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SOME OBSERVATIONS ON THE FOOD OF COD GADUS MORHUA (L.) ON

THE FLADEN AND IN THE FARN DEEPS

by

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ABSTRACT

This paper presents some preliminary data on the feeding habits of cod Gadus morhua (L.) on two Pandalid shrimp fishing grounds, the Fladen and the Farn Deeps. In both areas the most important prey species were Pandalus sp., Nephrops norvegicus (L.) and small gadoids. In the size range 20-50 cm cod take proportionally more pandalids while at sizes greater than 50 cm they feed to a greater extent on Nephrops.

RÉSUMÉ

Ce mémoire présente quelques données préliminaires à propos des moeurs alimentaires des morues Gadus morhua L. dans deux pêcheries de crevette Pandalide, celle de Fladen et celle des fosses de Farn (Farn Deeps). Dans les deux régions les espèces de proie les plus importantes étaient Pandalus sp., Nephrops norvegicus L. et les petits gadoides. Les morues dont la taille variait de 20 à 30 cm ont pris proportionnellement plus de Pandalides tandis que celles dont la taille dépassait 50 cm s'alimentent plus largement de Nephrops.

INTRODUCTION

In studies of the dynamics of the exploited populations of the deep water shrimp Pandalus borealis Krøyer, data were required on the major predator species of the shrimp on the fishing grounds at Fladen and in the Farn Deeps.

The stomach contents of a number of fish species were examined. This paper describes the results from a study of the cod Gadus morhua L., the predominant predator species of the shrimp.

METHODS

The cod were caught during routine population surveys for P. borealis on the fishing grounds at Fladen and in the Farn Deeps by the DAFS research vessels FRV CLUPEA and FRV GOLDSEEKER.

In all cases the cod were caught by shrimp trawl. On CLUPEA a standard commercial Danish shrimp trawl of 1600 meshes was used and on GOLDSEEKER a 16 fm shrimp trawl with 45 mm stretched mesh and variously sized codends. Trawl hauls were either 1 hour or half an hour in duration. The work was carried out at Fladen during 1978 and 1979 and on the Farn Deeps at intervals from 1974 to 1979.

A total of 422 cod were examined from the Farn Deeps grounds and 228 on the Fladen grounds.

The cod stomachs were removed and their contents examined immediately after capture. To avoid possible bias from fish swallowing food items in the artificial environment of the trawl and its codend, any part of the stomach contents not displaying signs of digestive action was discounted.

Where possible any Nephrops norvegicus present in the stomach contents were measured.

RESULTS AND DISCUSSION

The food items found in cod stomachs were as follows:-

Fladen: Pisces

Melanogrammus aeglefinus (L.)
Merlangius merlangus (L.)
Trisopterus esmarkii (Nilsson)
Rhinonemus cimbrius (L.)
Hippoglossoides platessoides (Fabricius)
Lumpenus lumpretaeformis (Walbaum)
Raja sp.

Crustacea

Nephrops norvegicus (L.)
Pandalus borealis (Krøyer)
Pandalus montagui (Leach)
Geryon tridens (Krøyer)
Meganyctiphanes norvegica (M Sars)

Mollusca

Loligo sp.

Polychaeta

Aphrodite oculata (L.)

Farn Deeps: Pisces

Melanogrammus aeglefinus

Merlangius merlangus

Micromesistius poutassou (Risso)

Trisopterus esmarkii

Trisopterus minutus (L.)

Rhinonemus cimbrius

Hippoglossoides platessoides

Lumpenus lumpretaeformis

Sprattus sprattus (L.)

Crustacea

Nephrops norvegicus

P. borealis

P. montogui

Crangon allmani (Kinahan)

Spirontocaris-sp.

Calocaris macandreae (Bell)

Cancer pagurus (L.)

Macropipus depurator (L.)

Hyas sp.

Munida rugosa (Fabricius)

Meganyctiphanes norvegica

Mollusca

Turritella communis (Risso)

Polychaeta

Aphrodite oculata

In both areas investigated, the most important prey species were Nephrops, Pandalus sp. and small gadoid fish (haddock, whiting and Norway pout).

