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Charter Vessel MV *Nich-Tola* H23

REPORT

28 November - 7 December 1990

Personnel

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Objectives

1. To complete the cockle survey of Barnhourie and Mershead Sand using suction dredging and to sample the areas inaccessible to the land based quadrat survey in August.

2. To survey other commercially exploited cockle grounds in the Solway Firth including the Wigtown Bay area.

3. To locate suction dredge tracks in Wigtown Bay when exposed to low tide and estimate the number of damaged cockles left in the tracks.

4. Estimate discard survival.

Narrative

The scientific staff joined *Nich-Tola* at 0930 on 29 November 1990. The discard retention device was assembled and attached to the riddle outlet before *Nich-Tola* departed on the afternoon tide and made for Barnhourie Bank. A total of 39 stations were covered at Barnhourie before moving to the North Bank where 45 stations were covered and the experiment on discard survival was carried out during low tide. At Wigtown Bay 30 stations were covered between 1 and 2 December and the examination of dredge tracks was carried out at low tide. Between 3 and 4 December *Nich-Tola* covered the Auchencairn area where 16 stations were sampled including the areas Orchardton, Glenisle, Rough Island and Auchencairn. Following coverage of the 16 stations at Carsethorn the remainder of the cruise was spent completing the North Bank. *Nich-Tola* made for Annan on 6 December where the cruise was completed.

Methods

Survey: The vessel's suction dredge was used for sampling. This consisted of a dredge head with a 16-18 mm bar spacing and a 1.24 m wide blade. A high pressure jet of water fluidised the sediment in front of the blade and a deck mounted solids handling pump lifted the fluidised material along with the cockles to the vessel via an 8" pipe. From there the fluidised material passed through a rotary riddle with a bar spacing of 13-15 mm. During normal fishing operations small unwanted cockles (discards) would pass through the riddle back to the sea. At each station the incoming flow of commercial sized cockles was sampled for 30 seconds (this represented a sampled area on the bottom of about 62 m). Simultaneously, a fine mesh cage was used to collect the discarded cockles after these had passed through the vessel's sorting riddle. Where densities were particularly high some subsampling was necessary.

Discard Survival: Twenty discarded cockles, without any outward sign of physical damage, were obtained while sampling at station 68 on the North Bank (54°54.59'N 03°28.6'W) at 1200, and kept aboard the vessel until the tide ebbed. For comparison "control" cockles were obtained from ground near to the position of haul 68 at 1430, after they were exposed by the ebb tide. The discard and "control" cockles were placed in surface water of depth 3-4 cm in duplicated groups (A and B) of high (2,000 m) and low (56 m) density. The animals were then observed at 10 minute intervals when the number that had reburied was recorded. The experiment commenced at 1500 and continued for three hours.

Results

Survey: A total of over 310,000 cockles were sampled, of which about a tenth (31,000) were aged and measured. Table 1 indicates the numbers of stations at which cockles were found and includes the results from the August shore based quadrat survey. Zero counts were most frequently found at the margins of the populations with similar distributions to the 1989 survey. Details of the sampling, by area, are given in Table 1 and the average densities (m^2) by age group for the individual grounds are given in Table 2. Figure 1 shows the areas surveyed during the charter and the associated shore based quadrat survey.

Discards: Results from the experiment on the survival of discards are given in Table 3. Figure 2 illustrates the cumulative proportion of the population buried over time.

T Howell
13 December 1991

Table 1

1990 survey sampling details. Giving information on numbers of stations, area coverage and the sampling levels of cockles. Note that the relatively large numbers obtained during the suction dredge surveys reflect the larger sampling unit used (62 m compared with 0.1 m in the shore survey)

Area	Date (1990)	Method	No stations	Grid sq area (km)	Overall area (km)	Stations with cockles	Cockles caught	Cockles aged and measured
A(q)	20-23 08	Quadrat	217	0.149	32.52	113	995	995
A(s)	29 11	Suction	39	0.149	5.84	19	4,950	2,949
B	30 11	Suction	64	0.239	15.28	55	57,601	10,686
C	05 12	Suction	14	0.158	2.22	13	119,920	2,318
D	03 12	Suction	5	0.116	0.58	5	18,820	1,560
E	03 12	Suction	3	0.120	0.36	3	10,887	866
F	04 12	Suction	3	0.097	0.29	3	4,641	997
G	04 12	Suction	3	0.067	0.20	3	2,059	817
H	04 12	Suction	2	0.035	0.07	2	14,324	852
I	01-02 12	Suction	30	0.239	7.16	29	79,406	9,908
Suction dredge totals			163		32.00		313,603	31,948

Table 2

Density of cockles (No.m^2)

