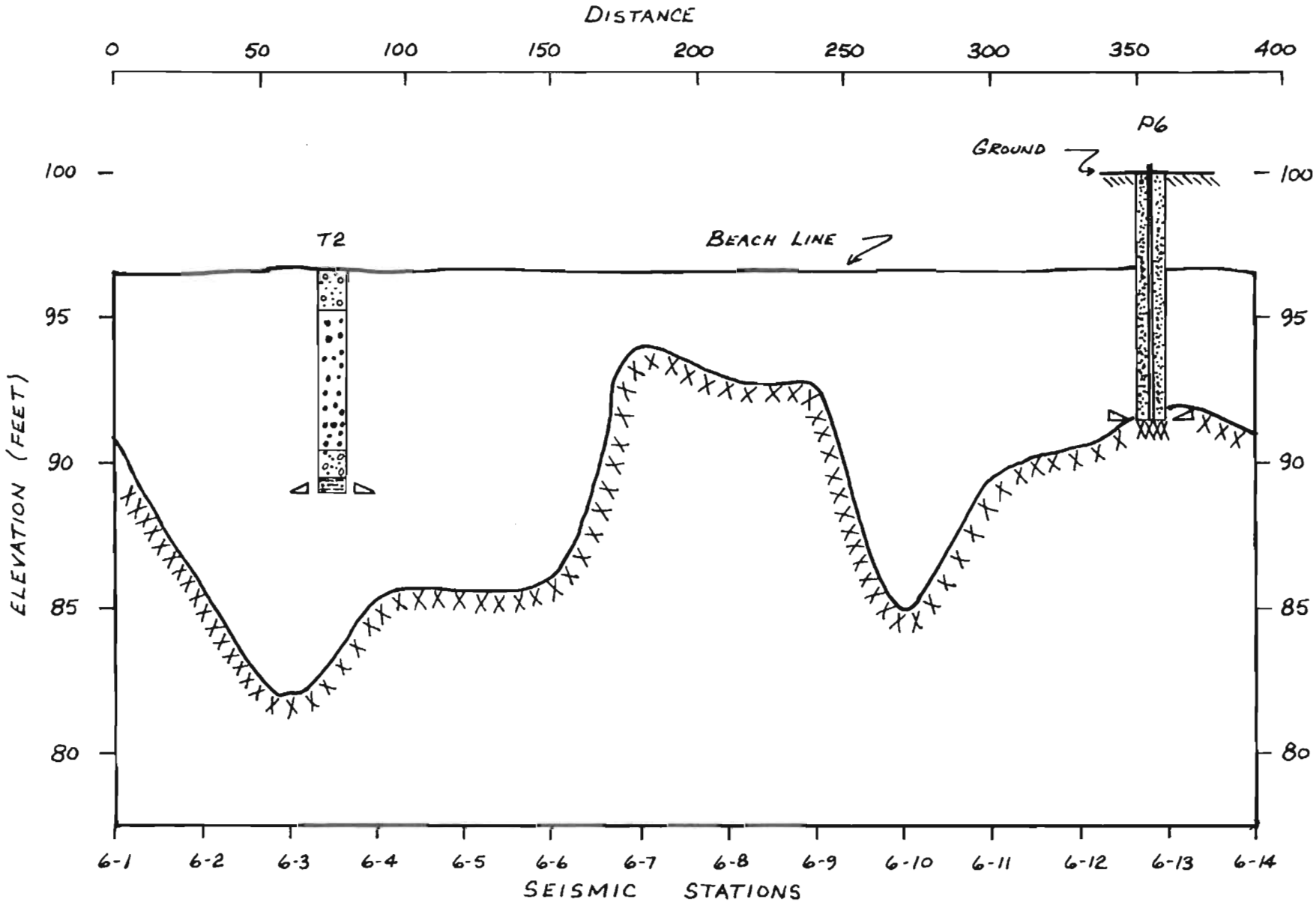


Fig. 66. Bedrock interpretation and test holes along seismic profile line No. 6 on the north beach of Lake 240. Distances and elevations are in feet. Peizometer 6 (P6) is shown as a projection on the seismic line (see Fig. 63).

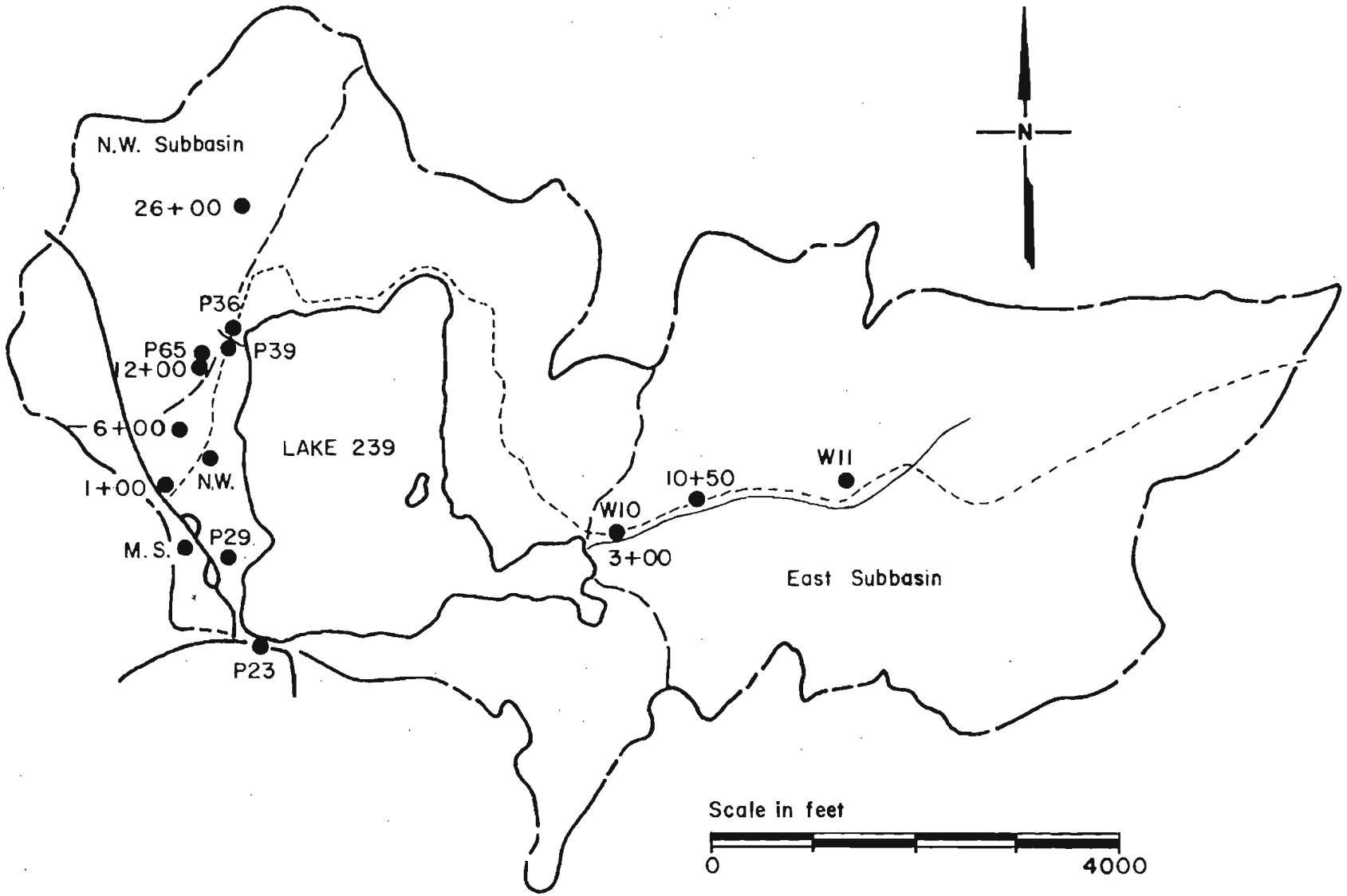


Fig. 67 Location plan of soil moisture sampling stations in the Rawson Lake Watershed. W10 and 3+00 are the same station.

Table 143 Soil moisture data in percent for the Rawson Lake Watershed for the year 1971.

