Open File Report OF87-1

Till Geochemistry of the Seal River Area, East of Great Island, Manitoba

by E. Nielsen

Manitoba
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INTRODUCTION

Basal till geochemical investigations have been carried out in selected areas of northern Manitoba to aid the mineral exploration industry in the search for mineralization in areas of little or no bedrock outcrop. Geochemical anomalies in till may be mapped successfully by using hand dug holes in areas where the till is ubiquitous and relatively thin. Some areas along the Seal River in the Great Island region meet these criteria.

Detailed till sampling was undertaken in the area approximately 5 km east of the eastern end of Great Island in an attempt to (1) reproduce the results of a previous survey and (2) map a geochemical anomaly.

Previous Work

The surficial geology of northern Manitoba, north of 58° N, was mapped by Dredge et al. (1986). The less than 2 micron fraction of several hundred till samples collected during that mapping program was analyzed for uranium and base metals (Dredge, 1983a, 1983b). The results show a large arsenic anomaly of 252 ppm centred approximately 5 km east of Great Island on the north shore of Seal River (Fig. 1). Gold analysis of the less than 63 micron fraction determined by neutron activation shows an anomaly of 87 ppb Au for the same sample. These results were reported by Dredge and Nielsen (1986).

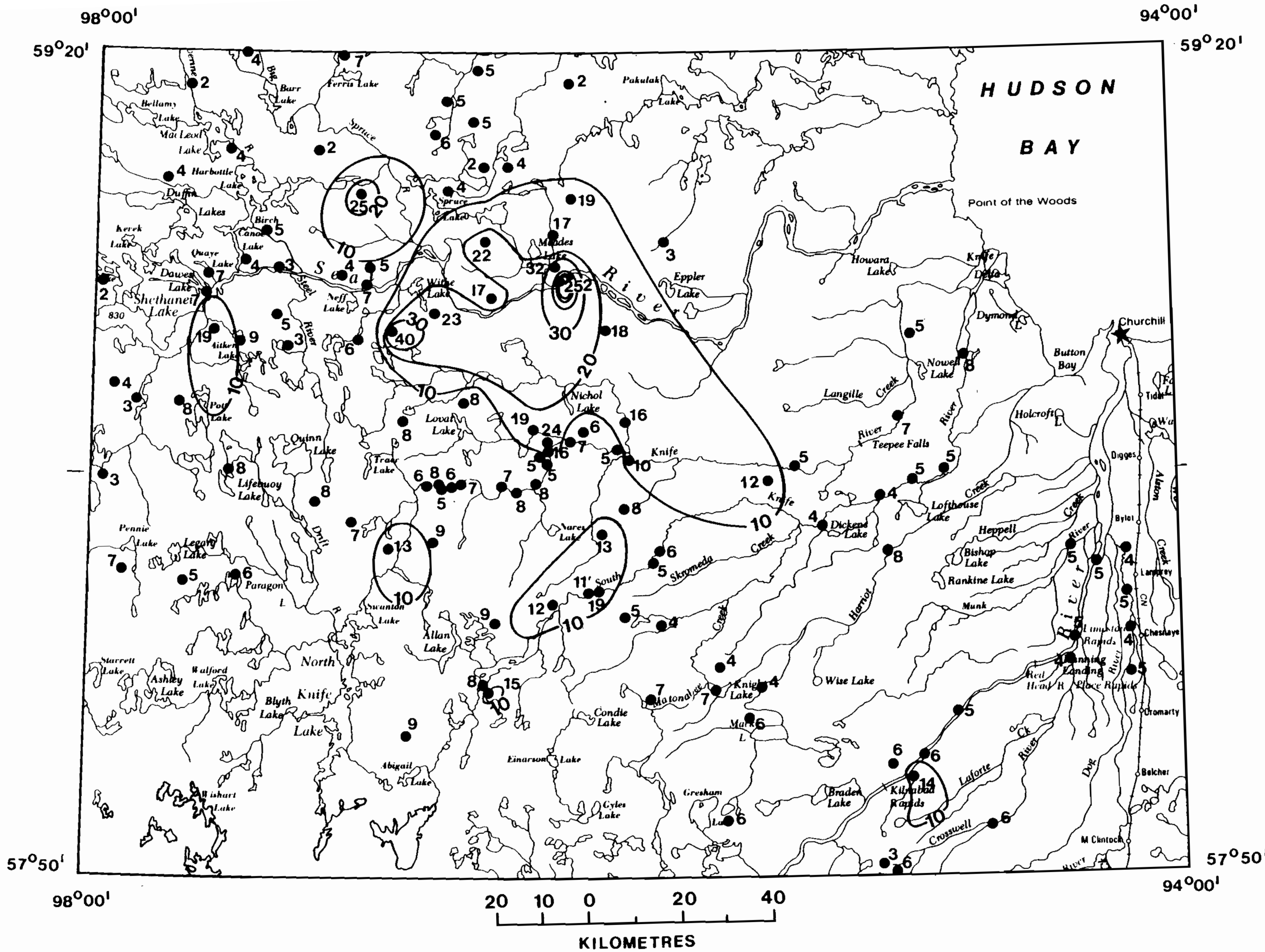


Figure 1: Location map and arsenic concentration (ppm) in the clay-sized fraction of tills from the Great Island area (from Dredge, 1983b).

GEOLOGY OF THE GREAT ISLAND AREA

Bedrock Geology

The bedrock of the Great Island area comprises quartzites (including sandstones), phyllites, volcanics, iron formation, dolomite and conglomerate (Schledewitz, 1986). Locally bedrock consists only of quartzites (including sandstones) and phyllites cut by quartz veins. There is no record of mineralization in the sampling area but during the present survey two areas of felsenmeer (near sites 18 and 32) with slight rusty weathering and one outcrop with more intense rusty weathering (near site 30) were discovered.

Pyrite and arsenopyrite mineralization was noted at site 30.

Surficial Geology

The ice flow direction recorded by striae at one site (Fig. 2) ranges between 175° and 210°. This southerly oriented striae direction is consistent with the orientation of eskers, striae and streamlined glacial bedforms reported previously by Dredge and Nielsen (1986).

Till is relatively scarce and generally outcrops only on the flanks of resistant quartzite ridges. The till is thin and patchy but may be sampled from mudboils(?) associated with felsenmeer, from solifluction lobes on the flanks of bedrock outcrops and, in places, in the "lee" of bedrock outcrops. The till is overlain by postglacial marine sand and gravel deposited in the Tyrrell Sea. The sand is particularly widespread along Seal River where a prominent terrace may be seen. Tundra peat and muskeg associated with permafrost is widespread and is the biggest obstacle to till sampling from hand dug holes.

Although only one till was observed in the area, Taylor (1961) reported interglacial sediments along the north side of Great Island, suggesting that a long and complex stratigraphic record occurs in the subsurface, as documented by Dredge and Nielsen (1985) and Nielsen et al. (1986) for other areas of northeastern Manitoba.

