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Maturity, feeding, length/age composition of white hake,
Urophycis tenuis (Mitch.), in Subarea 3 in 1969, 1971 and 1972

by

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Abstract

The paper presents information on white hake which, up to the present time, has not been heavily exploited. It is suggested that in Subarea 3 there is one local population. Examining of feeding showed that white hake are active predators. Their main food object are various fishes. Spawning takes place in the middle of summer. The main part of catches in 1969 consisted of specimens at the age of 4-5 years of the 1965 and 1964 year-classes and in 1971, fish ages 5-7 years (1966-1964 year-classes) were important. In 1972, 37.5% of the age composition of fish in catches included fish of the 1969 year-class (3-year-olds). There was a very small number of fish older than 10 years. White hake avoid low (close to 0°C) water temperatures.

Introduction

White hake, *Urophycis tenuis* (Mitchill), are fish which are less studied and poorly exploited. The aim of the paper given is to show their life pattern, typical occurrence and food value of these fish.

Material and Methods

This paper includes biological data collected in trips made by the R/V "Rossiya" and research - scouting vessel "Perseus III" in Subarea 3 in 1969, 1971 and 1972.

Fishery was carried out by a bottom trawl with a small-mesh nylon net (8 mm from knot to knot) inserted in the codend. Trawlings lasted for 1 hour.

White hake were measured from the tip of snout to the end of the tail fin. Stages of ripening were determined by the 6-mark scale of Sorokin (1957, 1960) and the index of stomach fullness by the 5-mark scale. The author has determined the age of fish by otoliths and checked by scale. Complicated composition

of white hake otoliths makes it difficult to determine age and one had to make a supplementary treatment of the surface of a cross cut by the method worked out by P.I.Savvatimsky (1971).

The volume of data used is given in tables and figures.

Maturity

According to data by Leim and Scott (1966) spawning of white hake is extended: in the south-eastern area of New Scotland it takes place early in autumn, in the Fundy Bay in winter or spring and in the southern part of the Gulf of St.Lawrence in the middle of summer.

Data given in Table 1 show that spawning in Subarea 3 is observed in the middle of summer. It is interesting that in May-June no females with running sexual products were recorded whereas a considerable number of males at V ripening stage was found. Probably this is due to different vertical distribution of males and females when spawning.

Feeding and Fatness

Bigelow and Schroeder (1953) state that after young white hake sink to the bottom they surface up during their life only seeking food and do not feed on bottom mollusks and echinoderms. Our observations confirm this. So, frequency of occurrence of these representatives of the benthic fauna in stomachs analysed is rather insignificant (Table 2). Various species of fish are predominant in feeding of white hake: cod, haddock, flatfish, sand eel, capelin, anchovies, grenadiers, gobies and the other fish inhabiting together with white hake. Rather important food objects for white hake are large and small crustaceans: shrimps, isopods, amphipods, crabs which are found by white hake on the bottom with the help of their sensitive ends of ventral fins, as Bigelow and Schroeder (1953), Leim and Scott (1966) state.

In Division 3P the frequency of occurrence of planktonic

crustaceans (euphausiids and amphipods) and shrimps is higher than in Division 3 O but that of fish is lower.

x)
Fatness of white hake inhabiting Subarea 3 ranges between 2.5 and 10.0%. Fatness becomes higher with increasing the length of fish. No essential difference of fatness in males and females was found.

Length-Age Composition

The maximum length of white hake in Subarea 3 is 120 cm and, as a rule, females reach such a length. Their weight is not more than 11 kg. In our catches the length of males didn't exceed 90 cm and weight was not more than 5 kg.

Examining the length-age composition of white hake in Divisions 3 O and 3 P one can suggest that in Subarea 3 white hake do not form several local populations. This assumption asks for careful check as it is founded only on complete synchronous course of curves of the length composition of white hake in these divisions (Fig. 1A-C), a detailed race analysis was not made.

The main part of catches in 1969 consisted of fish at the age of 4-5 years of the 1965 and 1964 year classes (Fig. 2A). In 1971, fish at the age of 5-7 years of the 1964-1965 year classes dominated in catches (Fig. 2B). Fig. 1b shows that in catches of 1971 there were occurred fish of the new 1969 year class which in 1972 amounted already to 37.5% of the age composition of catches of this year (Fig. 2C) and the value of the 1964-1966 year classes markedly decreased. A number of fish older than 10 years was insignificant in catches.

