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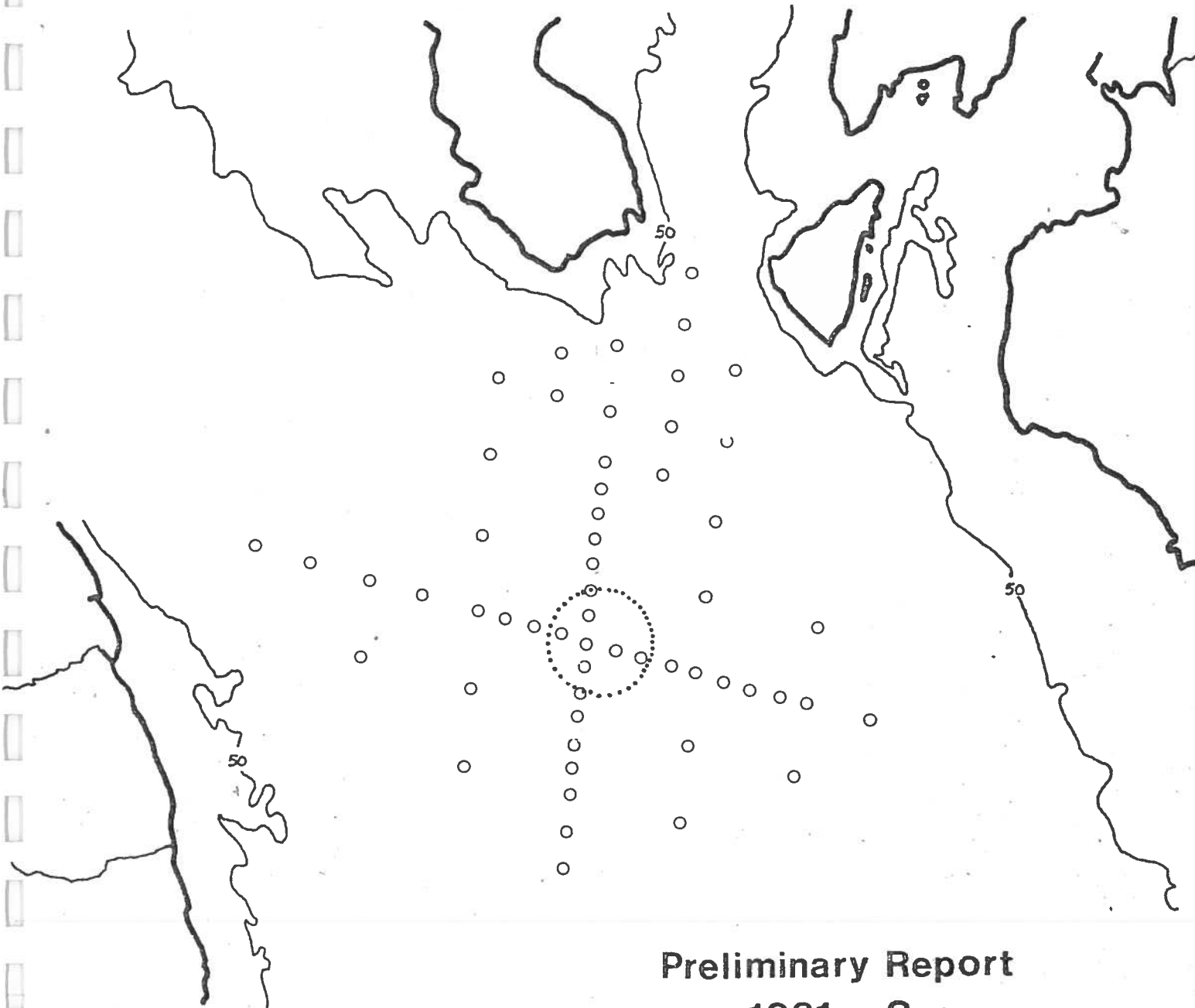
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GARROCH HEAD SLUDGE DUMPING GROUND SURVEY



Preliminary Report
1981 Survey

SCOTTISH MARINE BIOLOGICAL ASSOCIATION

GARROCH HEAD SLUDGE DUMPING GROUND SURVEY

Preliminary report on the monitoring survey carried out on 5th - 12th June 1981.

