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## CRUISE REPORT

FRV "GOLDSEEKER"

9 September - 2 October 1975

### OBJECTIVES:

1. To observe the operation, efficiency and selectivity of standard and modified scallop dredges.
2. To obtain cine film and still photographs of the gear in action.
3. To observe the effect of dredges on the sea bed and its inhabitants.
4. To study the reactions of scallops and queens to gear.
5. To study the escape and release of scallops from the dredge on different types of sea bed and to compare the mortality of scallops caught with those of scallops rejected or released by the dredge and others from unfished areas.
6. To determine the densities and population composition of scallops and queens on different grounds. In particular the abundance and distribution of 0-group animals was to be noted.
7. To undertake time-lapse camera studies of scallop and queen behaviour.
8. To record the movements of edible crabs by ultrasonic tracking.

### NARRATIVE:

"Goldseeker" arrived at Tarbert on 10 September and commenced dredging operations on 11th. Most of the diving work was carried out in Kilbrannan Sound between Claonaig Bay and Skipness at depths between 15-25 m. Routine dredge sampling was also carried out in Loch Fyne and off Arran. Most of the above objectives were satisfactorily carried out (with the exception of 8). Several commercial oyster 'farms' and our own mollusc culture experiments at Linne Mhuirich were visited at weekends. The scheduled work ended at Tarbert on 27 September and "Goldseeker" made a passage to Buckie, sampling the scallop stocks in Easdale Bay on the way, and arriving on the 1 October.

### RESULTS:

#### Scallop dredge efficiency

Divers observed 3 gears: (a) standard dredge with toothed bar, (b) standard dredge with 'wings' projecting forward of the toothed bar on each side, (c) commercial dredge with spring-loaded toothed bar. Two dredges were towed on a bar fitted with rubber disc bobbins to maintain a constant bar height and tooth angle of attack. The sea bed was generally composed of shell-sand, small stones and boulders. After watching the gear operation, the divers examined the track and collected the scallops escaped from or pushed aside by the gear. The efficiency was then expressed as the proportion of scallops caught of those originally in the path of the gear. The results are

summarised in Table I. They reveal a good deal of variation in efficiency from haul to haul but suggest that the fixed toothed dredge is more efficient than the spring-loaded dredge on the type of sediment encountered. The attachment of 'wings' to the standard dredge did not appear to affect efficiency.

Table I. Efficiency of dredges in catching undersized (<80 mm) and commercial sized scallops (>80 mm).

Gear	Number of observations	Average Efficiency (%)		Overall	Range
		<80mm	>80mm		
a) Standard	6	3.8	23.6	18.2	12.5-27.9
b) Standard + 'wings'	5	2.6	23.0	18.3	6.9-23.9
c) spring-loaded	10	2.0	16.2	13.4	2.4-30.3

Most scallops missed by the gears had either passed through the bag meshes or been pushed aside by the toothed bar. In the case of the spring-loaded toothed dredges, a significant number of scallops were still recessed in the track indicating that they had passed through the gaps between the teeth. This may partly account for the difference between the gears. The selectivity of each dredge is illustrated in Table II.

Table II. Efficiency of each dredge for different 10 mm size groups and the proportions of each size in the population.

Gear	Size range (mm)									
	40-49	50-59	60-69	70-79	80-89	90-99	100-109	110-119	120-129	>130
a) Standard	0	0	1.8	6.4	11.5	21.3	24.2	28.6	52.7	22.5
b) 'winged'	0	0	3.0	2.5	1.9	19.5	31.0	34.1	30.9	27.9
c) spring-loaded	0	0	1.5	2.9	5.2	10.1	16.9	23.8	25.7	36.4
Relative numbers in the population	5	12	157	156	219	299	230	205	134	51

#### The effect of dredges on the sea bed

The tracks left by the dredges were distinct and persisted for several days. Some scallops were badly damaged, particularly by the spring-loaded teeth. Starfish and edible crabs were also damaged. Large numbers of small gadoids and some plaice were feeding on these and other organisms damaged or disturbed by the dredge. Hermit crabs, starfish and whelks appeared to aggregate on the tracks.

### The survival of tagged scallops

Four categories were marked with plastic discs or 'flag' tags wired to one 'ear' of the upper valve: (a) 49 scallops collected by divers from an unfished area, (b) 19 caught by 5 min dredge haul, (c) 28 caught by 20 min dredge haul and (d) 45 collected from the dredge track. The animals were placed in netting enclosures on the sea bed and examined periodically. The only fatalities were 4 animals from group (d). At the end of the cruise, the survivors were released in Claonaig Bay.

### Population studies

The density of scallops (all sizes) on the Claonaig - Skipness ground was about 1 per 6m<sup>2</sup>. The densities of larger scallops ( $\geq 80$  mm) and juveniles ( $< 80$  mm) were 1 per 8 m<sup>2</sup> and 1 per 26 m<sup>2</sup> respectively. The size composition of this population is given at the foot of Table II. Small numbers of adult queens (mainly 55-70 mm) were taken on most dredge hauls. "O"-group queens (2-18 mm) were abundant on Laminaria fronds in depths of 6-13 m. The density of spat was about 11 animals per kg of Laminaria. "O"-group scallops were found in small numbers at 10 m depth.

### Behaviour of queens

Preliminary observations were made on the responses of queens to stimuli, including touch, sediment, sound, water currents and artificial lights. The first 3 stimuli appeared to be the most effective in producing escape responses. Measurements of swimming endurance showed that queens were fatigued after about 6 bursts of swimming. The greatest distance swum in a single burst was about 2 m and the total distance swum before exhaustion was generally less than 10 m.

### Photography

1150 feet of cine film and 300 still photographs were shot to illustrate the dredging operation and other aspects of the work. The time-lapse camera was used to record the activity of queens.

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