

R1/12

In Confidence: Not to be quoted without prior reference to the Laboratory  
FRV "Scotia"

Cruise 12/81

REPORT

4-23 December 1981

AR

12SR81

### Objectives

1. To investigate catch rates of Norway pout and bycatch species at different bottom depths within the prescribed sampling area using a GOV bottom trawl.
2. To investigate differences in bycatch rates in different strata of a horizontally divided bottom trawl in areas where catches of mixed Norway pout and other gadoids are found.
3. To investigate depth distribution and behaviour of Norway pout and other gadoids in relation to trawls by the use of appropriate photographic techniques.
4. To investigate feeding selectivity in Norway pout by comparison of stomach contents with plankton samples taken in the same area.

### Narrative

"Scotia" sailed from Aberdeen at 1800 on 4 December and headed for a station to the SE of the Shetlands. Strong headwinds delayed arrival there until the following evening when two hauls were made with the GOV trawl. During the following two days, two more hauls were made on the same station using the GOV trawl followed by three hauls with the multi-level trawl. The GOV trawl was fitted with a 20mm codend while each of the codends in the multi-level trawl was fitted with a 20mm liner. In view of the successful operation of the latter, the similarity in catch composition between the two trawls, and the additional information likely to be furnished by use of the multi-level trawl, it was decided at this stage to continue the survey using only the multi-level trawl.

During the remainder of the first part of the cruise seven more trawl stations were completed. A camera was attached to the headline during three of these hauls. In addition an Icelandic high speed plankton sampler, attached above the main trawl headline, and high speed samplers, attached below the headline in each stratum of the net, were used on five hauls. Longhurst Hardy Plankton Recorder (LHPR) tows were made at seven of the eight trawl stations sampled. "Scotia" docked in Aberdeen at around midnight on 10 December for the half landing.

Ships' personnel rejoined the ship on 12 December and sailed at midday. Strong NW winds prevented work that day and "Scotia" sheltered off the Buchan coast during the night before proceeding to the nearest station the following morning. The remaining 12 trawl stations were completed during the following four days with plankton samplers attached on all occasions. LHPR tows were made at all but two of these stations. The camera was attached during only two trawl hauls due to a malfunction which developed early on in the second part of the cruise.

During the remainder of the cruise a further five replicate trawls were made at different times of day on the first station sampled during the survey. Severe gales towards the end of the cruise reduced working time to some extent between 18-20 December.

"Scotia" docked in Aberdeen for the end of the cruise at 2000 on 21 December.

## Results

### 1. Performance of multi-level trawl

During the period of comparative fishing on the first station, the following average catch compositions and catch rates were achieved with the two types of trawl:

Type of trawl	No. valid tows	Average percentage catch composition				Av. catch (kg)
		N. pout	Whiting	Haddock	Other	
GOV	3	29	39	25	7	937
Multi-level	3	40	23	29	8	637

Although the average catch rate of the multi-level trawl was rather lower than that of the GOV, it nonetheless proved to be an effective sampling tool and all species taken with the GOV were also caught in sufficient quantities in the multi-level trawl for it to be used for the remainder of the survey. During the early part of the cruise, a number of different headline transducers were used to monitor trawl performance. Only the Simrad cabled system proved successful and this was used for the remainder of the trip.

The headline height achieved using the multi-level trawl varied between 5.3 and 8.7 metres, roughly twice that of the GOV trawl. Within the multi-level trawl the top stratum had an average vertical opening of roughly 3 metres while the two lower strata had smaller openings of around 2 metres each.

The mean catch rates achieved in the different strata of the trawl from all stations and for all species combined were as follows:

Top:	159kg	20%
Middle:	280kg	36%
Bottom:	343kg	44%

### 2. Bycatch

Using the results from the multi-level trawl only and weighing each trawl station equally, the mean percentage bycatch by weight was 87% with the following species breakdown:

Haddock:	36
Whiting:	39
Cod:	5
Other:	7

The maximum percentage catch of Norway pout on any one haul was 54% by weight. This was taken on the first station sampled. Classifying the results according to bottom depth yielded the following proportions of Norway pout and bycatch by weight.

Bottom depth (m)	No. of stations	Pout	: Bycatch
100	3	0	100
100-109	3	3	97
110-119	5	13	87
120-129	4	24	76
130	5	25	75

Of the main bycatch species, a preliminary analysis indicates that over 60% of haddock (by number) were below minimum legal landing size, while the equivalent percentage for whiting was about 26%. Very few undersized cod were taken.