Organic Degradation Group,
Dunstaffnage Marine Research Laboratory,
P.O. Box No. 3, Oban, Argyll.

T.H. PEARSON,
7th August, 1980.

INTRODUCTION.

Sampling was carried out between the 6th and 11th June 1981 from R.V. 'Calanus'. A total of fifty-six sampling stations were occupied where various samples were taken as detailed below. A list of all sampling stations and samples taken is given in Table 1. The station positions were based on the Decca Navigator grid as shown in Figure 1. In addition trawl samples were taken over the dumping ground and over a control area some seven kilometres to the west of the dumping ground. Trawl sample areas are marked on Fig. 1.

Sediment Redox Potential Survey

Core samples were taken at the fifty six sampling stations occupied throughout the area and the redox potential (Eh) profile down the core was recorded using standard redox electrodes. The redox levels at 40 mm depth in the sediment have been used for interstation comparisons. Low redox values are indicative of highly reducing conditions in the sediment brought about by the degradation of large amounts of carbonaceous material. Fig. 2 shows those areas found to have low redox values.

Very highly reducing conditions (redox values below - 100 mV) were found immediately around the dumping grounds in an area some 5 Km² in extent. Relatively low redox values were found extending beyond this area for about a further kilometre in any direction. A further area of relatively low potentials was found to the north of the designated

grounds and some two kilometres south of Garroch Head. These areas are somewhat more extensive than those observed in May 1980 but correspond closely to the conditions observed in October 1979 and October 1980.

Oxygen content of overlying water.

The oxygen content of the water immediately above the sediment surface was measured at station P1 situated seven kilometres from the centre of the dumping ground and at four stations situated from the edge to the centre of the grounds. The values obtained are given in Table 2 and vary between 7 and 9 mg O₂/L i.e. the bottom water over the dumping ground was fully oxygenated.

Transect Survey.

The two lines of transect stations sampled during the previous surveys were again occupied. Two grab samples were obtained from each station one of which was sieved on a 1 mm mesh and the residue retained for examination of the macrobenthic fauna. Samples for the analysis of the organochlorine content and heavy metal content were obtained from the second grab sample and the residue was retained as a back-up faunal sample. High populations of macrofauna were present in all the samples taken. No afaunal areas were found in the centre of the grounds.

Depth of Sludge Deposit.

Equipment failure during the June survey prevented the necessary long gravity cores being taken for assessment of the sludge deposit depth. It is intended that such cores will be obtained at a later date and the depth of the sludge deposit will be reported in the final report.

Trawl Survey.

Three ten minute otter trawl hauls were taken, the first across the centre of the dumping ground, the second over stations P1 and Q1 some 7 Km west of the centre of the dumping grounds and the third over positions H1 to A3 7Km to the NW of the grounds. Large numbers of fish were taken in the trawl from the dumping ground with Long Rough Dab, Saithe, Norway Pout and Cod numerous and six other species present. Not many fish were present in the P1 Q1 haul, but at H1 H3 eleven species of fish were taken with Norway Pout abundant, and whiting and hake numerous. A summary of the species taken in the various hauls is given in Table 3. Specimens of live fish from the centre of the dumping ground and the area to the NW were taken for bacteriological examination.

Conclusions.

Areas of reduced sediment were present in the vicinity of the designated dumping grounds and in an area to the north of the grounds. The extent of these areas was similar to that found in October 1979 and October 1980. High populations of commercial fish species were again taken over the dumping grounds.

Table 1. List of stations occupied, sediment type and samples taken.