Area	Ages						
	0	1	2	3	4	5	6+
A(q) No.m^2	2.28	29.21	4.61	1.60	2.12	0.40	-
A(s) No.m^2	0.02	1.71	0.14	0.01	0.05	0.02	0.01
B No.m^2	0.32	13.09	0.50	0.21	0.24	0.03	0.01
C No.m^2	6.36	121.62	3.51	0.76	4.14	0.06	-
D No.m^2	2.59	29.31	3.28	3.10	18.96	1.90	-
E No.m^2	1.97	38.89	4.17	0.92	11.11	0.28	-
F No.m^2	2.59	16.60	3.24	0.97	1.07	0.07	0.01
G No.m^2	1.48	7.42	0.48	0.08	1.14	0.21	-
H No.m^2	5.71	75.71	24.29	1.29	7.43	1.86	0.01
I No.m^2	12.85	15.36	11.45	0.56	0.98	0.98	0.42

A(q) - Barnhourie/Mersehead (quadrat)
A(s) - Barnhourie/Mersehead (suction)
B - North Bank
C - Carsethorn
D - Auchencairn Bay
E - Orchardton Bay
F - Glen Isle
G - Rough Island West
H - Rough Island East
I - Wigtown Bay

Table 3

Numbers of cockles buried after various time intervals in discarded and control cockle groups. Two replicates were used for each group and in each replicate cockles were placed on the sediment at two densities. Number of cockles per group = 5

Time intervals	Controls				Discards			
	A		B		A		B	
	High	Low	High	Low	High	Low	High	Low
10 mins	2	1	-	1	-	-	-	-
20 mins	3	2	1	1	1	-	2	2
30 mins	4	3	2	2	2	-	3	3
40 mins	5	4	3	2	3	-	3	4
50 mins	5	4	3	2	3	-	3	4
60 mins	5	4	3	2	3	2	3	4
70 mins	5	4	3	2	3	3	4	5
80 mins	5	4	3	2	3	3	4	5
130 mins	5	4	5	3	3	4	4	5
190 mins	5	4	5	4	3	4	4	5

