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**1988 Eastern Hudson Bay
nearshore survey
CCGS Narwhal - cruise report**

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CCGS Narwhal - 1988 Hudson Bay nearshore survey Cruise report

Survey Area

Hudson Bay east coast - The narrow survey corridor extended from Kuujjuarapik to just north of Richmond Gulf (55 15 N - 56 20 N), extending from the coastline to a maximum of 30 kilometres offshore.

Duration

September 12 - 19, 1988

Participants

Mr. Heiner Josenhans (chief scientist) Atlantic Geoscience Centre
Mr. Don Locke (technician) Atlantic Geoscience Centre
Dr. Bruno D'Anglegan (scientist) McGill University
Ms. Nicole Gonthier (Msc. student McGill University
Mr. John Zevenhuizen (second scientist) Orca Marine Geological
Consultants

Multidisciplinary survey in Hudson Bay (cruise summary)

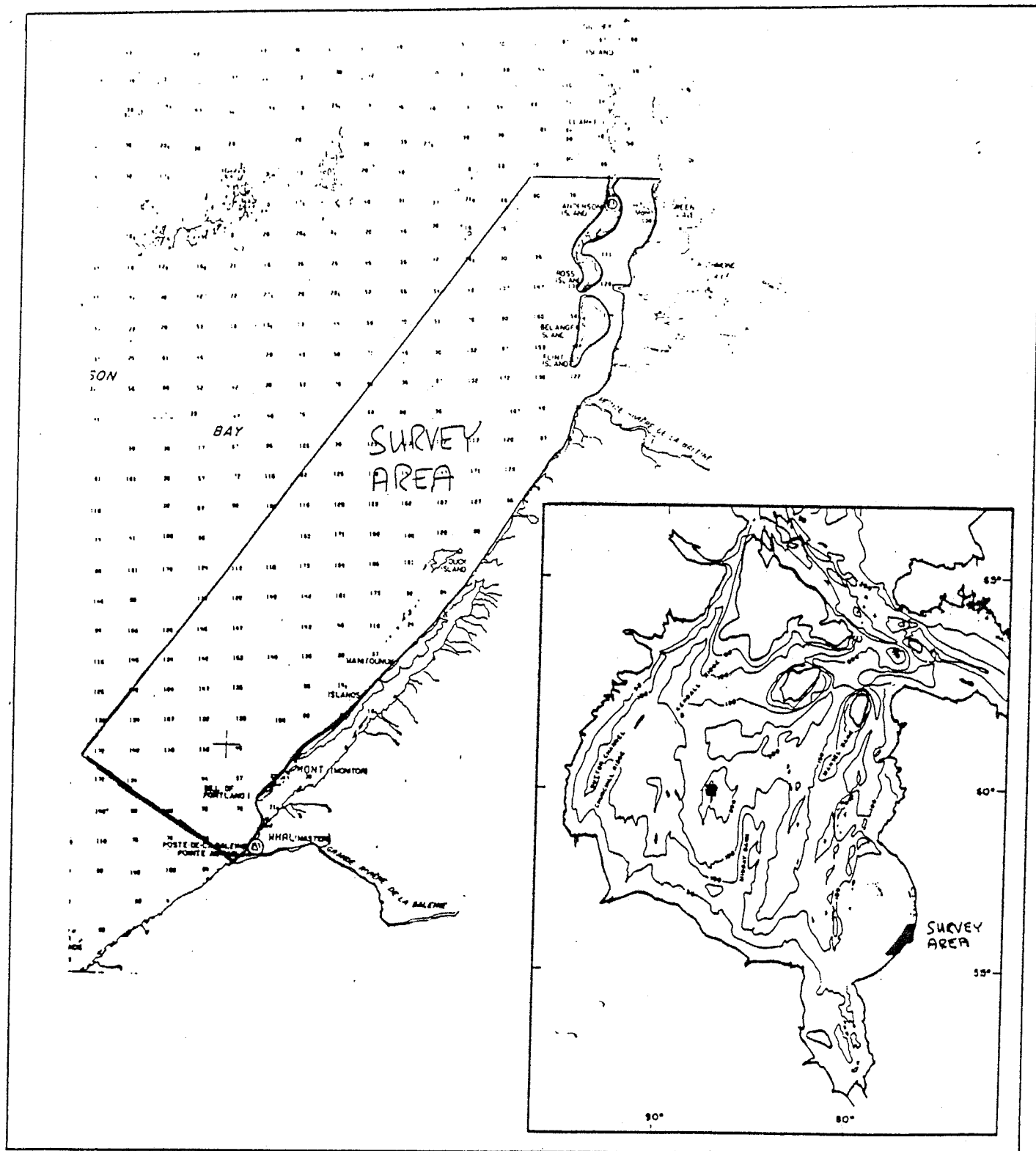
This cruise report catalogs and presents a few examples of the excellent data collected on a multidisciplinary high resolution seismic cruise recently completed in eastern Hudson Bay. The CCGS Narwhal was used by the Canadian Hydrographic Service for routine bathymetric charting of Manitounuk and Nastapoka Sounds and provided Atlantic Geoscience Centre a ship of opportunity to acquire seismic data at night. The excellent bathymetry and highly accurate navigation provided by the hydrographers served as an ideal foundation for mapping the bedrock and overlying Quaternary sediments. We were able to collect 260 line kilometres of high

resolution sparker profiles, 320 line kilometres of Huntex Sea Otter Boomer data, 800 line kilometres of 3.5 kHz subbottom profile data and 330 line kilometres of 100 kHz sidescan sonar data. This high quality data base will enable us to produce a large scale (1:50,000) acoustic outcrop map of the surficial geology and has helped us to understand the mechanisms of glaciation within this geologically complex area.

This cooperative project between Transport Canada, the Canadian Hydrographic Service and the Geological Survey of Canada has allowed the collection of a significant amount of new data at minimal cost and resulted in increased utilization of the ship and improved efficiency in surveying and mapping.

Acknowledgements

We wish to thank Captain M. McLauchlin, officers and crew of the CCGS Narwhal for their excellent cooperation and hospitality at sea. We wish to thank Ed Thompson and Dave Pugh, of the Canadian Hydrographic Service for allowing us to participate on their survey and for providing the excellent bathymetric base maps, Syledis navigation and logistical support.



88 NARWHAL (TOTAL CRUISE TRACKS) 1-750000 AT 55N

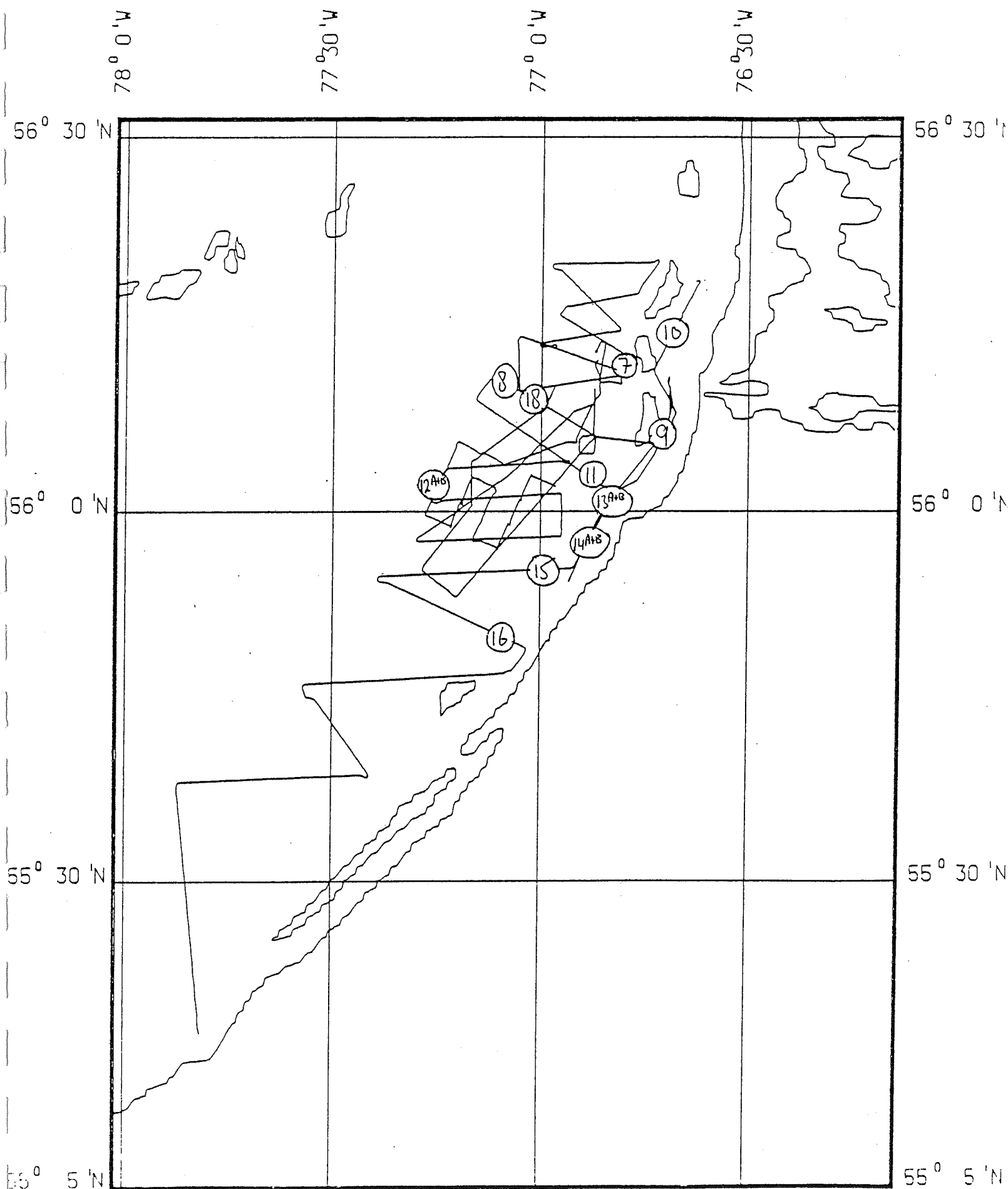
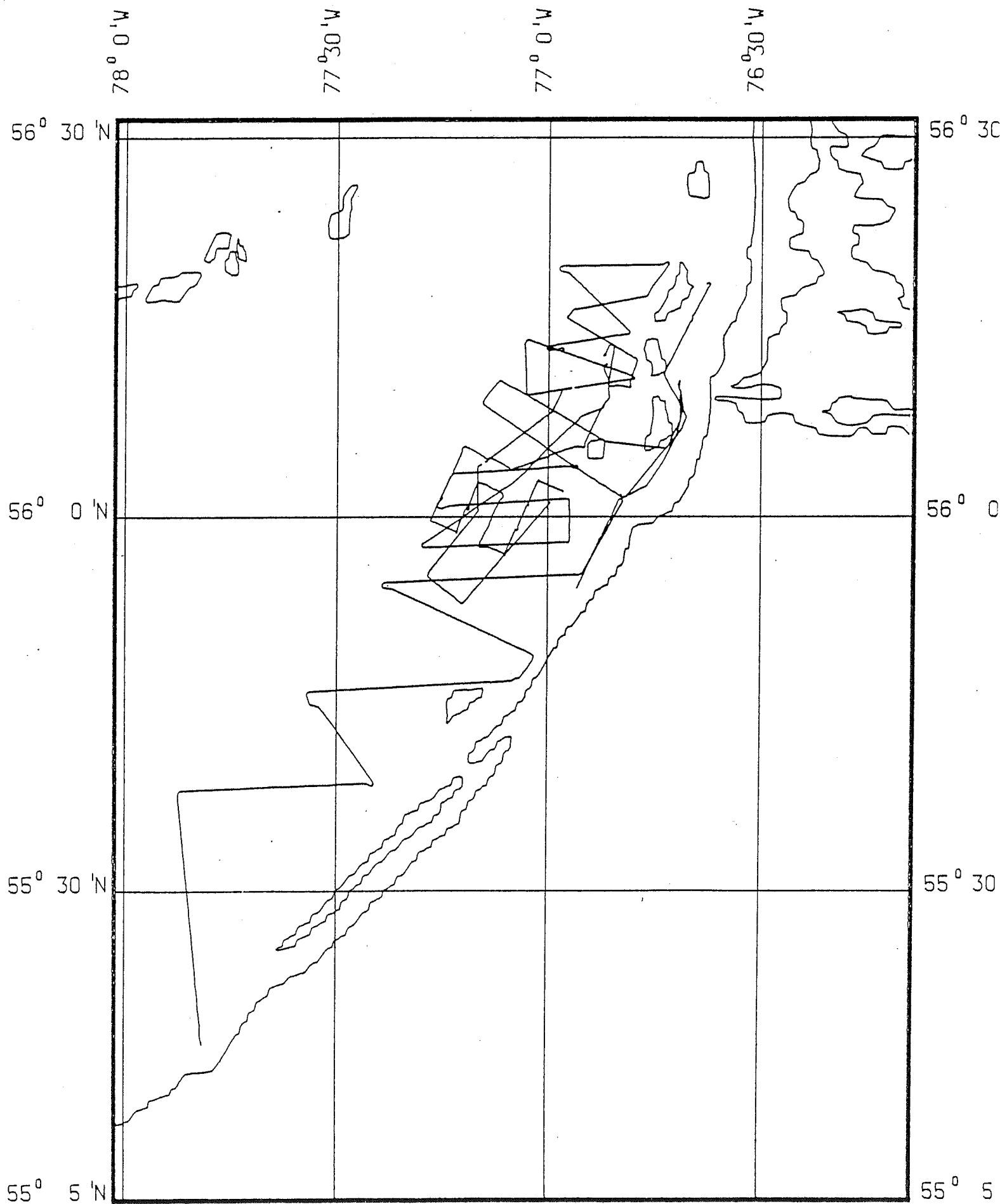