### 3. Catches of Norway pout and bycatch species in different strata of the net

An investigation of the relative proportions of Norway pout by weight in the different strata of the net indicated that on average the greatest proportion was taken in the middle section (48%) with 35% in the bottom and 17% in the top. For all the other main catch species, the greatest proportion of the catch was taken in the bottom section of the net with progressively smaller proportions in the middle and top sections. In the case of cod and flatfish, over 90% were taken in the bottom section, while in the case of haddock and whiting the proportions in the bottom section were 52% and 47% respectively. The mean relative proportions of Norway pout and bycatch species taken in the different strata of the net are given below:

Stratum	Mean Percentage of each species				
	Norway pout	Whiting	Haddock	Other	Total
Top	19	43	35	3	81
Middle	17	39	41	3	83
Bottom	10	33	38	19	90

### 4. Photography

The camera was attached to the trawl on six occasions and functioned successfully during four of these. Some difficulty was encountered setting the correct threshold to trigger the camera initially but this improved with experience. Analysis of results is not yet complete.

### 5. Stomachs and plankton sampling

Fifty Norway pout stomachs were collected from most trawl hauls. A preliminary investigation indicated that the main food species were euphausiids and copepods. LHPR hauls were made on 21 occasions and at 16 stations. Problems with the shipboard depth recording device were

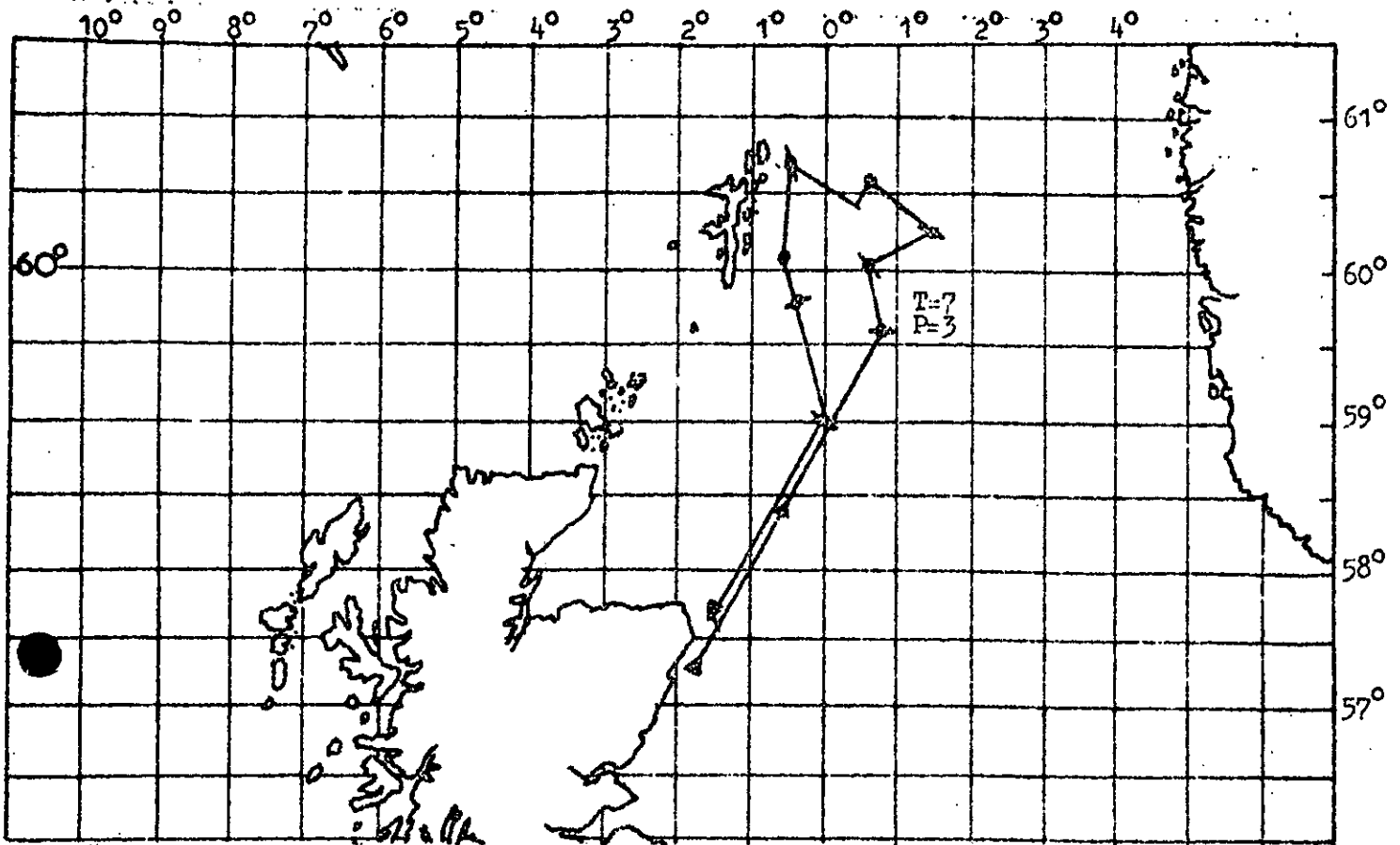
encountered during several hauls so that the sampler could not in every case be towed as close to the bottom as desired. Zooplankton, notably euphausiids, were abundant on several stations.

