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Charter Vessel *Aora*

CRUISE REPORT Ref H14

11-30 June 1990

Personnel

D I Fraser

Objectives

1. To investigate the settlement of scallop, queen and crab species at selected sites off west Scotland.

2. To study the size and age composition of scallop and queen stocks in the same areas and further afield. To keep and preserve samples of *Arctica islandica* which are caught during the survey.

3. To test a small mesh cod-end attachment designed to catch naturally settled pre-recruit scallops.

4. To examine the gonad stages of scallops to determine their maturity stage.

5. To record surface and subsurface water temperature.

6. To preserve gill sections of scallops from selected west coast stations for future pathological examination.

Narrative

D Fraser joined *Aora* on the morning of Monday 11 June and work commenced at the island of Arran that day. After completing work in the Clyde Sea area by 14 June, the vessel made passage round the Mull of Kintyre. The next four days were spent deploying spat collectors and dredging west of the Kintyre Peninsula to the Sound of Mull. The dredge survey then continued northwards around the west side of Skye to the Summer Isles before deploying the remaining spat collectors between Applecross and Mallaig by 26 June. Three short dredge hauls were then made near Mallaig to obtain shellfish samples for the Laboratory's PSP monitoring programme. The vessel then worked south around the islands of Rhum and Eigg then south to the sound of Jura before completing work on 29 June, allowing time for *Aora* to return to Millport by Saturday 30 June.

Results

1. A total of 120 spat collector strings were set and 107 dredge hauls made during the cruise. The spat collectors were left in the sea until autumn when they were retrieved and their contents examined.

2. Dredging was undertaken using two arrays of three, 85 cm dredges (each array consisting of one, nine toothed standard dredge in starboard and port positions and an 11 toothed sampling dredge in between). The hauls were mainly of 30 minutes duration and the results are shown in Table 1a and b. There were signs of good recruitment and good prospective commercial catches in most areas fished although a higher percentage of the catch was of fishable age (greater than four years) in the far north west and Clyde than west of Kintyre where most animals were four years or less.

A maximum of 196 queen scallops were caught in a 30 minute dredge haul in Kilbrannan Sound and of those it was possible to age 62 animals (15, 38 and 9 were two, three and four years old respectively). Few queens were caught elsewhere.

Samples of *Arctica islandica* were frozen and returned to the Laboratory for examination.

Four dredge hauls of 30 minute duration were made over the Several Order site at Loch Ewe. Data from these hauls will be analysed at a later date.

3. A cod-end attachment was bolted onto the top of the centre dredge of each three dredge array. Two types of cod-end attachment were used; one on the port side where the cod-end accepted trash from most of the dredge, and the second on the starboard side which accepted trash from just behind the dredge entrance. The former was abandoned after 10 hauls as the weight of material caught was in danger of affecting dredge efficiency. A further 72 hauls were made fishing the two arrays with only the starboard cod-end attachment in place. From 5,859 scallops caught in the six dredges, 51% were taken from the starboard array, indicating that the remaining cod-end attachment had little affect on dredge efficiency.

A summary of the cod-end catch, of pectinids, from 82 hauls throughout the west coast, is shown in Table 2. Only five, "0" group scallops, 82 *C. opercularis* (maximum length 30 mm), 57 *C. tigerina* and two *C. varia* were caught from 37.85 hours fishing on typical scallop grounds. The catch efficiency of the cod-end is unknown but if it did take a representative sample of the substratum, results would suggest that few "0" group scallops from the 1989 spring and autumn spawning were present on the adult beds. No dead "0" group scallop shells were present in the samples although much of the dead shell caught was of that size range (0-30 mm) - again suggesting that if dead "0" group scallop shell had been present in or on the substratum it would have been part of the catch. The reason why a higher number of *Chlamys* were caught than *Pecten* may be because *Chlamys* species were present in greater numbers on the seabed or, because of their greater swimming ability, they were caught more efficiently. It is possible that any "0" group animals present were recessed on the seabed and did not react to the oncoming gear and subsequently passed through the teeth of the dredges. Modern dredge arrays have been developed to follow the contours of the seabed and to fish "harder" ground more effectively but it may have been physically impossible for the cod-end attachment to fish recruitment areas on the harder ground. In September the cod-end attachment was used to fish for recently settled pectinids on the same grounds.

4. From a study of scallop gonads in the south west, it was observed that spawning had commenced by mid June when a high percentage of animals had partially or fully spawned. On returning to west of Kintyre on 28 June, it was observed that the spawning state of the scallops had advanced to the fully spawned state. As sampling continued north, on 17 June, the numbers of fully spent scallops increased until most had fully spawned by 27 June (Table 3).

5. Water temperatures were taken at all stations and the results are shown in Table 4.

6. Gill sections were taken from 30 scallops, from each main area fished, preserved in "Carson" fixative then sent to Stein Mortensen, Institute of Marine Research, Bergen, who is studying the prevalence *Rickettsiae* bacteria in scallop gill tissue.