figure 3 - Combined seismic data control and figure index map

88 NARWHAL (3.5 KHZ TRACKS)
1-750000 AT 55N



88 NARWHAL (SPARKER TRACKS)
1-750000 AT 55N

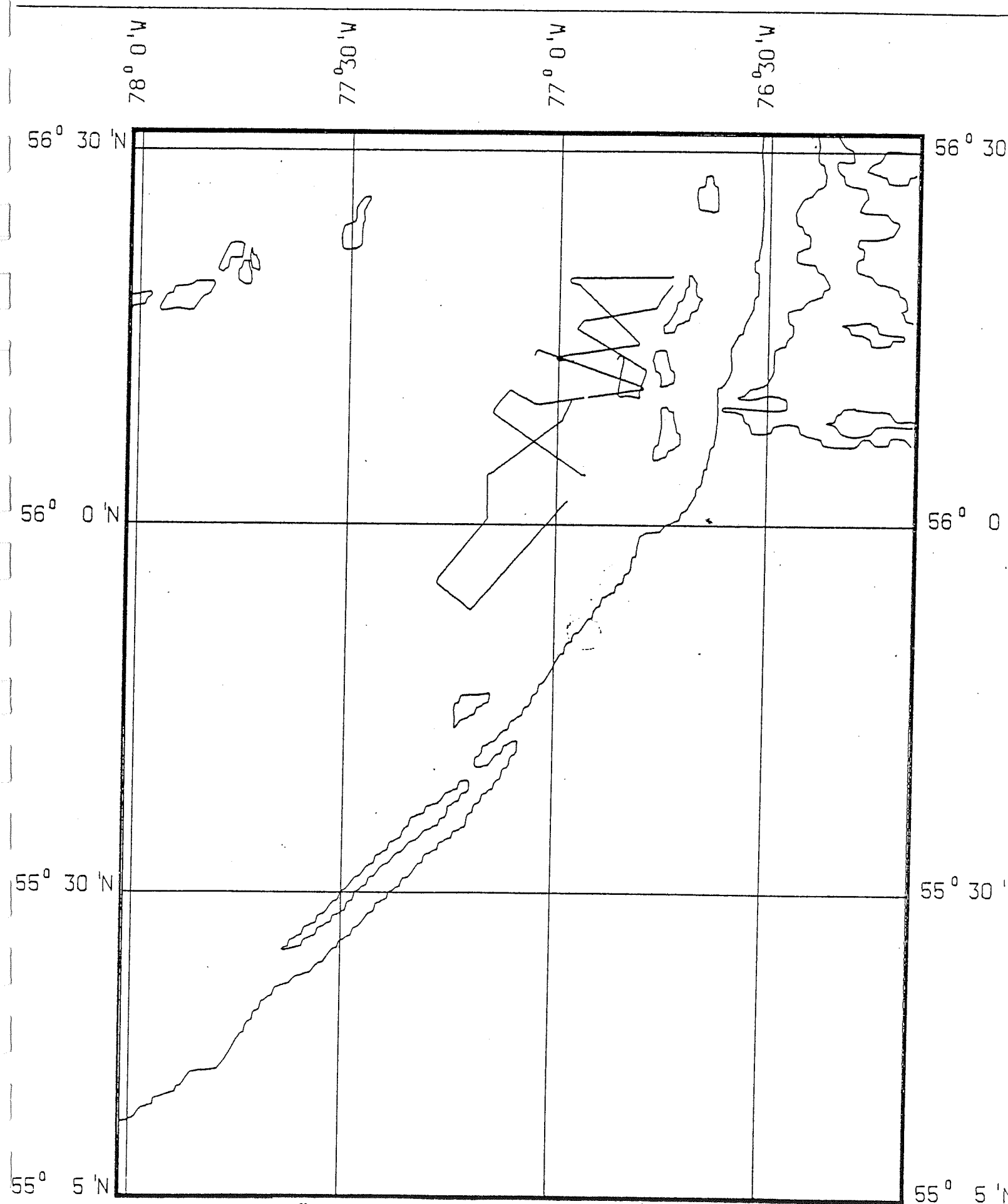


figure 5

88 NARWHAL (BOOMER TRACKS)
1-750000 AT 55N

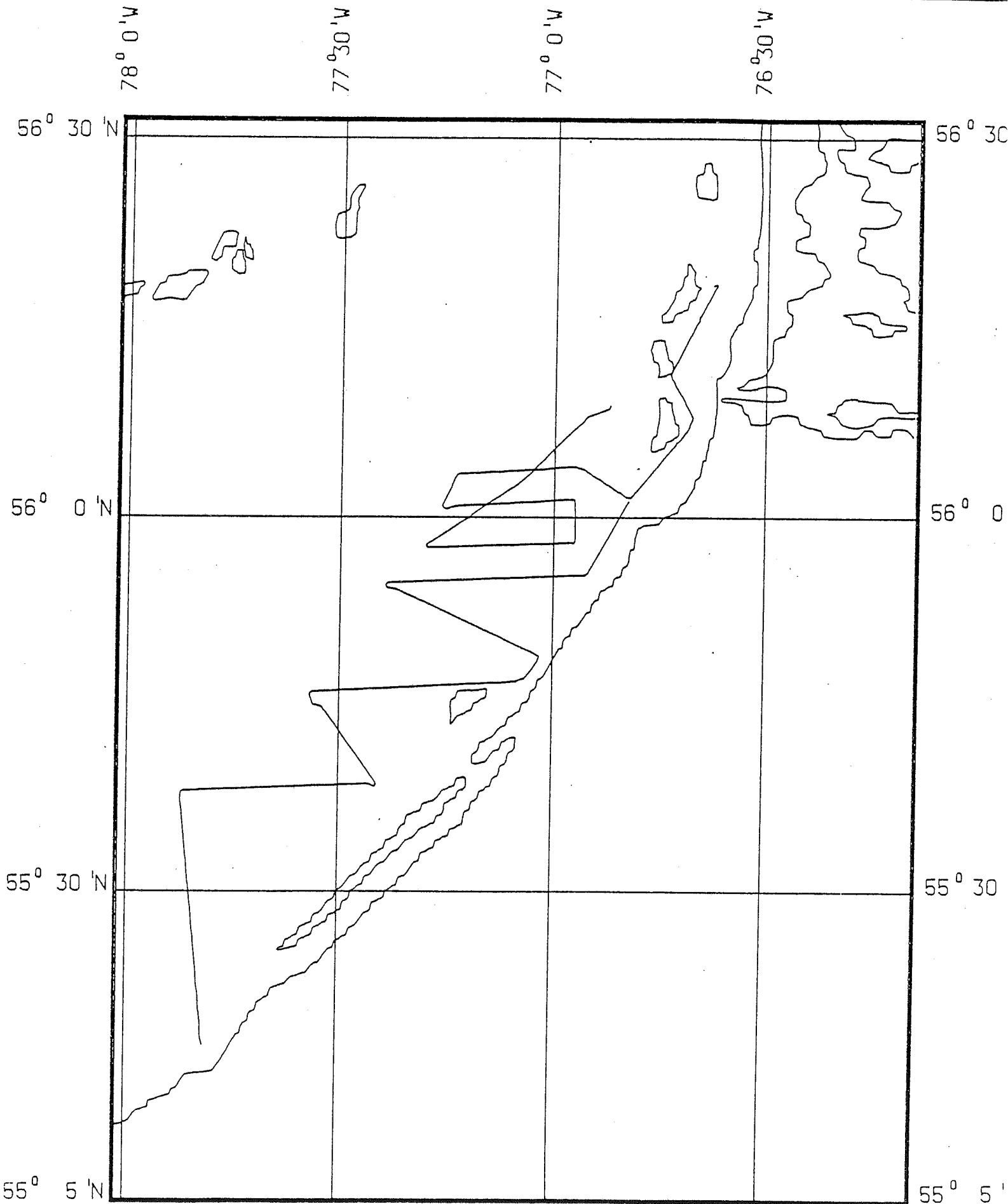


figure 6 - Hunter

SEA OTTER DATA tracks

258/2300

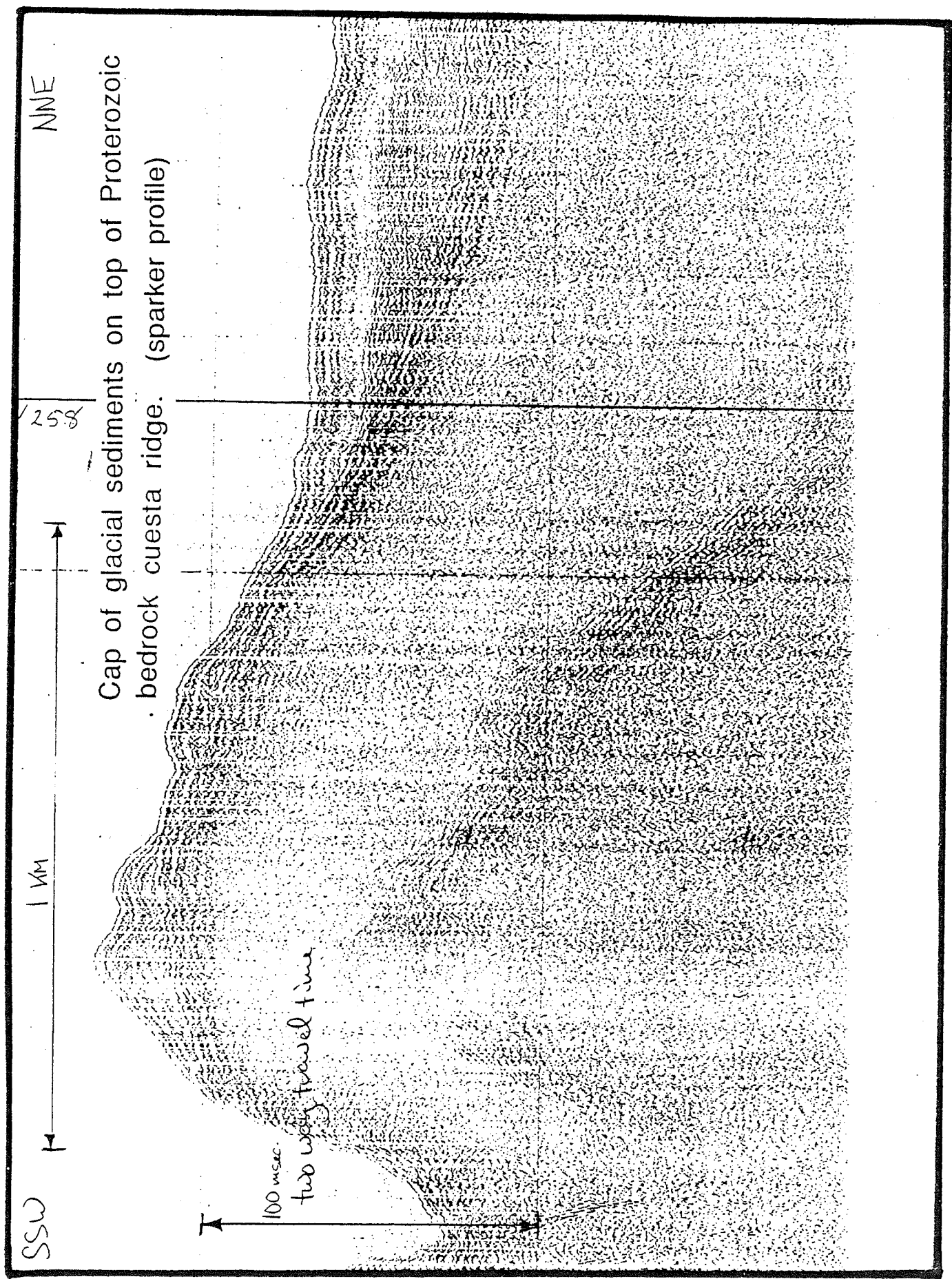


figure 7

不

22.15

Proterozoic bedrock cuesta ridges overlain by sediments interpreted to represent glacial tills (sparker profile)