Station	Depth (m)	Sample Taken*	Sediment Type	Gear
A8	92	Eh, pH	0-2 cm light brown silt, black below	Corer
C8	102	Eh, pH	0-3 cm light brown silt, black below	Corer
D7	100	Eh, pH F, HM, OC.	0-4 cm light brown silt, black below	Corer Van-Veen Grab
D9	96	Eh, pH	Light brown silt throughout	Corer
E6	76	Eh, pH	0-2 cm light brown silt, grey-black below	Corer
E8	100	Eh, pH	Light brown silt throughout	Corer
G5	70	Eh, pH	Light brown silt throughout	Corer
G6	82	Eh, pH	Grey brown silt to 4 cm, black below	Corer
G7	84	Eh, pH F, HM, OC.	0-4 cm light brown silt, black below	Corer Van-Veen Grab
G8	86	Eh, pH	0-4 cm light brown silt, black below	Corer
G9	84	Eh, pH	0-5 cm light brown silt, dark brown below	Corer
I7	80	Eh, pH F, HM, OC.	0-8cm brown silt, grey below	Corer Van-Veen Grab
I8	88	Eh, pH	Grey brown silt throughout	Corer
J5	100	Eh, pH	0-3 cm grey brown silt, grey-black below	Corer
J7	80	Eh, pH	Brown silt throughout	Corer
J9	76	Eh, pH	Grey brown silt throughout	Corer

Station	Depth (m)	Sample Taken	Sediment Type	Gear
K7	80	Eh, pH F, HM, OC.	0-5 cm brown silt, grey-black below	Corer Van-Veen Grab
L7	80	EH, pH F, HM, OC.	Brown silt with grey streaks	Corer Van-Veen Grab
M5	98	Eh, pH	Light brown silt	Corer
M7	80	Eh, pH F, HM, OC.	0-5 cm brown silt, black streaks below	Corer Van-Veen Grab
M9	80	Eh, pH	Brown silt with a few black streaks	Corer
M11	80	Eh, pH	Brown-grey silt with a few black streaks	Corer
N7	80	EH, pH F, HM, OC.	0-5 cm brown silt, dark grey below	Corer Van-Veen Grab
O7	83	Eh, pH	0-5 cm brown silt, dark grey below	Corer
P1	144	Eh, pH, O ₂ F, HM, OC	0-2 cm light brown silt, grey-brown below	Corer Van-Veen Grab
P2	144	Eh, pH F, HM, OC	0-1 cm light brown silt, grey-brown below	Corer Van-Veen Grab
P3	165	Eh, pH F, HM, OC	0-2 cm light brown silt, grey-brown below	Corer Van-Veen Grab
P4	152	Eh, pH F, HM, OC	0-2 cm light brown silt, grey-brown below some black at 10 cm	Corer Van-Veen Grab
P5	140	Eh, pH, O ₂ F, HM, OC	0-2 cm light brown silt, grey-brown with black streaks below	Corer Van-Veen Grab
P5.5	106	Eh, pH F, HM, OC	0-1 cm light brown silt, grey-brown with black streaks below	Corer Van-Veen Grab
P6	112	Eh, pH, O ₂ F, HM, OC	Dark grey silt with sludge	Corer Van-Veen Grab

Station	Depth (m)	Sample Taken	Sediment Type	Gear
P6.5	100	Eh, pH	Sludge at surface dark grey silt below	Corer Van-Veen Grab
P7	82	Eh, pH, O ₂ F, HM, OC	Sludge at surface, grey black sludge silt below	Corer Van-Veen Grab
P75	84 m	Eh, pH, F, HM, OC	Sludge at surface, grey 0-5 cm grey-black below	Corer Van-Veen Grab
P8	74 m	Eh, pH, O ₂ F, HM, OC	Black-grey sludge at surface, grey-black below	Corer Van-Veen Grab
P85	70 m	Eh, pH, O ₂ F, HM, OC	Grey sludge at surface, black below 2cm	Corer Van-Veen Grab
P9	64 m	Eh, pH, F, HM, OC	Brown-grey with black streaks to 4 cm, black below	Corer Van-Veen Grab
P95	80 m	Eh, pH	Brown-grey silt to 3 cm, dark grey below	Corer
P10	80 m	Eh, pH, F, HM, OC	Light brown surface, grey-brown to 5 cm, Black-brown below	Corer Van-Veen Grab
P105	83 m	Eh, pH	Light brown surface, grey-brown below	Corer
P11	83 m	Eh, pH, F, HM, OC	Light brown surface, grey-brown below	Corer Van-Veen Grab
P12	80 m	Eh, pH F, HM, OC	Light brown surface, grey-brown below	Corer Van-Veen Grab
Q7	102 m	Eh, pH	Sludge at surface, black-brown silt to 3 cm, dark grey below	Corer
R7	112 m	Eh, pH, F, HM, OC	Sludge at surface, black-brown below	Corer Van-Veen Grab
S7	116 m	Eh, pH, F, HM, OC	Sludge at surface, black-brown to 2 cm, grey below	Corer Van-Veen Grab