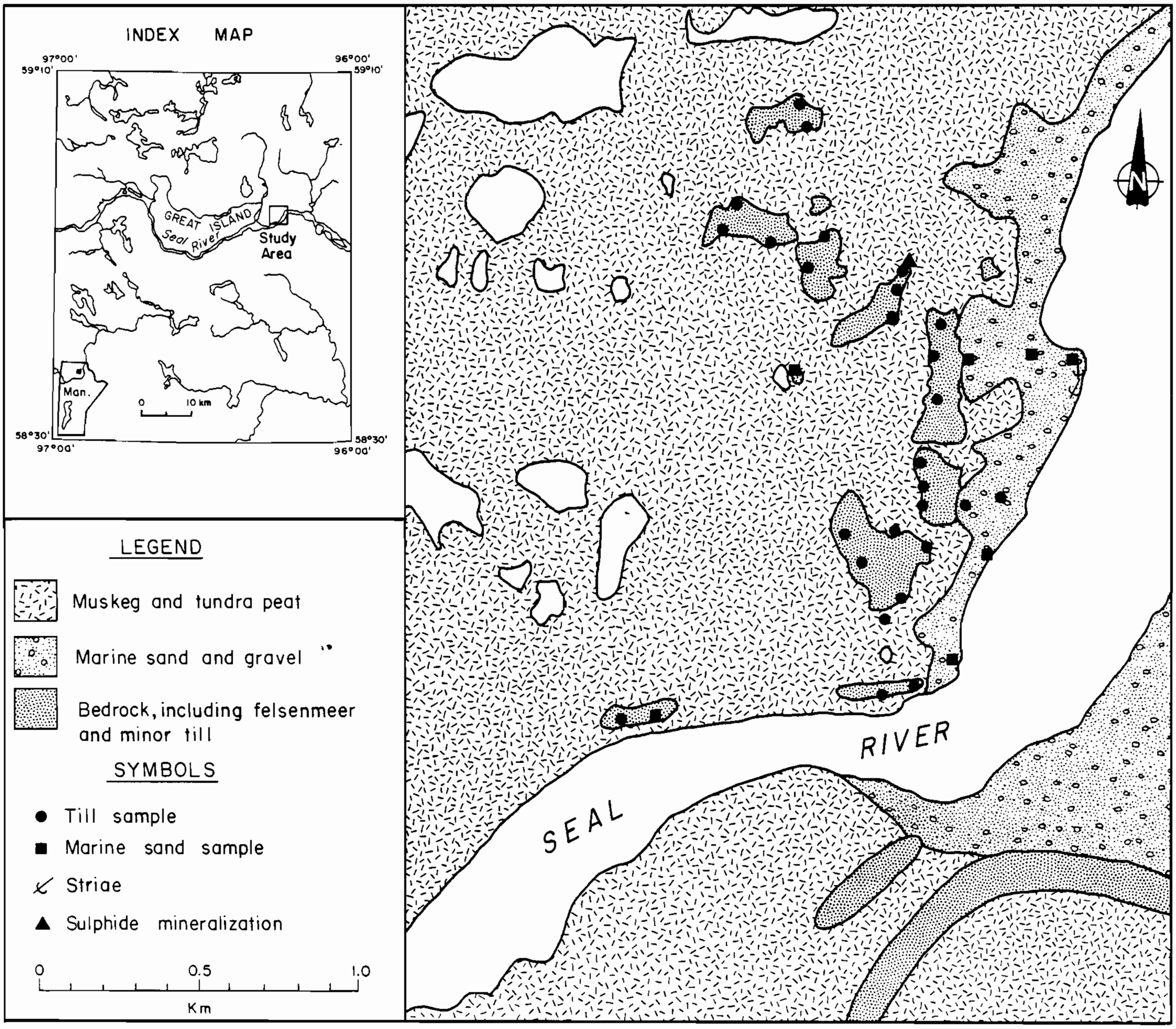


Figure 2: Surface materials and location of the detailed sampling area.

METHODS

Field Methods

Hand dug holes about 1 m deep were put down at intervals of 100 to 200 m where till outcrops or is near the surface (Fig. 3). Of the 34 samples collected, 27 were till and 7 were marine sediment. The marine sediment was collected from holes where till could not be reached.

An approximately 8 kg sample of relatively unweathered till or sand was collected from the bottom of each hole.

Laboratory Methods

TEXTURAL ANALYSIS

Six samples (4 till and 2 marine) were sieved at 1 phi intervals for material coarser than 63 microns (4 phi) and pipetted at 1 phi intervals between 63 microns and 4 microns. Standard laboratory techniques outlined by Folk (1968) were used.

PETROGRAPHIC ANALYSIS

The lithology of approximately 300 clasts between 4 and 16 mm in diameter was determined on all 34 samples.

GEOCHEMISTRY

Three fractions, a heavy mineral concentrate with specific gravity greater than 2.96, a clay-sized fraction less than 2 microns in diameter and, a silt + clay fraction less than 63 microns in diameter, were separated. The clay-sized fraction was concentrated from a 500 gm split using the procedure outlined by Nielsen and Graham (1985). The heavy mineral concentrates and

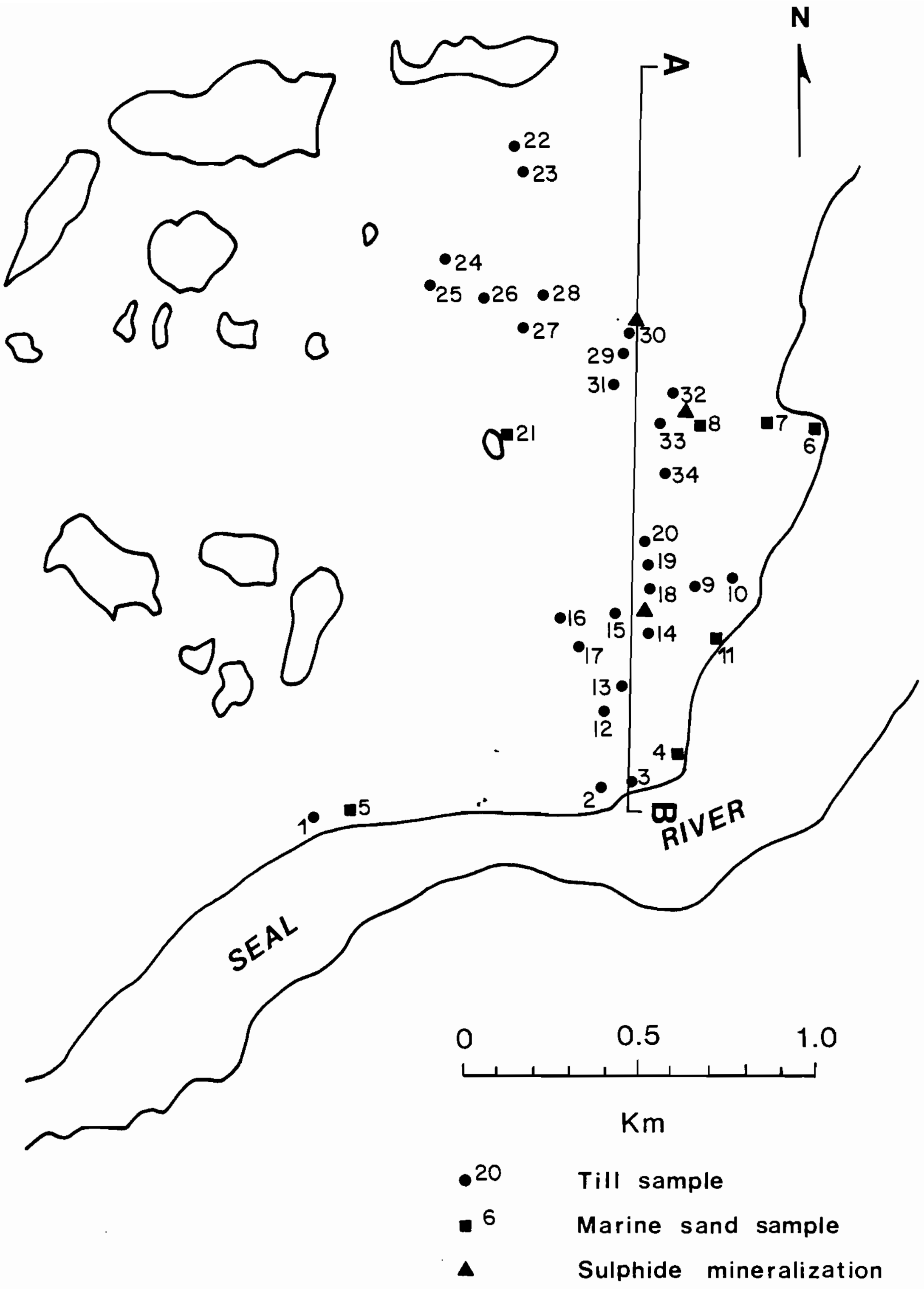


Figure 3: Location and sample number of overburden samples. The line A-B, constructed parallel to the ice flow, is used in plotting the dispersal curves in Figure 7.

visible gold grain counts were done by contract to Overburden Drilling Co. Ltd. in Ottawa. The less than 63 micron fraction was prepared by dry sieving 100-200 grams of sediment on a 63 micron stainless steel sieve to produce approximately 30 gm of silt + clay.

The clay-sized fraction and the less than 63 micron fraction received no prior treatment, but the heavy mineral fraction was pulverized to -200 mesh. The clay-sized fraction was analyzed for Cu, Pb, Zn, Ni, Co, Cr, Fe and Mn by atomic absorption spectrophotometry after hot nitric-hydrochloric acid extraction. On the same fraction As was determined colorimetrically after nitric-perchloric acid digestion, and antimony was determined by X-ray fluorescence. To date, the heavy mineral fraction has been analyzed only for As and Au. Arsenic was determined colorimetrically and gold was determined by fire assay and atomic absorption.

The lower detection limits for all the elements is 1 or 2 ppm except for Fe and Au which have detection limits of 0.1 per cent and 5 ppb, respectively.

The less than 63 micron fraction was submitted to Becquerel Laboratories Inc. for neutron activation analysis. The analysis was performed on a 10 gm sample. A total of 26 elements are routinely determined by this technique but only Au and As are reported. The lower detection limits of these two elements with neutron activation are 5 ppb and 1 ppm, respectively.