Reduce speed 6-4 kts

pass
two way travel
time

figure 8

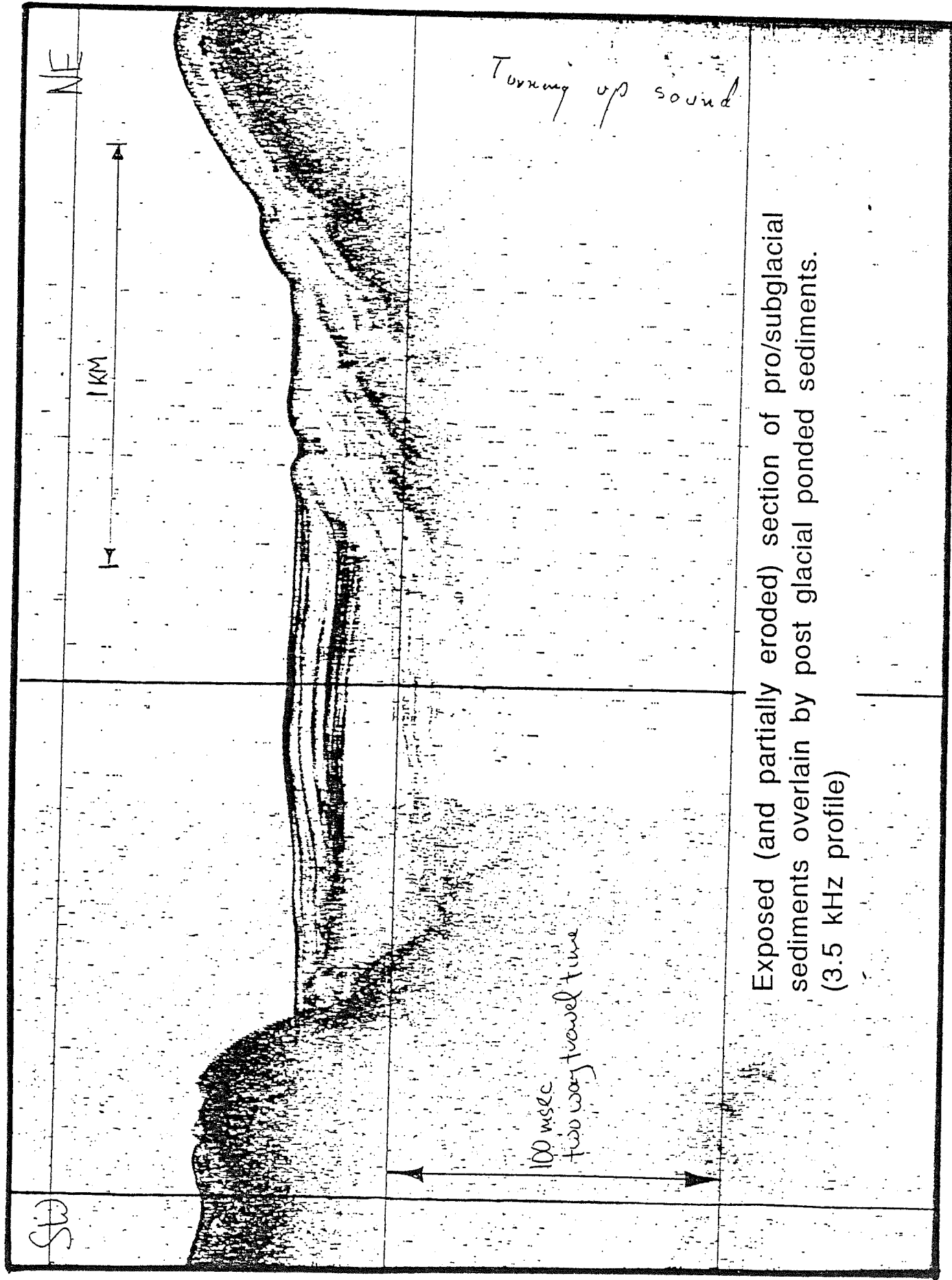


figure 9

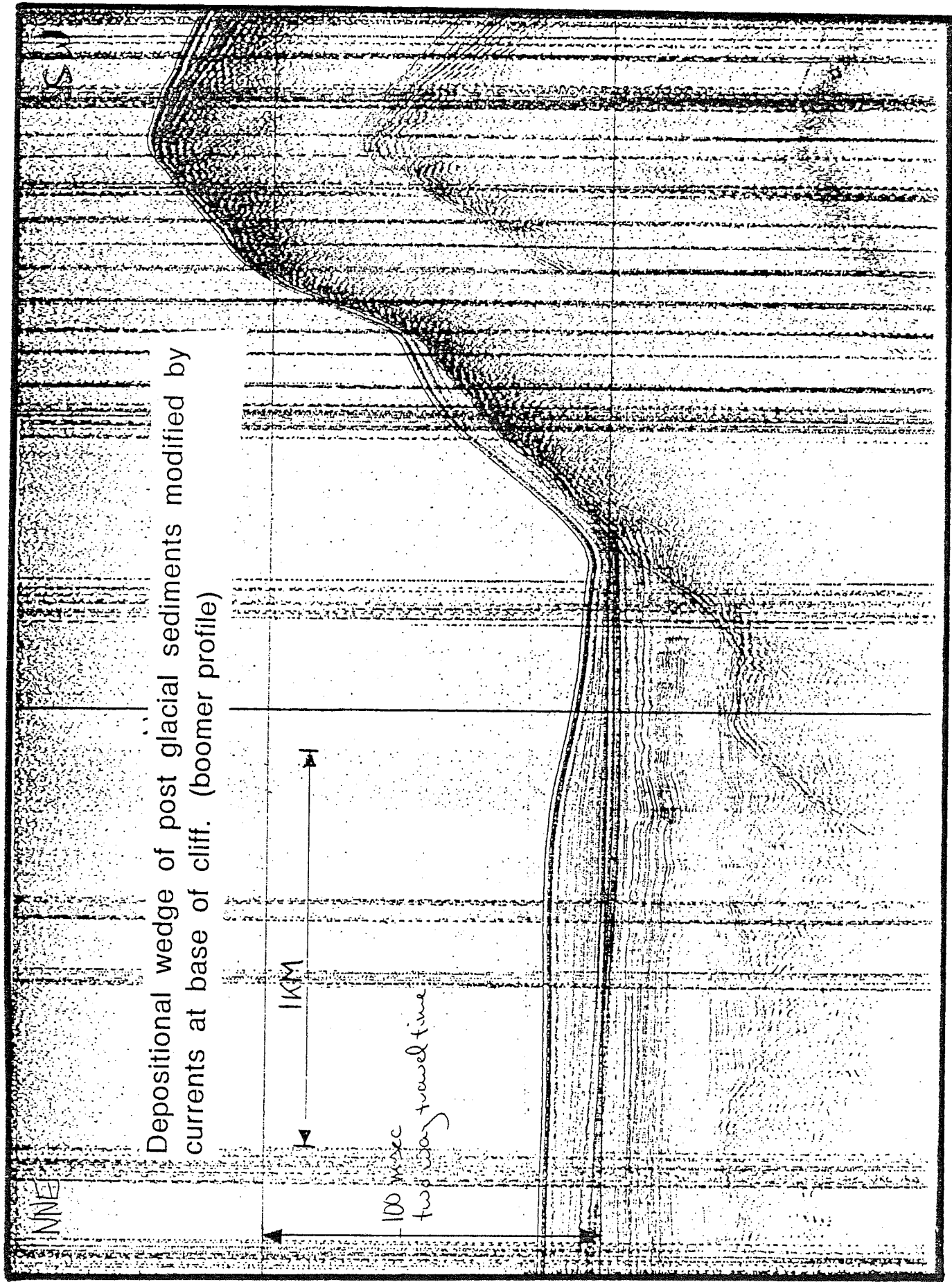


figure 10

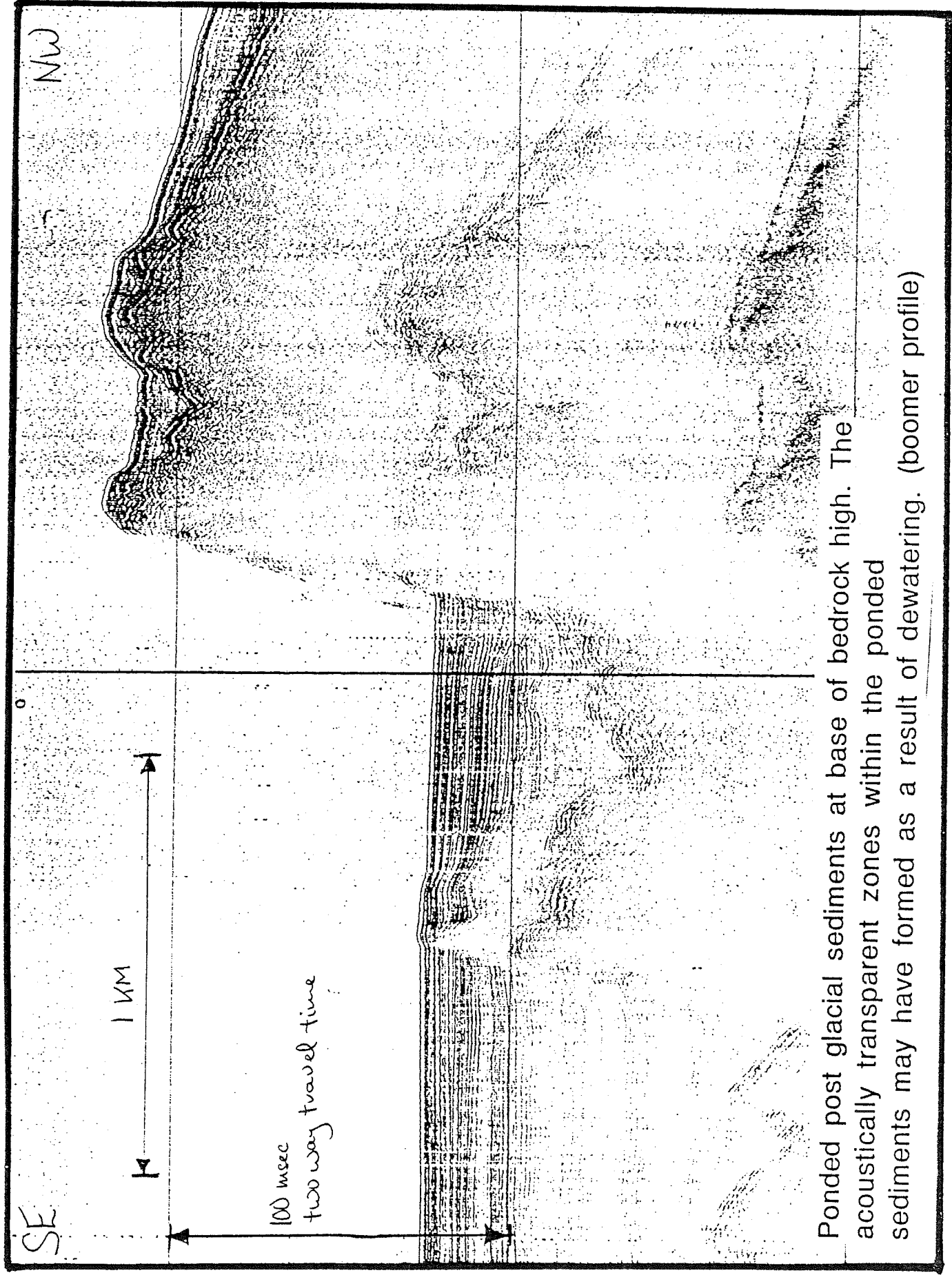


figure 11

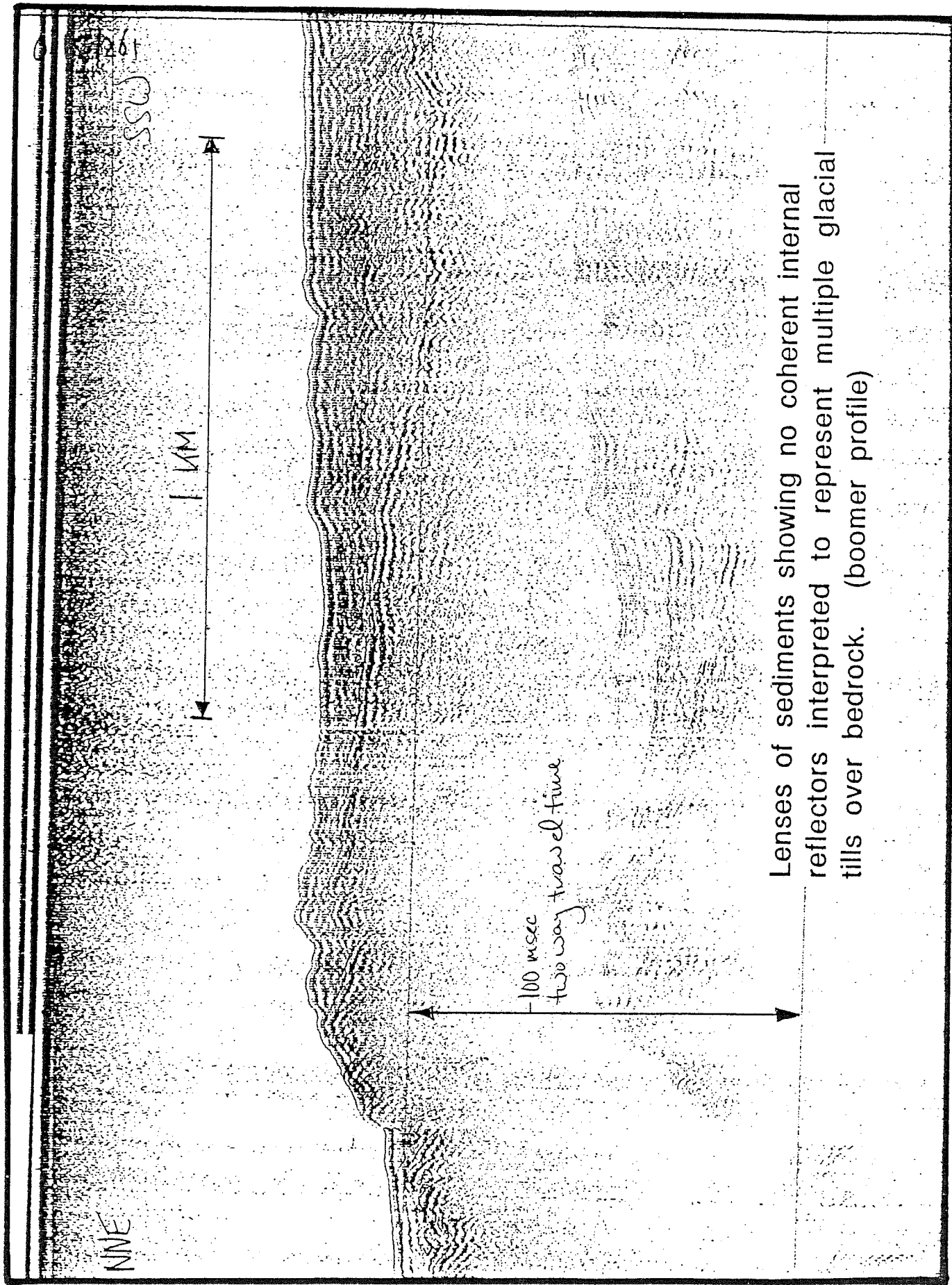
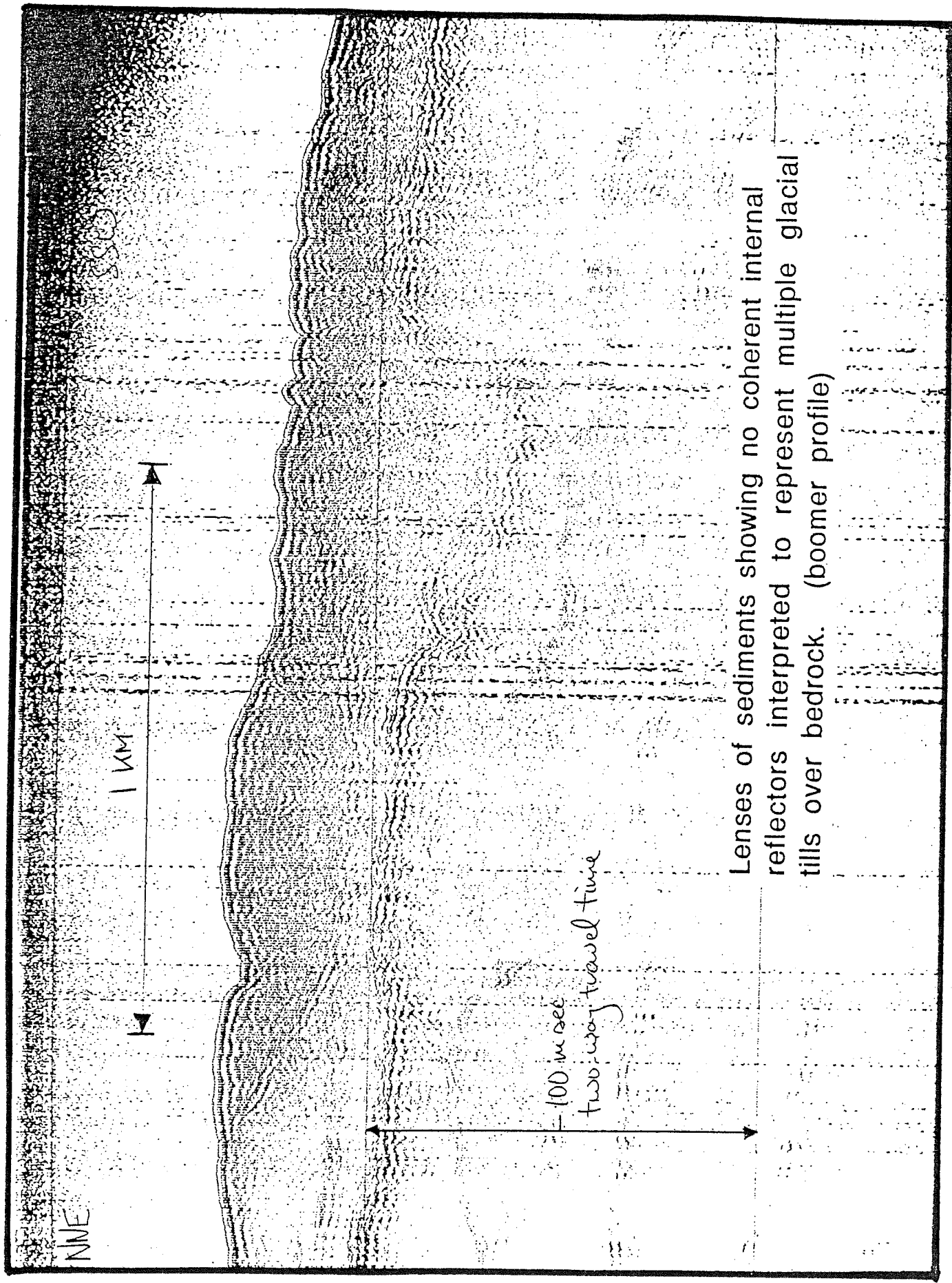


figure 12a



Lenses of sediments showing no coherent internal reflectors interpreted to represent multiple glacial tills over bedrock. (boomer profile)

figure 12b

262

N/E

SSW

Huntec boomer and 3.5 kHz seismic profiles of same area showing the increased penetration to the bedrock surface by the boomer system. Note that the 3.5 kHz system has slightly increased resolution near surface. (boomer profile)

