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On Distribution and Biomass of three Species of Wolffish,  
Atlantic wolffish (Anarhichas lupus Linne), Spotted wolffish  
(A. minor Olafsen), and Northern wolffish (A. latifrons  
Steenstrup et hallgrimsson) in the Newfoundland Area

by

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#### Abstract

Based on the data for 1971-1980 distribution of Atlantic wolf-  
fish (Anarhichas lupus Linne), spotted wolffish (A. minor Olafsen)  
and northern wolffish (A. latifrons Steenstrup et Hallgrimsson) in  
the Newfoundland area is characterized, their mean biomass per  
hour trawling with a fish-counting bottom trawl at different depth  
and water temperature near the bottom is calculated.

#### Introduction

The Newfoundland area is inhabited with three species of wolf-  
fish: Atlantic (Anarhichas lupus Linne), spotted (A. minor Olafsen)  
and northern (A. latifrons Steenstrup et Hallgrimsson). Although  
the commercial statistics refers them to a group of demersal fish,  
not all of these are equally related to the bottom. Atlantic and  
spotted wolffish are typical benthophages, which comparatively ra-  
rely leave the near-bottom layers. A peculiar tooth system, adapted  
to tear off not mobile bottom organisms with a strong carapace -  
echinodermata, mollusca, crabs - from substratum and to grind them  
then is typical of the fish above said. Teeth of northern wolffish  
are somewhat different from those of two other species and serve,  
chiefly, for keeping the mobile, swimming, comparatively spineless  
marine organisms. Stomachs of northern wolffish are often full with

Ctenophora and jellyfish, that differs them sharply from other wolffishes ( Barsukov, 1959, 1961). While searching the food, northern wolffish are observed in open water for a long period, sometimes rising to the very surface (Konstantinov, Shestopal, 1976).

The life way of wolffish is, mainly, settled or with insignificant seasonal migrations (Barsukov, 1959). The results of spotted wolffish tagging in the Barents Sea (Konstantinov, 1957, 1961), of Atlantic wolffish tagging in the Icelandic waters (Jonsson, 1966) confirm this: tagged specimens being at sea for a year or more were recaptured in the same place or not far than 100 miles from tagging area.

The area of wolffishes inhabitation is wide. They inhabit fairly different depths, as a rule, not forming dense concentrations, that is, probably, the consequence of the feeding with single bottom organisms. Wolffishes are not the objects of specialized fishery; they are caught as single specimens or several tens of specimens per one trawling with a bottom trawl during other fisheries. The size of modern yield does not practically influence the abundance and length composition of wolffishes even in the areas of intensive fishery, therefore their yield is not limited by any international agreements.

However, it should be noted, that wolffishes are rather often caught with long lines, but northern wolffish in contrast to Atlantic and spotted ones are taken in great numbers with pelagic trawls.

The meat of *A.lupus* and *A.minor* is of high gustatory quality, contains 15-16% of protein and 5% of fat; these are usually sold as fresh, frozen, smoked and salted products. Meat of *A.latifrons* because of high water content is of lesser food value (Minder, Khotilova, 1966). Eggs of wolffishes are very tasteful, the liver is considered by Scandinavians to be delicacy.

Degree of commercial use of wolffishes (or "intensity of yield" - Konstantinov, 1969) in the North West Atlantic is not high. Due to our preliminary estimates it constituted in the Newfoundland area in 1977 about 5-8% of the total biomass of population, including that taken by the Soviet fleet - less than 1%. By the way, the

necessity of more complete exploitation of these fishes stocks is evident.

Characteristics of wolffishes distribution in the Newfoundland area in different depths and at various near-bottom water temperature aimed at using the data obtained for conducting the specialized rational fishery is represented in this paper. Some authors ( Baranenкова et al., 1960; Nizovtsev, 1963; Boese und Kändler, 1969) pointed out the depth and water temperature of wolffish inhabitation off the Greenland, Iceland, Spitsbergen, Norway coasts, in the North, Barents and White Seas. No scientific papers specially devoted to wolffishes distribution in the Newfoundland area have been published so far. Such data are not also included in any of the numerous papers annually submitted to NAFO (ICNAF formerly).