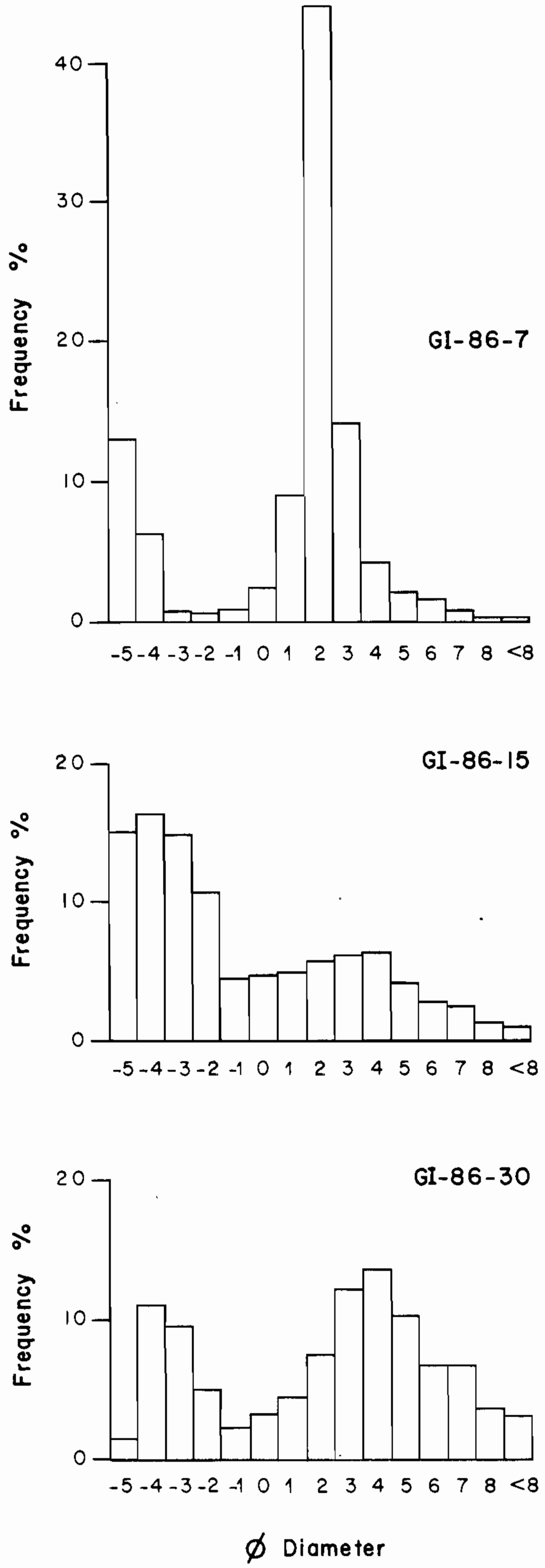


Figure 4: Histograms showing the grain size distribution of marine sediments (GI-7 and GI-11) and till samples (GI-15, 29, 30 and 32).

RESULTS

Textural Analysis

The till was derived primarily by erosion of the local bedrock and other glacial deposits. The resulting grain size distribution of four till samples is illustrated in the histograms in Figure 4. The tills are characteristically bimodal with prominent modes in the sand fraction (4 phi) and in the pebble fraction (-4 phi). Gravel ranges between 20 and 61 per cent, sand ranges between 27 and 55 per cent, silt ranges between 10 and 27 per cent and, clay ranges between 1 and 3 per cent.

The postglacial marine sediments were deposited during the regression of the Tyrrell Sea. The marine sediments were derived from the washing and sorting of the previously deposited till sheet that blanketed the bedrock. The general absence of silt and clay (Fig. 4) and the predominance of sand and fine gravel indicate deposition in a nearshore high energy environment.

Petrological Analysis

The results of the pebble counts are listed in Appendix I. Quartzite (including sandstones), phyllite and vein quartz constitute the local bedrock and form the largest proportion of most samples. Quartz vein material is a notable constituent of samples 29 and 30. Iron formation, volcanic, sandstone and carbonate lithologies were derived from the Great Island Group and constitute a minor proportion of the pebbles, reflecting the small size of the source area. Crystalline rocks, though sometimes difficult to distinguish from the local quartzites and sandstones and their metamorphic equivalents, were derived from the area 20 km to the north of the greenstone belt and range between a fraction of a per cent (sample 14) and 62 per cent (sample 34), reflecting the large size of the source area. Fossiliferous limestone and other lithologies from the Hudson Bay areas were found in the esker situated at the eastern end of Great Island but were not found in either the till or marine sediments.

Geochemistry

ARSENIC ANALYSIS

Results of geochemical analyses of the 34 samples are listed in Appendix II. Frequency distribution of each element is shown in Figure 5. Summary statistics are listed in Table 1 and a correlation matrix is shown in Table 2.

The variation in arsenic content of the clay-sized fraction is shown in Figure 6. All the arsenic determinations including those done on the marine samples are above the regional background value of 6 ppm reported previously by Dredge (1983a). A well developed glacial dispersion fan more than 1.3 km long is evident in the distribution of arsenic. The head of the fan has three samples with values above 2000 ppm. The concentration decreases irregularly to the south. This may be due to local enrichment of arsenic in the bedrock along the ice flow path (Fig. 7a), differences in the degree of weathering of the samples, or inclusion of samples from outside the dispersion fan in the construction of the diagram. The dispersal curve shows an exponential decrease in the arsenic content (Gilbert, 1965; Shilts, 1976) and indicates that the mineralized source lies near samples 29, 30, and 32 which all have arsenic values above 2000 ppm.

Arsenic concentration in the heavy mineral fraction similarly shows a well developed glacial dispersion fan more than 1.3 km long and 0.5 km wide (Fig. 8). Values range from greater than 2000 ppm to 6 ppm. The dispersal of arsenic in this fraction (Fig. 8, and 7b) indicates the source of the anomaly lies near samples 29, 30 and 32. As the arsenic values of the heavy mineral fraction are of the same order of magnitude as those of the clay-sized fraction, arsenopyrite is clearly very stable and resistant to weathering in this region.

The less than 63 micron fraction also shows a well developed glacial dispersion fan for arsenic in the same area as the other two fractions. The fan is about 1.0 km long and 0.5 km wide (Fig. 9). The dispersal curve is

Clay fraction (<2 µm)

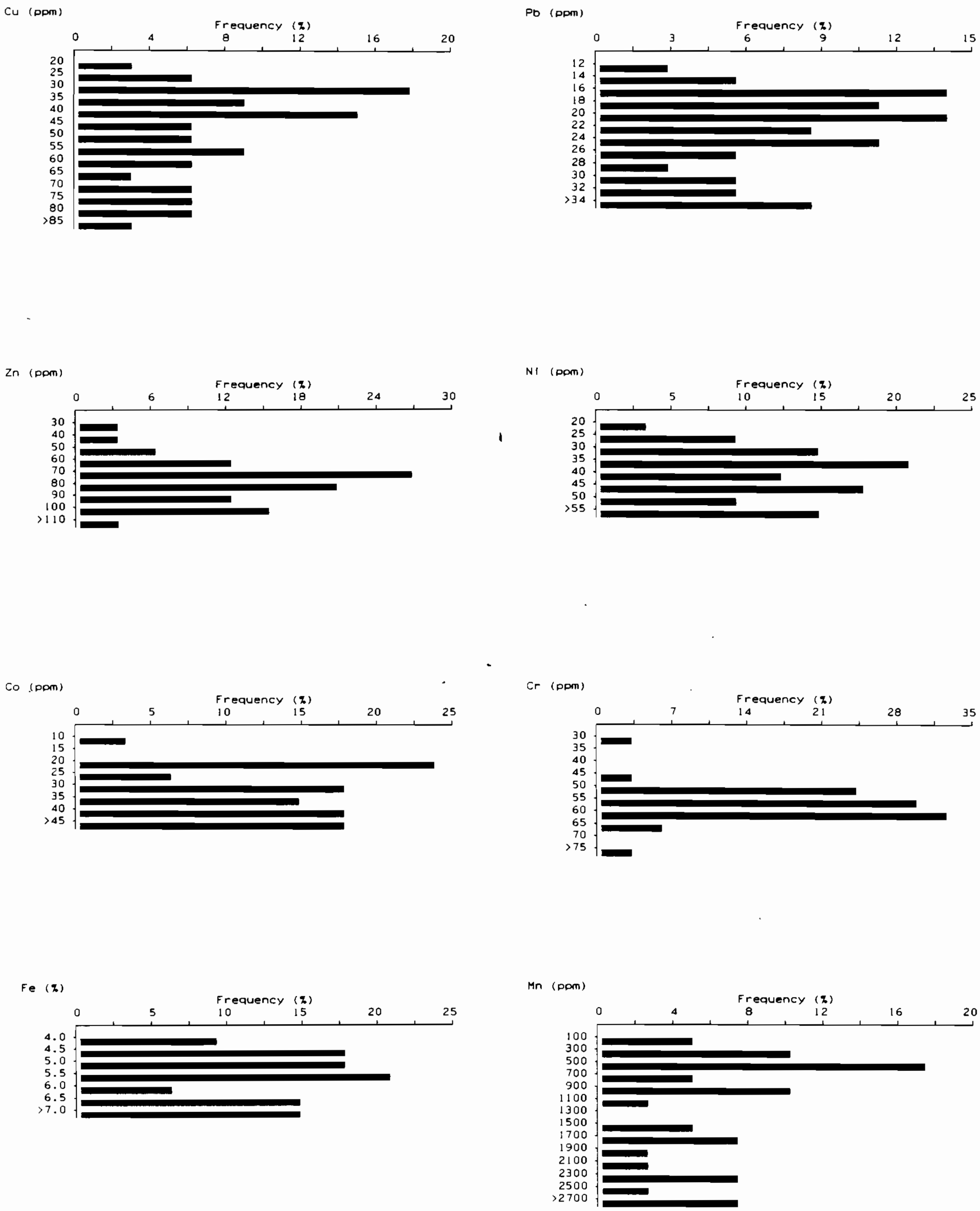
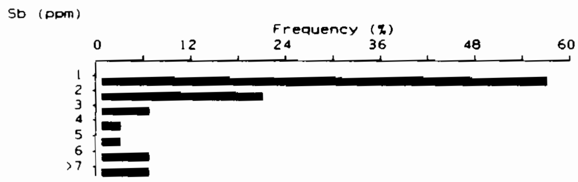
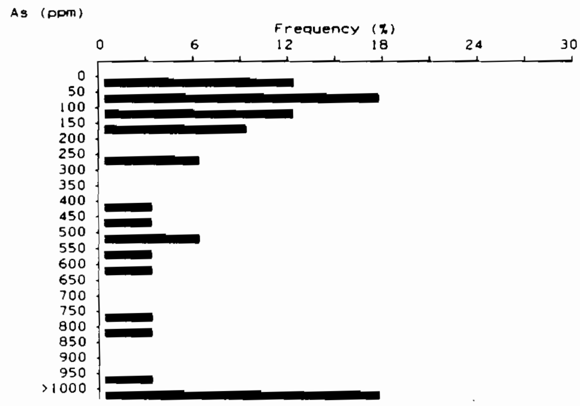
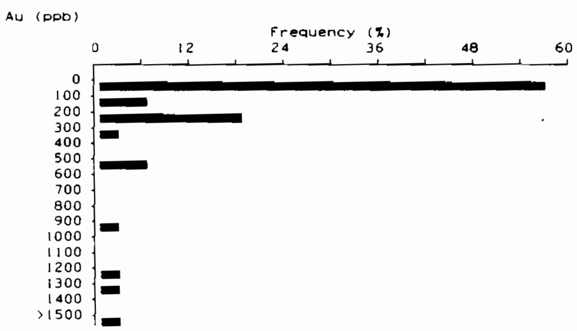