Station	Depth (m)	Sample Taken	Sediment Type	Gear
S9	80 m	Eh, pH	Grey-brown surface, grey below	Corer
S11	84 m	Eh, pH	Light brown surface, grey-brown below	Corer
T7	132 m	Eh, pH, F, HM, OC	Brown silt to 3cm, grey-brown below	Corer Van-Veen Grab
U7	164 m	Eh, pH	Brown silt to 4cm, grey-brown below	Corer
V7	192 m	Eh, pH, F, HM, OC	Brown silt throughout	Corer Van-Veen Grab
V9	116 m	Eh, pH	Brown silt throughout	Corer
W7	180 m	Eh, pH	Brown silt with a few black streaks at bottom	Corer
X7	148 m	Eh, pH, F, HM, OC	Brown silt throughout	Corer Van-Veen Grab

- * Eh, Redox potential measurements taken at 1 cm intervals down core samples.
pH, Acidity measurements taken at 1 cm intervals down core samples.
O₂, Oxygen content of water immediately above the sediment surface measured.
F, Grab sample for faunal analysis taken.
HM, Sediment sample for Heavy Metal analysis taken.
OC, Sediment sample for Organochlorine Analysis taken.

Table 2. Oxygen content of the water immediately above the sediment surface (mean values from two samples).

Station	Oxygen Content (p.p.m.)
P1	8.9
P5	8.0
P6	7.5
P7	8.8
P8	8.1

Table 3. Species taken in otter trawl hauls.

1. Trawl across dumping ground (07-Q7) 15 minutes on bottom.		
Cod,	<u>Gadus morrhua</u>	Numerous (50-100)
Saithe,	<u>Pollachius virens</u>	Numerous (≠ 50)
Norway Pout,	<u>Trisopterus esmarki</u>	Numerous (20-50)
Long Rough Dab,	<u>Hippoglossoides platessoides</u>	Numerous (50-100)
Whiting,	<u>Merlangius merlangus</u>	5
Poor Cod,	<u>Trisopterus minutus</u>	1
Herring,	<u>Clupea harengus</u>	3
Argentine,	<u>Argentina sphyreana</u>	1
Plaice,	<u>Pleuronectes platessa</u>	1
Flounder,	<u>Platichthys flesus</u>	1
2. Trawl 7 Km west of dumping ground (P1-N1) 15 minutes on bottom.		
Cod,		2
Lesser spotted Dog Fish,	<u>Scyliorhinus canicula</u>	1
Whelks,	<u>Buccinus undatum</u>	2
Prawns,	<u>Cranqon sp</u>	≠ 6
Norway lobster,	<u>Nephrops norwegicus</u>	1
3. Trawl 7 Km north-west of dumping ground (H2-H3) 15 minutes on bottom.		
Whiting,		7
Norway Pout,		numerous (20-50)
Poor Cod,		4
Hake,	<u>Merluccius merluccius</u>	10

Long Rough Dab,		14
Herring,		6
Four bearded rockling,	<u>Rhinonemus cimbrius</u>	1
Argentine,		3
Plaice,		1
Witch,	<u>Glyptocephalus cynoglossus</u>	1
Dab,	<u>Limanda limanda</u>	1
Prawn,		Numerous
Whelk,		1
Hermit Crab,	<u>Eupagurus sp</u>	2
Norway Lobster,		6

