NOT TO BE CITED WITHOUT PRIOR
REFERENCE TO THE AUTHOR(S)

Northwest Atlantic Fisheries Organization

Serial No. N2939

NAFO SCR Doc. 97/92

SCIENTIFIC COUNCIL MEETING - SEPTEMBER 1997

Food and Feeding of Ocean Redfish (*Sebastes mentella* Travin) in the North Atlantic

by

Concepción González and Isabel Bruno (*)

Instituto Español de Oceanografía, Centro Oceanográfico de Vigo

P.O. Box 1552, 36280, Vigo Spain.

ABSTRACT

The food and feeding of ocean redfish are described from stomach contents of 26,381 individuals analyzed on board commercial vessels in the Irminger waters from March to November. Most of the stomachs had been everted (15 488). The feeding intensity mean value throughout the period was 7.1%. The feeding intensity was higher in the months of least reproductive activity in each sex.

The prey spectrum was narrow, the diversity diminishing in autumn and winter. Crustacea dominates the redfish diet in March. Other items show great seasonal variation also as with Mollusca which have an increased presence in summer. Crustacea were more abundant in the diet of smaller individuals, the variety of fishes preyed on increasing with the length. The occurrence of Myctop hidae remains constant throughout the length range although their volume increases with size. A marked presence of offal was observed associated with the period of intense commercial activity: April to June. The offal occurrence and offal volume increased with length, particularly in the individuals larger than 40cm. The intense fishing activity was observed to have a direct influence on diet composition.

The main natural prey were: Copedoda (IRI=1582.5); Eupahusiacea (IRI=1361.9); Mollusca Decapoda (IRI=736.8) and Myctophydae (IRI=220.3).

The comparison between Flemish Cap and Irminger Sea redfish diet populations in the same month show important composition differences.

The condition factor by month values (Mean=1.26±0.12) were less than those obtained in the Flemish Cap population (Mean=1.43±0.17).

*) Equal authorships.

INTRODUCTION

Sebastes mentella is one of the most important commercial species exploited in the Irminger waters. In international waters of Reykjanes Rigde Area, an international pelagic fishery targets Ocean redfish (*Sebastes mentella* Travin). A considerable number of vessels carry out activity mainly in the period from April to June. The catches reached 59,776 tonnes in 1994 and 42,986 tonnes in 1995. (Anon. 1995).

Knowledge of food and feeding patterns of exploited species is a very important aspect of multispecific management since the quality and quantity of food intake by fish are known to be important factors for their growth, maturity and changes in fecundity. It is also known that intense fishing activity in the open sea can produce changes in the fishing diet since offal from fish-processing was found in a number of stomachs in the area where the fleet was operating (E. Rodríguez-Marín et al., 1993; J. Magnússon et al., 1994).

Recent studies on the food of *Sebastes mentella* are lacking for this Area (Jones, 1970). Furthermore, diet data (Magnússon,1995) and biological observations (Reynisson et al., 1992) from survey sampling cannot correspond to the diet in fishery conditions. The aim of this paper is to examine the food and feeding of Ocean redfish in the Irminger sea under fishing conditions and analyse the fishery influence in the diet. The differences in food by sex, by length and the seasonal variations in the period March to November, the condition factor by sex is also examined.

MATERIAL and METHODS

Sampling was carried out by scientific observers on board commercial trawl freezer ships in 1996. The study area was international waters of the Irminger Sea, where the international commercial fleet operates. The material was taken from the Spanish fishery targeting Ocean redfish in ICES Div XII and XIVb, Reykjanes Ridge Area (Figure 1). During the period March to November 1996, three scientific observers of the Spanish on board sampling program took some *Sebastes mentella* biological samples. In each haul sampled about 100 *Sebastes mentella* were examined. Each specimen was measured to the nearest cm, sexed and stomach content examined. Fish whose stomachs were everted or contained prey ingested in the fishing gear were discarded. From each stomach content, volume was quantified in cc. by a trophometer (Olaso, 1990), as was a percentage of this volume throughout the period March to August.

For stomach content analysis, predator length, sex and month were taken into account. As regards predator length, 6 groups with a range of 5 cm were established.

Information on *Sebastes mentella* from Flemish Cap, Northwest Atlantic (Nafo Div. 3M) was provided by A. Vázquez, biological data and feeding data by E. Marín, all data corresponding to July 1996. This made it possible to make some comparisons between populations.

To evaluate the importance of stomach content, the following indices are used:

- Frequency of occurrence (percentage), $F.O. = n_p/N_p * 100$, where n_p is the number of stomachs with a specific prey, and N_p is the total number of stomachs containing food analyzed.

The frequency of occurrence method was used to characterize fish feeding, only stomachs containing food were used for estimation (Kennedy and Fiztmaurice, 1972). This method does not give quantitative information, but is quick and requires a minimum of apparatus, giving a somewhat qualitative picture of the food spectrum (Hyslop, 1980).