1 KM

100 msec
two way travel time

figure 13a

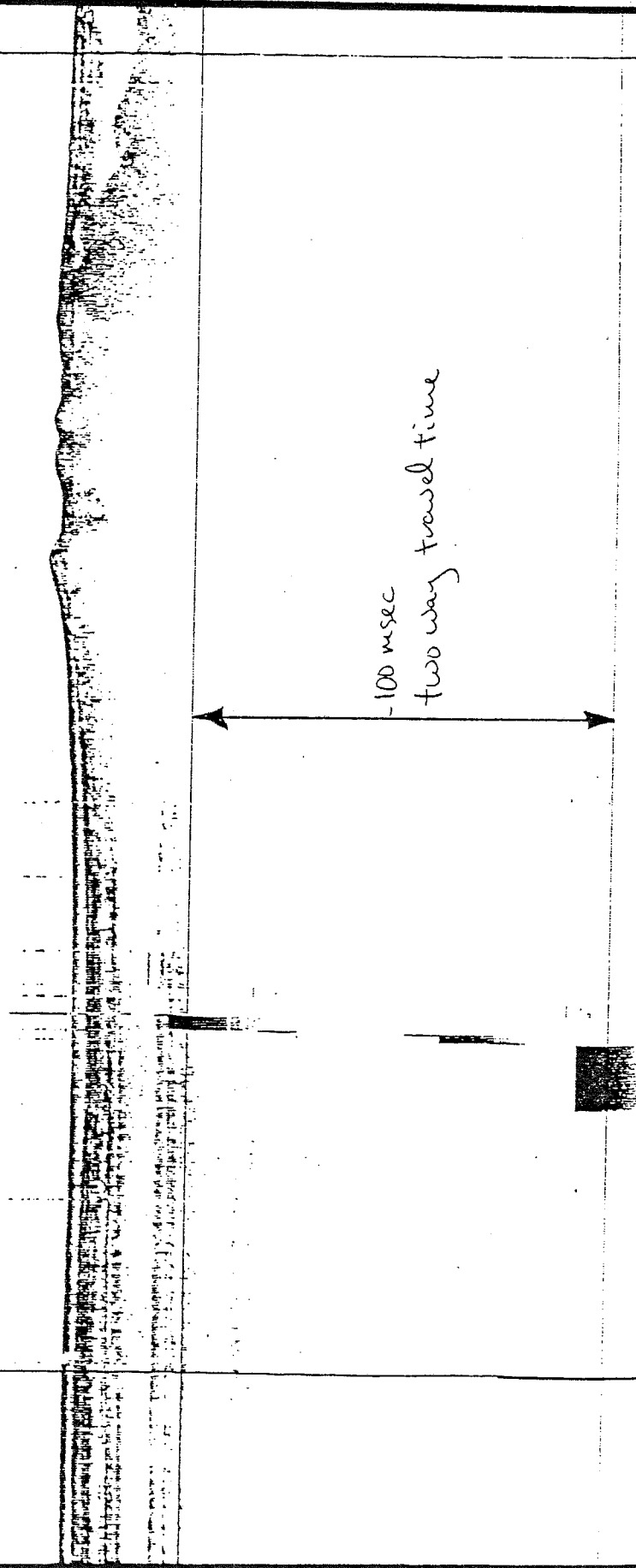
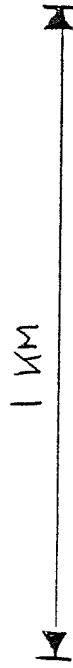
NNE

232/

SSW

Huntec boomer and 3.5 kHz seismic profiles of same area showing the increased penetration to the bedrock surface by the boomer system. Note that the 3.5 kHz system has slightly increased resolution near surface. (3.5 kHz profile)

1 KM



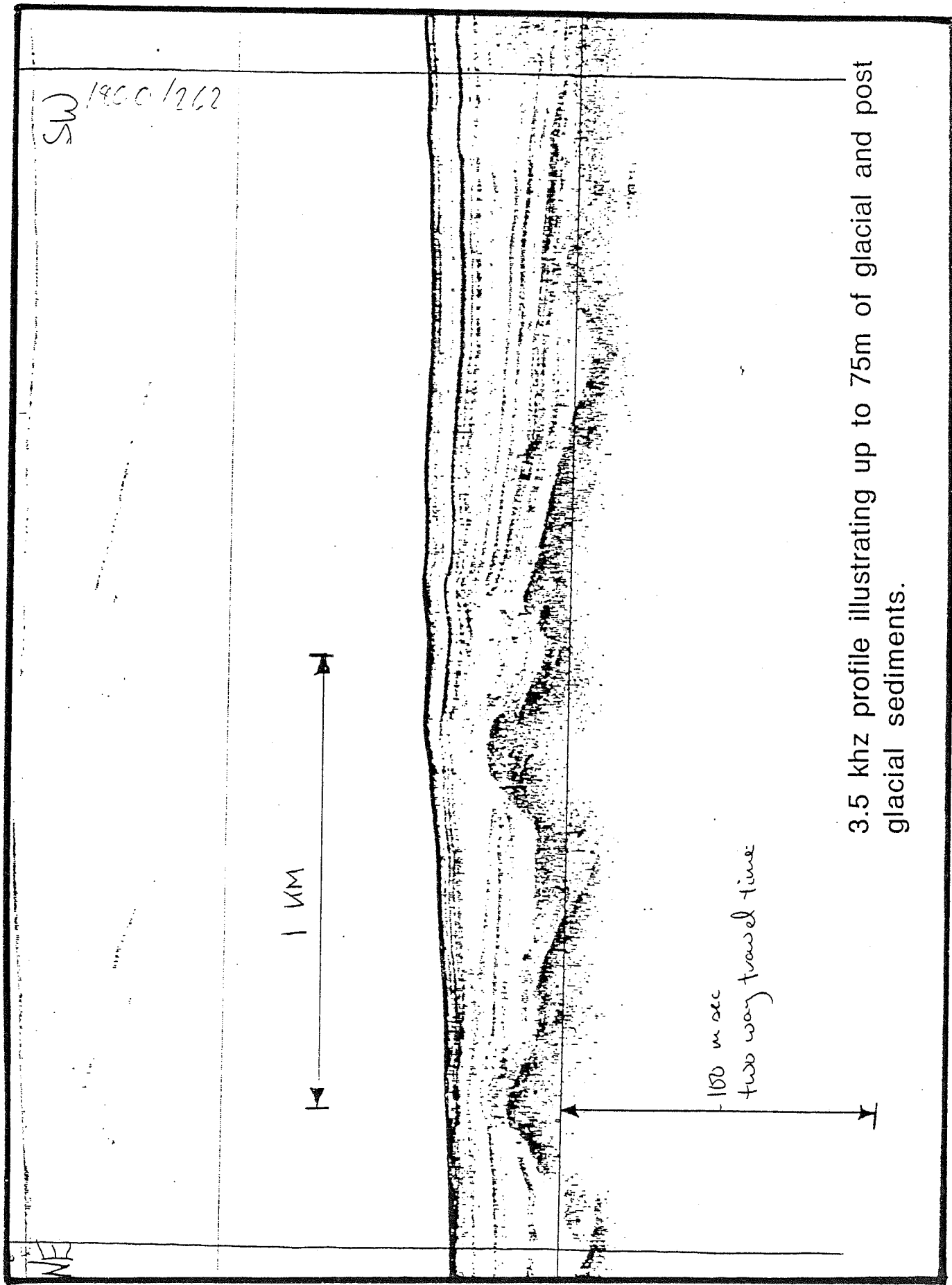


figure 14a

262/1800

NE

1400/262

WEEP

SW

1 KM

100 msec
two way travel
time

3.5 khz profile illustrating up to 75m of glacial and post
glacial sediments.