6. General

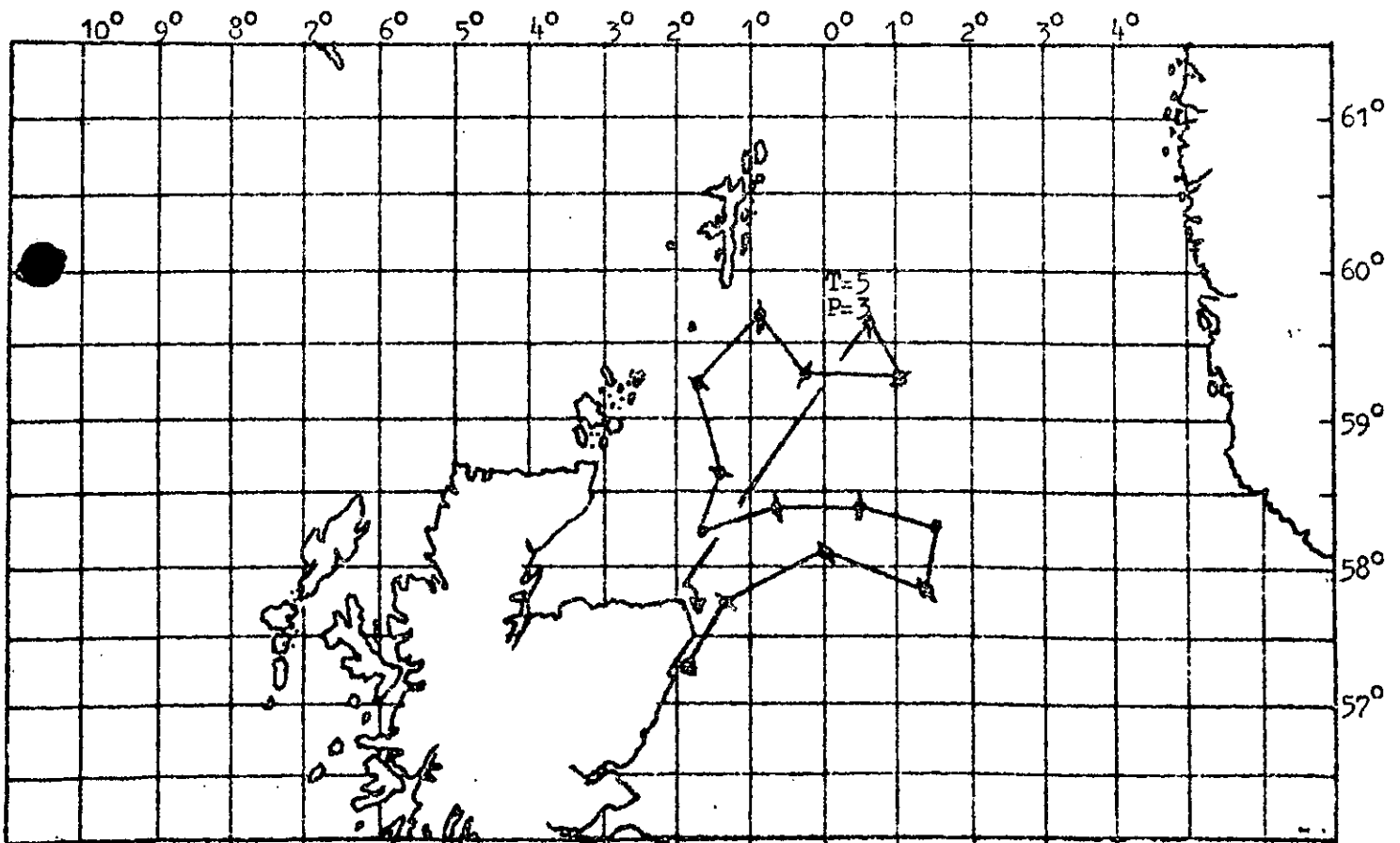
Norway pout otoliths were collected on a sub-area basis to furnish five complete age-length keys. Length measurements were taken for all species from each stream of the net.

H Walsh  
12 January 1982

Seen in Draft: I C MacLeod



(Part 1)



(Part 2)

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Key: ● Trawl station T = nos. trawl hauls  
 / LHPR station P = nos. LHPR hauls