#### Material and methods

The data on total trawl survey, undertaken annually since 1971 by the PINRO specialists in the Newfoundland area are analysed and summarized in the paper .

During the same or close to each other terms a set of fish-counting trawlings of one hour duration is carried out according to a standard grid of stations over a vast area in the spring-summer period (Fig.1). The survey is conducted aboard the research-scouting vessels of BMRT-type by bottom trawl with a small-meshed insertion. The depths and bottom temperature are registered during trawling. A field analysis of each trawl includes the measurements of all the specimens caught, determination of sex and maturity stages, analysis of food and fatness, samples of scales and otoliths for the following age determination.

The results of regularly conducted survey permit to evaluate abundance, biomass and distribution of commercial and non-commercial fishes. The data on wolffish catches taken in 1971-1980 separately by species are summarized in the paper suggested. Mean mass of one specimen in different depths and at various water temperature near the bottom was determined by means of size-weight key.

The number of trawlings, the results of which were used in the paper, is given in Table 1. Occurrence frequency is expressed by the ratio of the number of trawlings, when wolffishes were caught, to the total number of trawlings performed at a given depth over a given temperature range (Tables 2,3 and 4). The results of single trawlings are not presented in Tables.

#### Results of investigations

Atlantic wolffish *Anarhichas lupus* Linne is the most numerous species among the three mentioned, inhabiting the North West Atlantic. They are observed in fairly different depths over a wide range of near-bottom temperature (Fig.2). Mean biomass per hour trawling and occurrence frequency are usually maximum in the 201-350 m depths. Atlantic wolffish as bycatch were registered in catches practically after each trawling conducted at that depth. Mean biomass of 10-40 kg was registered there at water temperature from  $-1.5^{\circ}$  to  $4.0^{\circ}\text{C}$ . The catches reduced at a higher temperature. It should be noted, that in the range of  $2.6^{\circ}$ - $4.0^{\circ}\text{C}$  the maximum of mean biomass may be also registered in the 101-200 m depths.

Spotted wolffish *Anarhichas minor* Olafsen occur more rarely than two other species. Mean catch does not exceed usually 5 kg per hour trawling. They are observed at a wide near-bottom temperature range: from  $-1.5^{\circ}$  to  $8.8^{\circ}\text{C}$ . Average catch per hour trawling does not vary greatly depending on depth and near-bottom temperature. Some increase in mean biomass, sometimes up to 30 kg per hour trawling, is observed at near-bottom temperature from  $-1.0^{\circ}$  to  $1.0^{\circ}\text{C}$ . In the 101-350 m depths the possibility of taking these with a trawl increases. In shallow waters and at water temperature near the bottom over  $5^{\circ}\text{C}$  the fish are not practically observed (Fig.3).

Northern wolffish *Anarhichas latifrons* Steenstrup et Hallgrímsson is the most deepwater species of the three described. These were registered rather often in the catches taken with bottom trawl (Fig.4). In the depth range of 201-750 m the catches become greater with depth increase, not less than 10-20 kg, sometimes reaching

100 kg per hour trawling. In depths over 300 m occurrence frequency sharply increases. Fairly high mean biomass of northern wolffish up to 50 kg per hour trawling, was registered at water temperature from  $-1.5^{\circ}$  to  $5.0^{\circ}\text{C}$ . At higher temperature northern wolffish are observed very rarely.

#### Conclusions

Atlantic wolffish A.lupus is the most numerous species among the three, inhabiting the North West Atlantic. Maximum mean catch per hour trawling (10-40 kg) was found in the 201-350 m depths at near-bottom water temperature of  $2.6-4.0^{\circ}\text{C}$ .

The rarest species is spotted wolffish A.minor. Their catches do not usually exceed 5 kg per hour trawling. In the depth to 50 m and at water temperature over  $5^{\circ}\text{C}$  spotted wolffish is not almost observed.

Northern wolffish A.latifrons inhabit, mainly, the depths over 300 m at near-bottom temperature of  $-1.5^{\circ}$  to  $5^{\circ}\text{C}$ . Their mean biomass increases with depth growth.

