Sarah Note Sediment sampling on index card (as well as sandeel sampling & distribution)

16

R1/3

LD

IN CONFIDENCE - not to be quoted without reference to the Laboratory

REPORT

Charter Vessel 'Sunbeam' LK 335

1-4, 6-11, 13-17 August 1984

OBJECTIVES

1. To carry out a bottom trawl survey to determine the distribution of 1-group and older sandeels (Ammodytes marinus) in Shetland waters.

2. To collect data on length and age distribution by fishing grounds, depth of water, type of substrate, time of day and state of tide.

3. To collect samples of bottom sediment from trawling positions to determine particle size and suitability for sandeels.

4. To identify all fish species preying on sandeels and to determine the size preference of different predators.

5. To carry out a preliminary investigation of the depth distribution of sandeels from echo-sounder records and observation of sea-bird feeding behaviour.

NARRATIVE

Scientific staff joined 'Sunbeam' at Lerwick on 1 August. Over 1-4 August recognised sandeel grounds to the south-east and north of Shetland were sampled. Those grounds to the south-east were sampled on 3 occasions at approximately weekly intervals. Other inshore grounds to the south-west, and at Foula, Brekkin and at Balta were sampled only once whilst the grounds at Fair Isle were sampled twice. The grounds at Sands Voe were sampled intensively over 2 complete tidal cycles during 9-10 August.

Offshore grounds were surveyed during 6-8 and 13-15 August. Survey tracks and trawl positions are as shown on chart 1.

Four landings of sandeels were made to the reduction factory at Bressay. To test the efficiency of the magnets on the processing lines, in relation to earlier tagging experiments, 2 samples of 50 tagged sandeels were introduced into the storage hoppers at the factory. The numbers of tags recovered up to 17 August were 36 and 29 (72% and 58%).

The cruise finished at Lerwick on the evening of 17 August.

RESULTS

1. Trawling

A total of 81 trawl hauls were made using Sunbeam's standard sandeel trawl. Twenty two hauls were made on unexploited offshore grounds and 59 on recognised inshore sandeel grounds. Hauls ranged from 5 to 84 minutes duration depending on the extent of suitable ground available. Positions, numbers of hauls, and

types of bottom as determined from grab samples are given on chart 1.

Catches ranged from 0 to 10 tonnes per haul. On the offshore grounds Norway pout and other gadoids plus large numbers of Cyanea sp comprised the bulk of the catch. On inshore grounds catches consisted mainly of sandeels, principally A. marinus but with some Hyperoplus lanceolatus occurring on most grounds. Large numbers of Gymnammodytes semisquamatus were taken at the south end of Foula.

2. Distribution of A. marinus

On offshore grounds sandeels were found only on Bressay Shoal where one haul of 70 minutes duration yielded a total of 8 A. marinus. On inshore grounds hauls of A. marinus ranged from 0 to 10 tonnes. Mean catch rates for standard hauls of 30 minutes by fishing ground were as shown on chart 2.

The proportions of A. marinus by age group varied on the different fishing grounds and were as shown on chart 3. Length at age was also found to vary according to the grounds fished:

Age Group	Length Range (cm)	Range of Mean Lengths	Mean Length
0	4.5 - 12.0	6.2 - 10.3	8.9
1	9.5 - 15.5	9.5 - 14.5	13.3
2	11.5 - 18.5	12.3 - 16.1	14.7
3	12.5 - 19.0	14.8 - 17.0	16.1
4	15.0 - 21.5	15.0 - 19.0	17.1
5	15.0 - 20.0	15.9 - 19.0	17.7
6	16.5 - 20.0	16.6 - 20.0	17.6
7+	18.0 - 24.0	18.0 - 20.7	18.8

On inshore grounds the presence of A. marinus was limited to areas of less than 80m depth. Offshore, at Bressay Shoal, A. marinus were taken at a depth of 101m.

The availability of A. marinus by state of tide and by time of day was investigated at Sands Voe where a specific tow was worked at 90 minute intervals over 2 periods of 12 hours on successive days. Catch rates in relation to the direction of tidal flow, state of tide and time of day are given in figs 1 and 2.