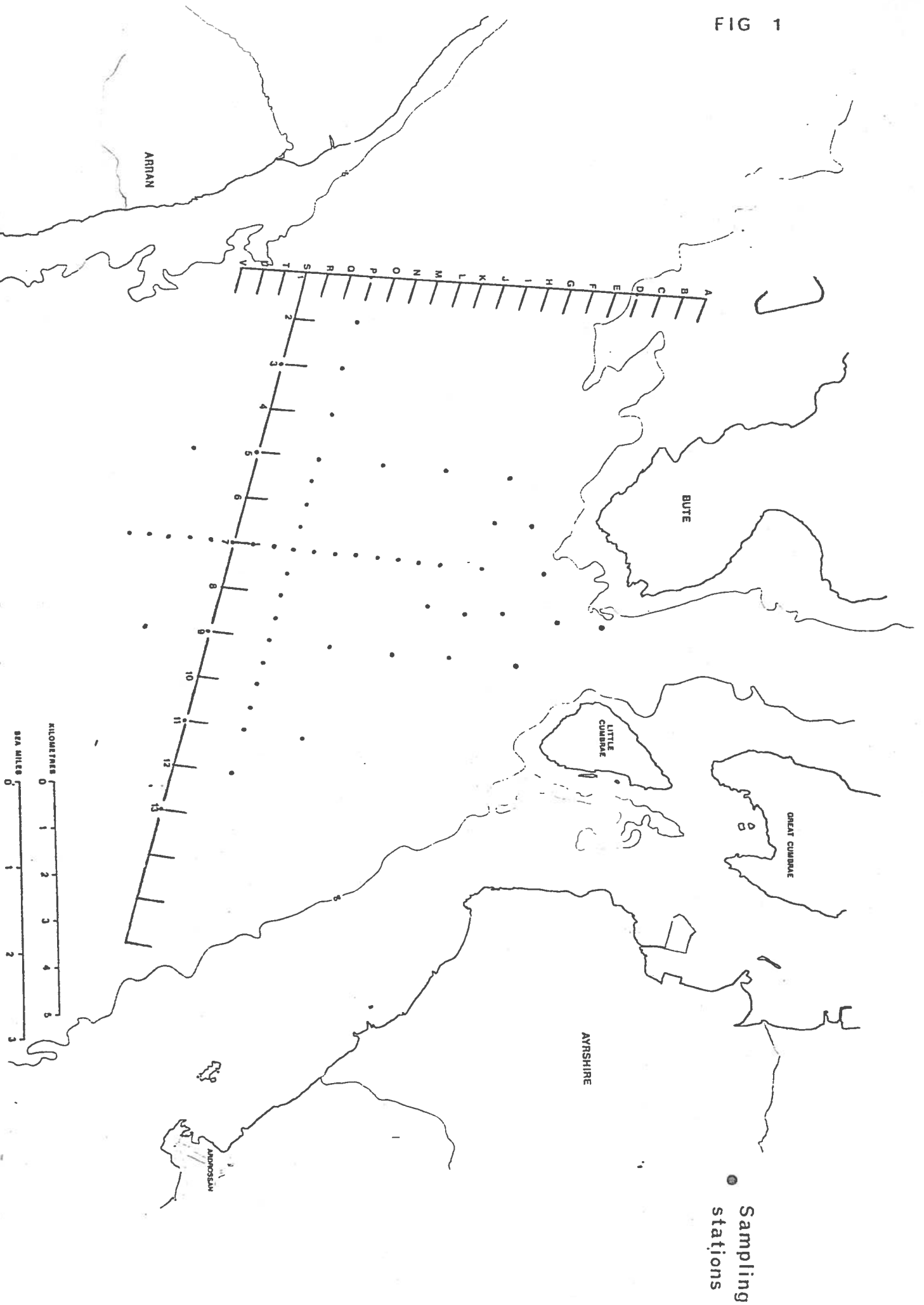
Captions to Figures.

Figure 1. Map showing sampling grid and station position with trawl positions marked.