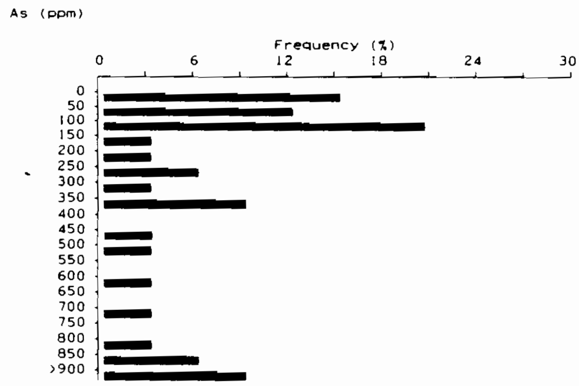
Figure 5: The distribution of element concentration in the clay, heavy mineral and less than 63 micron fractions of the 34 overburden samples.



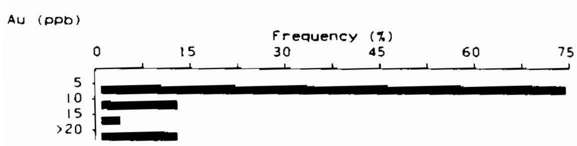


Heavy mineral fraction (S.G. >2.96)





Silt and clay fraction (<63 μm)



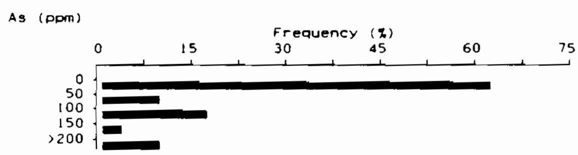


Figure 5: (cont'd.) The distribution of element concentration in the clay, heavy mineral and less than 63 micron fractions of the 34 overburden samples.

TABLE 1

SUMMARY STATISTICS FOR THE GEOCHEMICAL DATA

Variable:	< 2 Microns Cu (ppm)	Pb (ppm)	Zn (ppm)	Ni (ppm)	Co (ppm)	Cr (ppm)	Fe (%)	Mn (ppm)	Sb (ppm)	As (ppm)	Heavy Minerals As (ppm)	Au (ppb)	< 63 Microns As (ppm)	Au (ppb)
Number of Observations:	34	34	34	34	34	34	34	34	34	34	34	34	34	34
Minimum:	24	12	31	20	11	32	4.2	170	1	31	6	5	7.1	5
Maximum:	131	49	274	109	87	176	8.4	5000	7	2000	2000	16380	610	59
Mean:	51.2	23.5	85.0	43.7	35.7	60.3	5.8	1382.0	2.2	513.4	390.0	698.5	104.8	10.4
S.E. of the Mean:	3.8	1.4	6.4	2.8	2.3	3.7	0.2	193.8	0.3	101.3	78.4	478.7	22.9	2.1
Standard Deviation:	22.1	7.9	37.6	16.2	13.7	21.4	1.1	1130.1	1.9	590.5	457.2	2791.1	133.8	12.1
Kurtosis:	3.7	2.1	20.2	7.3	5.0	27.7	0.0	2.8	1.6	1.5	3.9	32.9	6.3	8.5
Skewness:	1.6	1.3	3.9	2.2	1.5	5.0	0.7	1.6	1.7	1.5	1.9	5.7	2.4	2.9

TABLE 2

PEARSON LINEAR CORRELATION MATRIX FOR

THE CLAY, HEAVY MINERAL AND LESS THAN 63 MICRON DATA

	Cu	Pb	Zn	Ni	Co	Cr	Fe	Mn	Sb	As	As*	Au*	As**	Au**
Cu	1.0000	.3766	.0053	.2890	.4655	.2526	.0617	.0487	.3135	.0531	.0764	-.1915	.1091	-.0008
Pb		1.0000	.2513	.0749	.1439	-.0891	.3347	.6183	.1769	-.0168	-.1401	-.1631	.0290	-.0490
Zn			1.0000	.4012	.3003	.0025	-.0324	.1378	.3253	-.0226	-.1079	-.0537	.0053	.0392
Ni				1.0000	.3353	.7716	-.3817	.0113	.0883	-.0484	-.0711	-.1228	-.0441	-.0379
Co					1.0000	.1645	-.1158	.2357	.1722	.2242	.2250	-.1709	.2488	.2978
Cr						1.0000	-.1468	-.0402	-.1280	-.0946	-.0652	-.0440	-.0742	-.0526
Fe							1.0000	.3068	-.1401	-.0297	-.0885	.1178	-.0544	.0784
Mn								1.0000	.1041	-.0356	-.1318	-.1752	.0082	.0070
Sb									1.0000	-.0398	-.0857	-.1033	.0374	-.0618
As										1.0000	.9470	.4685	.9302	.6635
As*											1.0000	.4330	.8811	.5990
Au*												1.0000	.2319	.6958
As**													1.0000	.5688
Au**														1.0000

(* Heavy Mineral Fraction)
(** <63 Micron Fraction)

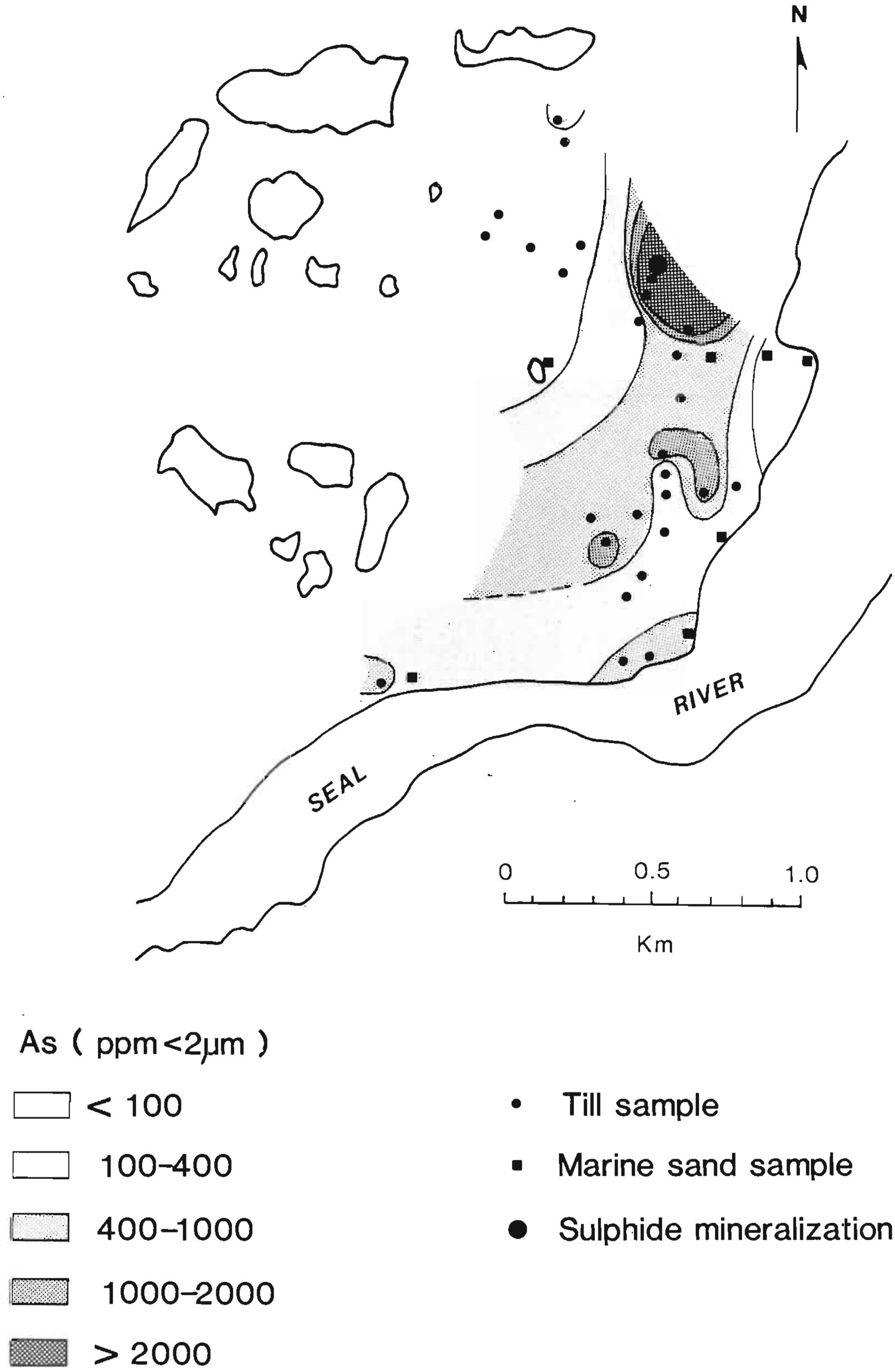


Figure 6: Arsenic dispersal in the less than 2 micron fraction.