- Percentage by number, $N = n_p/N_p * 100$, where n_p is the number of a specific prey, and N_p is the total prey number.

- Percentage by volume, $V = v/V_t * 100$, where v is the volume of a specific prey, and V_t is the total prey volume.

From these three measurements, an Index of Relative Importance, IRI (Pinkas et al., 1971) was calculated for each prey taxa, where possible. Some prey were not taken into account. $IRI = (N+V)\ F$

To compare the diet of *Sebastes mentella* in Flemish Cap and the Irminger Sea in July, IRI values were calculated for the main preys in each case.

The condition factor was studied with Fulton´s expression:

$$\frac{W\ 100}{L^3}$$

were "W" is total weight, and "L" is the length of the fish.

Maturity stages by sex were on sight estimates according to the following scale:
Males:

I: Immature (throughout year): Gonads very small and translucent.

II: Ripening: The larger size with white testicle, and with no sperm.

III: Mature: Gonads smaller again, with sperm in the interior when cut.

IV: Spawning: The largest gonads, cream colour, and the sperm flows to exterior.

V: Spent: The flaccid gonads, without sperm.

VI: Recuperating: The gonads are similar size to Stage III, without sperm, and a white-cream colour.

Females:

I: Immature: Very small, cylindrical ovaries.

II: Ripening-mature: Larger, granulated ovaries, yellow orange and opaque eggs.

III: Mature fertilized: More developed varies, with bright yellow eggs.

IV: Spawning: Ovaries occupy every visceral cavity, yellow-green. The eyes of the larvae are evident and flow to exterior.

V: Post-spawning: Large, flaccid ovary, without larvae, purple-blackish colour.

VI:Recuperation:The ovary are a similar size to Stage III. Yellow-purple.

Comparing this scale to that of the "Study group on redfish stocks" (Anon., 1993) the correspondences between both are as follows:

Stage I corresponding to "Juvenile" in the Study Group scale; Stage II: "Ripe ning"; Stages III and IV: "Spawning"; Stages V and VI: "Spent".

RESULTS and DISCUSSION

A total of 26,381 individuals were examined. Table 1 shows the number of individuals sampled by month. Most of the investigated specimens had everted 15,488 (58.7%) or empty stomach 10,120 (38.4%). The everted stomachs were discarded for analysis. The length frequency of predator containing food analysed are shown in Figure 2.

Feeding intensity. The mean feeding intensity was 7.1% in the period studied. By month, the maximum value was reached in March (12.9%), somewhat higher than that reported by Magnusson (1995) in the same month of the previous year: 10%. The minimum value corresponds to October, 1.30% (Table 1).

Diet composition. Table 2 shows the presence of each diet component by month. The diversity was higher in March, decreasing throughout the period considered. The relative importance of preys is shown in Table 3. The most important prey were: Copepoda: F.I= 11.6%; V=1.2%; IRI= 1582.5; Mollusca Decapoda: F.I.= 15.4%; V= 8.9%; IRI= 736.8; Euphausiacea: F.I.=17.1%; V= 3.6%; IRI= 1361.9; Myctophydae: F.I.=6.3%; V= 3.3%; IRI= 220.3 and offal from fish-processing: O.I= 40.6%; V=72.5% (Table 3).

Comparing the IRI value from the Flemish Cap redfish with the Irminger Sea IRI value, both from July, clear differences are noted. In the Flemish Cap redfish, the most important prey were: Copepoda (3481.8); Hyperiidea (735.1) and Euphasiacea (629.5), followed by Pandalidae y Misidacea. All these gave insignificant values in the Irminger Sea redfish, the most important prey being present here: Mollusca Decapoda (3494.7); unidentified Crustacea (637.1) and other Natantia (366.7). All these species being prey, they hardly contribute to the Flemish redfish diet. These differences highlight important ecological dissimilarities between areas but some of the differences in diets may be due to the difference in sampling method: bottom trawl in Flemish Cap and pelagic trawl in the Irminger Sea. Also, the sampling sizes were very different in each case (Table 4).

Diet composition in relation to season. The diet composition by month and sex shows clear differences. Some prey show a clear seasonal pattern. Crustacea are dominant in the spring diet, and later disappear from the diet. The Mollusca Decapoda increase their presence in the summer-autumn period and the *Chaulodius sloani* in summer (Table 6 and Figure 3).

The presence of offal from fish-processing reached their maximum value in April- June, which is the period of greater fishing activity. The frequency occurrence and the importance in volume attain high values in the period with strong yield and fishing activity: March to June. Comparison of the yield (Kg/h) with the offal incidence (F.O. as %) shows a clear correspondence (Figure 4). The presence of Offal in the Oceanic redfish diet in this area is not present in previous studies based on data taken from surveys (Jones, 1970; Magnusson et al. 1995).