Fishery and Utilization

White hake became to be exploited by the Soviet trawling fleet not long ago. There is no special fishery for white hake in Subarea 3. As a rule, fishing vessels take white hake as by-catch.

D 4

x)
$$\frac{\text{weight of liver}}{\text{weight of fish}} \quad (\text{in } \%)$$

Our observations show that depths of 100-250 m are optimum for catching the white hake. Favourable temperatures for a successful trawlings are between 2.8 and 8.4°C. As white hake are not found in trawls on the Grand Newfoundland Bank where temperatures in near-bottom layers are close to 0°C or below, one can assume that white hake avoid low temperatures (Fig. 3A-C).

According to Minder (1968) the meat of white hake is not so fat than that of cod and protein is watered somewhat higher and due to this meat of the fish given is coarse and unsavoury. No difference in the fat content of liver of white hake and cod and ~~is~~ that is equally used for melting of fat and preparing canned liver.

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Table 1. Maturity of white nake

Stage of ripening	Division 3 O						Division 3 P					
	1969		1971		1972		1969		1971		1972	
	Males	Females	Males	Females	Males	Females	Males	Females	Males	Females	Males	Females
II	89	91	13	47	79	74	58	131	2	7	38	78
III	53	47	4	34	3	15	45	33	3	-	2	6
IV	10	-	41	34	49	21	19	-	9	4	9	18
V	3	-	86	-	230	1	1	-	12	-	35	-
VI	1	1	4	1	15	3	4	1	-	-	1	-
VII - II	2	4	7	17	5	74	1	12	-	11	-	49
Total number of specimens	158	143	155	133	381	188	128	177	23	22	85	151

Table 2. Frequency of occurrence (in % from a number of stomachs analysed) of food components in white shark

Food groups	Division 50			Division 5 P		
	1969	1971	1972	1969	1971	1972
	Oct.	May	May	Oct.	May	May
Fish	29,5	48,7	70,2	27,2	38,2	39,8
Planktonic crustaceans	12,9	3,3	17,9	24,4	8,8	9,3
Shrimp	2,2	5,5	0,4	5,9	-	4,2
Large bottom crustaceans	0,4	2,6	-	2,4	-	0,8
Bottom mollusks	0,7	1,1	0,4	0,4	-	-
Cephalopoda	0,4	5,9	0,4	3,1	-	0,8
Echinoderms	1,5	0,4	0,4	-	-	-
Worms	0,7	0,7	-	2,0	-	0,8
Other food	-	2,6	-	2,0	-	0,8
Ground particles	0,4	-	-	0,4	-	-
No. of stomachs analysed	271	271	252	254	34	118
Average index of stomach fullness	0,82	1,10	2,22	0,99	1,01	1,08