At Fladen fish species were present in 40% of all cod stomachs examined, 29% contained Nephrops and 24% Pandalus spp., 26% of the cod stomachs were empty.

On the Farn Deeps, the proportions of these three prey items were different, with 26% of cod stomachs containing fish, 23% Nephrops and 53% Pandalus spp., 14% of cod stomachs were empty.

The relative importance of prey items varies with the size of cod. At Fladen the smaller cod, in the size range 30-50 cm, take proportionally more pandalids and euphausids, while cod greater than 50 cm in length take more Nephrops. Geryon and fish become increasingly important in the diet of cod over 40 cm long.

On the Farn Deeps pandalids and to a lesser extent crangonids, euphausids, Calocaris and Macropipus constitute the greater proportion of the diet in cod in the size range 20-40 cm. At lengths greater than 40 cm fish and Nephrops become more important and these predominate in cod over 65 cm in length.

The percentage of cod in each 5 cm group and their stomach contents are shown in figure 1.

Cod of less than 40 cm in length were found to contain up to five pandalids. A cod of 61 cm contained 30 pandalids, and many cod in the size range 40-60 cm contained in excess of 10 pandalids. Cod less than 70 cm long rarely contained

more than 4 Nephrops and no cod found contained more than 6 Nephrops. The carapace length of Nephrops found in the stomachs ranged from 17-55 mm. The mean carapace length of Nephrops found in Fladen cod was 28.8 mm, and in Farn Deeps cod 29.6 mm. Those figures compare closely with the mean carapace length of the Nephrops population in the two areas, as determined from trawl caught specimens at the time; Fladen 30.7 mm and Farn Deeps 31.0 mm.

Kinnear and Livingstone (1979) found that the mean carapace length of Nephrops in cod stomachs in the Firth of Forth was considerably less than the mean carapace length of trawl caught specimens. They postulated that cod were feeding largely on vulnerable small Nephrops discarded by commercial trawlers.

There was no evidence of this in either of the areas investigated. This, however, could reflect the much smaller amount of Nephrops trawl fishing in these areas compared with the Firth of Forth.

REFERENCE

- Kinnear, J.A.M. 1979 Observations on the feeding of young cod
and Livingstone, K. Gadus morhua (L.) on Nephrops norvegicus (L.)
in the Firth of Forth. ICES CM 1979/K:33.

TABLE I FLADEN Number of cod from Fladen in each 5 mm size groups and number containing prey species

Cod Size Range	Number	Nephrops	Pandalus	Fish	Geryon	Euphausids	Aphrodite	Squid	Empty
15-9									
20-4									
25-9	2	-	-	2					
30-4	8	-	3	2	-	1	-		3
35-9	32	2	13	7	-	-	-		12
40-4	47	4	17	16	1	1	-		14
45-9	35	5	11	13	3	1	-		11
50-4	18	5	8	6	-	-	-	1	5
55-9	17	3	1	10	-	-	-		4
60-4	24	16	1	14	3	-	-		3
65-9	17	9	1	10	2	-	-		3
70-4	11	9	-	6	2	-	-		2
75-9	6	5	-	2	-	-	-		2
80-4	5	3	-	1	1	-	-		-
85-9	2	1	-	1	2	-	-		-
90-4	3	1	-	1	1	-	1		-
95-9	-	-	-	-	-	-	-		-
100-4	1	1	-	-	-	-	-		-
	228	66	55	91	15	3	1	1	59

TABLE II FARN DEEPS Number of cod from Farn Deep in each 5 mm size groups and number containing prey species