All three species of wolffish are distributed very widely both by horizontal and by different depths. These are observed at fairly various water temperature near the bottom. Because of rather dispersed wolffishes extension, their stocks are evidently underexploited. It is reasonable to arrange a specialized fishery of these fishes, valuable in food respect.

#### References

- Baranenkova A.S., Barsukov V.V., Ponomarenko I.J., Syssoeva T.K., Khokhlina N.S., 1960. Morphological peculiarities, distribution and feeding of the young of *Anarhichas lupus* L., *A.minor* Olafsen, *A.latifrons* Steenstrup et Hallgrimsson. Zoolog. zhurnal, V.39, vyp.8:1186-1200.
- Barsukov V.V., 1959. *Anarhichadidae*. USSR fauna. Fishes. V.5, vyp.5:173.
- Barsukov V.V., 1961. Some observations on *Anarhichas latifrons* Steenstrup et Hallgrimsson. Voprosy ichtyologii, v.1, vyp.1 (1b): 19-28.

- Boese G., Kändler R., 1969. Beiträge zur Biologie der drei nordatlantischen Katfischarten *Anarhichas lupus* L., *A. minor* Olafs. und *A. denticulatus* Kr. Ber. Dtsch. Wiss. Kommiss. Meeresforsch., Bd. 20, H. 1: 21-59.
- Jonsson G., 1966. Preliminary investigations on the Icelandic catfish (*Anarhichas lupus* L.) - ICES, C.M. B:2. Distant Northern Seas Committee. B:2.
- Konstantinov K.G., 1957. Results of the marking of the bottom fishes of the Barents Sea in 1946-1955. Trudy PINRO, vyp. 10: 78-87.
- Konstantinov K.G., 1961. Tagging of bottom fish. Voprosy ichtyologii, v. 1, vyp. 2(19): 275-280.
- Konstantinov K.G., 1969. On terminology used in fishery biology. Voprosy ichtyologii, v. 9, vyp. 2 (55): 353-358.
- Konstantinov K.G., 1976. On the capture of bottom fishes off the sea surface. Trudy PINRO, vyp. 37: 77-82.
- Minder L.P., Khobotilova L.D., 1966. Weight and chemical composition of some commercial fishes in the North West Atlantic and the Barents Sea. Trudy PINRO, vyp. 18: 83-145.
- Nizovtsev G.P., 1963. Recent data on the distribution of striped (*Anarhichas lupus* Linne) and spotted (*Anarhichas minor* Olafsen) catfish and sea dab (*Hippoglossoides platessoides limandoides* /Bloch/) along the northern coasts of Spitsbergen. Doklady AN SSSR, v. 149, No. 3: 735-738.

Table 1. The number of fish-counting trawlings accompanied with measurements of temperature near the bottom in the Newfoundland area in 1971-1980.

Depth, m	Temperature near the bottom, C°													
	-1,9 :-1,5	-1,4 :-1,0	-0,9 :-0,5	-0,4 : 0,0	0,1 : 0,5	0,6 : 1,0	1,1 : 1,5	1,6 : 2,0	2,1 : 2,5	2,6 : 3,0	3,1 : 3,5	3,6 : 4,0	4,1 : 4,5	4,6 : 5,0
I-50	I		2	5	15	15	10	19	9	10	10	5	I	
5I-100	13	40	63	82	90	85	83	68	35	18	13	5	8	I
10I-150	7	46	61	49	23	4	13	4	6	6	13	14	7	6
15I-200	2	25	48	45	37	25	28	9	4	3	17	19	14	5
20I-250	I	8	14	21	28	31	48	40	31	16	13	32	18	11
25I-300		I	5	5	14	13	38	43	52	56	33	45	31	9
30I-350	I	I		I		3	7	21	34	82	48	40	4	I
35I-400		I					I	5	8	14	26	13	7	I
40I-450							I		I	12	15	13	5	2
45I-500								I		7	23	14	I	I
50I-550						I			2	2	13	7	I	
55I-600											5	8		
Total	25	122	193	208	207	177	229	210	182	226	229	215	97	37