figure 14b

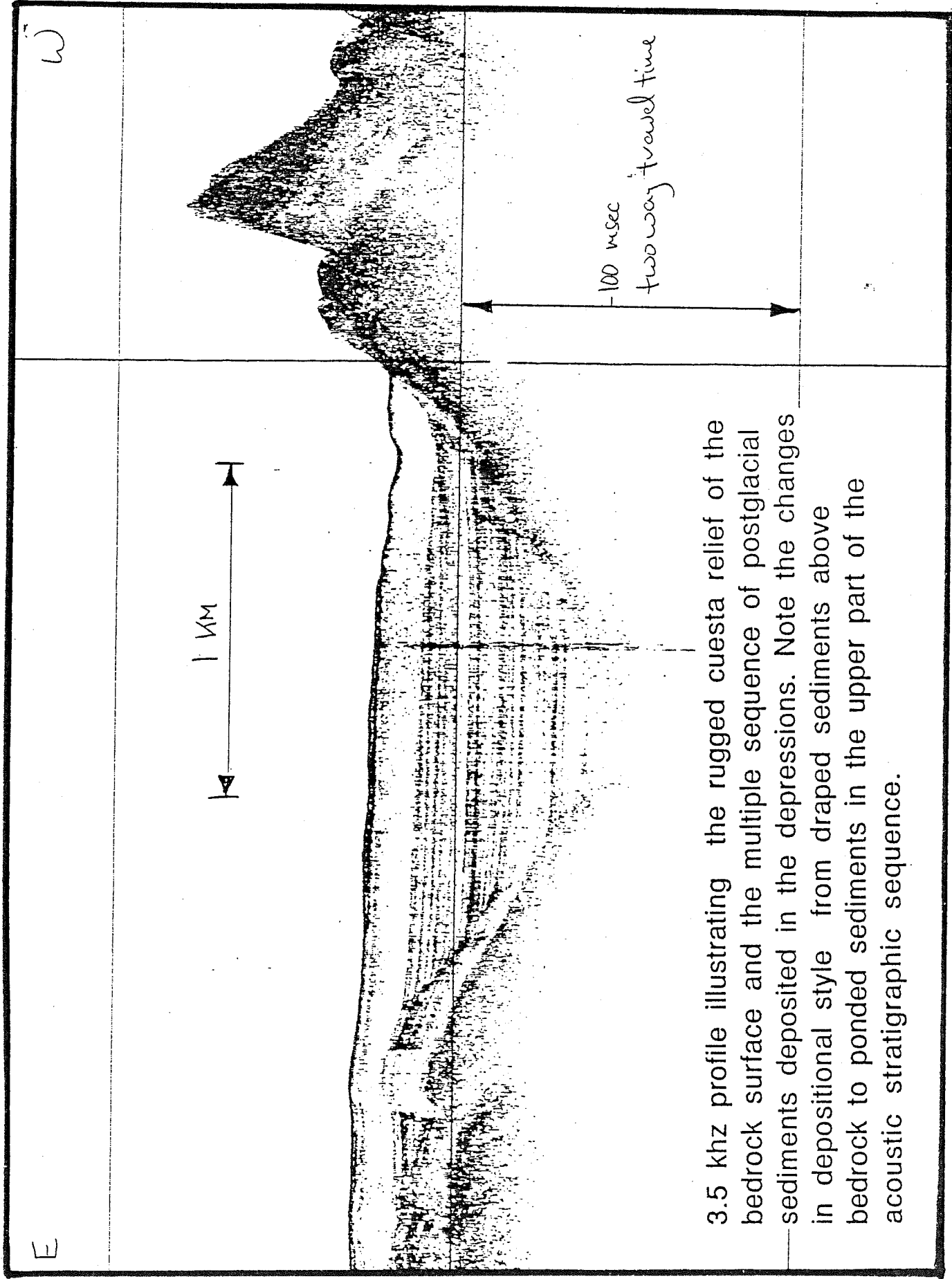


figure 15

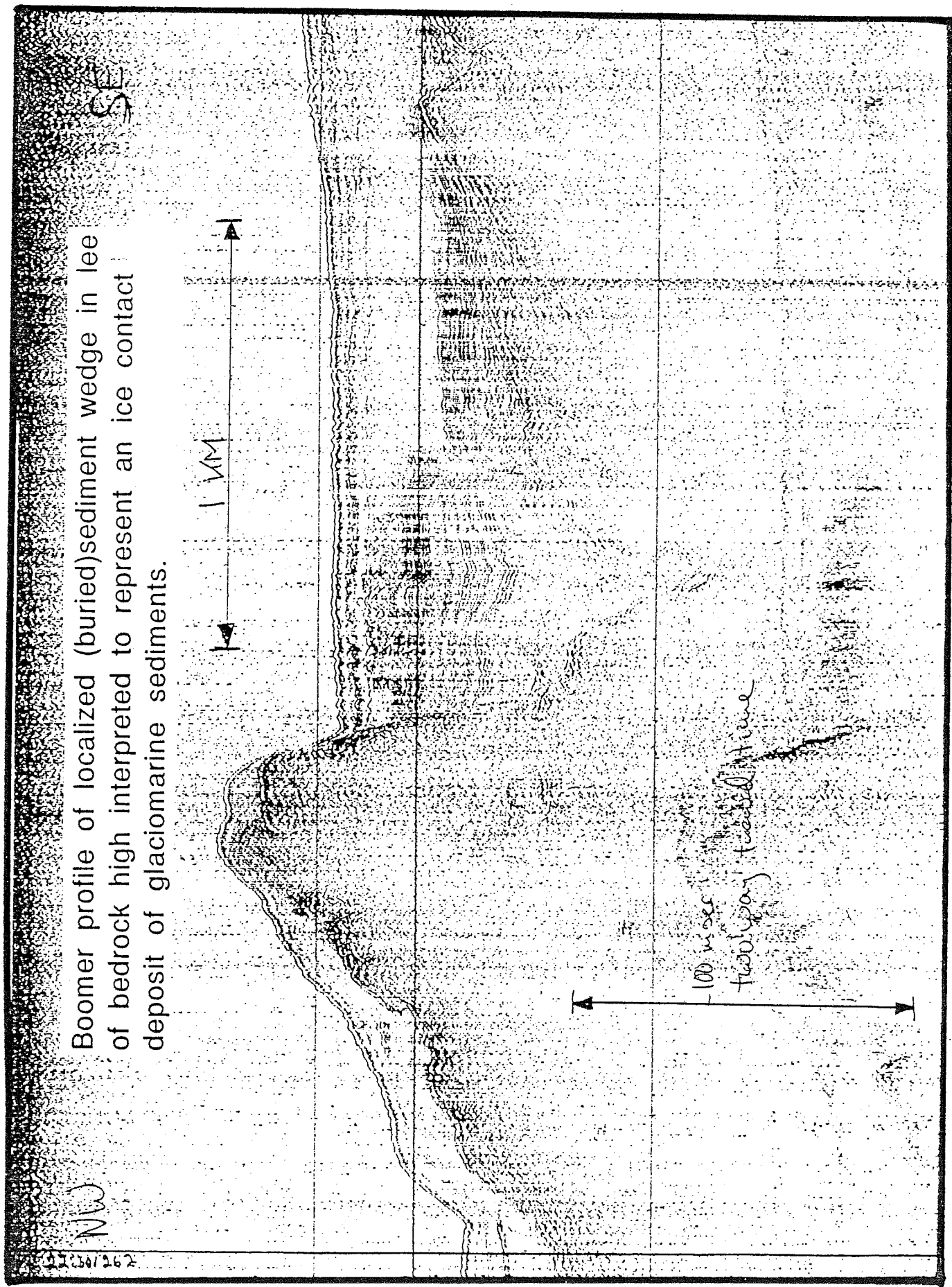


figure 16

88 NARWHAL (SIDESCAN TRACKS)

1-750000 AT 55N

78° 0' W

77° 30' W

77° 0' W

76° 30' W

56° 30' N

56° 30' N

56° 0' N

56° 0' N

55° 30' N

55° 30' N

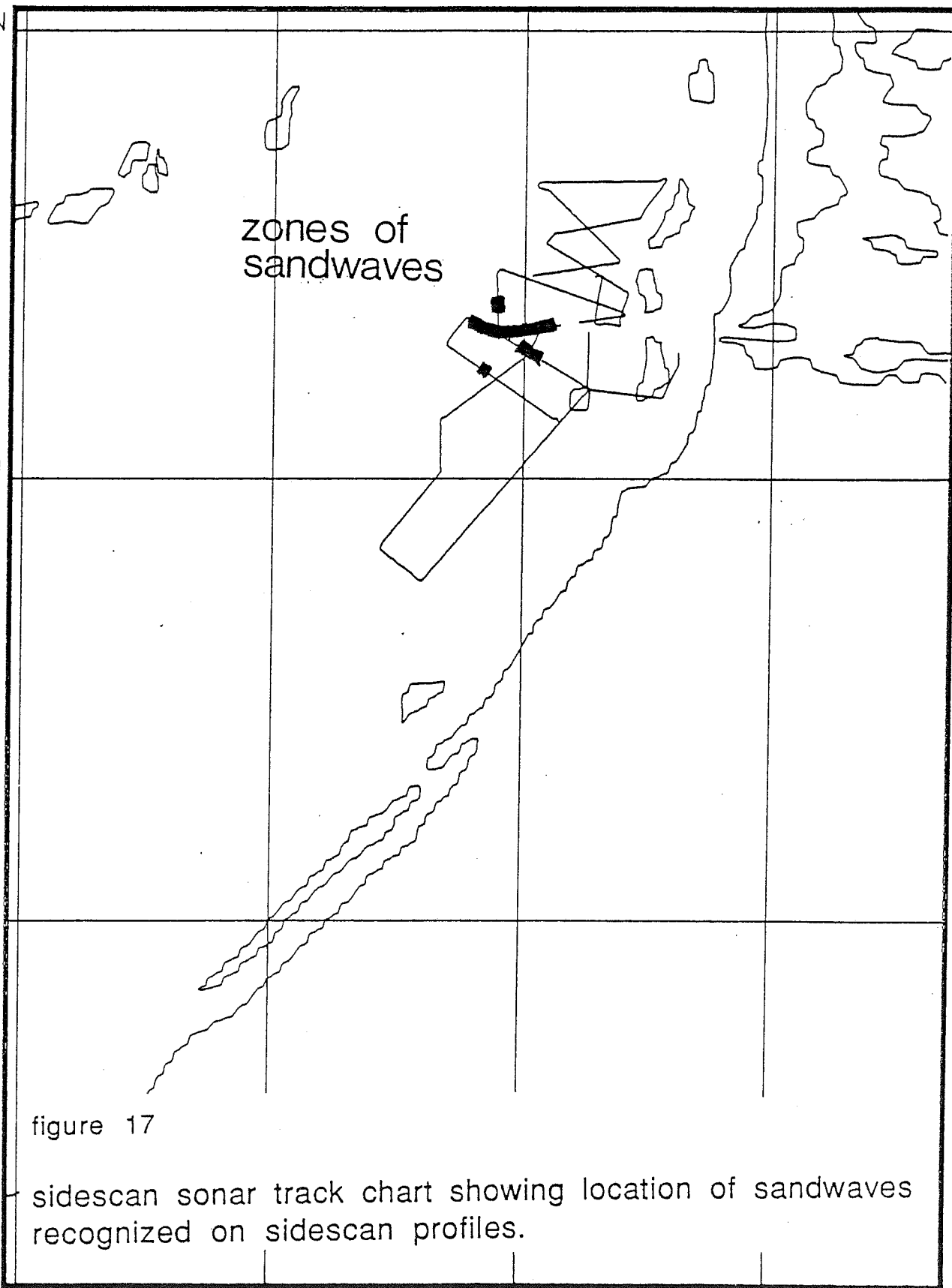
figure 17

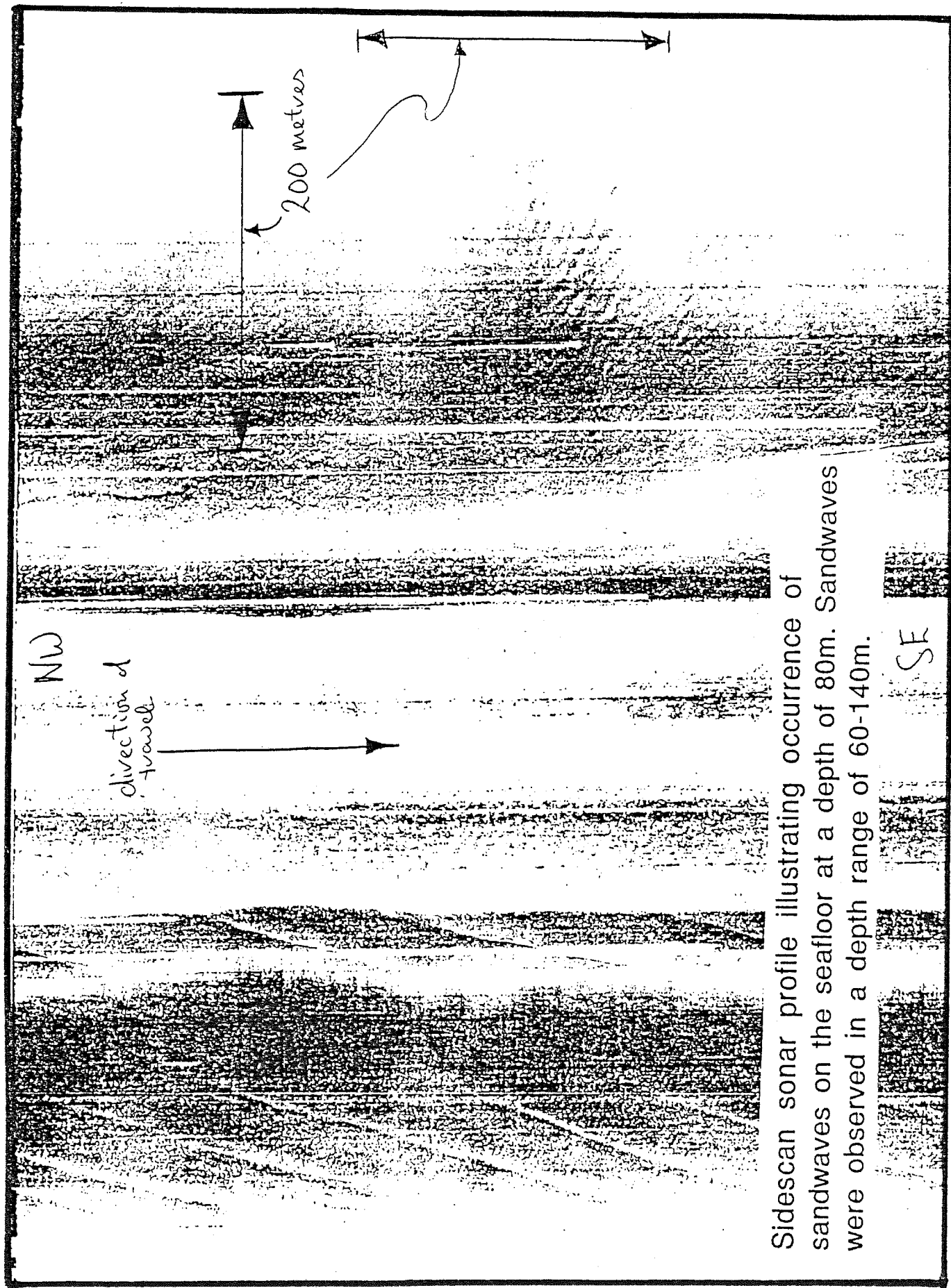
sidescan sonar track chart showing location of sandwaves recognized on sidescan profiles.