Cod Size Range	Number	Nephrops	Pandalus	Fish	Crangon	Macropipus	Euphausiids	Aphrodite	Calocaris	Spirontocaris	Turritella	Munida	Empty
15-9	2		1										
20-4	16	1	12		2	2				1			3
25-9	35	5	16	5	4	1	1		5	1	2		5
30-4	48	4	22	3	10	1	1		3	-	-	1	9
35-9	62	6	35	13	16	2	3		9	-	1		8
40-4	86	11	38	27	7	4	1	3	4	1	1		13
45-9	69	14	39	19	4	2	2	2	7	-	-		9
50-4	30	11	20	9	5	1	1	2	2	-	-		2
55-9	18	10	9	9	-	2	-	-	1	1	1		2
60-4	15	11	13	4	3	-	2	-	-	2	-		-
65-9	10	6	8	7	-	-	-	1	1	-	-		1
70-4	16	10	5	8	-	-	-	-	-	-	-		2
75-9	7	3	1	-	1	-	-	-	1	-	-		3
80-4	2	1	-	1	-	-	-	-	-	-	-		-
85-9	3	3	2	-	1	-	-	-	-	-	-		-
90-4	1	-	1	1	-	-	-	-	-	-	-		-
95-9	1	1	-	1	-	-	-	-	-	-	-		-
100-4	1	1	1	1	-	-	-	-	-	-	-		-
	422	98	223	108	53	15	11	8	33	6	5	1	57