	Northwest Subbasin						East Subbasin					Field Camp Area				
	1+00	6+00	12+00	P39	P36	26+00	P50	P53	P55	3+00	10+50	M.S.	W9	P21	P23	P29
Jun 23 a.m.	11.8	29.9	17.6	15.5	20.0	23.4	-	-	-	-	-	-	-	-	-	-
	12.0	29.6	17.4	15.7	-	22.6	-	-	-	-	-	-	-	-	-	-
Jun 28 a.m.	10.3	30.9	17.6	15.0	19.6	28.2	29.6	19.8	70.4	-	-	-	6.9	10.0	3.8	-
	11.6	29.0	18.5	15.8	18.0	26.5	29.2	19.1	65.1	-	-	-	7.0	10.7	3.7	-
Jul 5 a.m.	10.2	42.0	12.7	16.9	16.8	20.5	-	-	16.1	14.4	17.5	-	11.4	5.9	4.1	-
	10.2	27.2	14.8	17.4	18.5	26.1	-	-	18.4	14.7	17.4	-	12.0	5.6	4.1	-
Jul 12 p.m.	9.2	27.7	14.4	19.3	13.8	24.3	-	-	41.3	11.9	17.4	-	8.8	6.4	4.6	-
	10.7	31.4	15.3	19.4	13.3	25.2	-	-	26.0	11.5	17.3	-	9.0	6.3	4.2	-
Jul 19 a.m.	12.9	19.8	17.1	17.3	13.6	16.1	-	-	50.4	8.8	16.4	-	5.5	6.4	2.9	-
	12.6	18.5	17.0	16.7	15.6	20.1	-	-	22.3	8.8	17.7	-	5.6	6.1	2.7	-
Jul 26 a.m.	8.3	29.0	19.7	13.6	18.9	18.5	-	-	31.9	10.1	15.0	20.1	-	-	2.4	12.4
	7.3	16.9	17.9	13.8	19.4	20.0	-	-	35.1	9.3	13.8	46.8	-	-	2.2	10.2
Aug 2	8.9	21.1	11.4	11.7	2.7	16.7	-	-	147.1	9.1	17.1	19.1	-	-	8.0	9.9
	10.8	21.4	14.0	13.7	16.2	15.5	-	-	237.3	9.3	17.5	18.9	-	-	6.9	9.9
Aug 9 a.m.	7.9	35.6	15.0	16.8	16.4	14.8	-	-	-	7.2	16.3	-	8.9	-	2.1	7.5
	9.1	38.2	16.9	19.3	15.9	8.2	-	-	-	7.0	16.0	-	8.9	-	2.4	7.6
Aug 16 a.m.	4.9	17.2	15.4	9.4	11.4	7.0	-	-	86.0	5.0	14.4	14.0	-	-	1.2	5.1
	4.6	18.8	15.4	9.6	12.1	6.3	-	-	92.0	4.8	15.3	13.5	-	-	1.3	4.5
Aug 23	3.8	18.7	10.5	13.7	15.1	30.4	-	-	14.9	10.6	19.5	14.7	-	-	1.8	4.9
	-	14.1	9.9	14.7	14.1	27.7	-	-	16.8	10.9	18.5	15.1	-	-	1.9	4.6
Aug 30	4.9	26.4	16.4	13.4	18.6	21.6	-	-	18.8	8.4	16.6	20.4	-	-	4.0	8.2
	5.0	28.1	17.2	13.0	17.5	16.3	-	-	19.0	6.2	16.5	19.8	-	-	3.9	8.5
Sep 6	16.3	37.4	17.7	16.4	17.6	36.0	-	-	47.5	10.2	21.5	14.3	-	-	4.4	8.2
	-	39.8	-	16.8	19.0	35.0	-	-	53.0	10.2	17.7	14.5	-	-	4.4	6.9
Sep 13 a.m.	5.4	23.8	15.0	16.4	17.6	21.4	-	-	21.3	9.3	15.6	20.4	-	-	2.9	6.3
	4.4	21.2	15.0	16.0	17.0	23.1	-	-	21.8	10.0	16.2	15.8	-	-	2.7	7.2
Sep 20 a.m.	4.7	18.8	13.2	18.5	19.2	24.0	-	-	17.1	6.7	18.5	19.1	-	-	1.7	7.6
	4.7	20.3	10.3	17.9	20.4	24.1	-	-	17.4	6.2	21.1	18.1	-	-	1.7	7.0
Sep 27 a.m.	7.6	20.2	16.0	15.3	20.0	10.1	-	-	26.2	6.5	21.8	14.2	-	-	3.0	6.9
	7.4	21.1	16.4	14.3	21.0	9.2	-	-	26.6	7.0	18.2	14.0	-	-	2.9	7.1
Oct 4	10.8	24.8	21.7	25.4	20.6	sat.	-	-	sat.	23.2	sat.	26.6	-	-	5.4	11.5
	10.3	27.6	22.0	20.4	21.0	-	-	-	-	23.8	-	29.9	-	-	5.2	11.5
Oct 13	4.8	22.7	16.0	13.7	19.1	-	-	-	23.9	10.6	sat.	-	-	-	5.2	-
	5.3	21.5	17.5	14.5	19.5	-	-	-	22.7	12.8	-	-	-	-	3.8	-

1. All samples were taken approximately 1 foot (30 cm) below the surface.
2. All percentages were solved gravimetrically.
3. Sat. implies saturated - no sample taken.

Table 144 Soil moisture data in percent for the Rawson Lake Watershed for the year 1972.

	Northwest Subbasin						Camp Area		East Subbasin	
	1+00	6+00	12+00	P65	26+00	P36	M.S.	P23	3+00	10+50
May 23	13.4	24.5	14.8	sat.	24.1	sat.	19.9	4.5	15.8	23.5
	13.7	24.1	18.7	sat.	22.8	sat.	19.1	4.6	15.9	20.3
May 24	9.3	27.6	-	-	-	-	-	-	18.5	20.0
	8.4	27.3	-	-	-	-	-	-	18.0	20.1
May 26	7.6	26.1	-	-	-	-	-	-	14.6	24.6
	7.6	25.2	-	-	-	-	-	-	13.9	19.7
May 27	7.7	23.7	-	-	-	-	-	-	14.4	20.9
	3.8	22.8	-	-	-	-	-	-	16.4	-
May 28	9.4	29.2	-	-	-	-	-	-	13.1	sat.
	10.1	27.7	-	-	-	-	-	-	14.0	sat.
May 29	6.6	22.0	11.8	sat.	30.3	sat.	15.3	4.0	13.0	18.2
	8.6	24.0	11.6	sat.	24.9	sat.	14.5	4.0	12.9	21.6
May 30	11.8	18.2	-	-	-	-	-	-	-	-
	13.9	18.3	-	-	-	-	-	-	-	-
Jun 1	8.3	24.9	-	-	-	-	-	-	-	-
	8.9	30.6	-	-	-	-	-	-	-	-
Jun 3	7.7	25.5	-	-	-	-	-	-	14.9	15.9
	12.6	23.3	-	-	-	-	-	-	13.2	14.9
Jun 5	5.3	14.7	14.8	sat.	10.4	15.8	15.8	3.2	11.2	23.2
	5.8	16.1	8.9	sat.	10.8	15.6	12.2	3.1	9.8	20.7
Jun 7	5.1	20.4	-	-	-	-	-	-	9.0	19.7
	4.5	21.2	-	-	-	-	-	-	9.5	18.8
Jun 9	5.9	19.3	-	-	-	-	-	-	8.0	16.4
	6.7	19.4	-	-	-	-	-	-	7.7	23.8
Jun 12	5.4	17.7	10.6	sat.	8.0	26.8	17.4	4.2	9.2	20.8
	5.9	17.5	11.3	-	6.8	17.2	17.0	4.5	8.5	18.7
Jun 14	6.1	24.7	11.9	sat.	-	-	-	-	6.7	16.8
	6.1	25.9	11.8	sat.	-	-	-	-	6.9	18.8
Jun 15	5.7	18.4	-	-	-	-	-	-	15.9	20.3
	5.5	18.7	-	-	-	-	-	-	14.7	18.3
Jun 17	9.8	22.5	-	-	-	-	-	-	11.6	16.5
	7.6	21.7	-	-	-	-	-	-	12.1	17.2
Jun 19	9.6	25.6	16.4	sat.	16.3	sat.	22.3	7.0	12.9	18.1
	9.9	27.6	18.7	sat.	15.2	sat.	20.7	5.2	13.7	16.0
Jun 21	11.6	16.7	-	-	-	-	-	-	13.2	19.4
	12.1	21.0	-	-	-	-	-	-	12.7	16.5
Jun 23	7.6	22.6	-	-	-	-	-	-	9.6	14.8
	6.7	27.7	-	-	-	-	-	-	9.8	18.5
Jun 25	10.7	19.5	-	-	-	-	-	-	7.2	17.3
	8.2	16.1	-	-	-	-	-	-	7.8	17.4
Jun 26	5.4	15.1	12.6	17.2	17.2	19.3	12.0	3.7	7.9	19.3
	5.4	16.1	13.7	17.6	19.4	23.7	12.6	3.5	8.0	17.4

Table 144 Soil moisture data in percent for the Rawson Lake Watershed for the year 1972 (cont'd).

	Northwest Subbasin						Camp Area		East Subbasin	
	1+00	6+00	12+00	P65	26+00	P36	M.S.	P23	3+00	10+50
Jun 28	6.2	21.6	15.6	-	-	16.2	15.2	-	12.1	15.4
	6.4	19.3	14.7	-	-	17.7	13.6	-	10.5	14.5
Jun 30	4.1	15.9	-	-	-	-	-	-	7.0	16.7
	3.6	17.2	-	-	-	-	-	-	7.5	15.8
Jul 3	4.8	19.7	13.6	sat.	30.0	19.3	14.7	4.0	8.4	23.5
	5.2	22.3	12.7	sat.	25.9	19.0	14.7	3.2	11.2	19.2
Jul 5	5.9	17.1	10.8	18.5	-	-	-	-	12.5	14.7
	11.4	17.7	12.3	19.8	-	-	-	-	15.6	14.6
Jul 7	7.5	19.5	-	-	-	-	-	-	-	-
	6.8	15.6	-	-	-	-	-	-	-	-
Jul 8	-	-	-	-	-	-	-	-	11.1	15.6
	-	-	-	-	-	-	-	-	10.9	15.0
Jul 10	3.2	15.6	6.4	20.2	10.0	16.6	9.7	2.2	11.8	22.5
	3.6	14.4	8.3	19.7	7.2	16.6	8.3	2.9	10.1	18.4
Jul 12	6.8	25.7	-	-	-	-	-	-	18.9	sat.
	9.1	30.9	-	-	-	-	-	-	17.7	sat.
Jul 14	25.3	sat.	-	-	-	-	-	-	16.4	sat.
	7.2	sat.	-	-	-	-	-	-	17.6	sat.
Jul 17	8.2	sat.	14.9	sat.	20.4	sat.	17.8	2.6	19.1	20.8
	9.1	sat.	15.2	sat.	20.5	sat.	19.0	2.9	18.8	18.1
Jul 19	5.0	22.0	-	-	-	-	-	-	14.7	22.1
	4.5	25.1	-	-	-	-	-	-	14.2	21.6
Jul 21	9.7	23.4	-	-	-	-	-	-	12.0	14.1
	11.0	26.0	-	-	-	-	-	-	13.0	14.4
Jul 24	11.1	25.2	13.1	sat.	13.7	21.0	19.3	4.4	9.5	17.9
	11.5	24.3	13.5	sat.	11.7	20.8	17.4	4.6	9.0	17.0
Jul 26	4.3	22.5	11.5	sat.	-	-	-	-	10.0	14.3
	4.5	18.2	12.9	sat.	-	-	-	-	9.4	13.9
Jul 28	5.2	15.1	-	-	-	-	-	-	8.9	21.1
	5.1	17.6	-	-	-	-	-	-	9.0	19.0
Jul 30	11.1	19.4	-	-	-	-	-	-	14.6	18.5
	9.9	19.0	-	-	-	-	-	-	13.4	18.3
Jul 31	7.1	27.3	11.6	sat.	22.1	sat.	7.3	6.2	10.8	sat.
	7.4	22.7	11.9	sat.	21.1	sat.	7.7	6.2	9.7	sat.
Aug 2	7.8	21.1	17.8	sat.	-	sat.	-	-	11.5	sat.
	9.0	18.8	17.0	sat.	-	sat.	-	-	12.3	sat.
Aug 4	6.4	17.6	-	-	-	-	-	-	17.6	21.4
	5.7	18.4	-	-	-	-	-	-	15.2	20.1
Aug 7	5.5	23.9	14.1	sat.	24.9	sat.	4.8	17.3	8.2	15.1
	5.9	24.7	12.4	sat.	25.3	sat.	5.6	16.9	9.6	15.8
Aug 9	9.6	20.0	-	-	-	-	-	-	9.1	19.0
	9.2	20.6	-	-	-	-	-	-	9.9	18.3

Table 144 Soil moisture data in percent for the Rawson Lake Watershed for the year 1972 (cont'd).