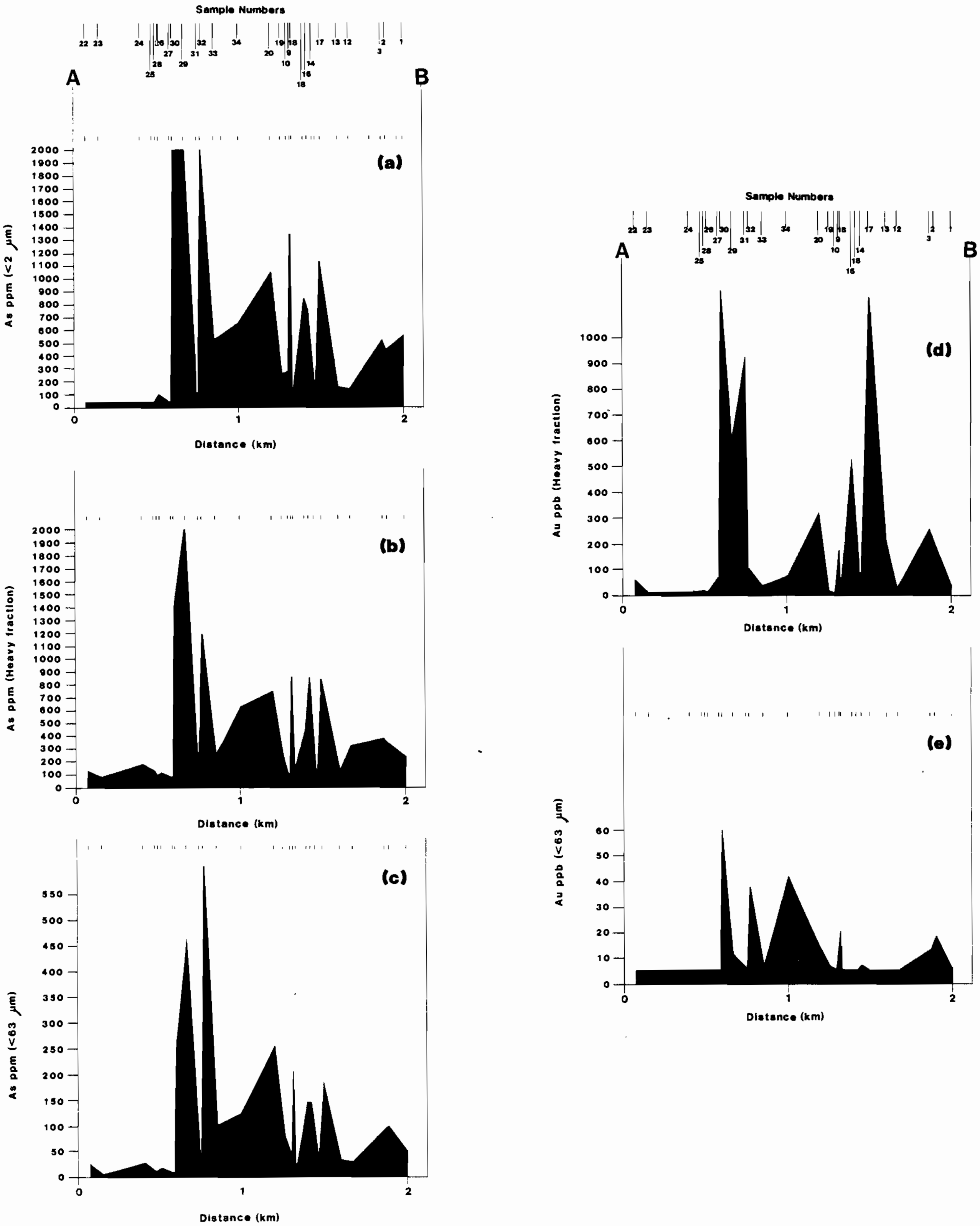


Figure 7: Dispersal curves: for arsenic in the clay-sized fraction (a), in the heavy mineral fraction (b), and in the less than 63 micron fraction (c); and for gold in the heavy mineral fraction (d), and in the less than 63 micron fraction (e). The location of the profile A-B is shown in Figure 3. The sample locations are projected to the line A-B at 90^{o}.

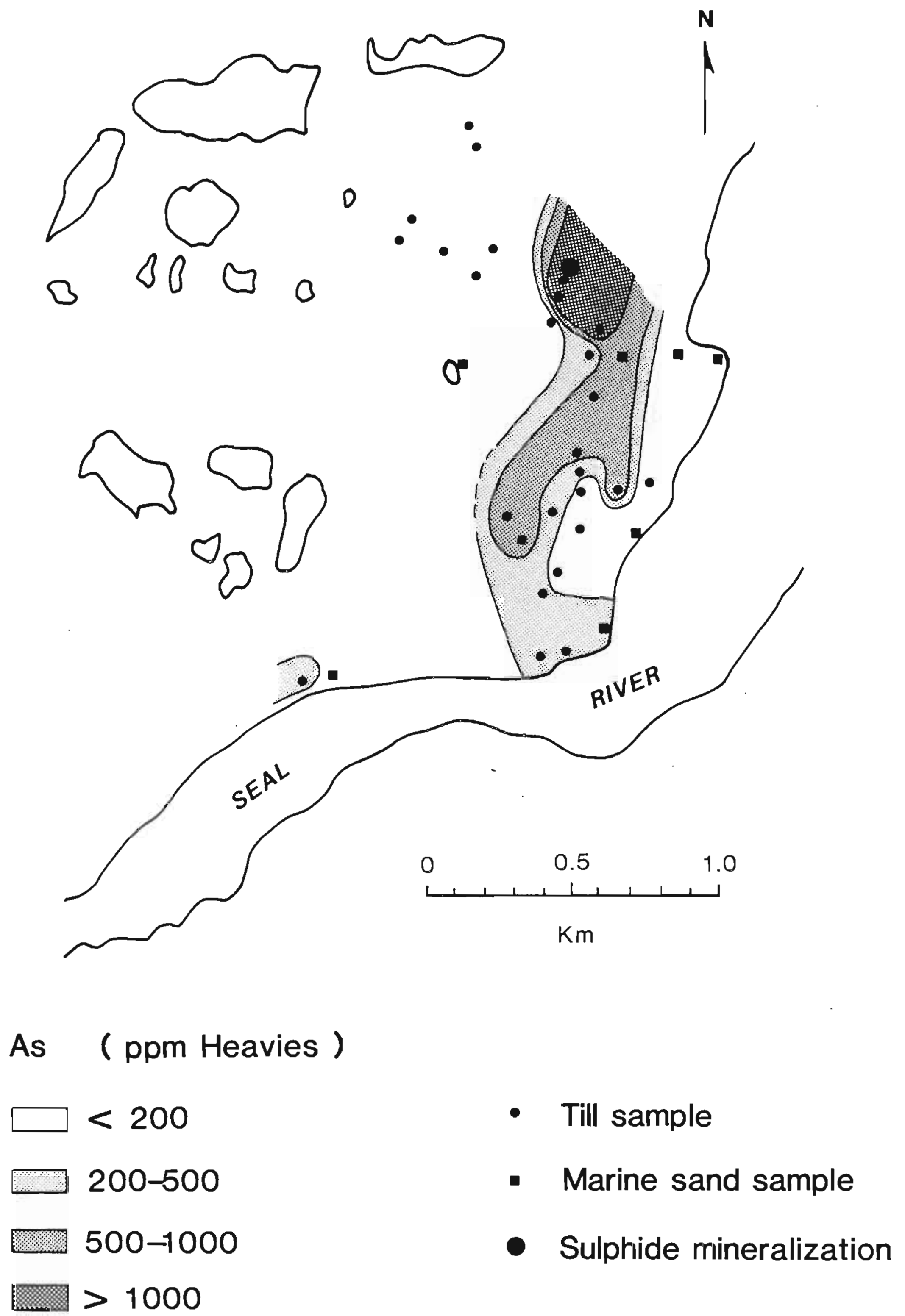


Figure 8: Arsenic dispersal in the heavy mineral fraction (S.G. > 2.96).

