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Feeding of Ocean Pout (Macrozoarces americanus) in the Northwest Atlantic

by

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Ocean pout (Order of Perciformes is typical bottom fish, living in coastal waters, chiefly up to 80 m. It is spread along th Atlantic coast of America from the Gulf of St.Lawrence to Delaware Bay. The most significant concentrations are found an Nantucket Shoals in the area of New England where fishery for the species basically occurres.

Presently, the ocean pout is an accessory object of fishery and is taken as a by-catch off New England and in small quantities in the area of Norfolk. In 1969 the catch of this species off New England was 5.4% of the total catch and in 1970-1971 - I.7%. During the past decade the catches of ocean pout decreased and accounts only for 0.5%.

Ocean pout biology, its feeding in particular, is studied very poorly, all available materials date back to I920-I921 and I946. According to Bigelow and Schroeder (I946) ocean pout feeds on various shelf molluscs - bivalve and univalve, Grustacea and other invertebrates. The basic food of ocean pout from the Bay of Fundy, investigated by W.A. Clemens and Z.S. Clemens (1921) was two species of common mussel: Modiolaria and Mytilus; gastropod - Biccunum, mollusc - Littorina, scallop -Pecten and different other species of bottom molluscs and also sea-urchins, Ophiura and Cirripedia.

Olsen and Merriman (1945) noted that Echinarachnius was the basic food of 850 ocean pouts caught in the south-western part of the Gulf of Man and in the southern part of the area off New England. Crabs(Gancer irroratus) and Crustacea -Jsopoda came second in occurrence. Some of the fishes used large amount of bivalve molluscs (Joldia and Pecten and also eggs of

A European representative of pout (Zoarces viviparus) unlike

SPECIAL SESSION ON TROPHIC RELATIONSHIPS

ocean pout, eagerly feeds on sea algae consisting of Zostera and also on detritus (according to 1917, who studied fish feeding in the Danish waters in detail).

This paper is based on the materials collected by the author and AtlantNIRO scientists during R/V "Argus" cruise in May-July 1971 in the area off New England in the north-west Atlantic.

About one hundred fishes were frozen, then thier stomaches were weighted and quantity analysis of them was made. All the fish was taken from the catches made by bottom trawl with the depths range from 40 to 80 m.

The length of the ocean pout was 26 - 62 cm (mean length - 50.% cm) its weight was from 200 to 1900 gr, sex ratio I:I.

Methods

Before the stomach was taken out every fish was weighed and measured, their sex and maturity stage were determined. Common and individual indices of fullness were calculated (<u>pro decimille</u>) to characterize the feeding. The indices were calculated on the basis of actual weight of food bolus and its separate components. Besides we used the percentage relashionship between the weight of separate groups of food and the total weight of stomach content.

AtlantNIRO scientist L.I. Stulova helped us a lot with determination of food organisms.

This work was done thanks to the assistance of Dr. Noskov A.S., Chief of laboratory of north-west Atlantic and other AtlantNIRO scientists.

The number of stomachs examined is given below:AreasGeorges BankNantucket ShoalsAnalysis43/946/7

Notes: in the numerator - the number of full stomachs

in the denominator - the number of empty stomachs

Samples of ocean pout for feeding habits were taken in the areas of Georges Bank and Nantucket Shoals.

Species composition of food organizms used by ocean pout is given in Table I. In the stomachs of Macrozoarces americanus there was found small amount of species, which were the base of their food.

During the period of studies the main objects of food of ocean pout were crabs Cancer (59.7%) and Gammaridae (I4.0). All food objects were benthic forms. When studying the number

- 2 -

of species in the food of ocean pout we found out that the mass form of molluscs prevailed (Joldia, Nucula and Cardium).

- 3 -

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Besides the components given in Table I, also sand and pebble were found in the fish stomachs. It gives us grounds to think that looking for food ocean pout sink to the bottom.

The results of ocean pouts feeding are shown in Fig.I separately for each region, where area of the circle is proportional to total index of fullness (Zenkevich, Brotskaya, 1931), and areas of the sectors are proportional to percentage values of different food components.

Index of fullness for ocean pout was 4I.3. As one can see, the largest part of the food spectrum is occupied by crabs (Cancer borealis). Change of food composition in different areas is given in Fig.2. In the area of Georges Bank the main food objects are Echinodermata (43.7%) and Gammaridae (36.3%) and in the area of Nantucket Shoals crabs were the most common objects of food - 76.0%.

Food habits of ocean pout of different sexes.

The data on feeding habits of males and females are given in Table 2 and Fig. 3. It is evident that crabs prevailed in the ration of both males and females. But if one follows the feeding of ocean pout males and females foe each region (Fig. 4-5), it becomes clear that in both regions the first and the second in the ration of females the portion of molluscs and Echinodermata increases and the importance of crustacea - Gammaridae goes down.