	Northwest Subbasin						Camp Area		East Subbasin	
	1+00	6+00	12+00	P65	26+00	P36	M.S.	P23	3+00	10+50
Aug 11	9.7	23.3	-	-	-	-	-	-	10.9	16.7
	-	21.1	-	-	-	-	-	-	11.6	19.9
Aug 14	10.7	20.1	14.6	sat.	9.4	17.3	19.1	3.3	8.1	19.5
	11.4	21.4	14.3	sat.	8.9	17.4	18.2	3.2	9.0	16.9
Aug 16	5.4	26.5	13.4	-	-	-	-	-	12.0	21.0
	7.0	26.2	13.6	-	-	-	-	-	12.5	23.5
Aug 18	5.9	22.7	-	-	-	-	-	-	14.0	17.7
	6.0	22.1	-	-	-	-	-	-	13.4	19.1
Aug 21	18.8	20.5	21.5	sat.	53.2	sat.	25.0	10.9	16.6	sat.
	13.0	18.0	25.6	sat.	50.8	sat.	25.7	10.1	15.1	sat.
Aug 23	11.6	18.5	20.2	sat.	-	-	-	-	24.5	30.6
	11.5	16.3	18.6	sat.	-	-	-	-	21.6	35.7
Aug 25	15.2	24.3	-	-	-	-	-	-	14.8	20.7
	15.2	23.3	-	-	-	-	-	-	14.8	19.7
Aug 28	12.8	19.5	16.4	-	24.7	17.6	19.3	22.4	10.7	15.6
	11.1	22.5	14.2	-	22.9	19.7	22.3	5.0	8.9	18.8
Aug 30	7.5	15.8	17.9	-	-	-	-	-	9.1	32.3
	10.5	20.7	11.4	-	-	-	-	-	7.6	20.8
Sep 4	5.3	16.6	11.8	sat.	14.2	17.8	16.7	4.0	7.4	28.0
	5.8	18.4	14.2	sat.	13.5	20.5	20.0	4.0	8.8	21.6
Sep 11	9.6	28.5	13.6	sat.	12.0	sat.	4.4	16.7	9.3	22.0
	14.2	25.0	17.1	sat.	11.6	sat.	4.2	17.3	9.3	23.4
Sep 20	14.9	25.9	10.3	-	9.4	21.1	14.9	4.2	-	-
	17.4	21.7	10.9	-	10.2	22.0	15.3	4.5	-	-
Sep 25	13.3	24.8	15.3	sat.	12.7	sat.	13.7	5.5	8.4	18.1
	13.4	12.0	11.5	sat.	11.1	sat.	13.8	5.9	8.7	17.7
Oct 4	7.3	25.6	16.4	sat.	9.6	sat.	15.6	1.4	8.4	sat.
	7.2	23.4	14.0	sat.	9.7	sat.	17.2	2.0	8.8	sat.
Oct 11	8.7	28.8	12.2	sat.	9.6	sat.	16.1	6.8	8.6	19.3
	7.3	39.4	14.4	sat.	10.4	sat.	18.9	7.6	8.4	19.6
Oct. 17	Ground Frozen									

1. All samples were taken approximately 1 foot (30 cm) below the surface.
2. All percentages were solved gravimetrically.
3. Sat. implies saturated - no sample taken.

Table 145 Soil moisture data in percent for the Rawson Lake Watershed for the year 1973.

	Northwest Subbasin						Camp Area		East Subbasin	
	1+00	6+00	12+00	N.W.	26+00	P36	M.S.	P23	3+00	10+50
May 16	11.0	38.0	19.0	-	16.0	sat.	23.0	-	11.0	17.0
	11.0	36.0	21.0	-	14.0	-	24.0	-	12.0	17.0
May 23	11.0	29.0	23.0	-	12.0	sat.	18.0	-	12.0	sat.
	10.0	25.0	17.0	-	14.0	-	16.0	-	10.0	-
May 30	15.1	23.1	17.8	-	20.7	sat.	16.8	-	13.9	sat.
	13.6	24.7	19.6	-	15.7	-	17.8	-	13.6	-
Jun 6	10.4	-	-	-	-	-	19.6	-	14.5	-
	10.6	-	-	-	-	-	18.6	-	15.0	-
Jun 8	-	-	-	11.7	-	-	11.9	-	11.6	-
	-	-	-	10.9	-	-	12.2	-	12.0	-
Jun 11	-	-	-	10.0	-	-	13.7	-	15.7	-
	-	-	-	10.7	-	-	14.5	-	15.8	-
Jun 13	-	-	-	9.5	-	-	12.9	-	10.8	-
	-	-	-	10.8	-	-	12.8	-	11.6	-
Jun 15	-	-	-	13.5	-	-	16.7	-	14.1	-
	-	-	-	13.6	-	-	15.8	-	14.3	-
Jun 18	-	-	-	16.2	-	-	18.4	-	15.5	-
	-	-	-	17.9	-	-	18.9	-	15.1	-
Jun 20	-	-	-	15.1	-	-	18.4	-	16.3	-
	-	-	-	15.6	-	-	18.5	-	16.6	-
Jun 22	-	-	-	12.8	-	-	16.7	-	14.8	-
	-	-	-	13.0	-	-	16.3	-	15.0	-
Jun 25	-	-	-	11.3	-	-	16.0	-	12.8	-
	-	-	-	11.5	-	-	16.2	-	12.5	-
Jun 27	-	-	-	12.2	-	-	16.0	-	14.4	-
	-	-	-	12.6	-	-	16.2	-	14.2	-
Jun 29	-	-	-	12.4	-	-	19.5	-	11.3	-
	-	-	-	13.3	-	-	19.2	-	11.3	-
Jul 2	-	-	-	11.7	-	-	16.7	-	12.6	-
	-	-	-	10.5	-	-	15.0	-	13.6	-
Jul 4	-	-	-	12.0	-	-	14.4	-	14.9	-
	-	-	-	12.5	-	-	14.3	-	14.7	-
Jul 6	-	-	-	10.7	-	-	13.9	-	6.2	-
	-	-	-	10.8	-	-	17.4	-	7.5	-
Jul 9	-	-	-	16.7	-	-	16.2	-	sat.	-
	-	-	-	17.0	-	-	16.3	-	-	-
Jul 11	-	-	-	14.1	-	-	17.4	-	12.6	-
	-	-	-	13.1	-	-	-	-	13.2	-
Jul 13	-	-	-	13.8	-	-	17.3	-	15.7	-
	-	-	-	13.2	-	-	17.3	-	15.0	-
Jul 16	-	-	-	13.5	-	-	20.3	-	13.0	-
	-	-	-	15.4	-	-	20.6	-	12.6	-

Table 145 Soil moisture data in percent for the Rawson Lake Watershed for the year 1973 (cont'd)

	Northwest Subbasin						Camp Area		East Subbasin	
	1+00	6+00	12+00	N.W.	26+00	P36	M.S.	P23	3+00	10+50
Jul 18	-	-	-	9.4	-	-	14.8	-	13.0	-
	-	-	-	11.8	-	-	14.2	-	13.2	-
Jul 20	-	-	-	11.0	-	-	19.4	-	12.5	-
	-	-	-	10.2	-	-	16.3	-	12.9	-
Jul 23	-	-	-	9.1	-	-	17.9	-	13.4	-
	-	-	-	9.1	-	-	16.5	-	-	-
Jul 25	-	-	-	11.6	-	-	15.9	-	12.9	-
	-	-	-	10.9	-	-	17.0	-	13.1	-
Jul 27	-	-	-	18.8	-	-	23.8	-	14.1	-
	-	-	-	17.8	-	-	23.9	-	13.9	-
Jul 30	-	-	-	17.7	-	-	16.0	-	12.5	-
	-	-	-	16.4	-	-	16.2	-	12.6	-
Aug 1	-	-	-	-	-	-	23.1	-	-	-
	-	-	-	-	-	-	23.3	-	-	-
Aug 3	-	-	-	13.5	-	-	18.6	-	13.7	-
	-	-	-	13.8	-	-	19.0	-	14.3	-
Aug 6	-	-	-	14.8	-	-	16.5	-	10.2	-
	-	-	-	15.4	-	-	16.9	-	10.2	-
Aug 8	-	-	-	15.7	-	-	12.8	-	14.2	-
	-	-	-	15.5	-	-	13.0	-	14.6	-
Aug 13	-	-	-	15.5	-	-	23.4	-	17.8	-
	-	-	-	14.7	-	-	28.0	-	17.5	-
Aug 15	-	-	-	18.5	-	-	17.5	-	17.0	-
	-	-	-	17.8	-	-	17.4	-	18.6	-
Aug 17	-	-	-	12.8	-	-	21.5	-	16.1	-
	-	-	-	12.1	-	-	21.4	-	16.7	-
Aug 20	-	-	-	20.0	-	-	13.0	-	12.6	-
	-	-	-	17.9	-	-	13.3	-	14.6	-
Aug 22	-	-	-	14.2	-	-	18.1	-	11.9	-
	-	-	-	15.2	-	-	17.8	-	12.3	-
Aug 24	-	-	-	10.7	-	-	20.0	-	11.4	-
	-	-	-	10.7	-	-	19.0	-	11.4	-
Aug 27	-	-	-	10.6	-	-	20.6	-	9.5	-
	-	-	-	11.5	-	-	20.5	-	9.2	-
Aug 29	-	-	-	12.1	-	-	15.4	-	12.1	-
	-	-	-	11.4	-	-	14.6	-	13.1	-
Aug 31	-	-	-	10.6	-	-	14.4	-	10.9	-
	-	-	-	10.6	-	-	14.0	-	10.3	-

1. All samples were taken approximately 1 foot (30 cm) below the surface.
2. All percentages were solved gravimetrically.
3. Sat. implies saturated - no sample taken.

Table 146 Soil moisture data in percent for the Rawson Lake Watershed for the year 1975.