55° 5' N

55° 5' N

zones of
sandwaves





Sidescan sonar profile illustrating occurrence of sandwaves on the seafloor at a depth of 80m. Sandwaves were observed in a depth range of 60-140m.

STATION LOCATIONS - 88NARWHA
1:2,500,000 (MERCATOR, 55N)

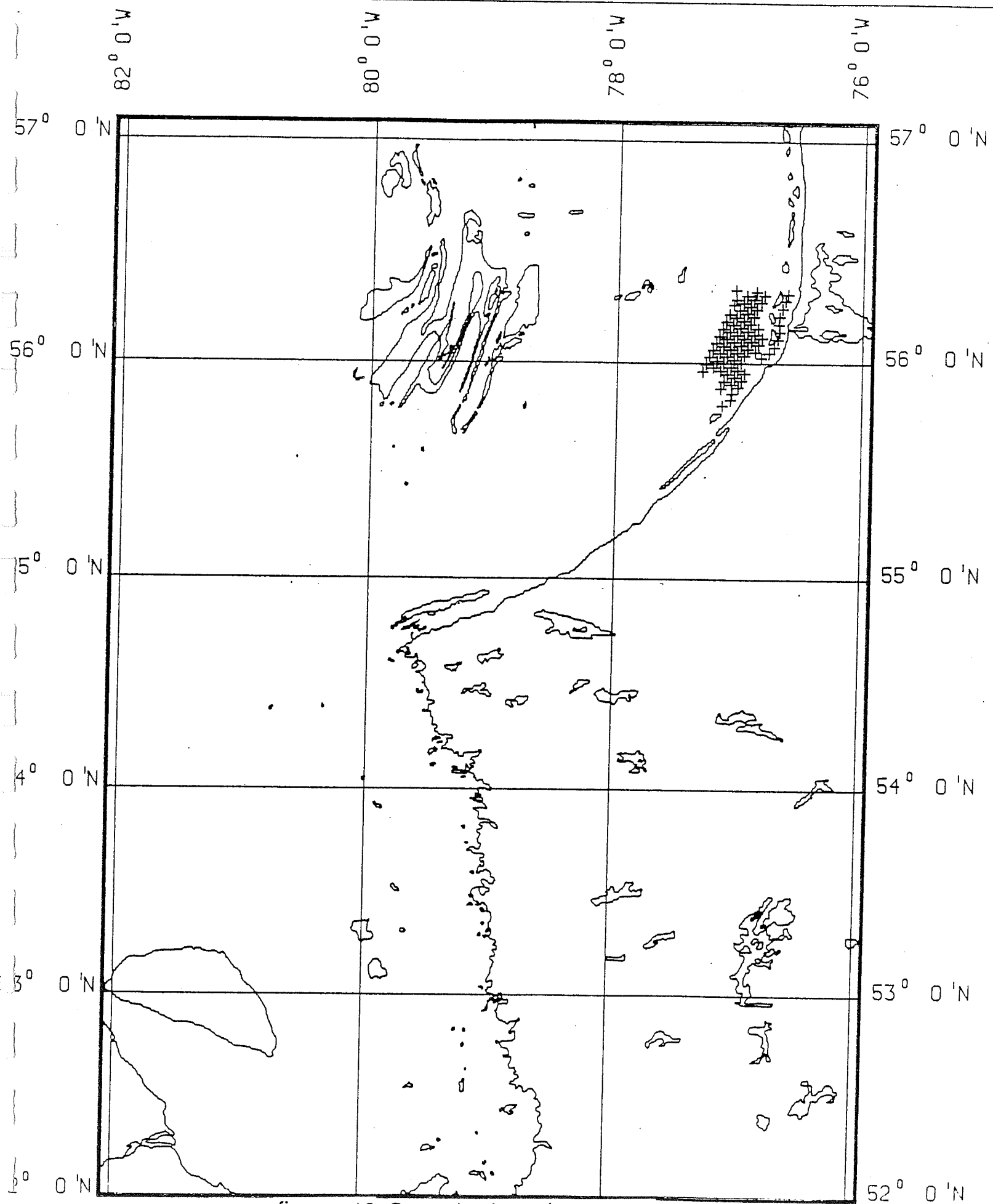
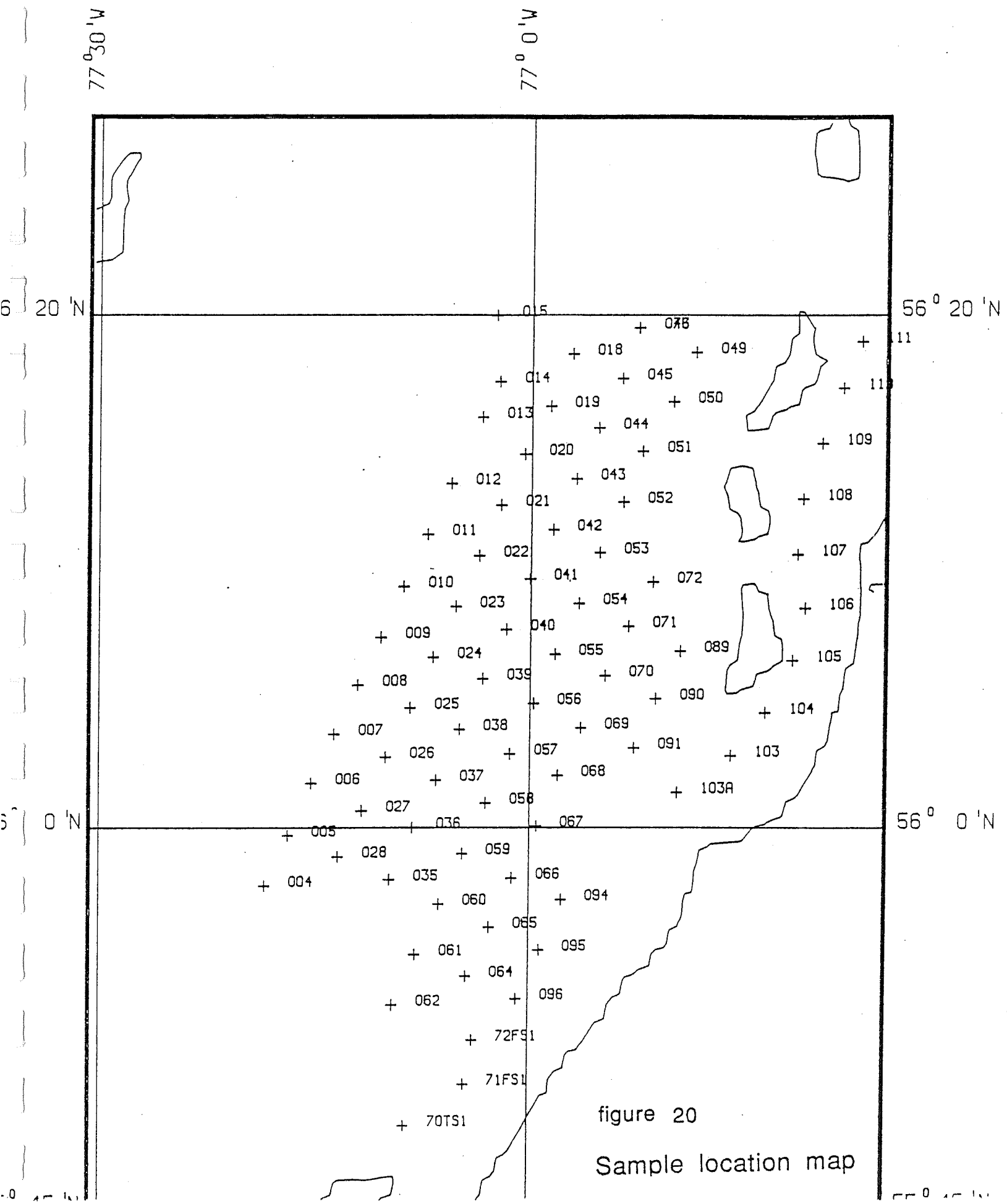


figure 19 Sample location map

STATION LOCATIONS - 88NARWHAL
1:350,000 (MERCATOR, 56N)



location map of shore traverses and index of geological highlights recorded on video film and photographic slides

1. water eroded potholes
2. Glacial outwash deposits
3. Richmond Gulf raised beaches
4. Ice contact and kettle hole topography
5. Moraine ridges
6. Tyrrell Sea sediments overlain by postglacial
7. Raised beaches dipping toward southeast
8. Glacially smoothed bedrock cliff
9. Glacially plucked bedrock face
10. Series of raised beaches