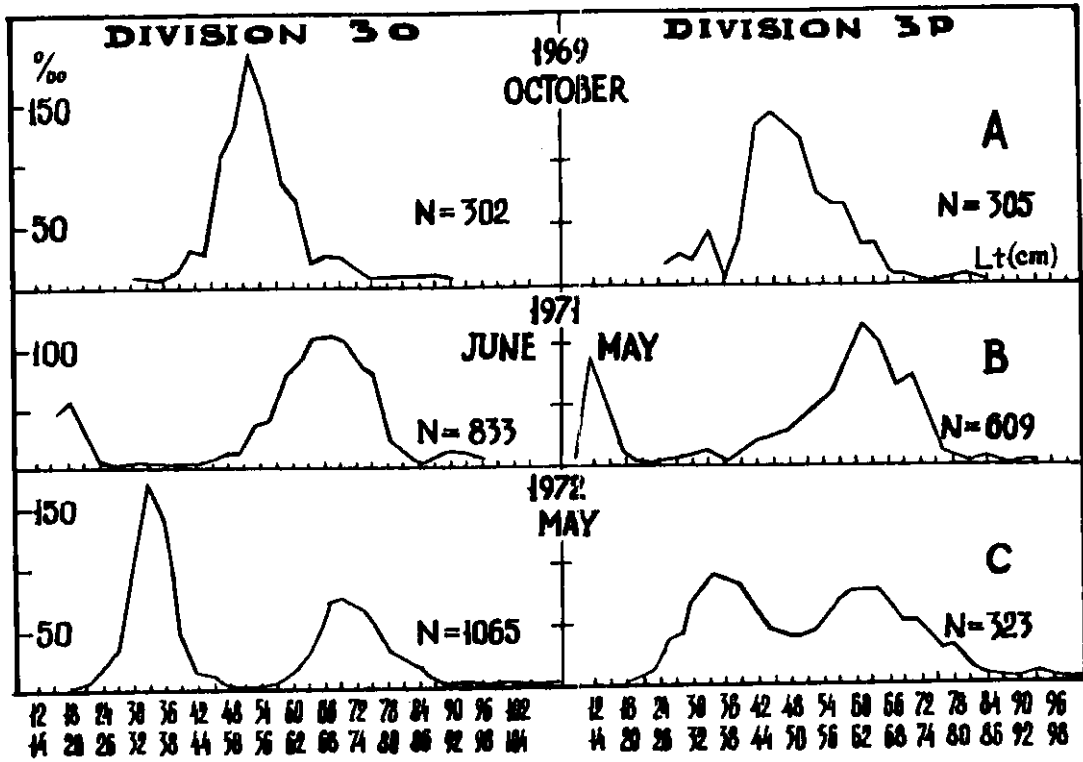


Fig. 1A-1C. Length composition of white hake.

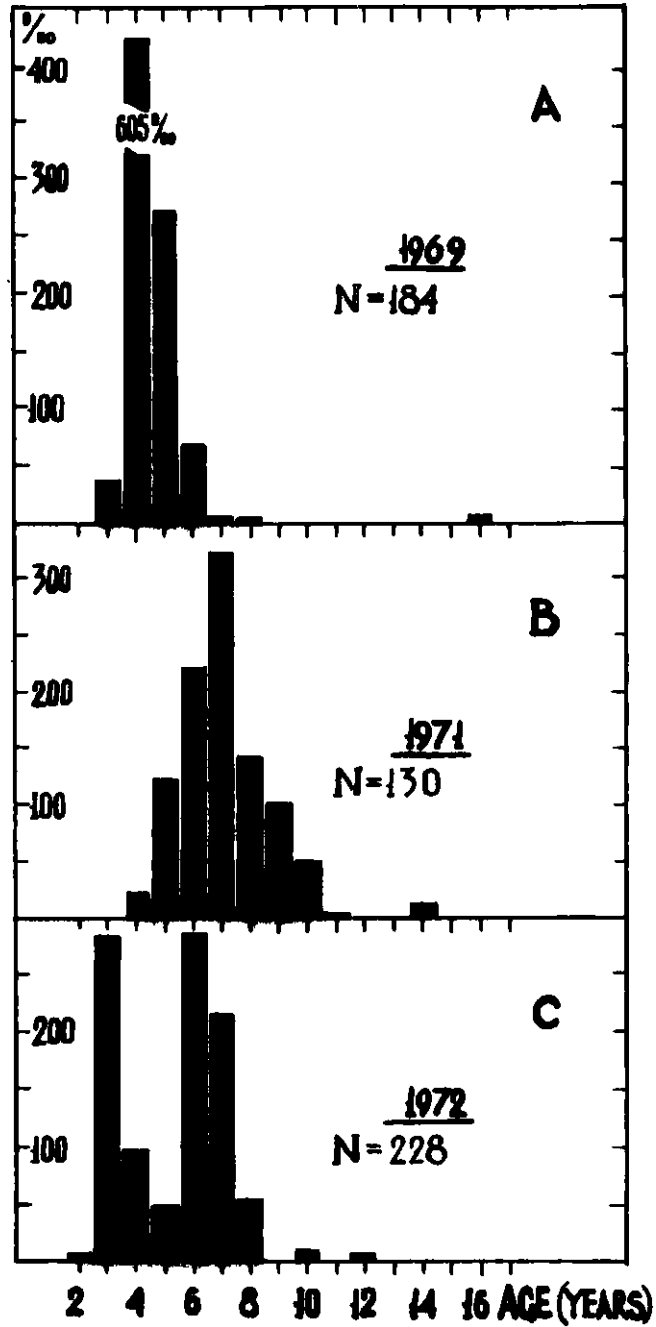


Fig. 2A-2C. Age composition of white hake in Div. 30.