Diet composition in relation to sex and length. By sex, the high frequency values of Copepoda, Euphausiacea y Mollusca Decapoda in males relative to females is noted. (Table 3).

The occurrence (presence frequency) and the volume (%) of Crustacea decreases as size increases (Table 5, Figure 5). The Cephalopoda, the Pisces and particularly, offal increase their presence in the diet as length increases. The brusque fall in the presence of fishes in specimen over 45 cm in length is particularly notable.

The higher values of Euphasiacea in volume were observed in individuals less than 25 cm; Crustacea in general almost disappear from the diet from 45 cm. The Mollusca Decapoda appeared in the diet from 26 cm, and so too the remains of processed fish which increase their volume with the increase in size (Figure 5).

Fishing activity, and more especially, the offal from fishing activity, seems to bear an important influence on the diet of the adult fraction of the population, particularly in individuals of over 35 cm, since their incidence increases with predator length (Table 5).

No relationship was observed between the sex ratio and the feeding intensity (Figure 6), although there was between the feeding intensity and the reproductive cycle, he higher values of feeding intensity occurring in the stages of post-spawning and inactivity (Figure 7).

Although weight calculation of individuals on board commercial vessels is inaccurate (Gutreuter 1994), the value of the conditioning factor was estimated using the Fulton expression. The mean value for the period was similar by sex 1.22 males and 1.21 females. Some variation was observed by month. The minimum value corresponds to June (Table 7). The total value of the conditioning factor obtained was 1.26 $\pm$ 0.12.

The mean of the conditioning factor calculated for the Flemish Cap survey (Nafo. Div. 3M) in July 96 on a sample of 1,472 individuals was 1.43 $\pm$ 0.17. This was greater in females (1.46 $\pm$ 0.22) than in males (1.41 $\pm$ 0.09). The length range of the individuals sampled in Flemish Cap was from 11 to 45 cm, whereas in the Irminger Sea, this was from 22 to 49 cm.

To gain knowledge of the development in diet composition and food in general, it is necessary to continue studies, all the year round, combining data taken from surveys with data from commercial fishing vessels. In this manner, it would also be possible to determine the influence of fishing activity on the food of the Ocean redfish.

Acknowledgements

This study was carried out under the Agreement established between the GPM and the IEO for researching the Spanish Fisheries in the North Atlantic. We thank Antonio Vázquez for providing us with the length and weight data and Enrique R-Marín for information on food, both sources regarding Flemish Cap *Sebastes mentella.*

REFERENCES.

Anom., 1993. Report of the Study Group on Redfish stocks. *ICES C.M.*/ G: 6.

Anom., 1995. Report of the North Western Working Group. *ICES C.M.*/ Assess: 19.

Gutreuter, S and D.J. Krozoska. 1994. Quantifying Precision of in Situ Length and Weight Measurements of Fish. Noth American Journal Fisheries Management. 14:318-322.

Hyslop, E. J. 1980. Stomach contents analysis: a rewiew of methods and their aplication. *J. Fish. Biol.* 17: 411-429.

Jones, D.H.. 1970. Food , parasites and the reproductive cycle of pelagic redfish *(Sebastes mentella*, Travin) From weather station alfa in the North Atlantic. *Bull. Mar. Ecol.*, 6: 347-370.

Kennedy, M. And P. Fitzmature, 1972. Some aspects of the biolgy of gudgeon *Gobio gobio* (L.) In Irish waters. *J. Fish. Biol.* 4: 425-440.

Magnússon, J.; K. Nedreaas; J.V. Magnússon; P. Reynisson and P. Sigurösson. 1994. Report on the joint Icelandic/Norwegian survey on Oceanic Redfish in the Irminger Sea and adjacent waters in June/July 1994. *ICES C.M.* 1994/G: 44

Magnússon, J., J. V. Magnússon, T. Sigurösson. 1995. On the Distribution and Biology of the Redfish in March 1995. *ICES C.M.* 1995/G: 40.

Marín-Rodríguez, E.; A. Punzón; J. Paz. 1995. Feeding Patterns of Greenland Halibut *(Reinhardtius Hippoglossides)* Fishery in Flemish Pass Area (1991-1992). *NAFO Sci. Counc. Studies*. 23: 43-55.

Olaso, I. 1990. Distribución y abundancia del megabentos invertebrado en fondos de la plataforma cantantábrica. *Bol. Inst. Oceanogr. Publi. Esp.* N°5: 128p.

Pinkas, L., M.S. Oliphant and L.K. Food habits of albacore bluefin tuna, and bonito in Califormia waters. *Calif. Dep. Fish Game. Fish. Bull.*152: 105 p.

Reynisson P., T. Sigurösson, J. Magnússon, J. V. Magnússon. 1995. Diurnal variation of the echo intensity and some biological observations on redfish in te Irminger Sea (preliminary results). *ICES C.M.* 1995/G:41.