D I Fraser
25 January 1991

TABLE 1a

Number of scallops caught at each age

Area	No of hauls	Hours fished	Growth rings										
			1	2	3	4	5	6	7	8	9	10	Total
North West													
Summer Isles to Greenstone Pt	10	3.57	3	5	52	87	72	71	99	52	49	79	569
Several order site in L Ewe	4	1.77	1	4	16	18	17	11	24	7	5	63	166
L Ewe to Red Point	7	3.50	2	12	26	42	41	62	64	62	41	145	497
Inner Sound	8	2.40	-	1	4	3	8	15	25	20	16	35	127
West Skye	13	4.95	-	31	218	138	86	79	85	28	14	46	725
Sound of Sleet	7	2.80	-	10	230	93	86	77	79	37	20	58	690
Arisaig Promintory to Mallaig	7	3.17	1	70	613	182	89	71	36	15	25	22	1,124
S Rhum to S Eigg	3	1.32	-	2	133	37	18	10	12	6	3	17	238
Caliach Pt (NW Mull)	3	1.48	-	29	156	24	15	10	13	1	1	6	255
Sound of Mull	7	2.88	-	39	155	123	70	57	21	16	9	42	532
North West Total	69	27.84	7	203	1,603	747	502	463	458	243	183	513	4,922
South West West of Kintyre													
Sound of Jura	4	2.00	-	7	59	69	60	45	26	22	8	16	312
Sound of Islay	5	2.33	-	6	47	33	43	22	26	16	8	21	222
West side of Kintyre Pennisula	9	4.33	-	74	552	97	24	33	20	6	7	15	828
Clyde Sea Area													
Kilbrannan Sound	10	4.58	-	10	17	21	48	44	39	27	13	57	286
N Arran	5	2.50	1	7	34	24	43	48	13	15	6	14	205
L Fyne	5	2.50	1	2	12	13	18	16	16	20	14	55	167
South West Total	38	18.24	2	106	721	357	236	208	130	106	56	178	2,000

TABLE 1b

Age composition (percentage) of scallop catches

Area	1	2	3	4	5	6	7	8	9	10
North West										
Summer Isles to Groenstone Point	0.5	0.9	9.1	15.3	12.7	12.5	17.4	9.1	8.6	13.9
Several order site, L Ewe	0.6	2.4	9.6	10.8	10.2	6.6	14.4	4.2	3.0	38.0
L Ewe to Red Point	0.4	2.4	5.2	8.5	8.2	12.5	12.9	12.5	8.2	29.2
Inner Sound	-	0.8	3.1	2.4	6.3	11.8	19.7	15.8	12.6	27.6
West Skye	-	4.3	30.1	19.0	11.9	10.9	11.7	3.9	1.9	6.3
Sound of Sleet	-	1.4	33.3	13.5	12.5	11.2	11.4	5.4	2.9	8.4
Arisaig Promintory to Mallaig	0.1	6.2	54.5	16.2	7.9	6.3	3.2	1.3	2.2	2.0
S Rhum to S Eigg	-	0.8	55.9	15.5	7.6	4.2	5.0	2.5	1.3	7.1
Caliach Point	-	11.4	61.2	9.4	5.9	3.9	5.1	0.4	0.4	2.4
Sound of Mull	-	7.3	29.1	23.1	13.2	10.7	3.9	3.0	1.7	7.9
North West (overall)	0.1	4.1	32.6	15.2	10.2	9.4	9.3	4.9	3.7	10.4
South West										
West of Kintyre										
Sound of Jura		2.2	18.9	22.1	19.2	14.4	8.3	7.1	2.6	5.1
South Islay		2.7	21.2	14.9	19.4	9.9	11.7	7.2	3.6	9.5
West of Kintyre Pennisula		8.9	66.7	11.7	2.9	4.0	2.4	0.7	0.8	1.8
West of Kintyre area (overall)		6.4	48.3	14.6	9.3	7.3	5.3	3.3	1.7	3.8
Clyde Sea Area										
Loch Fyne	0.6	1.2	7.2	7.8	10.8	9.6	9.6	12.0	8.4	32.9
Kilbrannan Sound	-	3.8	6.4	7.9	18.0	16.5	10.9	10.2	4.9	21.4
North Arran	0.5	3.4	16.6	11.7	21.0	23.4	6.3	7.3	2.9	6.8
Clyde Sea area (overall)	0.3	3.0	9.9	9.1	17.1	17.0	9.1	9.7	5.2	19.8
South West (overall)	0.2	5.3	36.1	12.9	11.9	10.4	6.5	5.3	2.8	8.9