Depth, m	Temperature near the bottom, C°												Total
	5,1 5,5	5,6 6,0	6,1 6,5	6,6 7,0	7,1 7,5	7,6 8,0	8,1 8,5	8,6 9,0	9,1 9,5	9,6 10,0	10,1 10,5	10,6 11,0	
I-50													102
5I-100	2	2	I	I	I				I				612
10I-150	2	7	4	5	7	3	5	I	I	I	I	2	298
15I-200	8	5	9	12	5	6	4	5	3	4		I	343
20I-250	3	3	6	11	8	7	4	7		I	I	I	364
25I-300	I	4	3	6	I	2	2						364
30I-350		2	5	2		2	I						255
35I-400													76
40I-450	I												50
45I-500													47
50I-550													26
55I-600													13
Total	17	23	28	37	22	20	16	13	5	6	2	4	2550





Table 4. Occurrence frequency of northern wolffish in the Newfoundland area according to the total trawl survey data for 1971-1980, %

Depth, m	Temperature, C°											
	-1,9:-1,4	-0,9	-0,4:0,1	0,6:1,1	1,6:2,1	2,6:3,1	3,6:4,1	4,6:5,1	5,6:6,1	6,6:7,1	7,6:8,1	8,6
I-50	50	0	7	29	20	10	II	40	20	0		
51-100	8	2	3	0	4	3	2	4	I7	II	8	20
101-150	0	2	II	I3	9	25	I5	25	0	I7	23	I4
151-200	0	8	I4	II	I2	II	33	0	0	6	5	7
201-250	25	43	24	I8	29	23	48	42	I9	8	3I	6
251-300	0	40	7	23	29	44	38	52	42	33	29	II
301-350				0	43	43	35	60	46	45	25	
351-400					20	50	57	38	33	57		
401-450						33	47	54	40	I00		
451-500						43	56	50				
501-550					I00	0	77	I00				
551-600						50	38					

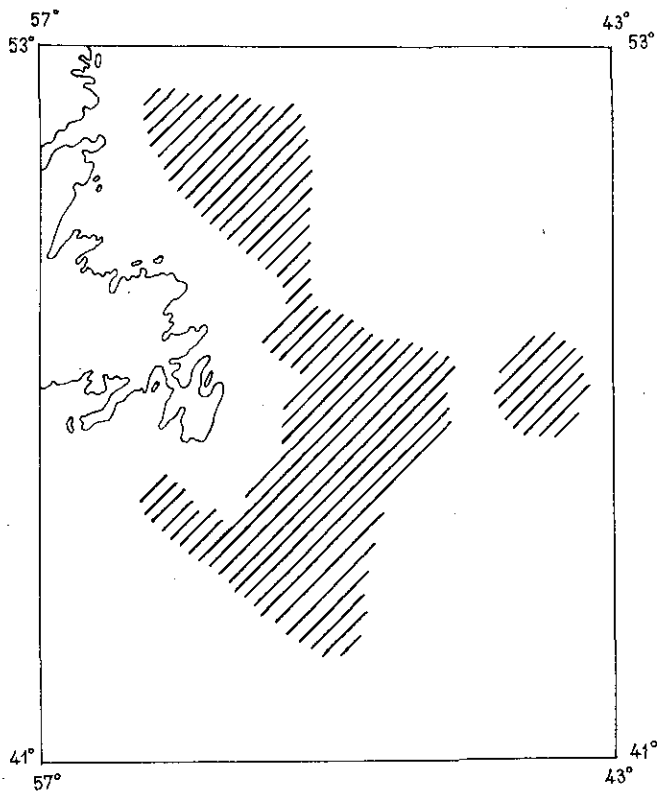


Fig. 1. Area of total trawl survey.