	N.W.			M.S.			W10			W11		
	0-3"	3-6"	6-9"	0-3"	3-6"	6-9"	0-3"	3-6"	6-9"	0-3"	3-6"	6-9"
May 26	21.2	-	-	25.2	25.2	22.6	22.0	16.2	14.7	21.1	18.9	17.6
	26.2	-	-	25.6	21.4	19.7	20.3	17.3	15.4	20.9	-	-
May 29	22.8	-	-	34.0	20.1	-	17.0	14.4	18.4	21.4	19.0	19.2
	19.7	-	-	63.1	19.0	18.1	17.8	11.4	12.3	22.0	22.3	19.7
Jun 2	16.0	-	-	20.9	16.5	21.4	14.3	9.3	9.0	19.2	22.7	17.3
	17.4	-	-	40.1	20.1	17.0	12.3	8.5	10.5	7.1	4.1	4.3
Jun 6	25.3	-	-	26.6	18.5	18.2	15.5	14.5	11.1	20.9	20.4	20.2
	26.5	-	-	29.8	21.1	21.0	18.8	9.8	9.9	20.4	21.6	19.1
Jun 9	20.5	-	-	19.5	19.4	21.3	18.8	14.6	18.5	23.3	20.3	17.3
	14.7	-	-	28.4	12.3	17.8	20.4	9.3	11.4	7.3	19.2	8.7
Jun 12	23.9	-	-	21.5	13.6	14.0	13.8	9.0	8.2	20.7	17.5	15.5
	28.7	-	-	31.8	23.2	25.1	13.4	8.5	8.4	20.7	20.9	17.8
Jun 16	23.8	-	-	37.9	18.9	21.0	14.2	11.5	12.8	20.9	17.8	21.0
	20.1	-	-	18.9	17.1	20.1	15.1	8.9	10.8	21.9	16.0	21.7
Jun 26	28.0	-	-	19.5	21.4	23.0	19.5	15.8	16.8	24.6	20.7	21.8
	28.1	-	-	26.0	15.6	18.6	19.1	15.8	17.6	19.4	24.2	22.2
Jul 4	20.4	-	-	20.0	17.8	18.0	22.8	18.2	17.4	21.6	20.0	16.7
	21.2	-	-	20.8	22.5	25.1	23.5	14.6	16.1	21.7	21.6	19.2
Jul 16	11.1	-	-	15.4	17.7	22.7	13.2	10.9	13.0	20.3	21.0	17.9
	12.7	-	-	16.3	17.8	21.0	14.6	11.3	-	31.6	15.6	21.9
Jul 24	10.2	-	-	15.6	14.8	14.9	17.3	6.9	6.9	22.9	19.2	12.8
	10.2	-	-	13.8	14.8	14.1	26.8	13.4	6.8	16.9	12.4	13.2
Jul 30	13.1	-	-	13.1	13.8	15.4	15.3	7.8	7.3	16.9	-	15.6
	7.3	-	-	32.7	13.9	14.0	13.3	7.4	7.3	24.5	17.9	18.3
Aug 7	10.1	-	-	10.8	11.9	14.1	12.4	6.6	6.5	23.7	18.4	12.3
	11.3	-	-	25.2	24.6	11.1	8.4	6.4	6.5	17.3	21.7	21.1
Aug 15	19.4	-	-	14.1	13.7	14.0	18.2	9.9	12.4	15.4	11.1	9.4
	24.9	-	-	17.2	13.4	26.0	17.8	8.6	8.4	22.7	21.6	17.3
Aug 25	16.4	-	-	16.9	21.8	11.2	14.6	12.6	11.2	22.3	16.3	16.8
	19.1	-	-	17.7	17.5	14.5	30.9	12.7	13.0	24.8	18.9	15.0
Sep 12	23.4	-	-	20.3	18.5	16.8	17.5	15.5	14.6	20.1	20.7	18.6
	25.6	-	-	15.3	16.1	9.9	24.4	12.1	11.7	27.5	25.7	14.7
Sep 24	28.3	-	-	19.5	13.5	13.0	19.5	13.3	12.2	16.9	17.9	17.9
	28.5	-	-	20.9	15.5	10.9	13.9	9.6	9.2	23.1	23.1	21.8
Sep 29	21.1	-	-	36.1	18.0	10.8	10.5	9.5	7.9	22.8	17.6	14.9
	17.7	-	-	15.8	14.5	15.4	14.0	12.8	12.4	26.1	17.9	15.6
Oct 17	15.7	-	-	16.6	11.4	12.0	18.7	8.3	9.0	20.0	19.6	18.2
	25.0	-	-	17.3	16.7	16.7	15.2	8.6	10.0	27.7	19.9	16.2

1. Samples taken were representative of each depth range 0 to 3 inches, 3 to 6 inches and 6 to 9 inches.
2. All percentages above were solved gravimetrically.

APPENDIX 11

SUMMARY OF SEDIMENT LOAD DATA FOR THE EAST INFLOW TO RAWSON LAKE

On June 26, 1974, an extreme forest fire burned much of the Experimental Lakes Area, including the entire East Subbasin of the Rawson Lake Watershed. The forest fire and its effects have been described by Schindler et al. (1980). Immediately following the fire it was decided to attempt to collect data on the transportation of sediment load in the stream through the early years of forest regeneration in the basin. The importance of physical weathering in the East Subbasin is evident by the occurrence of the deltaic fan at the mouth of the stream entering Rawson Lake. This sediment load material, or solid debris load, as a result of the physical weathering process, can be divided into the bedload and the suspended load.

Bedload

Measurement of bedload

The bedload is the solid debris load that moves along the stream bottom by rolling, sliding and saltation. A bedload sediment sampler was installed in July 1974 only a few weeks after the fire. Unfortunately, this sampler was a failure, yielding no quantitative data, and only one sample for grain size analysis. A second sampler, a flow through sediment trap, was constructed and installed in 1975. It functioned extremely well, and has collected essentially all bedload sediment transported from the East Subbasin since August 1, 1975. Accurate measurements of volume in situ were easily made on a regular basis, and samples could easily be removed at any time. Table 147 provides a summary of all accumulated bedload volume from 1975 to 1978.

Grain size analysis of bedload

Each time the sediment trap was emptied, sub-samples were retained for grain size analysis. Figures 68 provide grain size distribution diagrams of samples taken on nine occasions from 1974 to 1978. Grain sizes were determined by sieve analysis, using a mechanical sieve shaker and standard methods.

Density of bedload

In order to calculate mass bedload in terms of weight, the dry density of the material had to be determined. Samples were obtained by inserting a plexiglass tube with a beveled sharpened edge into undisturbed, submerged bedload. The core sample was removed and transported to the lab without loss of moisture or sediment, and density was determined. Dry density is calculated by dividing the dry weight of the material by the volume of the core. The average dry density of bedload was 2.50 grams/cm^3 based on the following 6 values:

Date sampled	Dry density gms/cm^3
July 3, 1978	2.37, 2.37
July 12, 1979	2.58, 2.68, 2.49, 2.52

Suspended Sediment

In order to estimate the amount of suspended sediment entering Rawson Lake from the East Subbasin, a sampling program was begun in May 1978. Water samples were collected on 19 occasions from May 23 to October 10. Table 148 summarizes the sample information and concentration data determined by filtration. As the study was preliminary, sampling volumes, frequency and intervals were irregular. Campbell and Elliott (1975) reported that suspended sediment at levels of 2 to 3 mg per litre in natural waters can be measured to ± 5% accuracy by filtration methods.

Field methods

Samples were collected in the vicinity of the bedload sampler located approximately 150 metres from the lake shore on the East inflow stream. Clean 500 ml and 1000 ml plastic bottles were filled from the centre of the stream. Filling was achieved by submerging and moving the bottle up and down until an integrated sample over about 2/3 of the depth of the stream was collected. The stream width was about 1.5 metres and the depth ranged from about .15 metres to .6 metres depending on the flow. Discharges at the time of sampling are also given in Table 148. Samples were refrigerated until the time of filtration.

Labratory methods

Samples were filtered through Whatman GF/C 42.5 mm diameter glass fiber filters using glass Millipore filter units and a vacuum of 5-10 psi. Only filter papers that had been ignited at 525°C for a minimum of 8 hours were used. Before filtering, papers were dried for a minimum of 8 hours at 90-95°C, cooled in a desiccator, and weighed to 0.01 mg for initial weight. After filtering, papers were again dried for a minimum of 8 hours at 90-95° C, cooled in a desiccator, and weighed to 0.01 mg for a final weight. During filtering, if a filter began to clog or slow down, more than one paper was used. To verify the procedure, a 1000 ml sample of distilled water was included with each batch of samples filtered.

Suspended organic debris

It should be noted that there is a major component of suspended sediment not included in this data. Large amounts of floating organic debris, consisting mainly of branches, twigs, leaves and pine needles, make their way to the lake each year during peak runoff events. Several types of net and screen sampling devices were used to collect this material, resulting in many samples for qualitative analysis, but no reliable or useful quantitative data.

REFERENCES

CAMPBELL, P., and S. ELLIOTT. 1975. Assessment of centrifugation and filtration as methods of determining low concentrations of suspended sediment in natural waters. Fish. Mar. Serv. Res. Dev. Tech. Rep. 545: 18 p.

SCHINDLER, D.W., R.W. NEWBURY, K.G. BEATY, J. PROKOPOWICH, T. RUSZCZYNSKI, and J.A. DALTON. 1980. Effects of a windstorm and forest fire on chemical losses from forested watersheds and on the quality of receiving streams. Can. J. Fish. Aquat. Sci. 37: 328-334.

Table 147 Measurements of stream bedload from the East Inflow to Rawson Lake for 1975 to 1978.