TABLE 2

Catch from the dredge codend attachment

Area	No of hauls	Weight (kgms) of codend contents	Fishing duration (hours)	Depth (m)	Bottom type	Live scallops and queens and their size range (mm)							
						Scallops		Queens					
								C. opercularis		C. tigerina		C. varia	
						No	Range	No	Range	No	Range	No	Range
Clyde Sea area	17	0.5-30	8.50	25-40	gravel/shell sand/shell	2	21&19	10 107	13-30 39-77	26	12-23	0	-
West of Kintyre	14	0.5-67	7.00	20-30	mud/shell/stones shell/sand/merle/ weed	1	32	7 22	15-27 38-80	2	15,17	2	42,29
Sound of Mull	7	0.5-5	3.20	20-37	gravel/shell/weed mud/shell/weed	2	20,21	31	12-26	10	17-20	0	-
Arisaig-Mallaig	6	0.25-0.5	3.00	22-35	gravel/shell/weed	0	-	29	13-28	3	13,15,18	0	-
L Novis-Armadale	6	0.25-3	2.60	27-40	shell/weed sand/mud	0	-	2 5	16,17 53-73	2	15,16	0	-
West Skye	13	0.5-95	5.45	20-33	sand/shell mud shell/gravel/weed shell/weed	0	-	0	-	0	-	0	-
Scalpay	2	1, +20	0.80	28-30	sand/shell	0	-	3	18,21,22	14	11,19	0	-
Rubh Deidh - Red Point	5	30-60	2.50	28-51	sand/shell	1	115	0	-	0	-	0	-
Summer Isles - Gruinard I	8	0.5-75	2.80	28-70	gravel/shell gravel/shell/weed	0	-	0	-	0	-	0	-
L Ewe SO site	4	3-5.0	2.00	9-21	shell/weed/sand	0	-	0	-	0	-	0	-
			37.85										

TABLE 3

Gonad stages of mature scallops

Area	Total sampled	Date sample June 90	Gonad stage									
			IV Filling		V Half full		VI Full		VIIp Partially spent		VII Spent	
			No	%	No	%	N	%	N	%	N	%
North West												
Summer Isles	323	21	1	0	14	4	11	3	95	29.0	202	63.0
Several order site, L Ewe	104	22	-	-	-	-	-	-	13	12.5	91	87.5
L Ewe to Red Point	319	20-23	6	2	21	7	3	1	76	24.0	213	67.0
Inner Sound	97	25	-	-	-	-	-	-	5	5.0	92	95.0
West Skye	288	19-20	-	-	7	2	12	4	44	15.0	225	78.0
Arisaig to Mallaig	233	18	-	-	9	4	3	1	54	23.0	167	72.0
Sound of Sleat incl Loch Nevis	276	25	2	1	4	1	-	-	21	8.0	249	90.0
S Rhuim to S Eigg	145	27	-	-	-	-	-	-	3	2.0	142	98.0
Caliach Point	53	27	11	21	-	-	-	-	1	2.0	41	77.0
Sound of Mull	283	17	-	-	3	1	-	-	19	7.0	261	92.0
Overall Total	2,121	17-27	20	1	58	3	29	1	331	16.0	1,683	79.0
South West												
Arran	131	11-12	-	-	3	2	14	11	91	70.0	23	18.0
L Fyne	128	12	-	-	3	2	27	21	35	27.0	63	49.0
East Kintyre	229	13	-	-	-	-	6	3	59	26.0	164	72.0
West Clyde	488	11-13	-	-	6	1	47	10	185	38.0	250	51.0
Islay Shore	162	14	-	-	3	2	1	1	143	88.0	15	9.0
Jura Shore	145	15&16	-	-	9	6	6	4	63	43.0	67	46.0
West Kintyre	114	15	-	-	1	1	1	1	59	52.0	53	47.0
West Kintyre	133	28	11	8	1	1	-	-	4	3.0	117	88.0
West of Kintyre - Jura Total	421	14-16	-	-	13	3	8	2	265	63.0	135	32.0

TABLE 4

1990 water temperatures at each spat collector station

Station	Number	Date	Depth (m)	Seabed	Midwater	Surface
South West						
Loch Fyne	(21)	12.6	15.0	9.50	9.50	10.50
	(26)	12.6	15.0	10.00	10.50	11.50
Kilbrannon Sound	(28a)	13.6	15.0	10.00	10.00	11.00
	(28b)	13.6	15.0	10.00	10.00	11.00
Arran	(31)	11.6	15.0	9.00	9.00	10.50
West of Kintyre	(14)	15.6	15.0	10.50	11.00	11.00
	(16)	15.6	6.2	11.50	-	11.50
Islay Shore	(12)	14.6	15.0	10.00	10.50	11.00
	(10)	14.6	15.0	10.50	10.50	11.00
Jura Shore	(4)	16.6	15.0	10.00	10.00	10.50
	(7)	16.6	15.0	10.25	10.50	10.75
North West						
Sound of Mull	(45)	17.6	15.0	10.50	10.50	11.00
	(46)		15.0	10.50	10.75	11.00
Loch Nevis	A	26.6	15.0	10.50	10.75	11.00
	B	26.6	15.0	10.00	10.50	11.00
	C	26.6	15.0	10.50	10.50	11.25
Loch Carron	A	24.6	15.0	9.50	10.00	10.75
	B	24.6	15.0	10.00	10.50	11.00
	C	24.6	15.0	9.75	10.00	10.25
Crowlin Isles	A(ii)	24.6	15.0	10.25	10.50	11.00
Camustiel	B	24.6	15.0	9.75	10.00	10.25
Gairloch		23.6	15.0	10.25	10.75	11.00
Loch Ewe		22.6	15.0	10.00	10.50	11.50