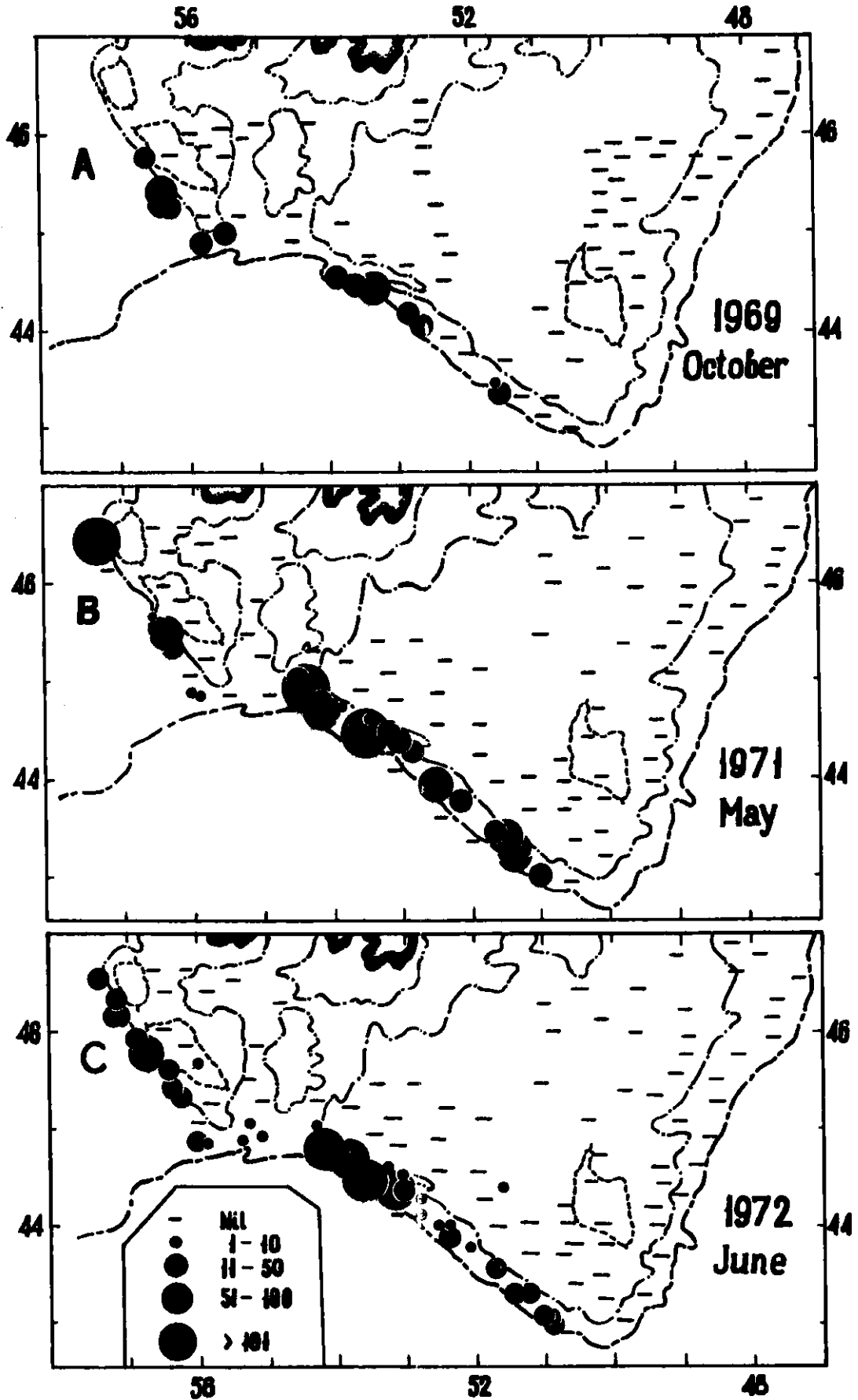


Fig. 3A-3C. Distribution of white hake catches.