Date	Time (cst)	Accumulated Volumes (ft^3)
1975		
Aug. 1	approximate date sampler activated	
Aug. 28	14:00	* 25.73
Sep. 2	13:40	28.47
Sep. 8	10:00	31.82
Sep. 12	08:45	39.37
Sep. 22	08:25	46.98
Oct. 1	13:00	* 49.08
Oct. 17	13:45	53.60
Nov. 4	14:15	* 62.68
1976		
Apr. 29	P.M.	62.0
May 3	P.M.	* 62.0
May 10	14:35	63.15
May 18	09:20	72.0
May 26	08:40	71.8
May 31	10:00	71.85
Jun. 4	13:20	71.90
Jun. 7	09:45	72.0
Jun. 10	08:35	72.2
Jun. 11	15:45	72.4
Jun. 12	11:45	73.15
Jun. 12	16:45	74.70
Jun. 14	10:35	87.55
Jun. 16	18:15	100.0
Jun. 18	08:40	*101.1
Jun. 24	12:35	102.05
Jun. 25	13:45	102.35
Jun. 26	11:30	109.35
Jun. 26	18:40	110.5
Jun. 27	15:25	113.15
Jun. 29	13:25	120.7
Jul. 1	13:40	127.05
Jul. 7	13:25	128.45
Jul. 14	14:45	128.35
July 16	09:10	* 127.80
Aug. 10	10:10	128.90
Aug. 10	16:25	128.85
Aug. 11	10:10	130.60
Aug. 13	14:30	133.90
Aug. 18	09:10	133.50
Aug. 19	10:40	133.85
Aug. 19	13:10	134.1
Aug. 20	14:35	134.75
Aug. 31	13:30	135.49
Sep. 13	09:00	135.30
Sep. 14	16:00	135.85
Sep. 22	14:40	135.80
Sep. 29	09:30	135.95
Oct. 8	14:55	* 135.85
1977		
May 16	10:30	4.35
May 19	09:25	8.05
May 20	10:00	8.06
May 20	12:30	9.60
May 20	15:15	9.85
May 23	10:10	12.40
May 24	08:20	14.20
May 25	13:00	16.35
May 27	08:45	17.90
May 27	14:45	17.80
May 30	12:40	19.50
May 31	09:30	18.65
Jun. 1	13:30	20.35
Jun. 5	12:45	21.30
Jun. 7	10:15	23.75
Jun. 9	08:55	24.15
Jun. 12	12:15	24.50
Jun. 13	11:15	24.20
Jun. 14	09:15	24.80
Jun. 15	07:00	25.50
Jun. 16	08:45	27.20
Jun. 20	06:30	30.95
Jun. 23	09:55	* 34.50
Jun. 26	09:45	36.85
Jun. 28	09:10	37.30
Jun. 30	10:00	38.70
Jul. 5	09:00	41.10
Jul. 7	08:45	40.70
Jul. 12	08:55	40.85
Jul. 14	08:45	41.10
Jul. 19	09:00	41.35
Jul. 21	09:00	41.00
Jul. 26	08:40	41.75
Aug. 2	09:20	43.45
Aug. 4	08:55	44.00
Aug. 9	09:00	42.90
Aug. 11	08:45	43.65
Aug. 16	08:55	43.05
Aug. 18	08:50	43.25
Aug. 23	09:50	43.20
Aug. 25	08:50	43.65
Aug. 26	09:00	43.10
Aug. 27	08:30	43.90
Aug. 29	11:40	45.20
Aug. 30	08:30	45.45
Sep. 8	15:30	44.87
Sep. 15	10:30	52.92
Sep. 22	11:00	52.80
Sep. 29	11:00	53.31
Oct. 6	14:30	53.91
Oct. 13	10:00	53.20
Oct. 20	11:00	52.59
Oct. 27	12:30	* 53.40
1978		
May 3	10:00	4.12
May 9	14:15	5.12
May 15	10:55	4.98
May 23	13:40	8.21
May 26	No measurements available.	
May 30	14:00	11.84
Jun. 6	17:00	13.43
Jun. 13	13:30	13.84
Jun. 20	13:50	14.26
Jun. 27	08:40	14.31
Jul. 3	13:30	* 14.69
Jul. 11	10:45	15.43
Jul. 20	12:30	16.69
Jul. 25	10:30	16.98
Aug. 1	13:15	17.84
Aug. 8	09:00	18.85
Aug. 15	09:00	19.05
Aug. 16	10:30	19.46
Aug. 17	08:45	19.85
Aug. 22	09:45	21.78
Aug. 29	08:50	22.19
Sep. 5	08:35	22.90
Sep. 12	13:30	22.48
Sep. 14	10:30	22.90
Sep. 19	14:30	24.19
Sep. 26	10:00	24.12
Oct. 3	12:30	24.70
Oct. 10	11:00	24.21
Oct. 17	13:00	24.72
Oct. 24	10:30	24.02
Oct. 26	12:00	* 24.42
Nov. 1	11:00	24.42

Notes: 1) All times are central standard (cst).
2) Bedload volumes are in cubic feet as measured. cubic feet x 0.028316 = cubic meters.
3) * indicates sampler was emptied following measurement.

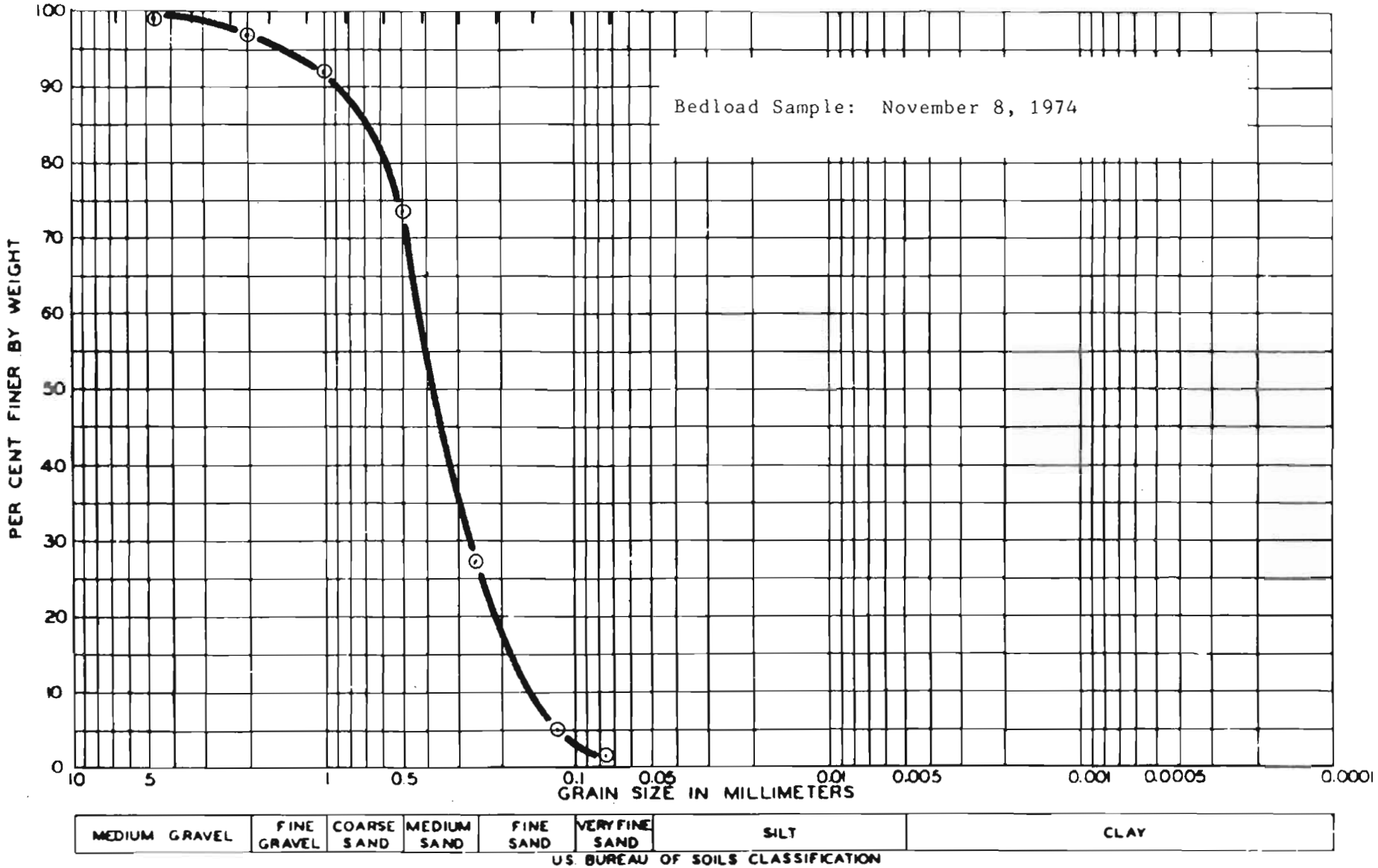


Fig. 68 Grain size distribution diagram of East Inflow stream bedload sample taken November 8, 1974.

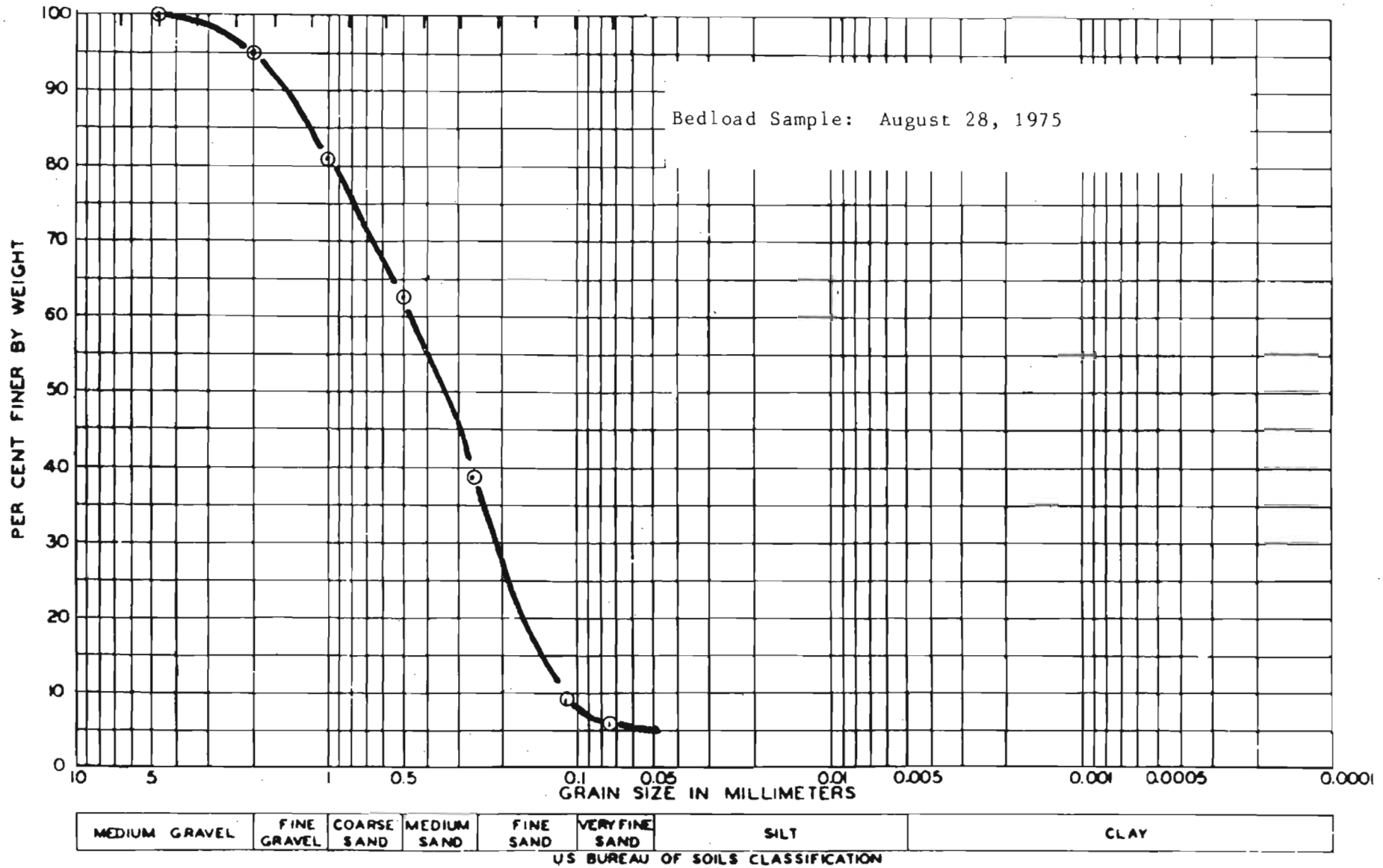


Fig. 68 Grain size distribution diagram of East Inflow stream bedload sample taken August 28, 1975.