Figure 2. Redox potential (Eh) values at 4 cm depth in the sediment.

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FIG 1



Eh at 4cm-Depth in Sediment

0
V V 100

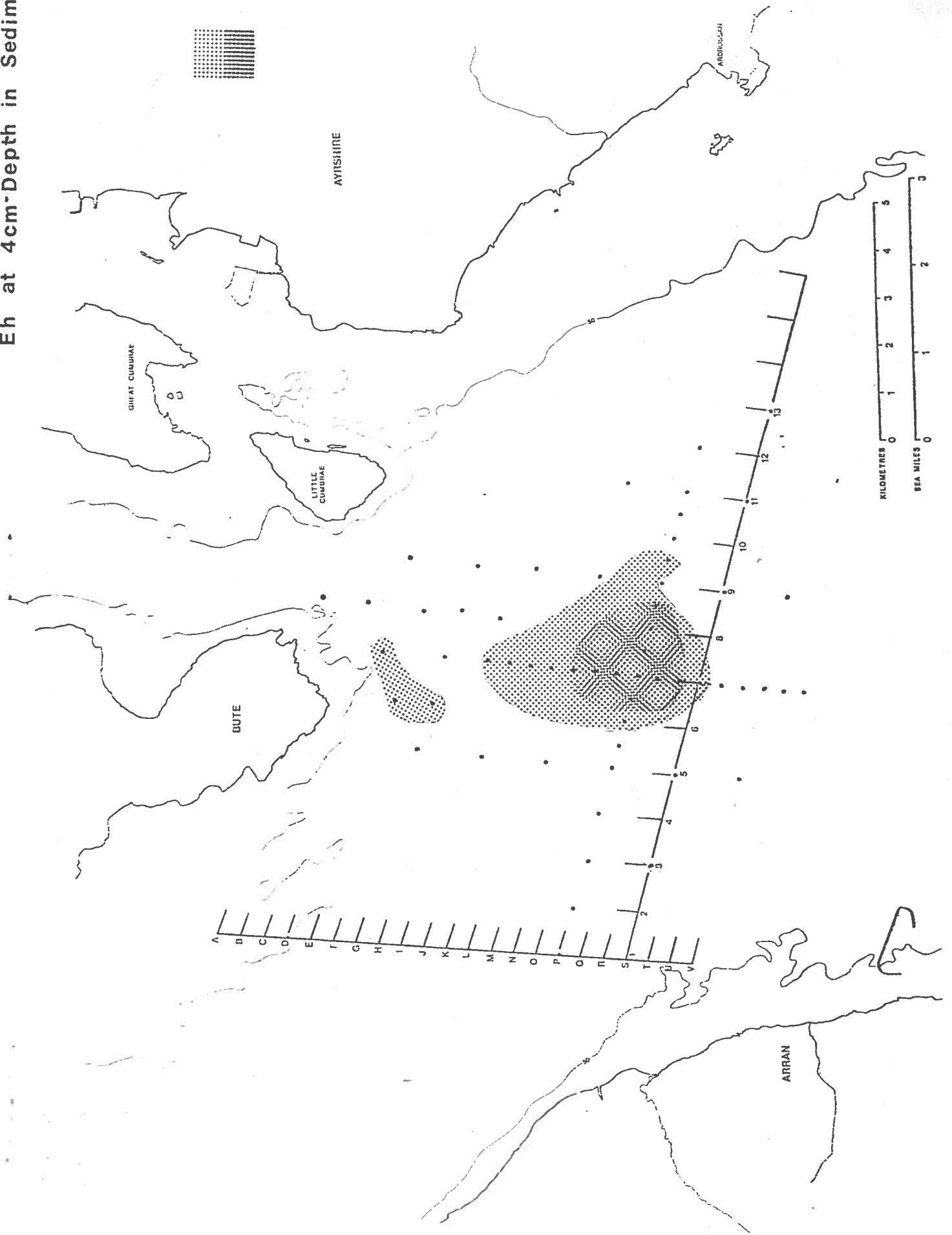


Fig 2