MONTH	% Full	% Emptiness	% Everted	TOTAL
March	12.96	47.25	39.78	*1674*
April	2.53	52.71	44.77	*5303*
May	1.84	34.30	63.85	*8734*
June	4.80	35.65	59.55	*1896*
July	2.64	20.71	76.64	*1931*
August	2.11	29.72	68.16	*2271*
September	1.54	39.25	59.22	*2018*
Octover	1.30	41.83	56.86	*1690*
November	2.08	33.33	64.58	*864*
TOTAL	*773*	*10120*	*15488*	*26381*

Table 1.- Characteristics of stomach sampling of *Sebastes mentella.* Irminger Sea, 1996.

Prey taxa	March	April	May	Juin	July	Aug.	Set.	Oct.	Nov.
CRUSTACEA									
Amphipoda									
Hyperidae	*			*					
Copepoda	*								
Decapoda									
Natantia									
Pandalidae	*		*	*	*				
Otros Natantia	*	*	*		*	*	*	*	*
Euphausiacea	*	*	*						
Crustacea unidentified					*	*	*	*	*
MOLLUSCA									
Cephalopoda	*	*	*						
Decapoda	*	*	*	*	*	*	*	*	*
Octopoda	*		*		*				
PISCES									*
Myctophidae	*	*	*	*	*		*	*	
Chauliodus sloani			*	*	*	*	*		
Notolepis rissoi	*	*	*			*	*		
Nemichtys scolopaceus		*	*		*				
Pisces unidentified	*	*	*	*		*	*	*	
Fish larva	*								
OTHER INVERTEBRAT									
Chaetognata	*								
Cnidaria (Scyphozoa)	*		*		*	*	*		
OFFAL	*	*	*	*	*				*

Table 2 .- Presence of prey items found in *Sebastes mentella* stomachs sampled from March to November 1996. Irminger Sea. ICES Div. XII and XIVb.

PREY TAXA	F.O.(%)		TOTAL		
	Males	Females	F.O.(%)	VOL(%)	I.R.I.
CRUSTACEA					
Amphipoda					
Hyperiidea	9.3	1.7	5.8	0.5	166.3
Copepoda	19.7	2.0	11.6	1.2	1582.5
Decapoda					
Natantia					
Pandalidae	1.9	0.6	1.3	0.3	4.7
Other Natantia	5.0	2.6	3.9	1.2	53.0
Euphausiacea	27.1	5.1	17.1	3.6	1361.9
Crustacea unidentified	2.1	3.7	2.9	0.3	47.6
MOLLUSCA					
Cephalopoda					
Decapoda	11.6	1.9	15.4	8.9	736.8
Octopoda	0.7	0.0	0.4	0.7	---
PISCES					
Myctophidae	7.6	4.8	6.3	3.3	220.3
Chauliodus sloani	1.0	2.3	1.6	1.6	18.8
Notolepis rissoi	1.4	3.4	2.3	1.0	12.0
Nemichthys scolopaceus	1.0	0.0	0.5	1.7	7.0
Pisces unidentified	6.7	5.7	6.2	1.9	---
Fish larva	0.2	0.0	0.1	0.0	0.0
OTHER INVERTEBRATES					
Chaetognata	2.9	0.6	1.8	0.1	---
Cnidaria (Scyphozoa)	2.4	2.6	2.5	1.6	---
OFFAL	31.1	52.0	40.6	72.5	---
N° Individuals considered	421	352	773	657	308

Table 3.- Frecuency of ocurrence (%); prey volume (%) and the index of relative importance of *Sebastes mentella,* in the Irminger Sea, 1996.

	I.R.I	
PREY TAXA	**Flemish Cap Bank**	**Irminger Sea**
CRUSTACEA		
Amphipoda		
Hyperiidea	735.06	0
Copepoda	3481.78	0
Decapoda		
Natantia		
Pandalidae	405.40	3.60
Other Natantia	1.50	366.70
Euphasiacea	629.49	0
Misidacea	312.68	0
Crustacea unidentified	2.96	637.05
MOLLUSCA		
Cephalopoda		
Decapoda	8.68	3494.70
PISCES		
Myctophidae	88.19	8.91
Nemichthys scolopaceus	0	55.01
Nº Individuals sampled	277	42

Table 4.- Comparation of I.R.I. of main prey found in stomach of *Sebastes mentella* for July 1996 in Flemish Cap and Irminger Sea.