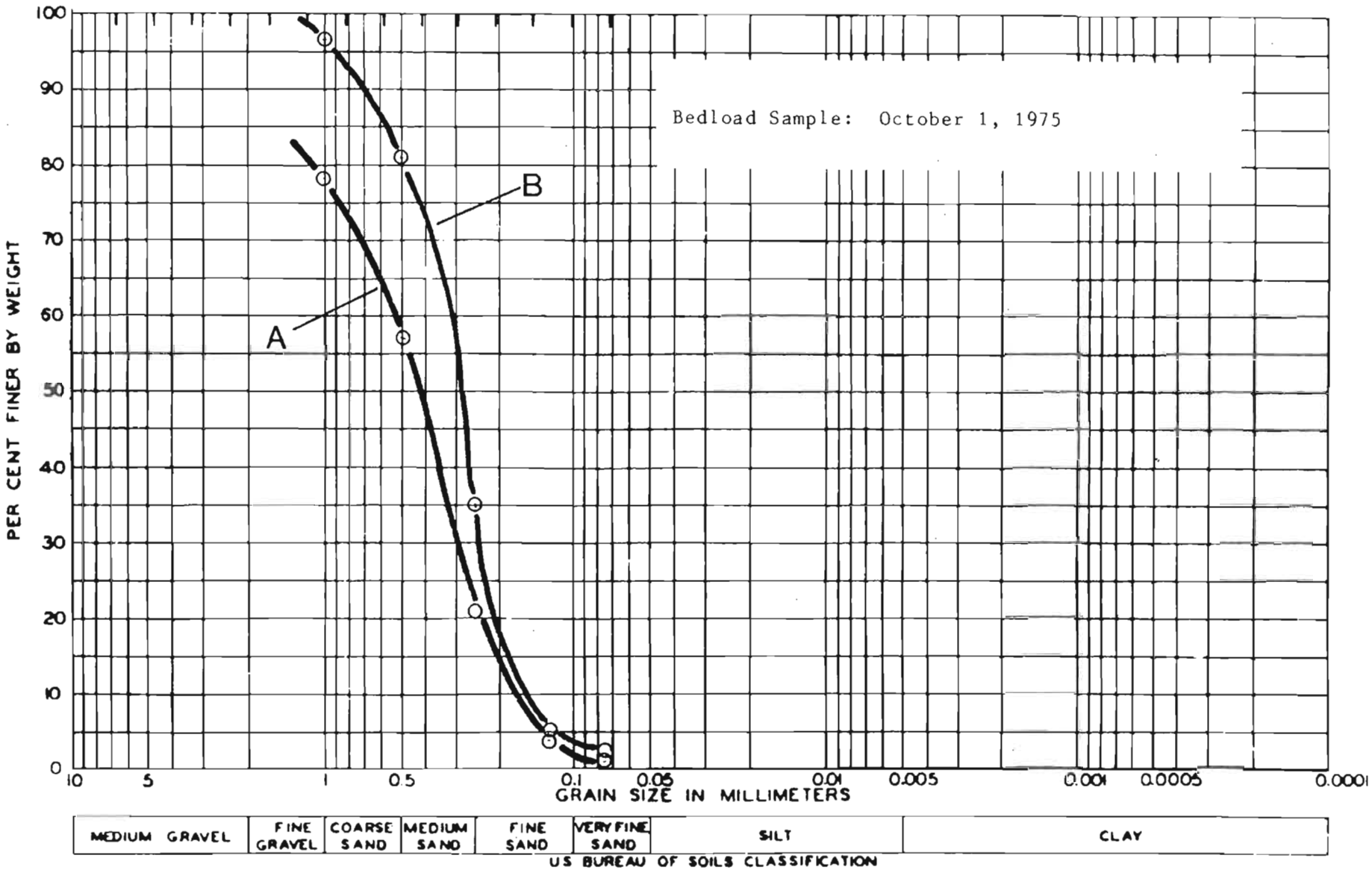


Fig. 68 Grain size distribution diagram of East Inflow stream bedload sample taken October 1, 1975.

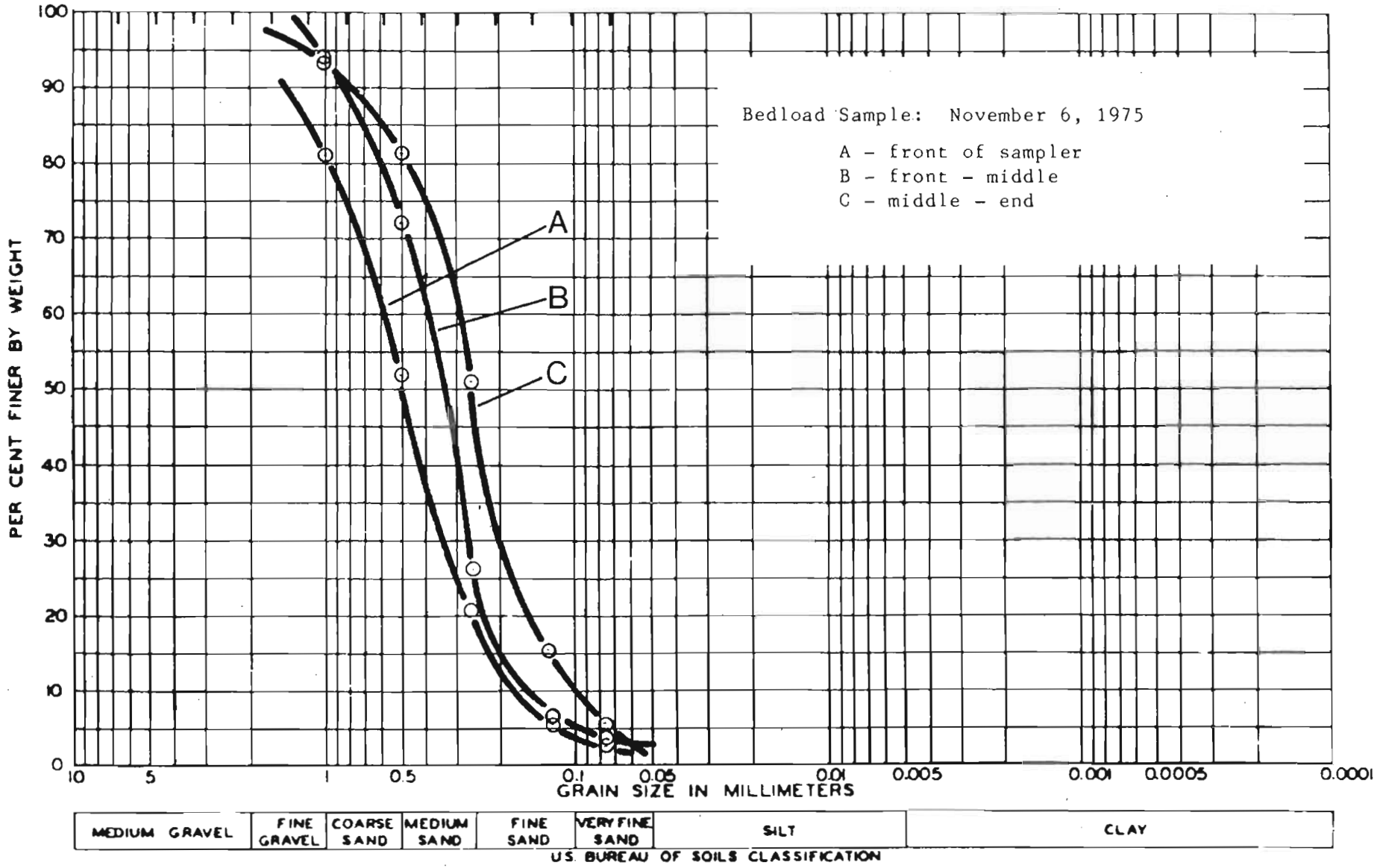


Fig. 68 Grain size distribution diagram of East Inflow stream bedload sample taken November 6, 1975.