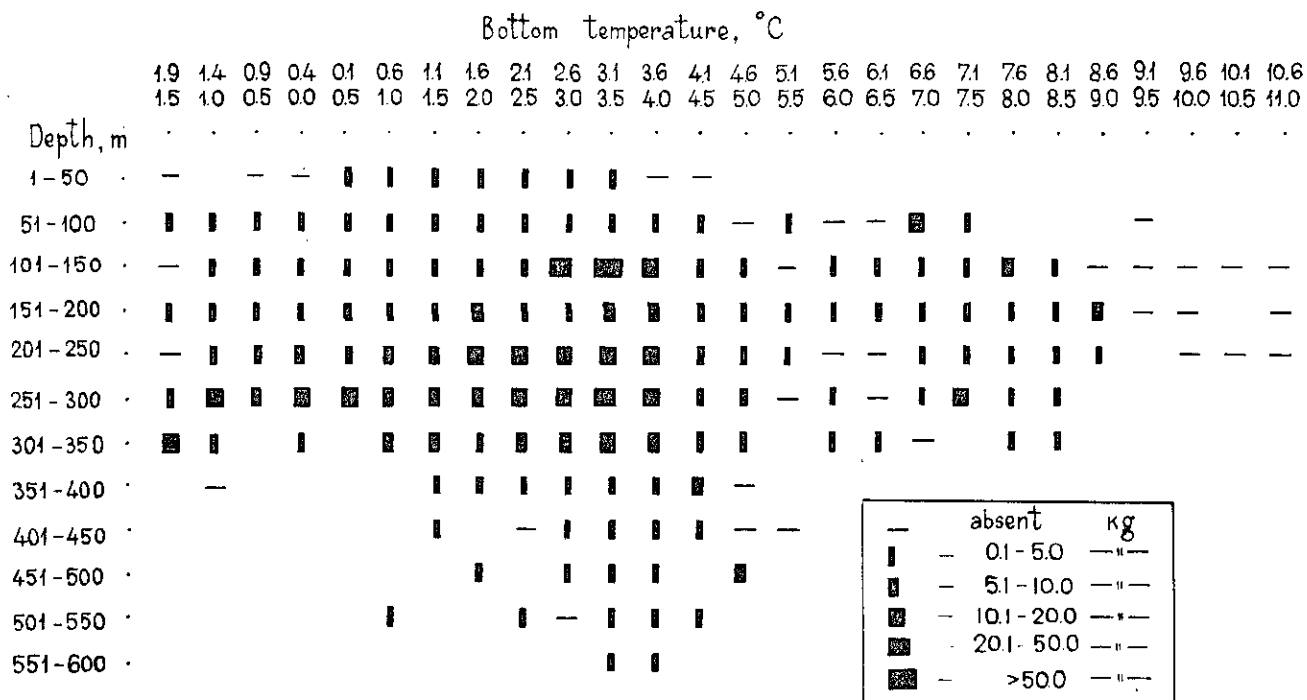


Fig. 2. Mean biomass of Atlantic wolffish A. lupus in different depths at different near-bottom water temperature.