	Sebastes mentella. Length (cm)					
PREY TAXA	**<= 25**	**26-30**	**31-35**	**36-40**	**41-45**	**>45**
CRUSTACEA						
Amphipoda						
Hyperiidea	7.7	11.1	5.4	7.9	1.5	0.0
Copepoda	23.1	29.6	20.1	9.6	0.7	0.0
Decapoda						
Natantia						
Pandalidae	0.0	0.0	1.3	1.5	0.7	3.4
Other Natantia	7.7	0.0	1.3	6.1	2.2	0.0
Euphausiacea	84.6	37.0	21.4	16.3	3.6	6.9
Crustacea unidentified	0.0	0.0	4.5	3.5	0.0	0.0
MOLLUSCA						
Cephalopoda	0.0	0.0	0.4	0.3	0.0	10.3
Decapoda	0.0	11.1	15.2	19.5	10.2	3.4
Octopoda	0.0	0.0	0.4	0.6	0.0	0.0
PISCES						
Myctophidae	7.7	3.7	6.3	7.0	6.6	0.0
Chauliodus sloani	0.0	3.7	0.4	1.7	2.9	0.0
Notolepis rissoi	0.0	0.0	1.8	3.5	1.5	0.0
Nemichthys scolopaceus	0.0	0.0	0.4	0.3	1.5	0.0
Pisces unidentified	7.7	11.1	7.6	4.7	6.6	6.9
Fish larva	0.0	0.0	0.0	0.3	0.0	0.0
OTHER INVERTEBRATES						
Chaetognata	7.7	0.0	3.1	1.7	0.0	0.0
Cnidaria (Scyphozoa)	0.0	0.0	1.8	2.9	3.6	0.0
OFFAL	0.0	18.5	34.4	35.9	63.0	75.9
N° Individuals	13	27	224	343	137	29

Table 5.- Frequence of occurrence (%) by length group of *Sebastes mentella*, in the Iminger Sea, 1996.

	MAR		APRIL		MAY		JUNE		JULY		AUG		SET		OCT		NOV	
PREY TAXA	**M**	**F**	**M**	**F**	**M**	**F**	**M**	**F**	**M**	**F**	**M**	**F**	**M**	**F**	**M**	**F**	**M**	**F**
CRUSTACEA																		
Amphipoda																		
Hyperidea	21.2	15.2	0.0	0.0	0.0	0.0	0.0	1.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Copepoda	45.1	21.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Decapoda																		
Natantia																		
Pandalidae	2.2	0.0	0.0	0.0	1.6	1.0	5.4	1.9	4.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other Natantia	6.5	3.0	1.4	1.6	1.6	0.0	0.0	0.0	26.1	21.4	0.0	0.0	0.0	0.0	0.0	0.0	11.1	11.1
Euphausiacea	59.2	39.4	5.5	1.6	1.6	3.1	0.0	1.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Crust.unidentified	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.4	7.1	17.7	12.9	0.0	13.8	30.8	33.3	11.1	0.0
MOLLUSCA																		
Cephalopoda																		
Decapoda	3.8	9.1	6.9	1.6	1.6	1.0	5.4	1.9	39.1	57.1	64.7	67.7	100	55.2	61.5	44.4	44.4	77.8
Octopoda	0.5	0.0	0.0	0.0	1.6	0.0	0.0	0.0	4.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PISCES																		
Myctophidae	9.8	9.1	9.6	11.5	6.4	1.0	2.7	5.6	4.4	0.0	0.0	0.0	0.0	10.3	7.7	0.0	0.0	0.0
Chauliodus sloani	0.0	0.0	0.0	0.0	1.6	0.0	5.4	1.9	4.4	10.7	0.0	3.2	0.0	10.3	0.0	0.0	0.0	0.0
Notolepis rissoi	0.5	0.0	1.4	1.6	4.8	1.0	0.0	0.0	0.0	0.0	5.9	22.6	0.0	10.3	0.0	0.0	0.0	0.0
N. scolopaceus	0.0	0.0	1.4	0.0	1.6	0.0	0.0	0.0	8.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pisces unidentified	4.4	6.1	9.6	4.9	7.9	7.1	10.8	1.4	0.0	0.0	17.6	0.0	0.0	10.3	7.7	33.3	0.0	11.1
Fish larva	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
OTROS INVERT.																		
Chaetognata	6.5	6.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cnidaria (Scyphozoa)	2.2	0.0	0.0	0.0	0.0	2.0	0.0	0.0	26.1	17.9	0.0	3.2	0.0	3.5	0.0	0.0	0.0	0.0
OFFAL	4.9	18.2	67.1	75.4	68.2	85.7	73.0	85.2	0.0	3.6	0.0	0.0	0.0	0.0	0.0	0.0	33.3	0.0
Nºindividual sampled	184	33	73	61	63	98	37	54	23	28	17	31	2	29	13	9	9	9

Table 6.- Frequence of ocurrence (%) by sex and months of *Sebastes mentella* in Irminger Sea, 1996.