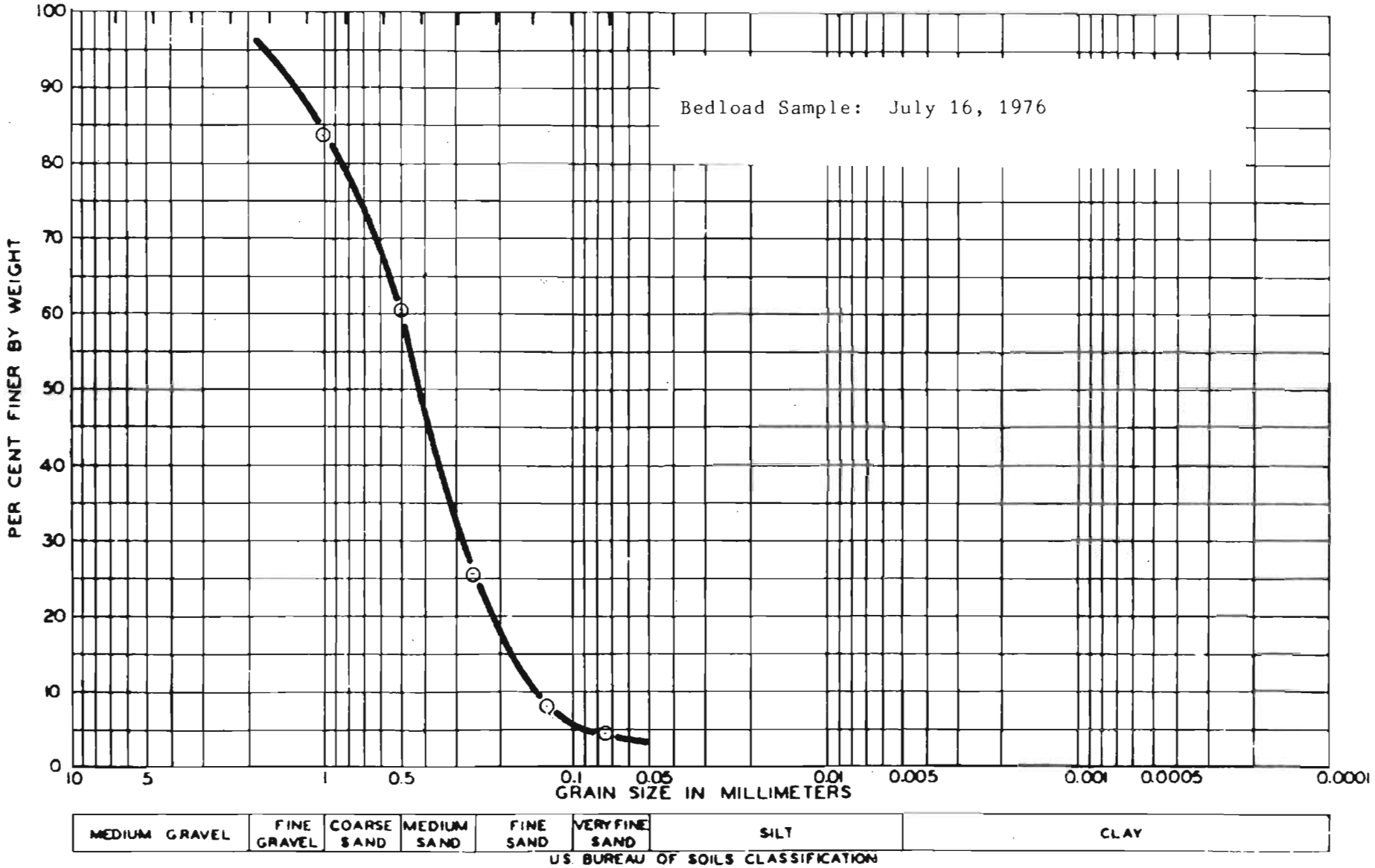


Fig. 68 Grain size distribution diagram of East Inflow stream bedload sample taken July 16, 1976.

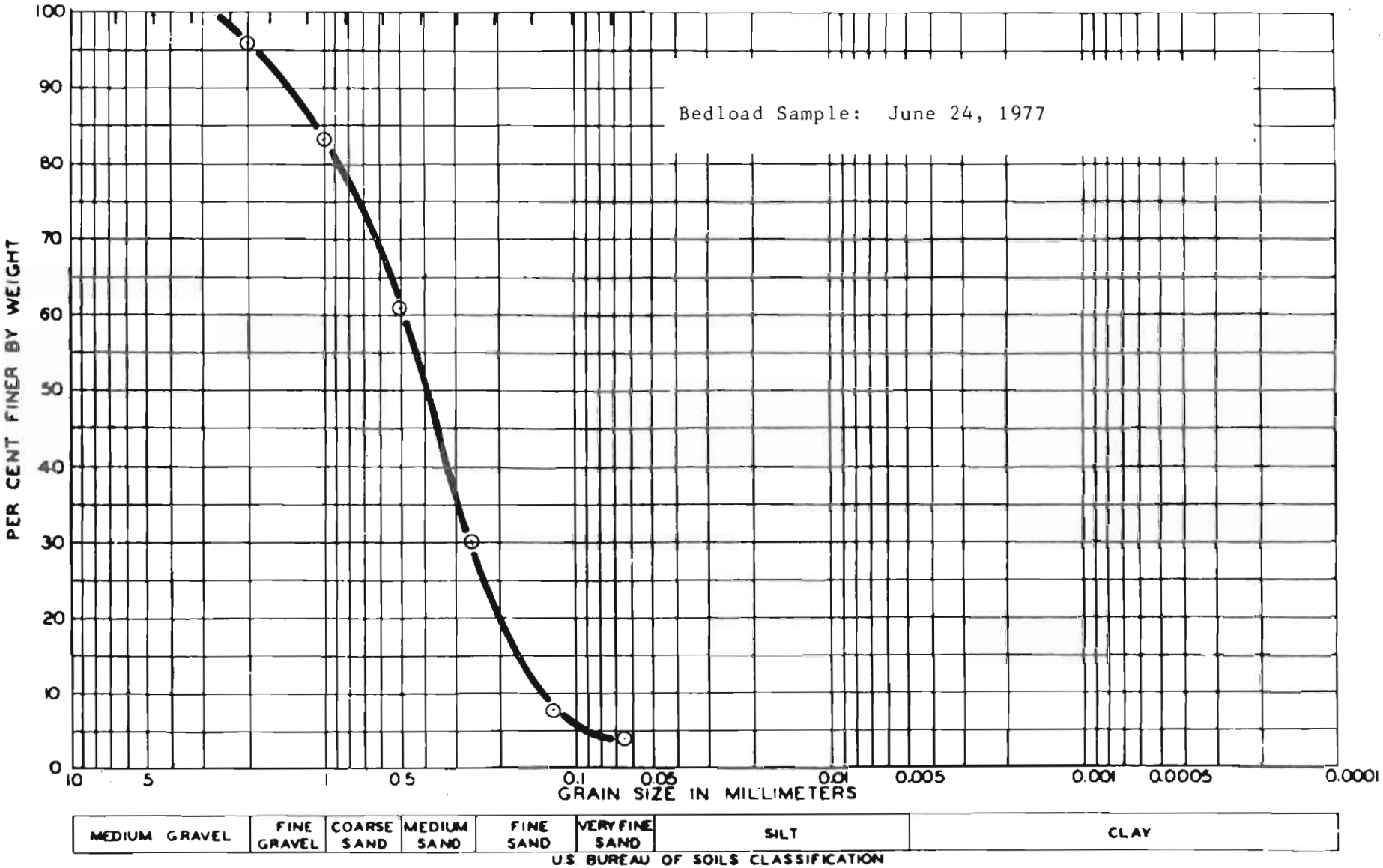


Fig. 68 Grain size distribution diagram of East Inflow stream bedload sample taken June 24, 1977.

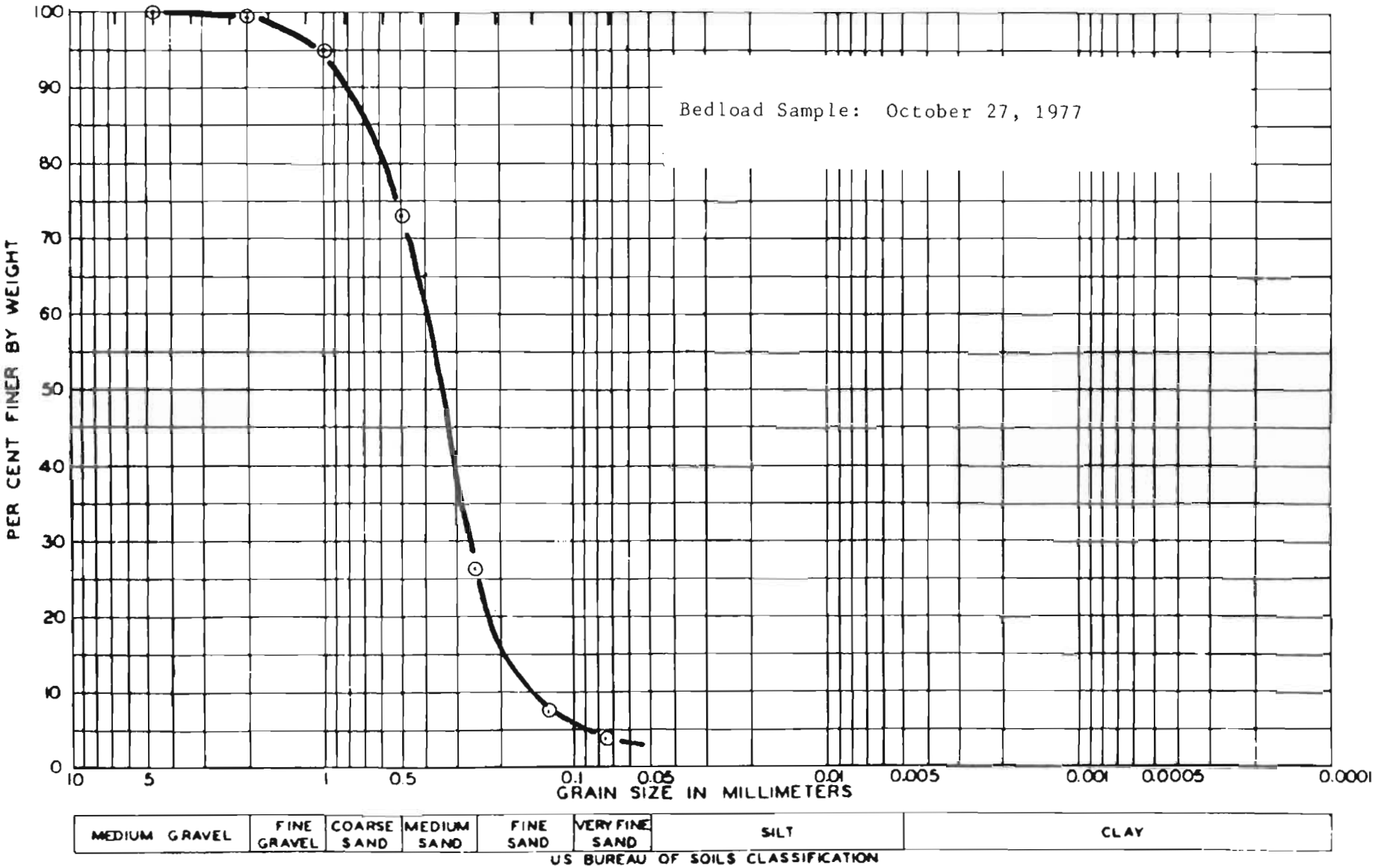


Fig. 68 Grain size distribution diagram of East Inflow stream bedload sample taken October 27, 1977.