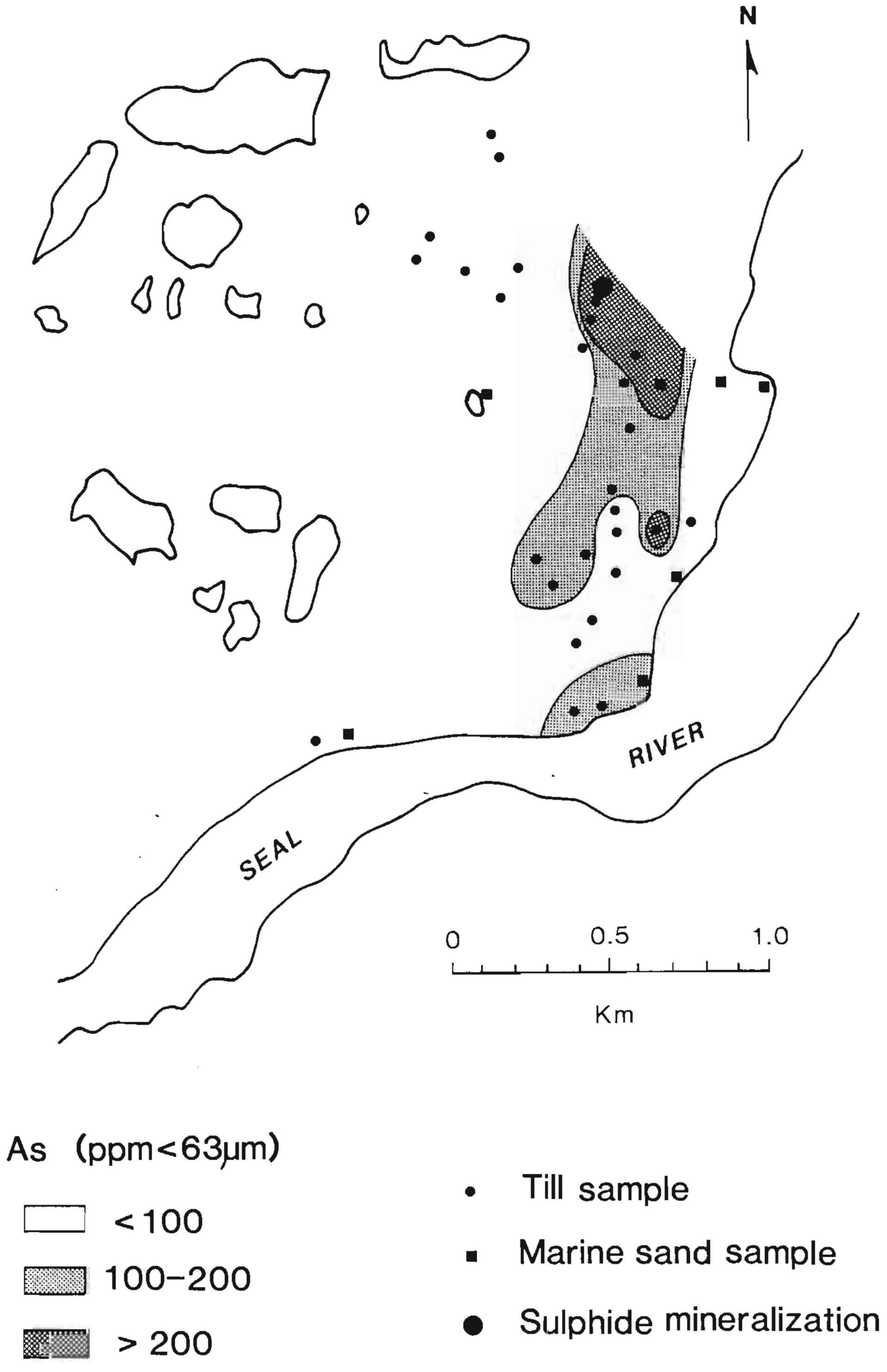


Figure 9: Arsenic dispersal in the less than 63 micron fraction.

similar to the other two curves (Fig. 7c). However, the arsenic values obtained are significantly lower than the other fractions. This is due to dilution by quartz, feldspar and other minor mineral constituents that are abundant in the coarse silt fraction. The results obtained using the less than 63 micron fraction may consequently be severely skewed, depending on the grain size distribution of the material analyzed, though this does not appear to have been a problem in this set of samples.

GOLD ANALYSIS

Gold values in the heavy mineral fraction range from 16 380 ppb to the detection limit. The dispersion fan is more than 1.3 km long and about 0.5 km wide (Fig. 10). Values above 100 ppb are somewhat erratically distributed within the anomaly. This is also apparent in the shape of the dispersal curve (Fig. 7d) which shows two peaks, one associated with samples 29, 30 and 32 and the other with samples 15 and 17. The high values obtained in the latter two samples may be due to a second mineralized source located immediately up ice from those samples, or may be the result of glacial transport of material from the mineralization associated with samples 29, 30 and 32. As there was little indication of a secondary source from the arsenic distribution the latter alternative is thought to be more likely.

Gold distribution in the less than 63 micron fraction shows a simple and well developed dispersion fan about 0.75 km long and 0.25 km wide (Fig. 11). The values are low, ranging from a high of 59 ppb to below the detection limit. The dispersal map (Fig. 11) and the dispersal curve (Fig. 7e) clearly indicate the source of the fan lies near sample 30.

VISIBLE GOLD

Visible gold grains were found in 11 of the 34 samples including three marine sand samples. The number of grains, the dimensions, and the characteristics of the gold grains, i.e. the degree of abrasion of the grains, are listed in Table 3. Sample number 30 contained the highest number of gold

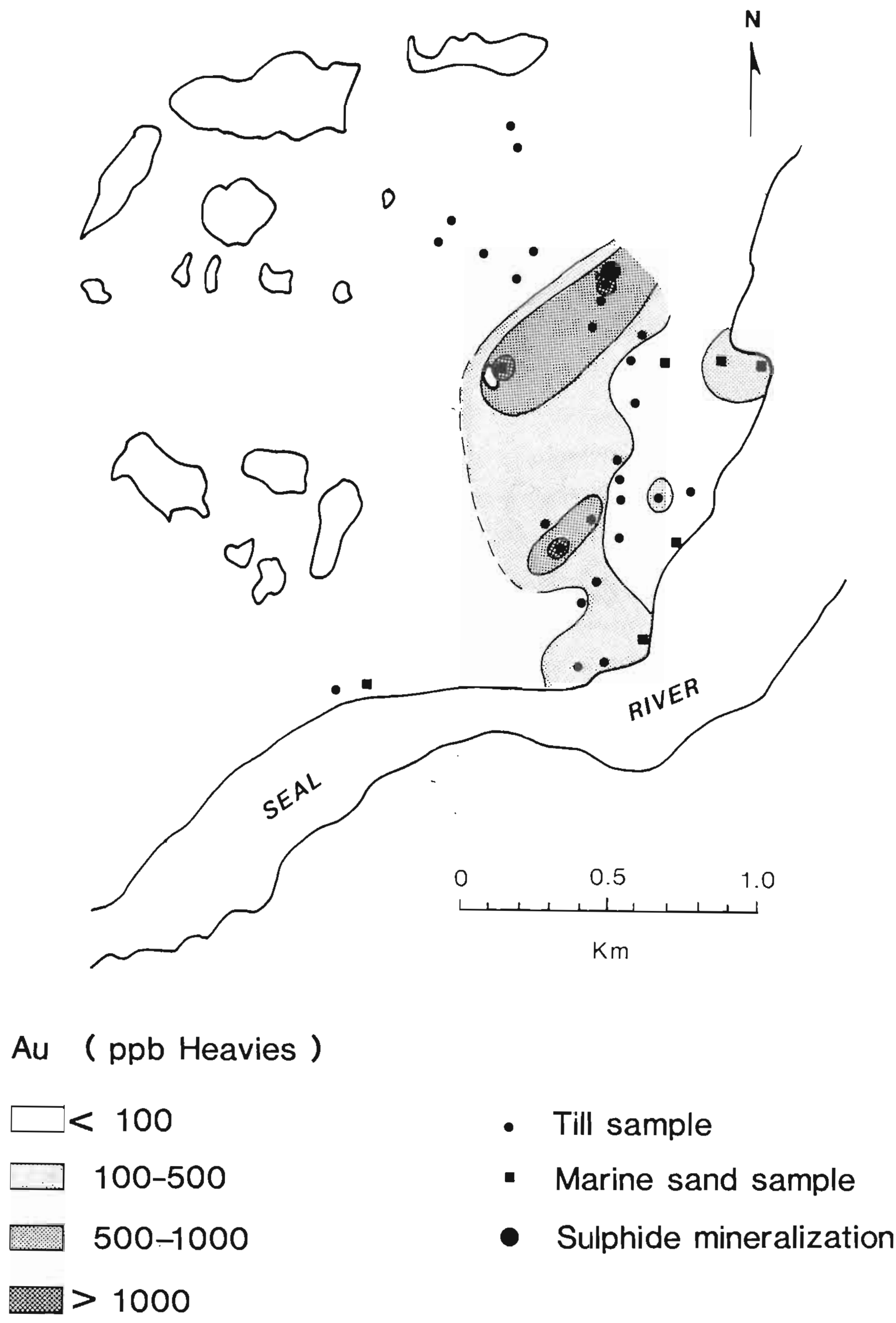


Figure 10: Gold dispersal in the heavy mineral fraction (S.G. >2.96).