Apparently, females are capable of selective feeding on molluscs and Echinodermata.

> Change in feeding habits of ocean pouts depending on growth.

In Table 3 the data on feeding of ocean pout of different size groups are given.

Crustacea - Gammaridae, are the main food object of ocean pout 26 - 40 cm long (IOO%). With the increase of length their importance in feeding decreases. For the ocean pout of 5I-55 cm long they account only for I5.9% of the food bolus weight. The importance of crabs on the contrary increases with the length and for individuals of 46-50 cm long they account for 78% of the food mass.

Change in ocean pout food composition in June 1971 depending on its size (percentage by weight) is given in Fig. 6.

Condition(fullness of fish)

Coefficient of condition of ocean pout (Fulton's condition factor) in spring 1971 was low - 0,49 (for fish off Georges Bank - 0,50, off Nantucket Sho**a**ls - 0,48). Ocean pout condition factor is increasing with the size (Table 4).

The materials on the results of study of ocean pout feeding gives additional information to that we have from scaree data on biology of this very interesting oceanic fishery object.

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Food	Ar	e a s	n an	
organisms	North-west Atlantic	Georges Bank	Nantucket Shoals	
Amphipoda Gammaridae	I4.0	36.3	7.08	
Decapoda Cancer borealis	59.7	2.3	76.0	
Pelecypoda Nucula Joldia Cardium pinnulatu	m 7.3	0.5	8.5	
Echinodermata Echinarachnius pa	rma I0.5	43.7	I.2	
Nematoda	22.0	II.O	24.0	
Undetermined (digested mass)	8.5	17.2	6.5	
% of empty stomac	hs I8.0	2I.0	15.0	

Table I. Food components of ocean pout (Macrozoarces americanus). June 1971, north-west Atlantic

- 5 -

(percent by weight of separate food components).

Table 2. Food composition of ocean pout of different sex (percent to the weight of total stomach content) (1971)

	· · · · · · · · · · · · · · · · · · ·							
	Sex		Males Females					
Food Area	Area	All areas	Georges Bank	Nantucket Shoals	All Areas	Georges Bank	Nantucket Shoals	
<u>Crustacea</u> Gammarida	8	17.1	40.I	II.9	II.0	34.8	3.4	
Crustacea	n Malacost	racan						
Cancer bo	realis	65.2	-	80.8	54.2	-	71.4	
Molluscs Nucula, J Cardium	oldia	I.9	-	2,3	13.0	I.0	16 .%	
Sea-urchi Echin er ac	n <u>s</u> hnius parm	a 6.6	34.5	0.3	14.2	52.3	2.0	
Undetermi: mass	ned	9.2	25.4	5.5	7.8	II.9	6.7	
Total ind	ex(percent	age) 34.8	I2.9	19.0	44.6	6I. 7	68.8	
Number of	stomachs	48	23	25	41	20	21	
Fishes wi empty stor	th , nachs		23	annan - annan ta sa annan a	Allan a 22 a 24 a 24 a 24 a 24 a 24 a 24 a	I7		

Food objects	26-30	36-40	41-45	Size 46-50	groups 51-55	56-60	6I - 65	66 - 70
Crustacean	100	I 00	26,3	8,0	15,9	15,2		
Molluscs			19,2	4,0	12,2	2,5	donali MCD Angesta Internet, foto fanos de	
Sea-urchins			21 ,2	6,0	13,9	IO,4		-
Crabs			17,3	78,0	47,0	63,5		IOO
Undetermined mass			16,1	4,3	10,9	8,4		ан оны <u>с намада на кон</u> оните —
Empty stomachs	1 -		II	23	25	20	na da naga ga sa ta da sa ta d	
Index of fulln	iess 33,3	22,0	44,(0 69,3	3 33, I	25 , I	7,5	8,0

Table 3 Food composition of sea pout of different size group (%)

Table 4. Condition factors for ocean pout.

Length, cm 26 36-40	4I -Q5	46-50	
Condition factor 0.34 040	0.14	0.47	ng n



7 -

Fig. 1 Feeding spectrum of M. americanus in the Northwest Atlantic.

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Fig. 2 Feeding spectra of M. americanus for different areas a) Georges Bank b) Nantucket Shoals







- 8 -



Fig. 5 Feeding spectrum of M. americanus of Nantucket Shoals

- a) males b) females
 - Crabs 2. Molluscs 3. Gammaridae 4. Sea-urchins
 Digested food



- 9 -

Fig. 6 Food composition of the ocean pout of different size groups

a) Georges Bank b) Nantucket Shoals c) Northwest Atlantic

Crabs 2. Molluscs 3. Gammaridae 4. Sea-urchins
 Digested food

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