Month	Males	Females	Total
March	1.20 ± 0.10	1.18 ± 0.11	1.19 ± 0.10
April	1.19 ± 0.13	1.22 ± 0.12	1.21 ± 0.12
May	1.20 ± 0.11	1.18 ± 0.12	1.20 ± 0.11
June	1.06 ± 0.09	1.06 ± 0.11	1.06 ± 0.10
July	1.32 ± 0.07	1.32 ± 0.12	1.32 ± 0.10
August	1.36 ± 0.09	1.31 ± 0.08	1.40 ± 0.08
N°Indiv.	372	274	646

Table 7.- Condition factor value (%)of *Sebastes mentella* by sex and total.Irminger Sea, 1996. The weigth is the live weigth less his stomach content.

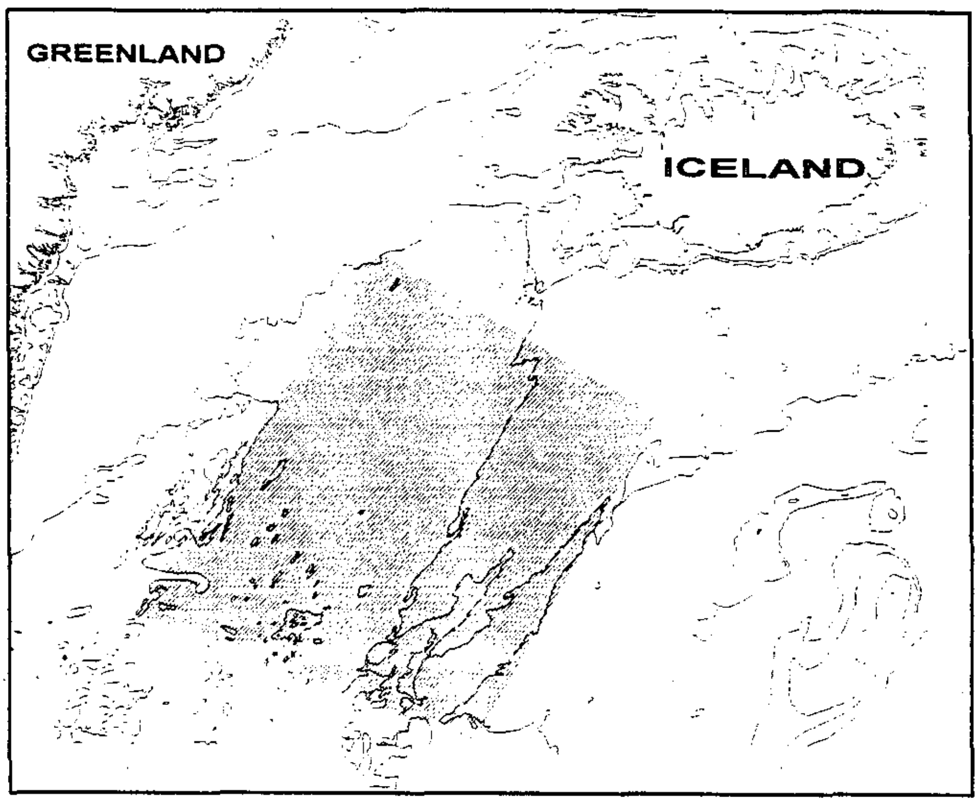


Figure 1.- Map showing the fishing zone of international commercial avtivity target to the *Sebastes mentella* in Reykanes Ridge Area, 1996.

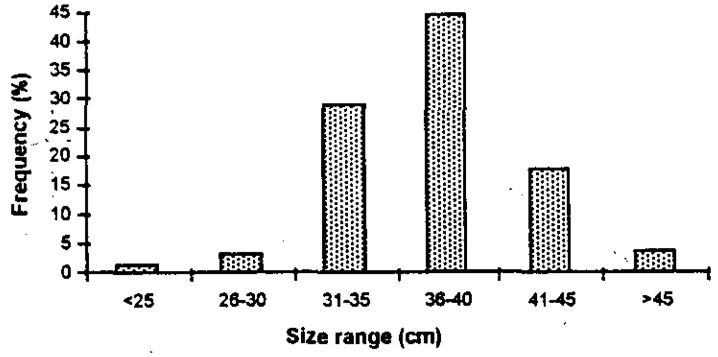


Figure 2.- Distribution of size range of individuals with food of *Sebastes mentella* in the Irminger Sea, 1996.