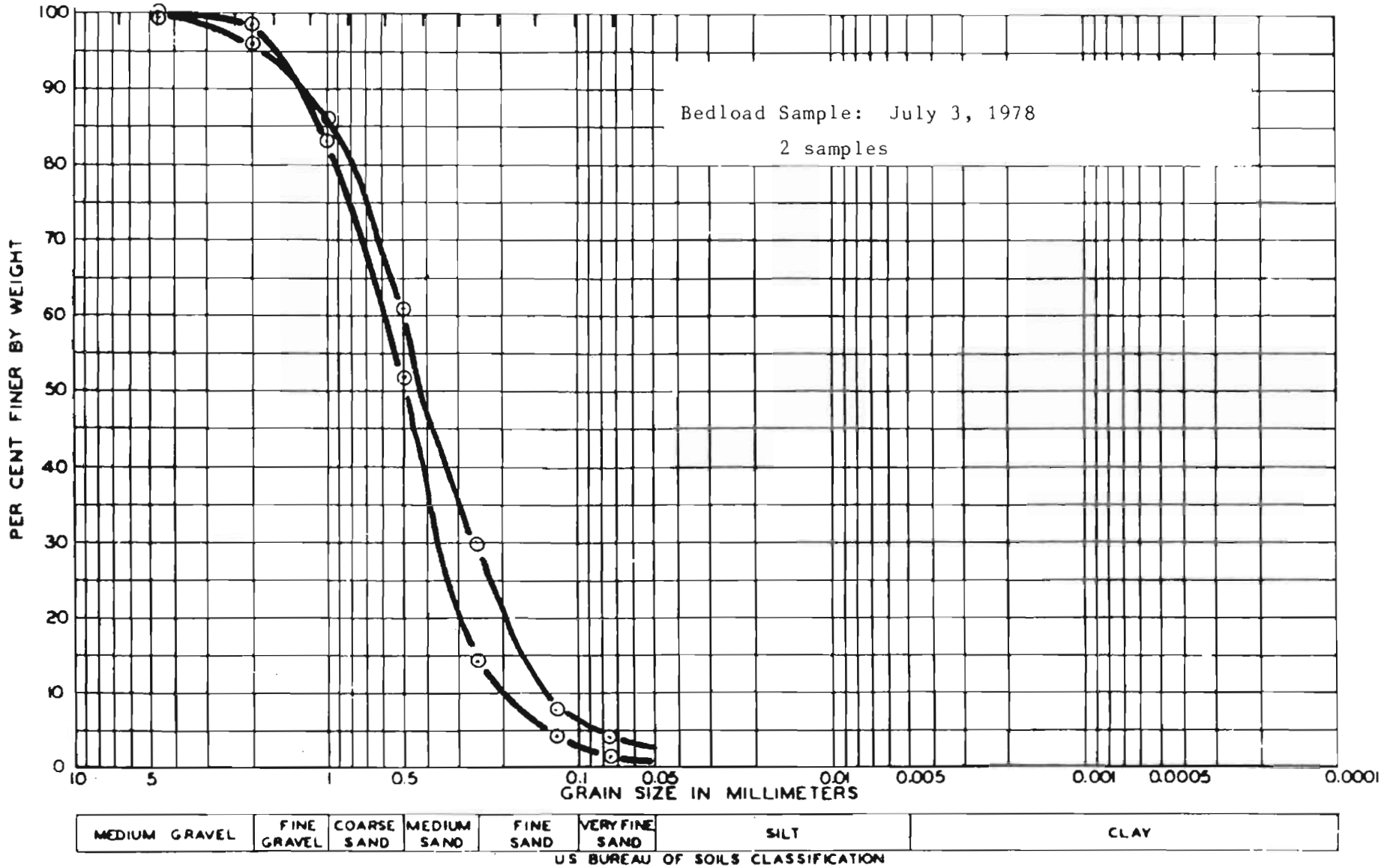


Fig. 68 Grain size distribution diagram of East Inflow stream bedload samples taken July 3, 1978.

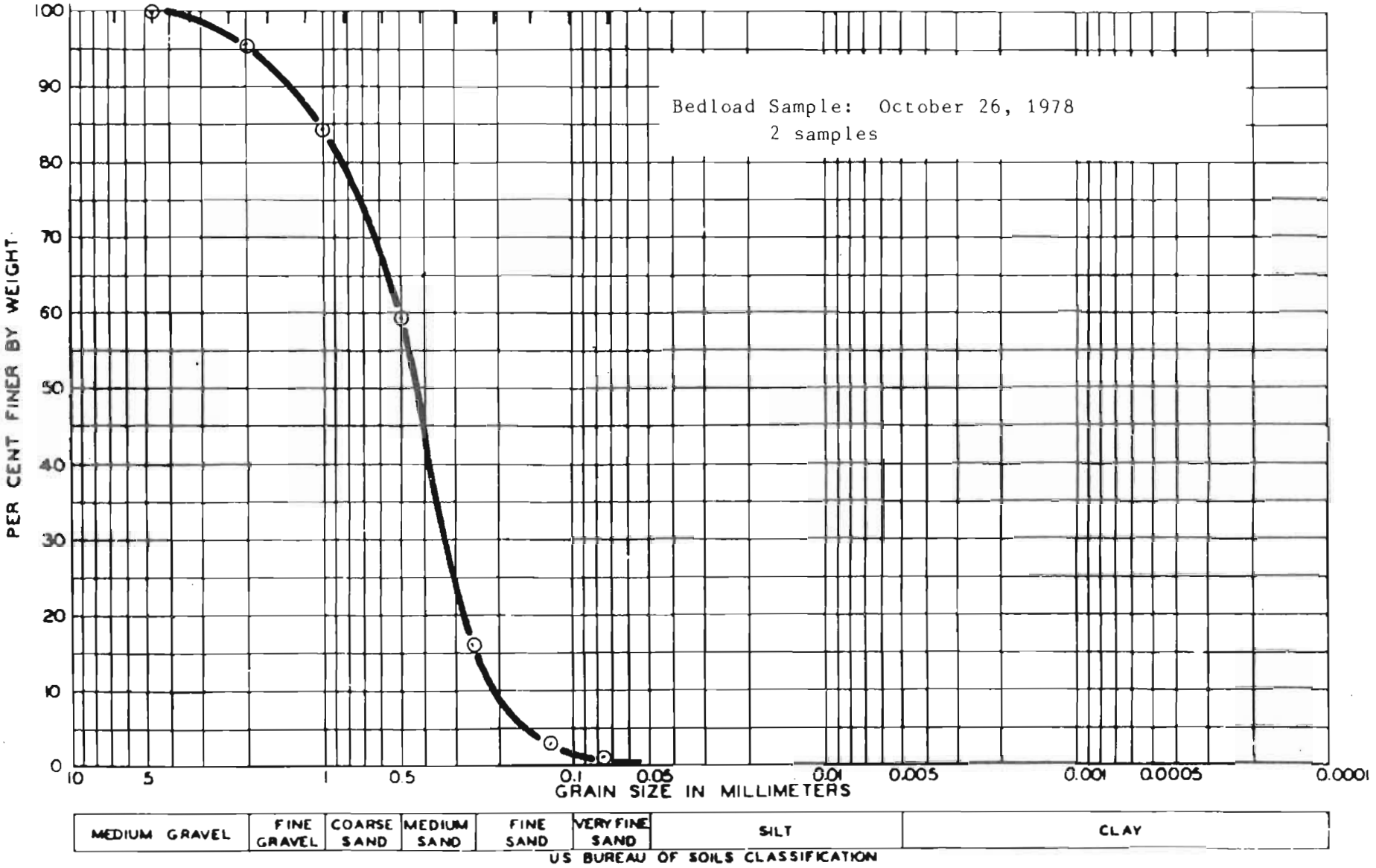


Fig. 68 Grain size distribution diagram of East Inflow stream bedload samples taken October 26, 1978. Distribution is the same for both samples.

Table 148 Suspended sediment data from the East Inflow to Rawson Lake for 1978.

Date Sampled	Time (CST)	No. of Samples	Sample Number	Date Filtered	Volume Filtered (ml)	Weight Retained (g)	Concentration (mg/l)	Discharge (cfs)	Stream flow condition
May 23	14:00	1		Sept. 19	548	0.00234	4.27	0.76	recession limb
26	10:00	1		Sept. 19	543	0.01456	26.81	9.00	rising limb
30	10:00	1		Sept. 21	550	0.00101	1.84	2.70	peak
Aug. 1	13:30	6	1	Aug.	1000	0.00280	2.80	0.20	base flow
			2		}				
			3		(1660)	0.00407	2.45		
			4		1000	0.00337	3.37		
			5		1000	0.00262	2.62		
			6		1000	0.00289	2.89		
			x				2.79*		
Aug. 2	13:30	6	1	Aug.	1000	0.00375	3.75	1.30	peak
			2		1000	0.00442	4.42		
			3		1000	0.00502	5.02		
			4		1000	0.00503	5.03		
			5		1000	0.00399	3.99		
			6		1000	0.00456	4.56		
			x				4.46*		
Aug. 15	16:00	2	1	Sept. 22	1066	0.01224	11.48	0.70	rising limb
			2	Sept. 25	1055	0.01151	10.91		
			x				11.20*		
Aug. 16	10:30	2	1	Sept. 26	1050	0.00299	2.85	0.78	recession limb
			2	Sept. 26	1055	0.00353	3.34		
			x				3.10*		
Aug. 17	9:00	2	1	Sept. 22	1100	0.00281	2.55	0.54	recession limb
			2	Sept. 25	1055	0.00217	2.06		
			x				2.30*		
Aug. 22	10:56	1	1	Sept. 19	1000	0.00269	2.69	0.27	baseflow
Aug. 31	8:48	2	1	Sept. 22	1080	0.00227	2.10	0.25	baseflow
			2		1080	0.00204	1.89		
			x				2.00*		
Sept. 7	9:00	2	1	Sept. 26	1055	0.00406	3.85	0.19	baseflow
			2		1053	0.00333	3.16		
			x				3.50*		
Sept. 12	10:00	1	1	Sept. 21	540	0.00116	2.15	0.14	baseflow
Sept. 14	10:30	1	1	Sept. 21	533	0.00678	12.72	2.20	peak
Sept. 15	13:00	1	1	Sept. 21	541	0.00184	3.40	1.50	recession limb
Sept. 19	14:30	1	1	Sept. 21	1067	0.00220	2.06	0.53	recession limb
Sept. 21	10:00	2	1	Sept. 21	539	0.00079	1.46	0.37	recession limb
			2		541	0.00083	1.53		
			x				1.50*		
Sept. 26	10:00	1	1	Sept. 26	1055	0.00114	1.08	0.17	baseflow
Oct. 3	12:30	1	1	Oct. 5	1055	0.00181	1.72	0.29	baseflow
Oct. 3	12:30	6	1		500	0.00082	1.64		
			2		533	0.00092	1.70		
			3		540	0.00095	1.76		
			4		540	0.00095	1.76		
			5		540	0.00102	1.89		
			6		540	0.00133	2.46		
			x				1.85*		
Oct. 10	11:00	2	1	Oct. 10	500	0.00044	0.88	0.18	baseflow
			2		500	0.00045	0.90		
			x				0.89*		

Notes: 1. * mean of more than one sample

2. cfs x 0.0283 = m^3/sec.

3. Stream flow condition refers to the part of the hydrograph sampled.