3. Bottom Sediments

A total of 22 samples of bottom sediment were collected, 20 from offshore grounds and 2 from inshore grounds. The distribution of bottom types by visual examination were as shown on chart 1. The samples will be analysed for particle size composition at the Laboratory.

4. Predation

For each haul the stomachs of up to 10 fish per size group for each fish species caught were examined. The numbers and the state of digestion of sandeels present were recorded for each fish species in relation to time of day.

A total of 38 fish species were caught, 27 in inshore waters, 29 in offshore waters. Examination of stomach contents showed A. marinus to be present in 16 of the species taken on inshore grounds and in 6 species from offshore grounds.

5. Echo Sounder records of sandeels

The ship's echo-sounders and fish loop were run continuously during the survey. Traces of sandeels were recorded on recognised fishing grounds only. The majority of traces were a short distance off the bottom and were above the estimated height of the trawl headline. Although some sandeel traces were observed in mid-water no obvious large concentrations were observed on the surface.

6. Observations on sea-bird feeding

Observations of sea-bird activity were made during daylight hours. Feeding behaviour by gannets (Sula bassana) was observed on 2 occasions on inshore fishing grounds.

Ad hoc

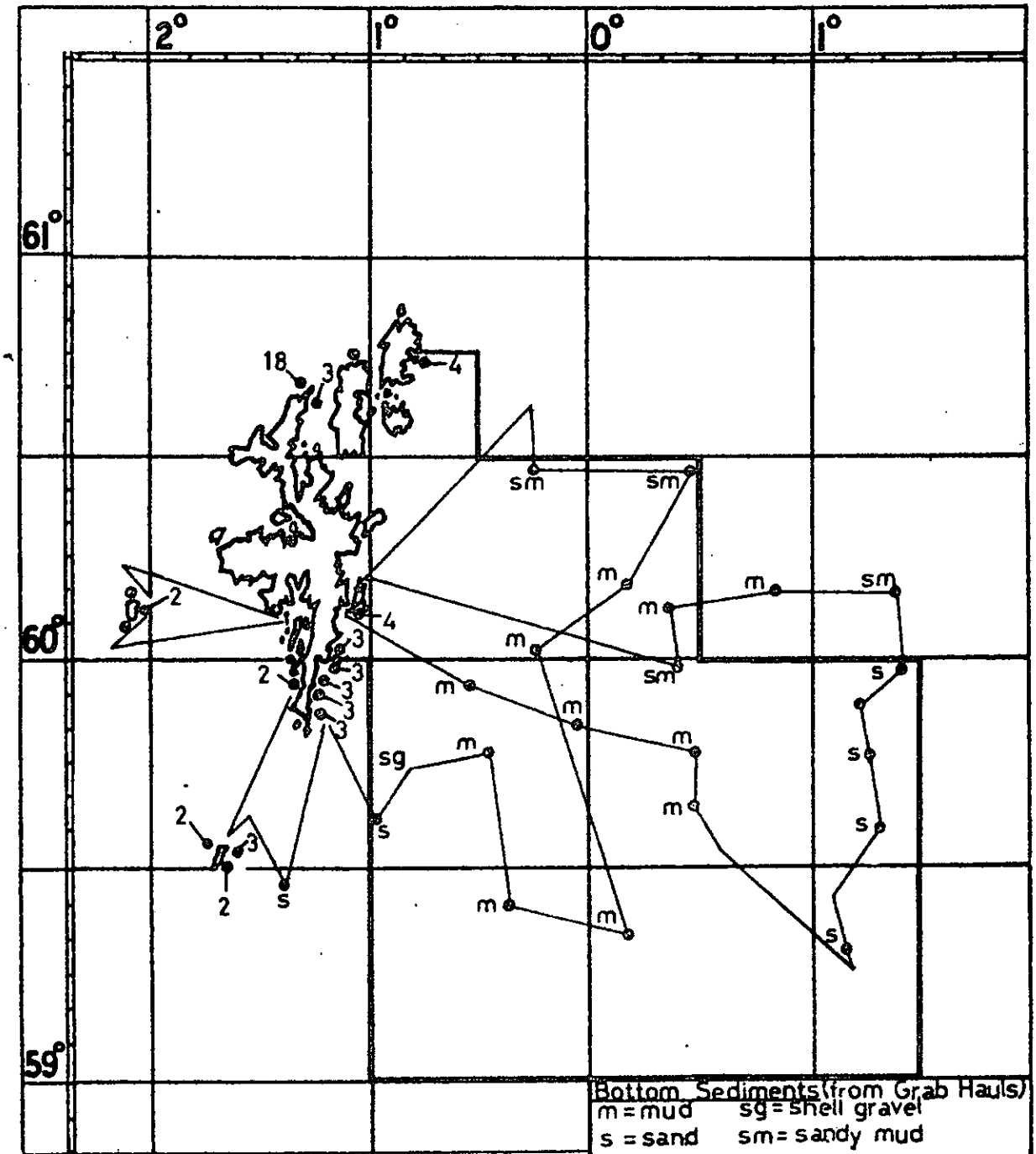
Observations of cetaceans

Dolphins were observed on 7 occasions on grounds to the south and east of Shetland. Whales were observed on 2 occasions to the east of Shetland. These data have been passed to the Sea Mammal Reasearch Unit.