Figure 1 SOLWAY FIRTH 1990 SURVEY AREAS AND STATION POSITIONS

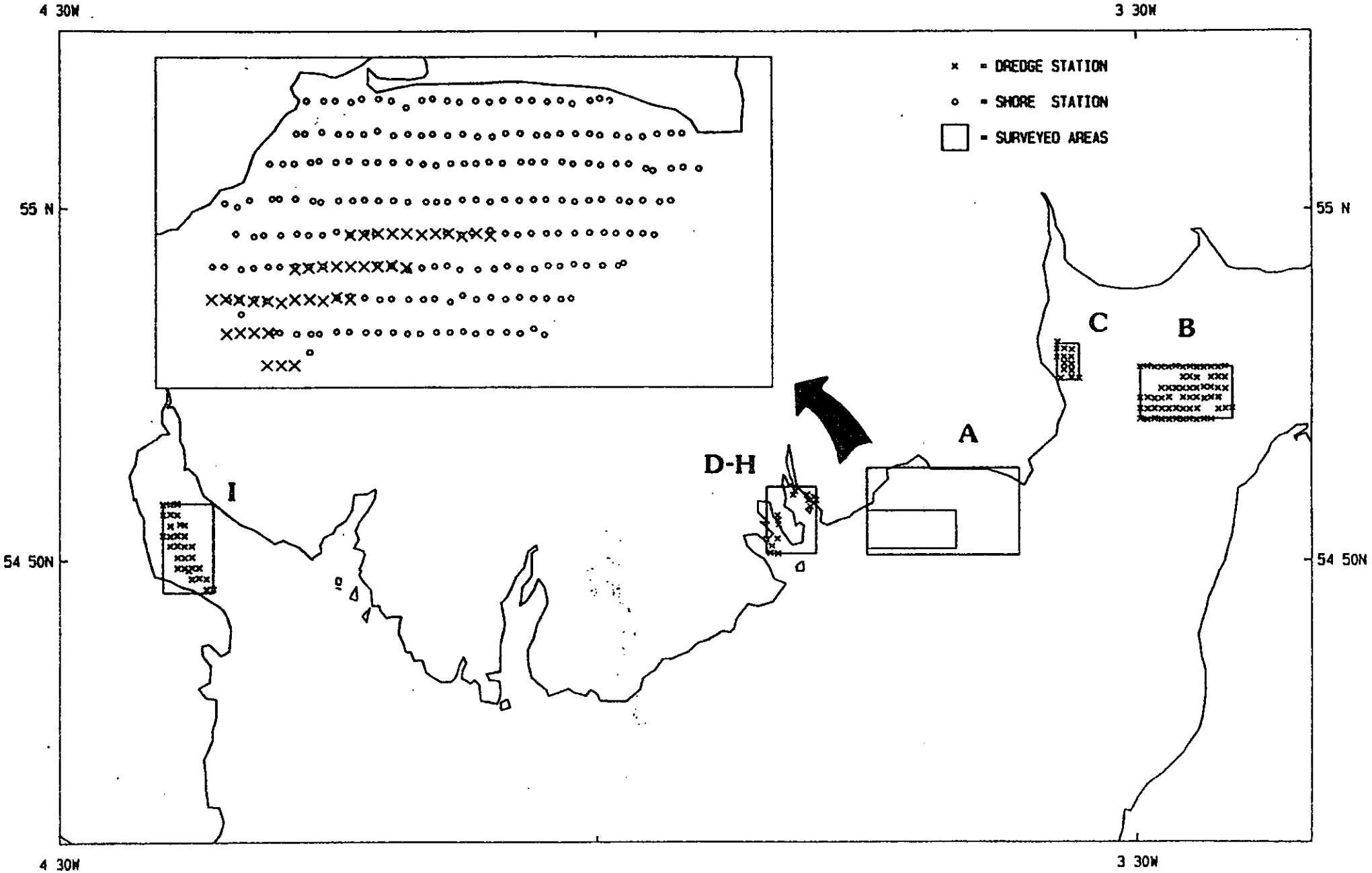
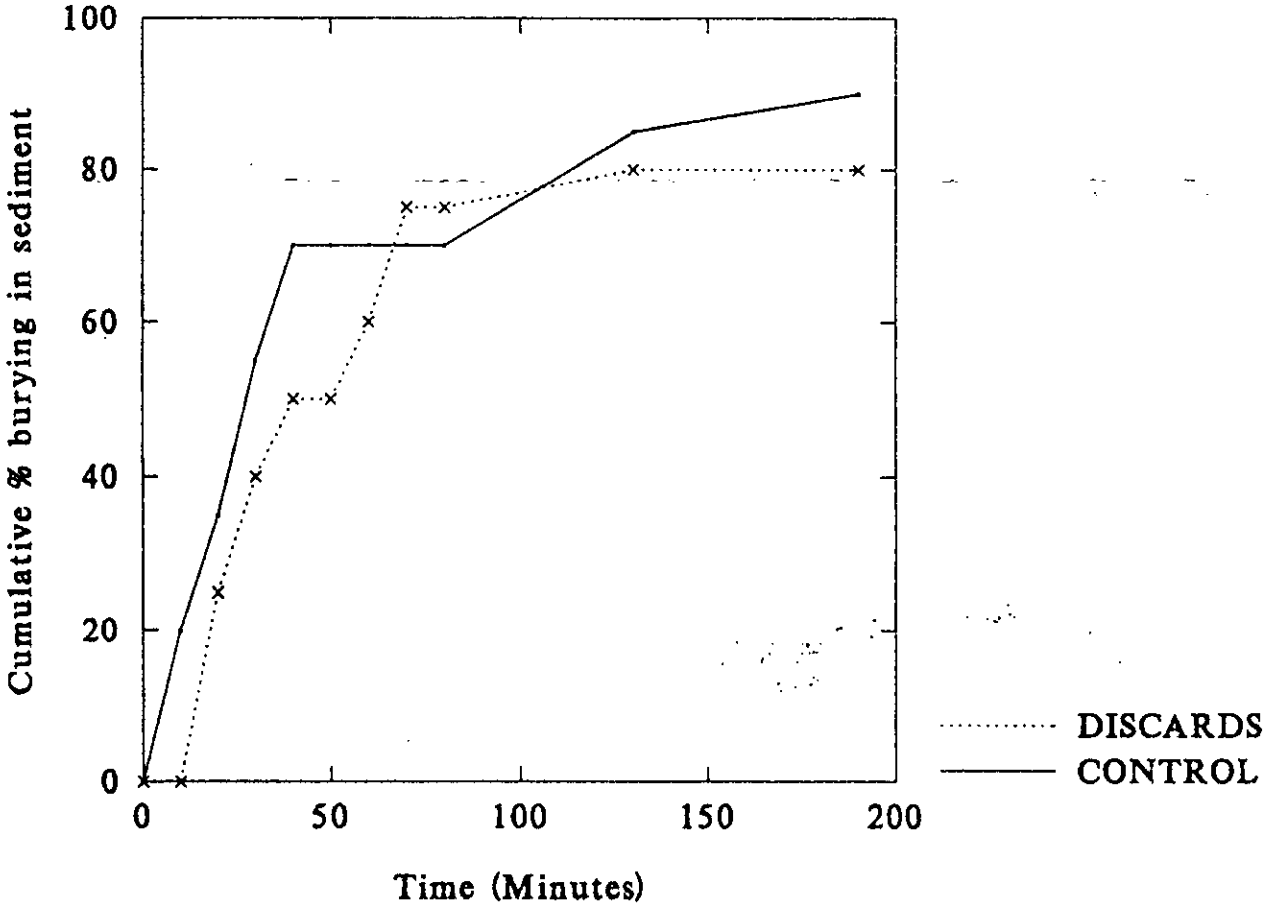


Figure 2


100
80
60
40
20
0
Cumulative % burying in sediment
0
50
100
150
200
Time (Minutes)
DISCARDS
CONTROL