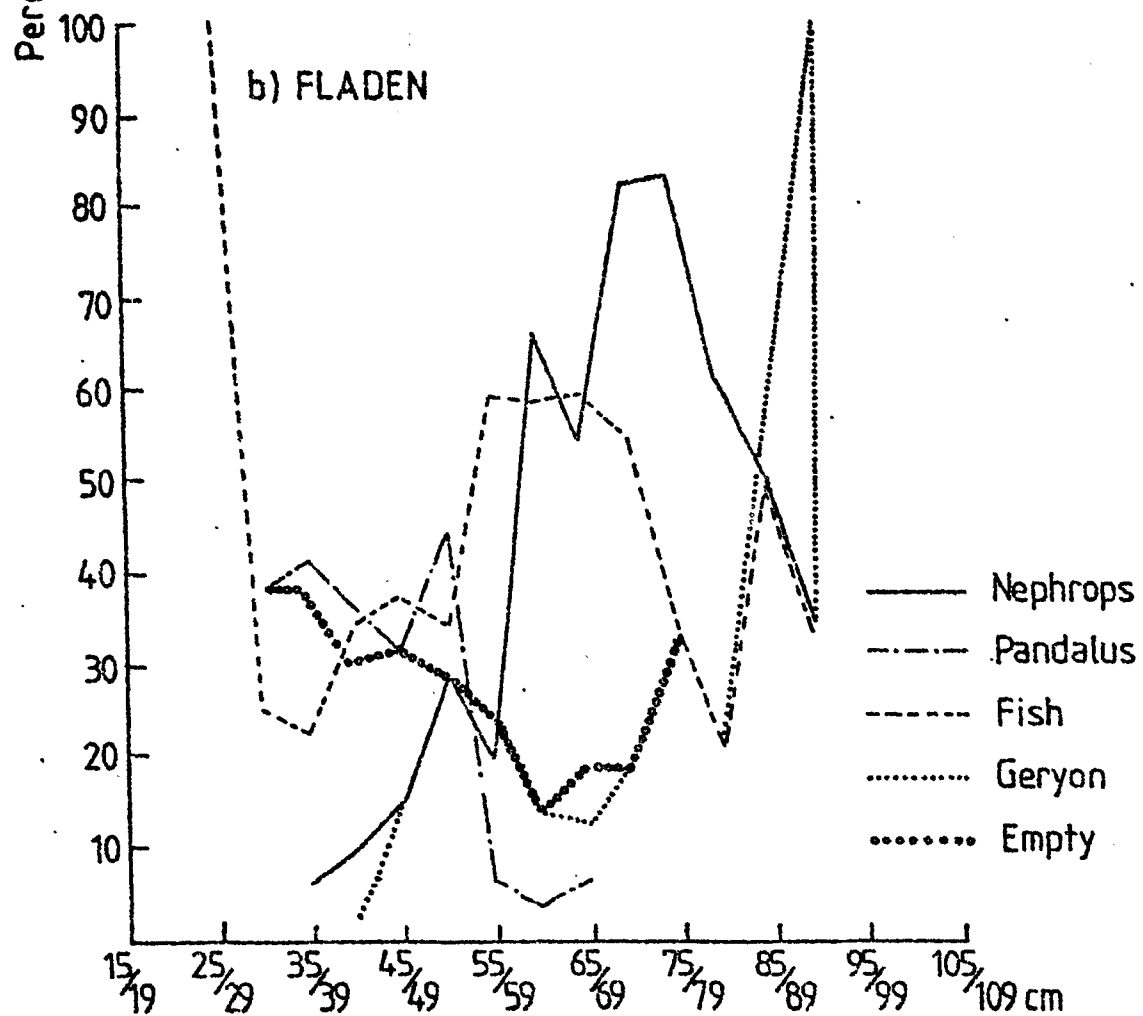
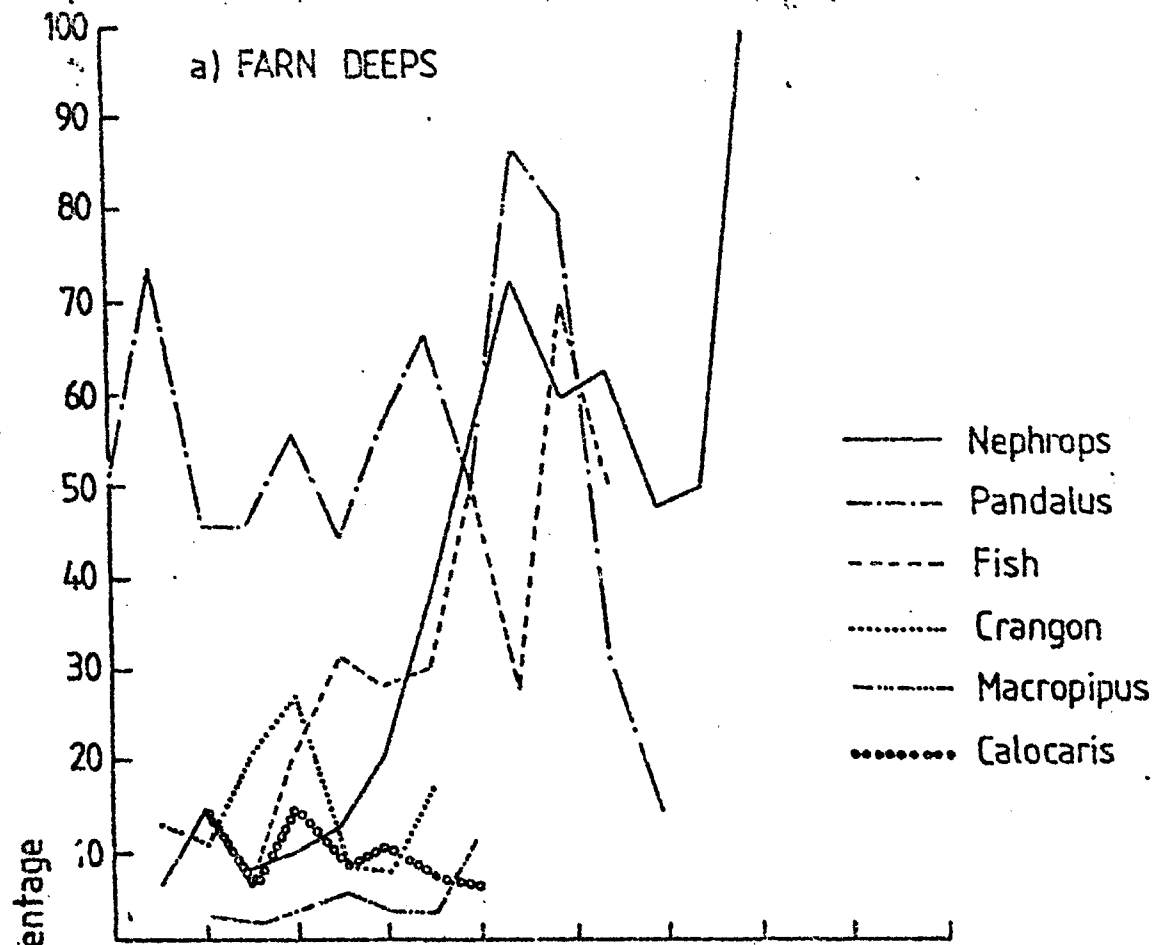


Figure 1 Percentage of cod in each 5 mm size group containing principle prey species