R1/10 In Confidence - Not to be quoted without reference to the Lab.

9GR80
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FRV GOLDSEEKER
Cruise 9/80
REPORT
5-29 August 1980

Objectives

1. To survey BACO cryolite sludge dumping ground.
2. To set up cages of Nephrops on and around the cryolite dump.
3. To study the behaviour and survival of Nephrops in relation to discarding.

Narrative

GOLDSEEKER left Buckie at 0915 on 5 August and proceeded to Invergordon where scientific staff joined the vessel and Nephrops creels were made ready for work to start the next day. Eight fleets of baited creels (each fleet comprising 22-28 creels) were fished in the vicinity of the BACO dump. Between 7-12 August six cages, each containing 50 Nephrops were set up on the seabed, three at the centre of the dump and three outside (about 1.5km west of the dump centre). The cages were examined by divers during the second week and were eventually raised at the end of the cruise. Most of the third week was lost through bad weather and only one day of grab sampling was possible.

One member of the team (CJC) was unfit for diving so that objective 3 had to be cancelled. The cruise terminated at Invergordon on 28 August and GOLDSEEKER returned to Buckie, arriving at 1730 the same day.

The R.N. Fuel Depot kindly provided storage facilities at Invergordon.

Results

1. Creel sampling

The catch from each creel was analysed separately to give information on spatial distribution of the each main species across the dump. From the presence of sludge deposit on the fauna and creels the dump appears to be fairly localised, elliptical in shape, measuring about 1300m along the NE-SW axis, about 900m across the NW-SE axis and covering an area of approximately 0.9km^2. Most of the dump appears to be outside the "spoil ground" marked on Admiralty chart L(D6)223.

The greatest catches of Nephrops were taken 1km west of the dump centre. Small numbers were taken on the dump, mainly in the NE corner. This distribution is partly governed by the suitability of the underlying substrate for burrowing.

The most abundant species, present in nearly every creel, were hermit crabs (Pagurus bernhardus), welks (three species; Buccinum undatum, Neptunea antiqua and Colus gracilis), swimming crabs (Macropipus depurator) and

starfish (Asterius rubens). A preliminary analysis of the catch rates of these species (Table 1) at different distances from the centre of the dump suggests that Pagurus and Macropipus were most abundant near the centre whereas Nephrops and Asterias became more abundant away from the dump.

Other species caught in the creels (with numbers in brackets) were Munida (105), Cancer (73), Hyas (10), Crangon (1), Cottus (14), Codling (3), Whiting (2), Catfish (2), Ling (1), Topknot (1), Agonus (1), Flounder (1), Eledone (7), Nudibranch (1), Solaster (6), Echinus (1) and Brittlestars (common).

TABLE 1 Catch/creel of most common species at different distances from the centre of the dump (immersion time of creels 1-2 days).

	Distances from centre of dump (150m bands)								
Species	0-150	150-300	300-450	450-600	600-750	750-900	900-1050	1050-1200	>1200
Nephrops	0.67	0.12	0.18	0.50	0.24	0.83	0.67	1.15	4.58
Pagurus	6.44	7.83	7.20	6.62	4.92	4.25	4.43	5.45	2.08
Welks (3 species combined)	0.89	4.28	6.62	4.38	2.75	3.15	6.14	6.21	1.47
Macropipus	2.56	2.86	1.84	1.89	1.00	1.90	1.71	1.09	1.18
Asterias	0.56	0.83	1.13	0.83	2.17	3.51	3.43	3.58	2.16
No. of creels	9	58	102	63	12	59	7	33	38

2. Grab sampling

Eleven samples were taken by TV grab at several distances from the centre of the dump. These confirmed the localised nature of the dump. Each sample was divided into two parts, one being sent to BACO, the other retained here for detailed laboratory analysis.

3. Cage experiments

Creel-caught Nephrops from 'clean' ground were placed in cages, three at the centre of the dump and three outside. The cages remained on the seabed for 15-21 days. During this time 7-9 full loads of cryolite sludge were deposited over the cages at the centre of the dump. Table 2 shows the numbers surviving in each cage (out of original 50). There was good survival in two cages in each position. Cage No. 6 was found to be torn and at the end of the experiment contained only 5 Nephrops, and cage No. 2 contained only 12 Nephrops. It seems likely that Nephrops had escaped from these two cages. Survival in the remaining pairs of cages was 85% at the centre of the dump and 87% outside.

TABLE 2 Survival of Nephrops in cages on and outside the BACO dump.

Position	Cage No	Dates put down	Dates brought up	No days	No of sludge loads	No Nephrops surviving
off dump	1	7/8	28/8	21	0	45
	2	8/8	27/8	19	0	12
	3	12/8	28/8	16	0	42
on dump	4	7/8	26/8	19	9	43
	5	8/8	27/8	19	9	42
	6	11/8	26/8	15	7	5*

* cage torn

Seen in draft: W Smith - Officer-in-charge

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2 December 1980