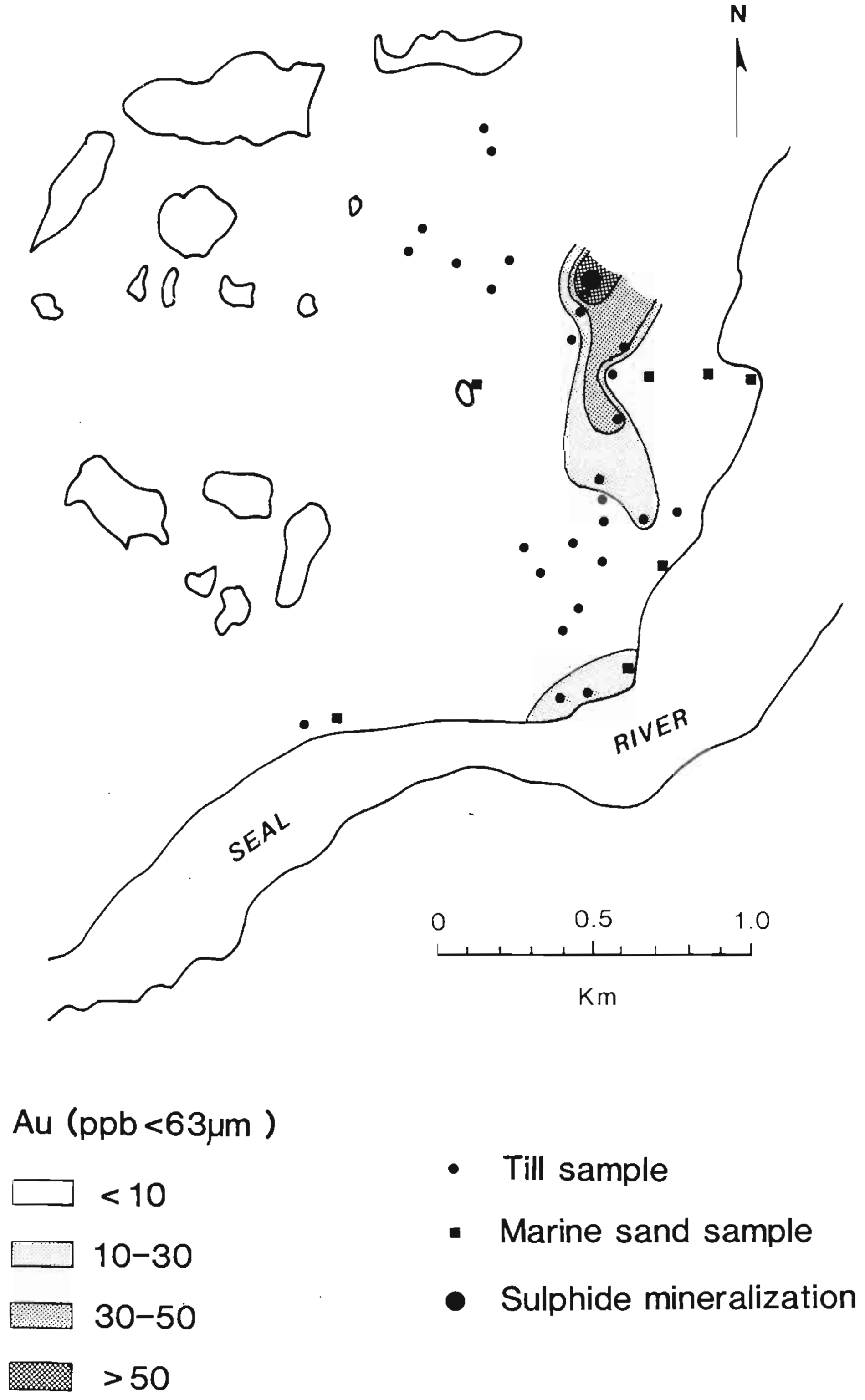


Figure 11: Gold dispersal in the less than 63 micron fraction.

TABLE 3.
CHARACTERISTICS OF VISIBLE GOLD GRAINS

Sample Number	Dimensions (in microns)	Grain Shape	Number of grains
GI-86-2	150 x 175 x 31	abraded	1
GI-86-3	100 x 200 x 29	irregular	1
GI-86-6	25 x 25 x 5	abraded	1
	50 x 100 x 15	abraded	1
	75 x 75 x 15	abraded	1
	100 x 150 x 25	abraded	1
	75 x 100 x 18	irregular	1
GI-86-7	100 x 125 x 22	abraded	1
GI-86-8	50 x 100 x 15	abraded	1
	50 x 150 x 20	abraded	1
	75 x 100 x 18	irregular	1
	25 x 50 x 8	delicate	1
GI-86-15	75 x 150 x 22	irregular	1
GI-86-17	25 x 25 x 5	irregular	1
	50 x 75 x 13	abraded	2
	100 x 450 x 50	delicate	1
GI-86-29	25 x 50 x 8	abraded	1
GI-86-30	75 x 175 x 25	abraded	1
	200 x 225 x 40	abraded	1
	200 x 325 x 48	abraded	1
	25 x 25 x 5	delicate	3
	25 x 50 x 8	delicate	1
	25 x 100 x 13	delicate	1
	25 x 150 x 18	delicate	1
	50 x 50 x 10	delicate	1
	75 x 100 x 18	delicate	2
	75 x 75 x 15	delicate	3
	50 x 75 x 13	delicate	2
	75 x 125 x 20	delicate	1
	100 x 125 x 22	delicate	2
	100 x 175 x 27	delicate	1

Sample Number	Dimensions (in microns)	Grain Shape	Number of grains
GI-86-30 (cont.)	50 x 50 x 10	irregular	2
	75 x 75 x 15	irregular	1
	75 x 100 x 18	irregular	1
	100 x 150 x 25	irregular	1
GI-86-31	50 x 50 x 10	delicate	1
	50 x 75 x 13	delicate	2
	100 x 100 x 20	delicate	1
	100 x 125 x 22	delicate	1
GI-86-32	25 x 25 x 5	delicate	3
	25 x 100 x 13	delicate	1

grains. Of the 26 gold grains in this sample 18 were delicate, five were irregular and only three abraded, indicating little or no glacial transport and a nearby source. The proportion of abraded grains increases down ice from this site indicating site 30 is on or immediately adjacent to the source (Fig. 3 and 12). Of the four grains found in sample 17, two are abraded, one is irregular and one is delicate suggesting there was some glacial transport and that the gold in this region was probably derived from some distance up ice.

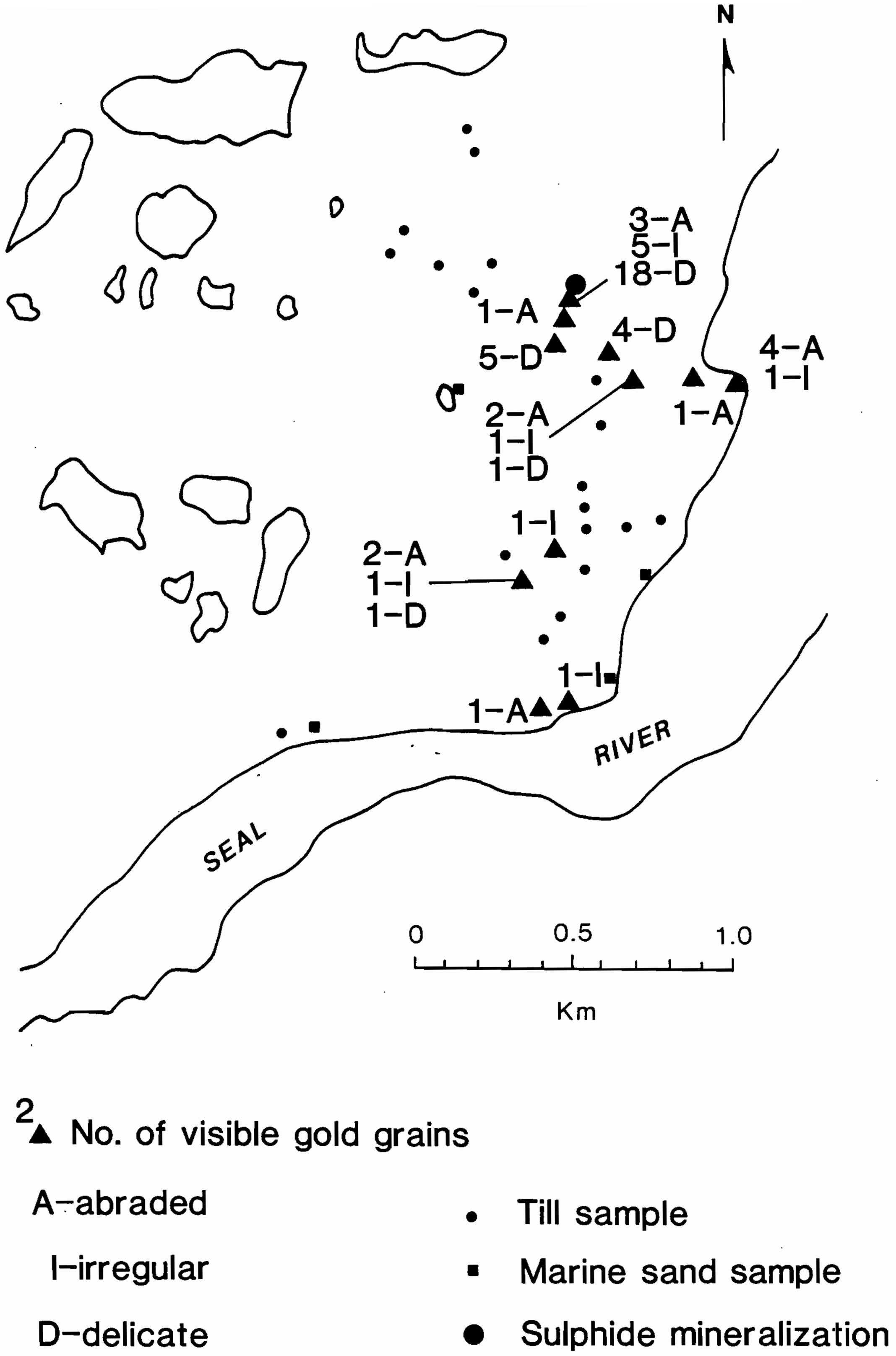


Figure 12: Distribution and characteristics of visible gold grains.