J Gauld

22 October 1984

CHART 1



mv 'SUNBEAM' 1-17·8·84

CHART 2

A.marinus : CATCH per 30 min HAUL

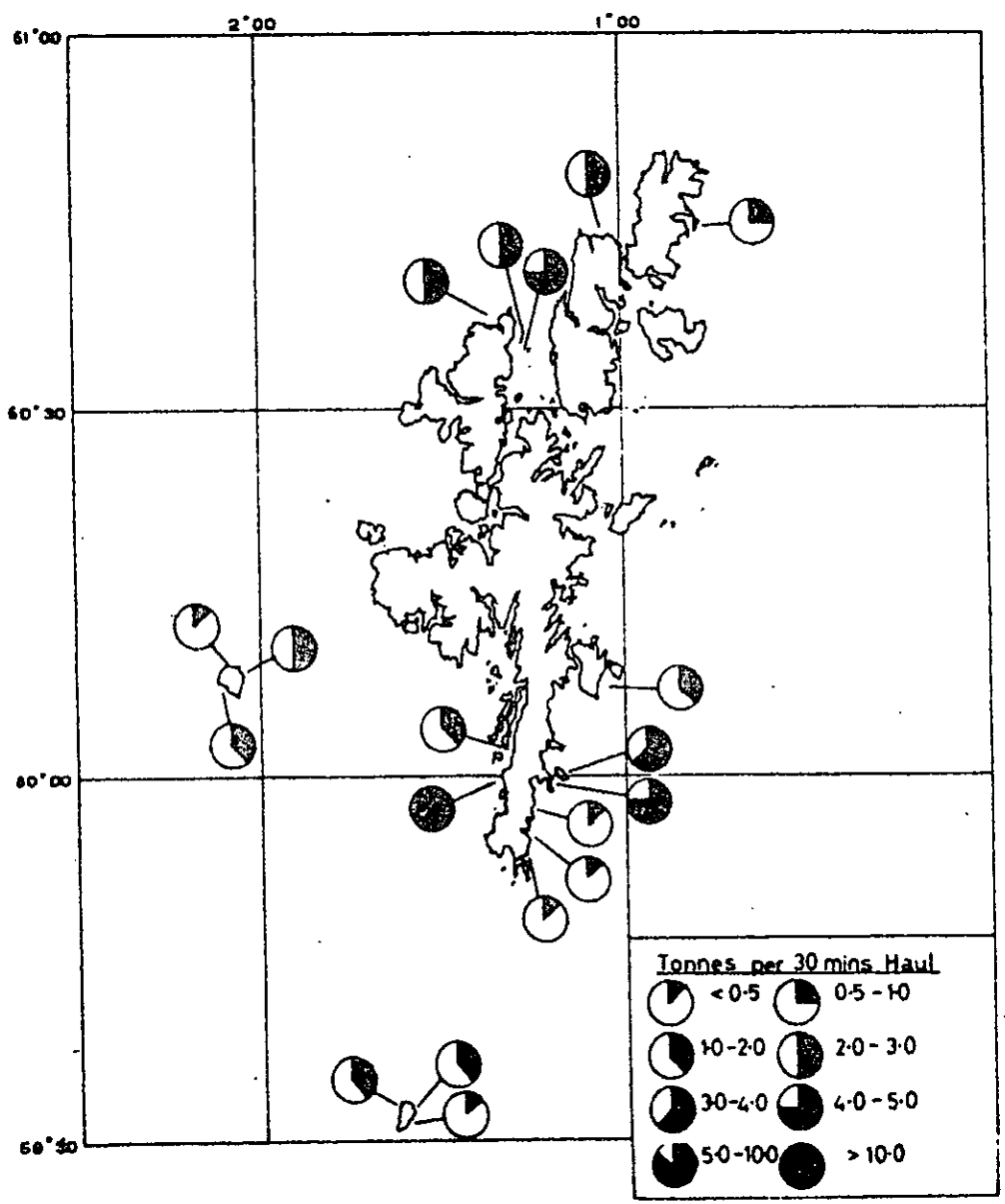
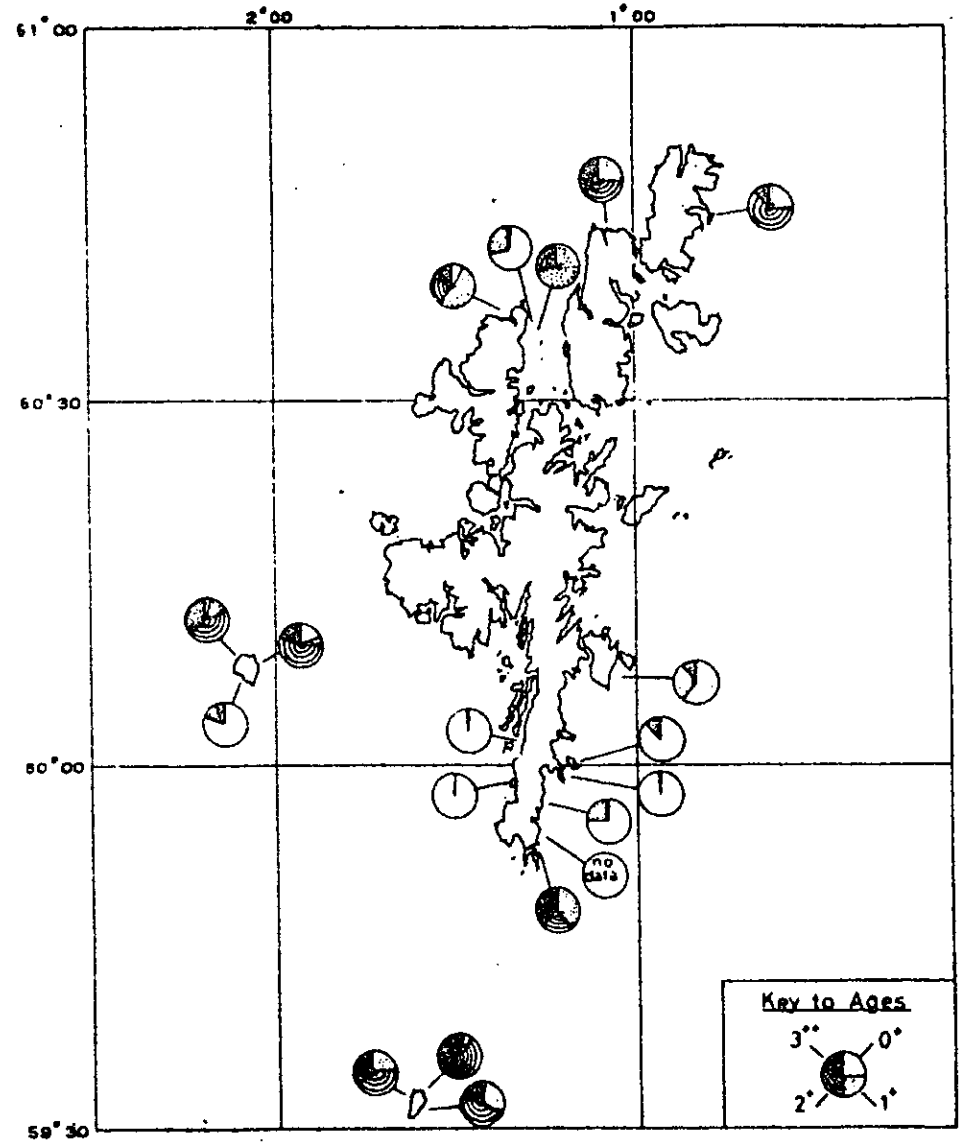