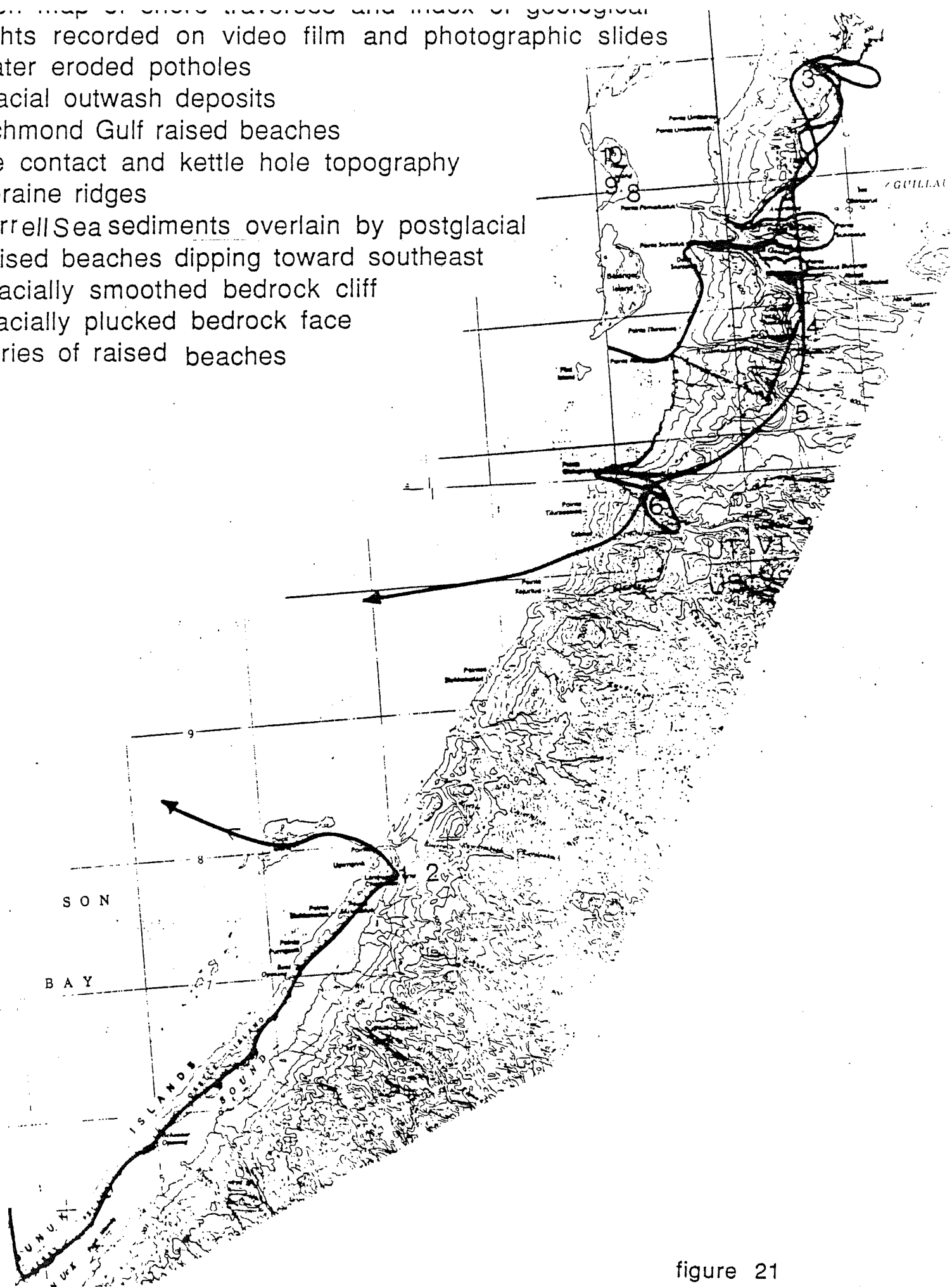


figure 21

APPENDIX 1

Catalogue of seismic data collected

Geopulse Sparker data

258/0000 - 0745
258/2109 - 259/0745
259/2030 - 260/0235

Huntec Sea Otter (boomer) data

260/1930 - 261/0904
262/1615 - 263/0815

O.R.E. 3.5 kHz subbottom profiler data

257/1930 - 258/0535
258/0539 - 1858
258/2109 - 259/0745
259/2015 - 2316
259/2328 - 260/1136
260/1915 - 261/0900
262/1615 - 263/0815

E.G.&G. 100 kHz sidescan sonar data

257/2130 - 258/0745
258/2130 - 259/0715
259/2030 - 260/0746

APPENDIX 2

Catalogue of grab samples

In order to determine the substrate characteristics of the study area the Canadian Hydrographic Service collected Deitz Lafond small volume (500 cc) grab samples along an evenly spaced grid. These samples were examined and described immediately upon recovery. The samples were then bagged, labelled and retained for a future more detailed lithological and sediment size analysis. These samples are now cataloged (see appendix 2) and stored at the Atlantic Geoscience Centre sample repository.

APPENDIX 2

DEITZ LAFOND GRAB SAMPLES

SAMPLE NUMBER	DAY/TIME (ADT)	LATITUDE	LONGITUDE	WATER DEPTH	DESCRIPTION
1					no sample retained
2					no sample retained
3					no sample retained
4	260/1515	55 57.75	77 18.38	122	gray mud
5	258/1302	55 59.76	77 16.76	83	sandy gray mud with shells
6	258/1231	56 01.74	77 15.16	63	sandy gray mud with one pebble
7	258/1205	56 03.70	77 13.57	48	very sandy gray mud with pebbles and shells
8	258/1140	56 05.60	77 11.96	35	very sandy gray mud with pebbles
9	257/1810	56 07.44	77 10.42	40	small sample, grayish brown sand
10	257/1745	56 09.46	77 08.85	60	uniform gray mud
11	257/1725	56 11.46	77 07.22	52	sandy mud with fine and coarse gravel
12	257/1700	56 13.46	77 05.58	41	mixed sandy mud with gravel
13	257/1625	56 16.04	77 03.47	45	mud and one large pebble
14	257/1610	56 17.42	77 02.26	56	sandy gray mud with one pebble
15	257/1545	56 20.02	77 02.49	47	sandy gray mud with pebbles
16					no sample retained
17					no sample retained
18	257/1525	56 18.48	76 57.14	58	sandy gray mud with pebbles and a shell
19	257/1510	56 16.49	76 58.68	52	very small sample of gravelly mud with shells and pebbles
20	257/1450	56 14.58	77 00.51	40	very sandy gray mud with shells and pebbles
21	257/1430	56 12.61	77 02.14	60	sandy mud, pebbles, (pelecypod) shell and shell fragments
22	257/1410	56 10.63	77 03.62	84	sandy gray mud with one pebble
23	257/1348	56 08.67	77 05.25	60	sandy gray mud with some small pebbles
24	257/1330	56 06.71	77 06.83	46	very sandy gray mud, shells and one pebble

SAMPLE NUMBER	DAY/TIME (ADT)	LATITUDE	LONGITUDE	WATER DEPTH	DESCRIPTION
25	258/1110	56 04.71	77 08.38	108	gray mud
26	258/1436	56 02.76	77 10.07	133	gray mud
27	258/1400	56 00.71	77 11.64	95	gray mud
28	258/1323	55 58.86	77 13.26	100	slightly sandy gray mud
29					no sample retained
30					no sample retained
31					no sample retained
32					no sample retained
33					no sample retained
34					no sample retained
35	258/1604	55 57.96	77 09.74	165	slightly sandy gray mud
36	258/1535	56 00.00	77 08.17	155	gray mud
37	258/1504	56 01.90	77 06.55	127	gray mud
38	258/1044	56 03.85	77 04.95	72	gray mud
39	257/1245	56 05.85	77 03.30	112	fine gray mud
40	257/1225	56 07.79	77 01.70	100	gray sandy mud with one cobble
41	257/1208	56 09.75	77 00.11	102	uniform gray mud
42	257/1145	56 11.69	76 58.48	169	compact fine gray mud
43	257/1130	56 13.67	76 56.83	77	very sandy gray mud with abundant pebbles
44	257/1108	56 15.62	76 55.26	115	gray sandy mud with pebbles (1-6 cm) 5 black volcanics and 3 others
45	257/1042	56 17.57	76 53.65	122	dark gray fine mud with polychaete worms
46	257/1015	56 19.54	76 52.50	122	gray mud
47					no sample retained
48					no sample retained
49	257/0955	56 18.59	76 48.55	114	slightly silty gray mud
50	257/0935	56 16.66	76 50.10	110	slightly silty mud with reduced organic matter and 5 pebbles (1-6 cm) 3 black volcanics and one worm
51	257/0900	56 14.70	76 52.21	83	gray sandy mud with 2 black volcanic cobbles, about 10 cm
52	257/0840	56 12.73	76 53.56	142	gray silty mud with a little sand and reduced organic matter
53	257/1940	56 10.75	76 55.19	155	gray mud
54	257/1915	56 08.80	76 56.62	162	gray mud
55	257/1855	56 06.82	76 58.31	122	sandy gray mud with shell (possibly overlain by a thick brownish mud layer)

SAMPLE NUMBER	DAY/TIME (ADT)	LATITUDE	LONGITUDE	WATER DEPTH	DESCRIPTION
56	258/1009	56 04.91	76 59.77	136	gray mud
57	258/1828	56 02.92	77 01.41	160	gray mud
58	258/1750	56 00.97	77 03.09	166	slightly silty gray mud
59	258/1713	55 59.00	77 04.69	164	very slightly sandy gray mud
60	258/1636	55 57.04	77 06.31	118	
61	259/1740	55 55.03	77 07.93	128	slightly silty gray mud
62	259/1720	55 53.05	77 09.52	155	gray mud with one pebble
63					no sample retained
64	259/1755	55 54.22	77 04.38	165	gray mud
65	259/1815	55 56.13	77 02.77	175	gray mud
66	259/1835	55 58.07	77 01.22	106	sandy gray mud with pebbles
67	259/1225	56 00.07	76 59.55	86	gravelly gray mud
68	258/1858	56 02.07	76 58.03	144	slightly sandy gray mud
69	259/1920	56 03.93	76 56.42	160	gray mud
70	258/0930	56 05.99	76 54.76	160	gray mud
71	258/0907	56 07.90	76 53.12	151	gray mud
72	258/0852	56 09.60	76 51.42	122	gray mud
73	257/2005	56 19.54	76 52.50	130	gray mud
74					no sample retained
75					no sample retained
76					no sample retained
77					no sample retained
78					no sample retained
79					no sample retained
80					no sample retained
81					no sample retained
82					no sample retained
83					no sample retained
84					no sample retained
85					no sample retained
86					no sample retained
87					no sample retained
88					no sample retained
89	259/0855	56 06.95	76 49.53	112	gray mud
90	259/0910	56 05.07	76 51.23	164	sandy gray mud
91	259/1155	56 03.12	76 52.70	110	slightly sandy gray mud
92					no sample retained
93					no sample retained
94	259/1252	55 57.23	76 57.73	66	sandy and gravelly gray mud with pebbles and shell
95	259/1320	55 55.22	76 59.30	130	silty gray mud
96	259/1335	55 53.33	77 00.87	128	gray mud

SAMPLE NUMBER	DAY/TIME (ADT)	LATITUDE	LONGITUDE	WATER DEPTH	DESCRIPTION
97					no sample retained
98					no sample retained
99					no sample retained
100					no sample retained
101					no sample retained
102					no sample retained
103	260/0950	56 02.83	76 45.97	115	gray mud
103a	260/1015	56 01.43	76 49.70	126	gray mud
104	260/0930	56 04.50	76 43.62	106	gray mud
105	260/0908	56 06.55	76 41.80	107	slightly sandy gray mud
106	260/0845	56 08.63	76 40.95	109	very sandy gray mud
107	260/0816	56 10.70	76 41.50	133	sandy gray mud
108	260/1755	56 12.85	76 41.13	144	gray mud
109	260/1812	56 15.03	76 39.78	127	slightly sandy gray mud
110	260/1833	56 17.17	76 38.37	92	gray mud
111	260/1853	56 19.00	76 37.08	80	gray mud
70FS1	259/1435	55 48.30	77 08.65	102	sandy gray mud
71FS1	259/1415	55 49.97	77 04.52	98	gray mud
72FS1	259/1355	55 51.67	77 03.92	90	gray mud