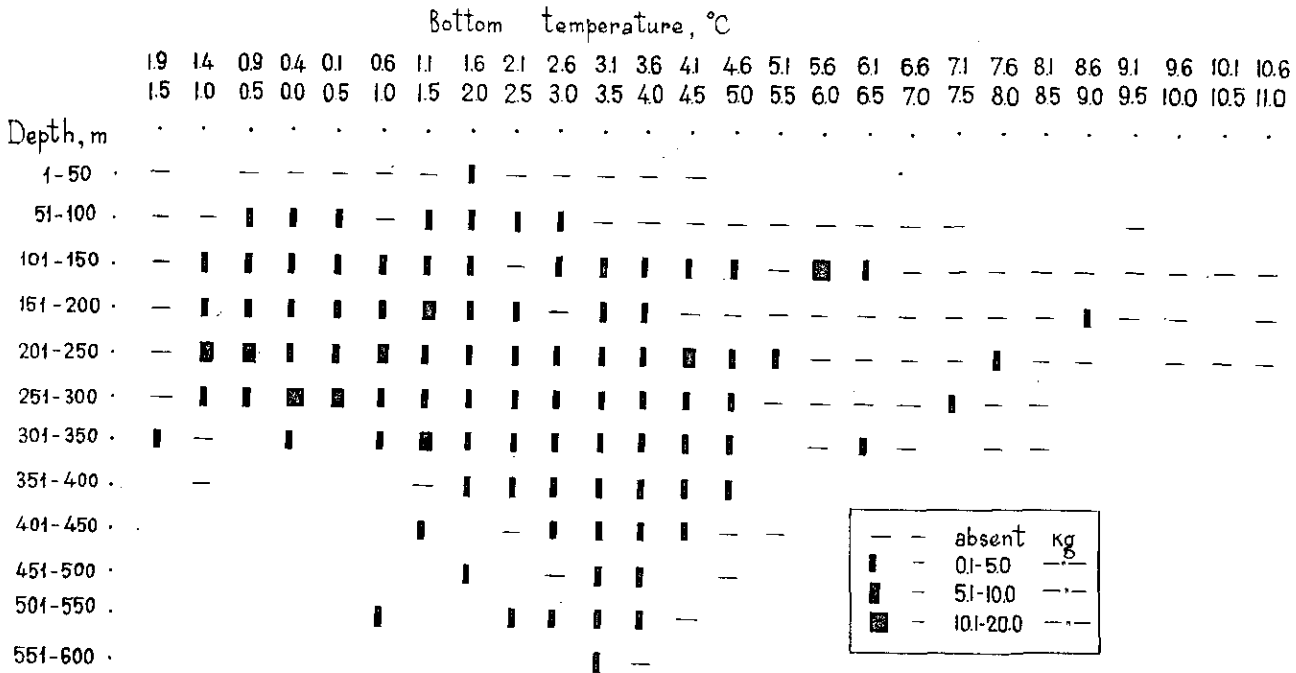


Fig. 3. Mean biomass of spotted wolffish A. minor in different depths at different near-bottom water temperature.

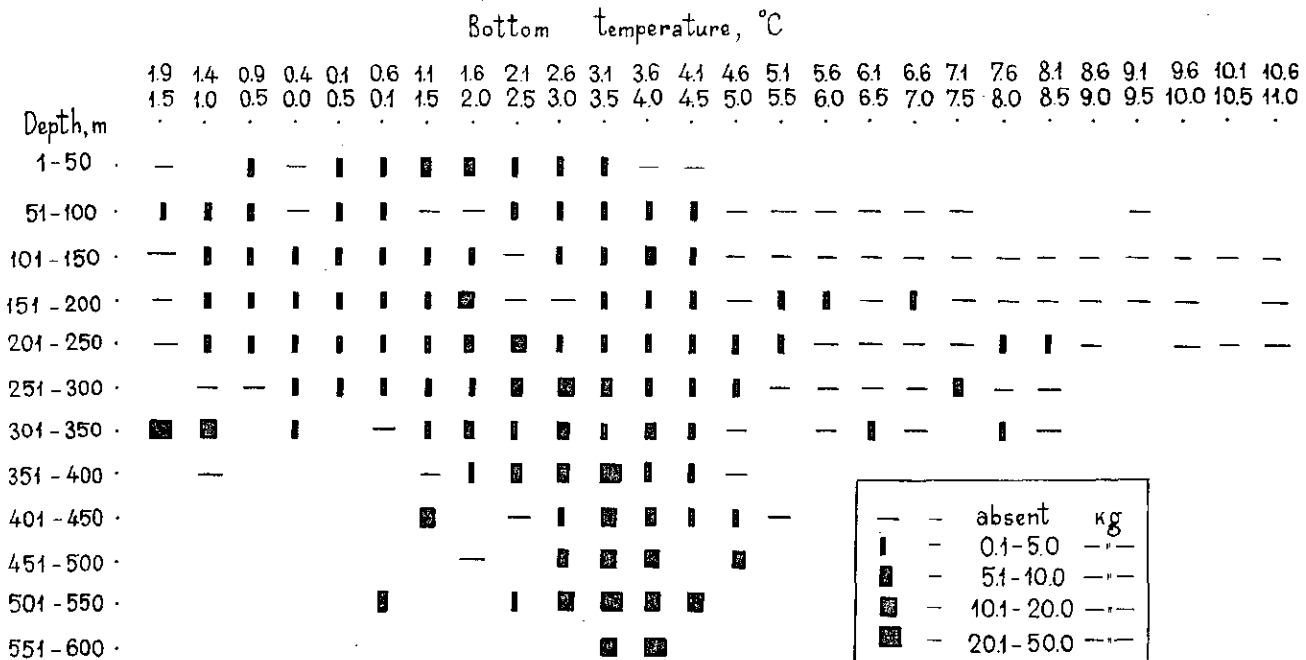


Fig. 4. Mean biomass of northern wolffish A. latifrons in different depths at different near-bottom water temperature.