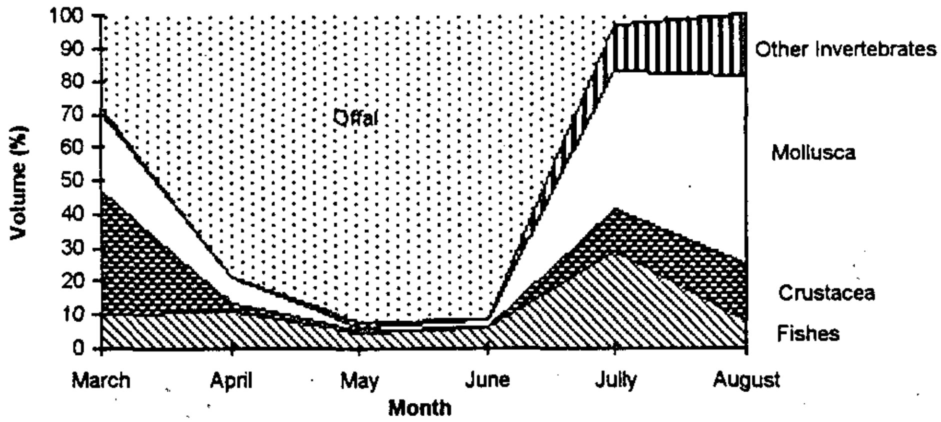


Figure 3.- Volumetric index (%) of preys of *Sebastes mentella*. Irminger Sea, 1996.

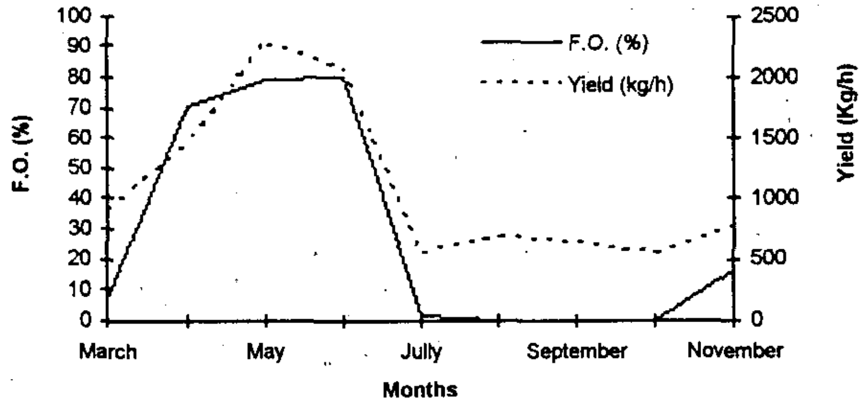


Figure 4.- Frequency of occurrence offal and yield (Kg/h) of *Sebastes mentella*. Irminger Sea, 1996.

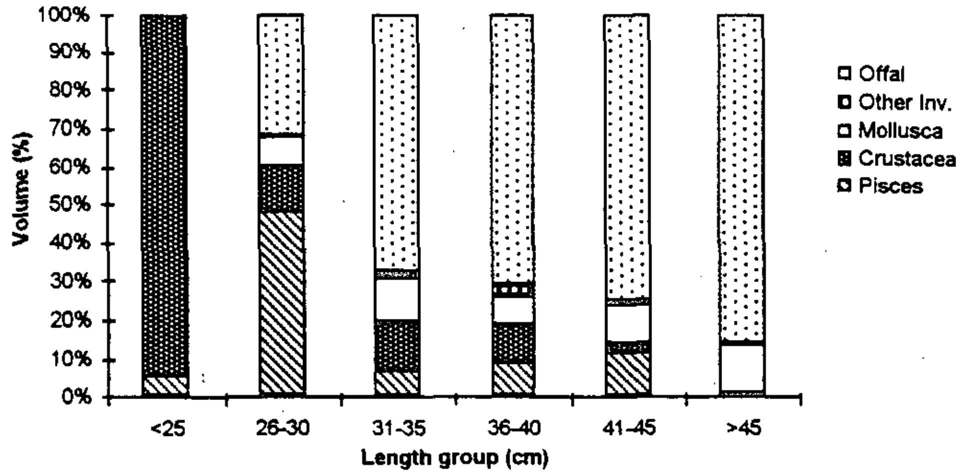
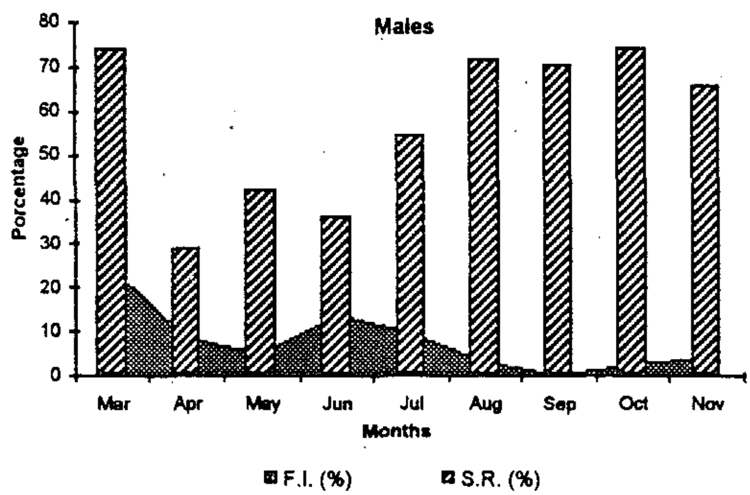


Figure 5.- Volumetric index (%) of main prey for length group of *Sebastes mentella* in Irminger Sea, 1996.