CHART 3

Distribution of A.marinus by Age by Fishing Ground



mv "Sunbeam" Aug 1984

Fig 1

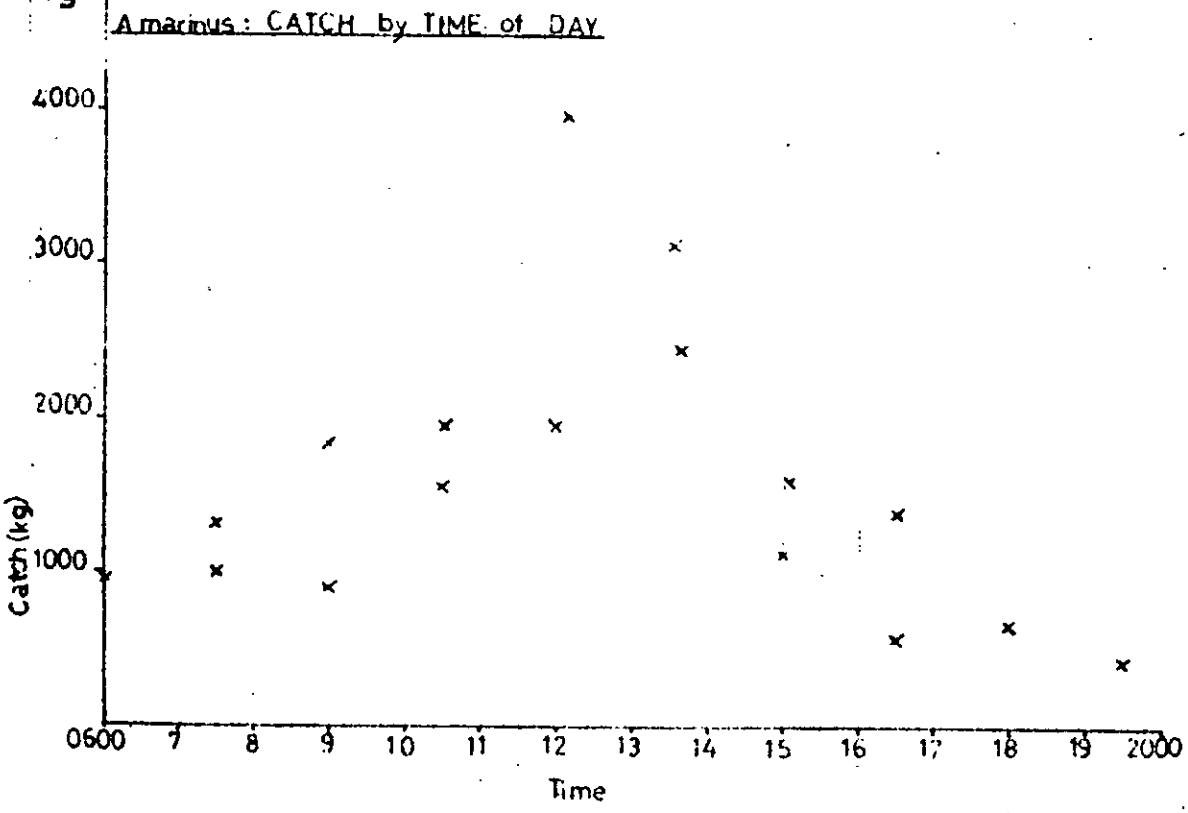
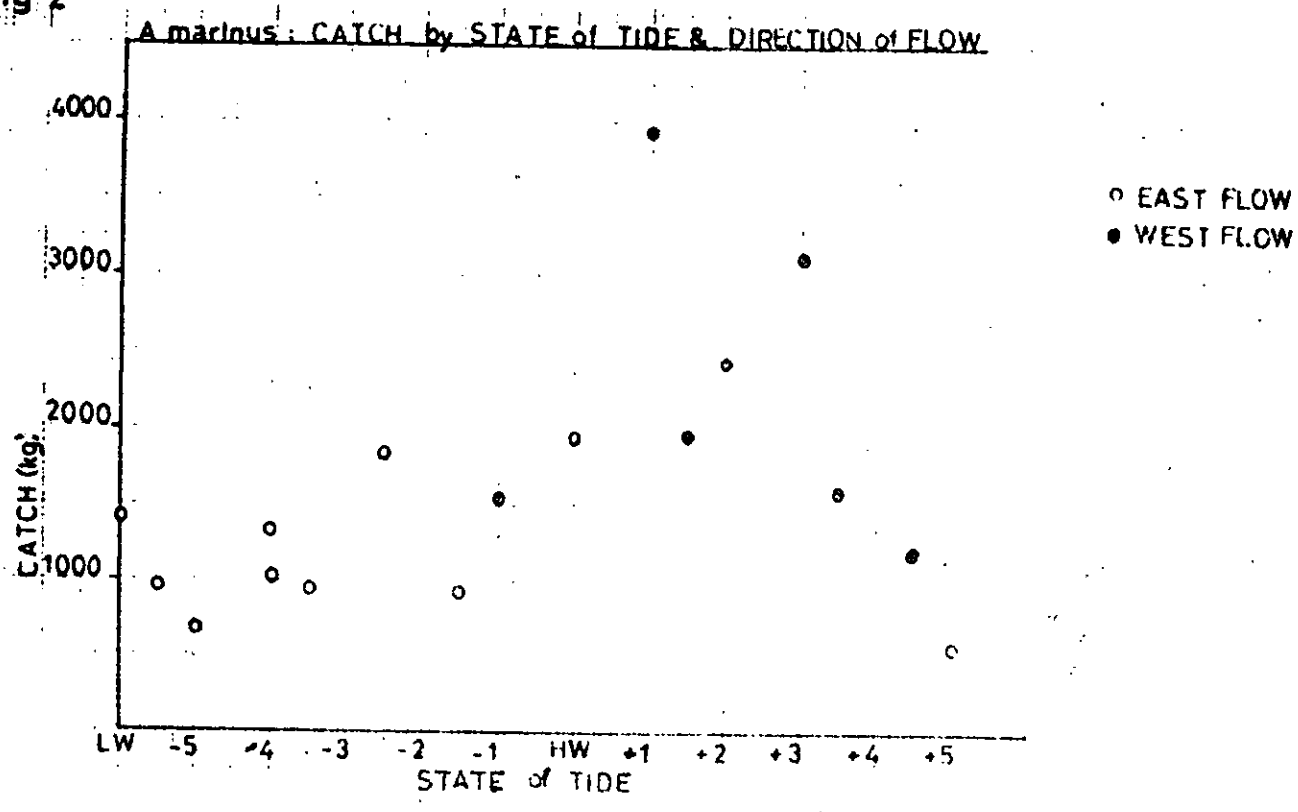

A marinus : CATCH by TIME of DAY
4000
3000
2000
1000
Catch (kg)
0600
7
8
9
10
11
12
13
14
15
16
17
18
19
2000
Time

Fig 2


A marinus : CATCH by STATE of TIDE & DIRECTION of FLOW
4000
3000
2000
1000
CATCH (kg)
LW
-5
-4
-3
-2
-1
HW
+1
+2
+3
+4
+5
STATE of TIDE
o EAST FLOW
• WEST FLOW