CONCLUSIONS AND RECOMMENDATIONS

A well formed glacial dispersion fan up to 1.3 km long and 0.5 km wide has been mapped using different till fractions. The apex or head of the fan lies near a hitherto unknown mineralized outcrop adjacent to sample 30. The high proportion of vein quartz clasts in the three till samples at the head of the fan indicates the mineralization is associated with quartz veining.

Sample 30 has 16 380 ppb gold in the heavy mineral fraction and 59 ppb in the less than 63 micron fraction. Arsenic values in the same sample range from above 2000 ppm in the clay-sized and heavy mineral fractions to 610 ppm in the less than 63 micron fraction. The dispersion curves decrease exponentially down ice from the site but do not reach background values because of the limited sampling.

The largest and most prominent anomalies with the highest anomaly to background contrast are achieved using arsenic analysis of the less than 2 micron fraction and gold analysis of the heavy mineral fraction. On the other hand, gold and arsenic analyses of the less than 63 micron fraction give dispersion fans that are short and narrow but with less contrast between the dispersal train and the regional background. However, care must be used when selecting the less than 63 micron fraction as the results may be greatly affected by the texture of the sediment.

Although arsenic analysis of the less than 2 micron fraction and gold analysis of the heavy mineral fraction would be preferred in a regional or semi-regional till sampling program, the cost benefit of selecting the less than 63 micron fraction makes the latter method preferable. Commercially, clay separation costs $15 per sample, heavy mineral separation $30 per sample and arsenic and gold analyses cost $5.25 and $6.75 per sample, respectively. On the other hand, gold and arsenic analysis of the less than 63 micron fraction determined by neutron activation costs only $12 per sample and requires minimal sample processing. Using the less than 63 micron fraction would require more detailed sample spacing to achieve the same results as analyzing the clay and heavy mineral fractions of fewer but more widely spaced samples.

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Appendix I

Per cent Pebbles

Sample No.	Iron Fm	Quartz Vein	Phyllite & Qtzite	Cryst	Volcan	Sand-stone	Carb
GI-1	0.0	2.1	31.1	57.7	0.2	8.9	0.0
GI-2	0.0	2.7	51.5	44.3	0.0	0.4	1.1
GI-3	0.0	4.7	37.9	53.0	0.0	4.1	0.3
GI-4	0.0	3.0	52.0	42.9	0.2	1.6	0.2
GI-5	0.0	2.9	27.7	67.3	0.0	1.4	0.6
GI-6	0.0	8.7	44.9	43.5	0.0	2.9	0.0
GI-7	0.0	3.3	53.3	40.0	0.0	1.4	1.9
GI-8	0.0	2.3	36.7	60.2	0.0	0.9	0.0
GI-9	0.0	1.5	48.5	45.4	0.0	3.7	0.9
GI-10	0.0	2.5	38.2	56.1	0.0	3.1	0.0
GI-11	0.0	3.4	44.2	51.6	0.8	0.0	0.0
GI-12	0.0	2.9	81.5	11.7	0.0	1.3	2.6
GI-13	0.0	0.3	92.6	7.1	0.0	0.0	0.0
GI-14	0.0	1.0	98.7	0.3	0.0	0.0	0.0
GI-15	0.0	1.2	79.5	17.4	0.0	0.0	2.0
GI-16	0.0	4.2	57.7	37.5	0.0	0.4	0.2
GI-17	0.0	2.6	62.4	34.7	0.0	0.3	0.0
GI-18	0.0	7.1	74.5	17.8	0.0	0.0	0.6
GI-19	0.0	8.9	85.7	5.4	0.0	0.0	0.0
GI-20	0.2	8.9	67.9	22.1	0.0	0.6	0.2
GI-21	0.1	0.5	98.6	0.8	0.0	0.1	0.0
GI-22	0.0	2.8	35.7	55.2	0.6	4.2	1.7
GI-23	0.0	1.6	74.4	22.3	0.4	1.0	0.4
GI-24	0.0	0.8	88.1	10.4	0.2	0.4	0.0
GI-25	0.0	0.4	95.8	3.3	0.2	0.2	0.0
GI-26	0.0	1.5	71.8	25.8	0.0	0.6	0.3
GI-27	0.0	1.1	81.4	16.4	0.0	0.8	0.3
GI-28	0.0	1.5	85.2	10.6	0.0	2.2	0.4
GI-29	0.0	17.6	62.8	19.6	0.0	0.0	0.0
GI-30	0.0	13.0	61.8	24.6	0.0	0.6	0.0
GI-31	0.0	6.4	79.8	13.8	0.0	0.0	0.0
GI-32	0.0	4.3	38.0	56.3	0.0	1.4	0.0
GI-33	0.0	4.1	64.1	30.1	0.4	1.4	0.0
GI-34	0.0	2.7	33.3	61.7	0.0	2.2	0.2

Abbreviations: Carb = carbonate rock; Cryst = crystalline rock; Fm = formation; Qtzite = quartzite; Volcan = volcanic rock.

Appendix II

Great Island - Raw Data

	< 2 Microns										Heavies		Neutron Activation	
Sample Number	Cu (ppm)	Pb (ppm)	Zn (ppm)	Ni (ppm)	Co (ppm)	Cr (ppm)	Fe (%)	Mn (ppm)	Sb (ppm)	As (ppm)	As (ppm)	Au (ppb)	As (ppm)	Au (ppb)
GI-1	58	25	104	53	33	68	6.2	1500	<1	555	239	40	49.0	<5.0
GI-2	38	19	87	36	36	60	5.7	1800	1	448	358	210	100.0	18.0
GI-3	62	30	81	45	37	62	5.8	2300	7	512	388	260	97.0	13.0
GI-4	59	33	102	59	23	68	5.6	1500	2	480	352	140	131.0	11.0
GI-5	50	29	76	65	24	56	4.6	1700	2	190	137	80	30.0	<5.0
GI-6	41	37	96	42	32	64	8.4	5000	<1	99	6	230	7.1	<5.0
GI-7	43	30	80	37	28	57	5.0	2839	1	77	18	235	33.0	5.6
GI-8	56	26	65	45	54	56	4.8	2400	1	952	536	55	202.0	5.8
GI-9	70	25	99	57	45	60	5.8	1700	<1	1352	864	175	210.0	20.0
GI-10	78	49	109	51	40	64	7.8	2400	2	270	66	5	38.0	<5.0
GI-11	30	32	94	28	39	52	7.0	4400	2	155	25	<5	36.0	<5.0
GI-12	40	14	48	20	21	46	8.0	210	1	135	320	15	29.0	<5.0
GI-13	48	16	68	38	29	52	5.3	2560	7	166	126	210	35.0	<5.0
GI-14	40	25	274	73	55	54	4.6	1000	6	134	21	<20	40.0	6.8
GI-15	39	22	70	45	34	58	5.6	560	<1	840	472	530	147.0	<5.0
GI-16	45	18	87	49	35	60	5.0	640	<1	760	864	280	140.0	<5.0
GI-17	31	19	68	43	38	56	4.3	880	3	1136	848	1365	183.0	<5.0
GI-18	31	20	90	36	20	56	4.8	720	<1	60	122	<25	14.0	<5.0
GI-19	131	39	71	27	43	52	6.5	1000	5	272	252	<25	80.0	5.5
GI-20	75	22	82	45	52	60	5.4	1000	6	1056	744	320	249.0	13.0
GI-21	34	20	51	29	11	32	4.8	170	2	70	39	1220	10.0	<5.0
GI-22	81	21	103	54	40	56	5.7	900	4	130	114	65	25.0	<5.0
GI-23	42	16	73	35	23	56	4.2	560	<1	45	84	<5	9.0	<5.0
GI-24	82	15	70	109	46	176	4.4	640	<1	43	181	<10	26.0	<5.0
GI-25	74	12	58	33	42	52	6.6	600	<1	31	111	<25	8.8	<5.0
GI-26	37	16	79	35	32	60	6.6	470	<1	96	109	<10	15.0	<5.0
GI-27	24	21	31	35	24	54	4.7	540	2	37	75	70	10.0	<5.0
GI-28	29	17	86	33	31	62	6.6	560	<1	60	90	20	14.0	<5.0
GI-29	62	21	67	33	41	52	5.2	1200	<1	>2000	>2000	590	465.0	11.0
GI-30	31	17	79	34	24	58	6.7	400	1	>2000	1440	16380	267.0	59.0
GI-31	32	19	78	40	32	60	5.6	400	2	120	138	920	26.0	<5.0
GI-32	52	27	104	42	40	58	6.2	1900	3	>2000	1200	100	610.0	37.0
GI-33	29	22	79	31	22	60	7.0	440	<1	528	282	40	102.0	6.2
GI-34	67	24	80	48	87	54	5.1	2100	<1	648	640	70	124.0	41.0