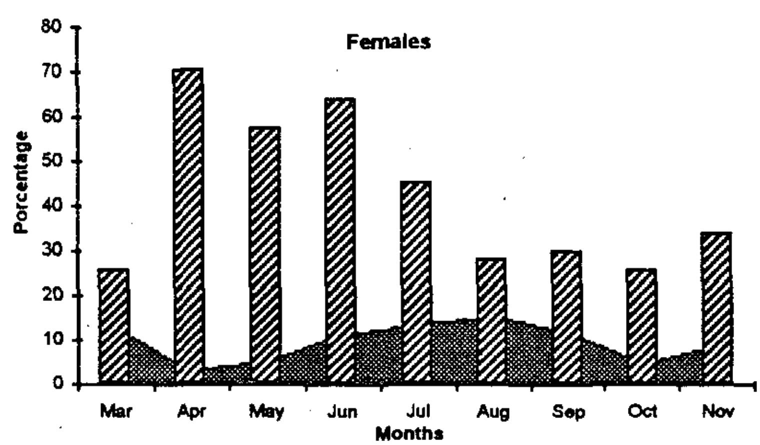
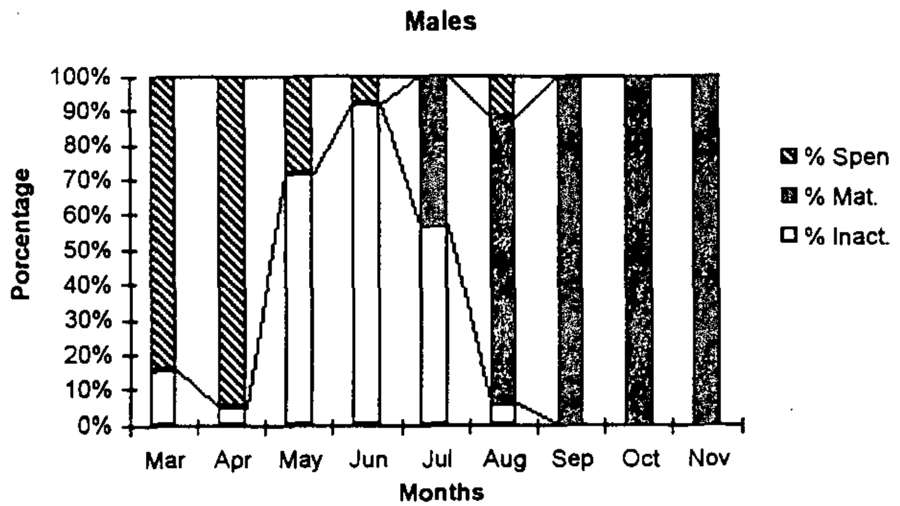


Figure 6.- Sex ratio (S.R.) in the catches and feeding intensity (F.I.) by sex and months of *Sebastes mentella* in Irminger Sea, 1996.



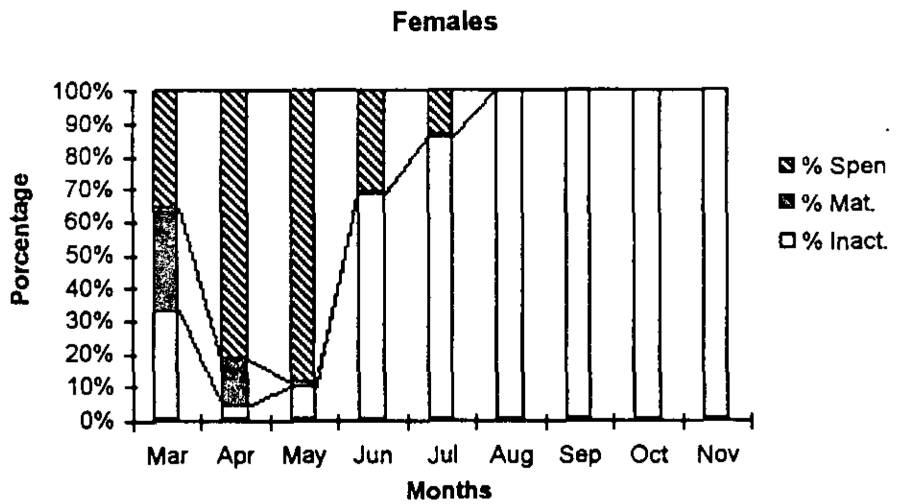


Figure 7.- Maturity stages of adult *Sebastes mentella* in Irminger Sea, 1996. Inactive: stage I and II; Mature: stage III an IV; Spent: stage V and VI.