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

# Northwest Atlantic



Fisheries Organization

NAFO SCR Doc. 82/VI/71

# Serial No. N564

#### SCIENTIFIC COUNCIL MEETING - JUNE 1982

DISTRIBUTION OF THREE SPECIES OF EELPOUT IN NEWFOUNDLAND DIVISIONS IN RELATION WITH DEPTHS AND BOTTOM TEMPERATURES

by

G.N. Morosova PINRO, Murmansk, USSR

## Abstract

This paper deals with distribution of Arctic eelpout (<u>Lycodes</u> <u>reticulatus</u>), patterned eelpout (<u>Lycodes esmarki</u>) and Vahl's eelpout (<u>Lycodes vahlii</u>) in Divisions of Newfoundland and South Labrador.

A regularity in distribution of eelpouts by depths depending on bottom temperatures is determined. It is found that cold-water Arctic eelpout are distributed at lesser depths and at lower bottom temperature than warm-water Vahl's eelpout.

Relatively to temperature patterned eelpout take an intermediate position between Arctic and Vahl's eelpouts.

Average length of Arctic eelpout in northern areas is less than that in the south. Average lengths of patterned and Vahl's eelpouts differ insignificantly by areas.

Mean catch per hour trawling with fine-mesh trawl in Div. 2J brought 4.5 kg of the most numerous Arctic eelpout and in div. 3L -3.4 kg.

### Introduction

The present paper is an attempt to find out some features of eelpouts biology for the Newfoundland and South Labrador subareas. Literature available contains only scattered data on ecology of eelpouts, in particular, on their relation to temperature and water salinity (Knipovich, 1926; Andriyashev, 1954). Data on lengths of some species of eelpout are more frequent (Lütken, 1898; Jensen, 1904, 1952; Knipovich, 1926; Andriyashev, 1954; Leim, Scott, 1966). But all these data are based only on some specimens taken, that is why data obtained by us from materials of the total trawl survey may be of a certain interest.

Eel pouts are not commercial species of fish. They may be found in a bottom trawl as a rule individually or by dozens but almost in every trawl. It is necessary to consider, of course, that our data were obtained with the help of fine-mesh trawl only.

This paper deals with the most numerous 3 species of eelpouts: Arctic (Lycodes reticulatus), patterned (Lycodes esmarki) and Vahl's (Lycodes vahlii) eelpouts. Their horizontal distribution, distribution by depths and size composition are presented.

According to the PINRO laboratory of raw materials biochemistry flesh of Arctic eelpout contains 16.3% of proteins and 5.5% of fats, i.e. it is close to that of Atlantic wolffish and spotted wolffish (by its composition) which is of great nutritional value.

### Material and methods

Data on size composition were collected during total trawl surveys carried out in summer periods from 1978 to 1980.by R/V "Persey III", BMRT "Suloy" and BMRT "N.Kononov".

Fish-counting trawlings were made by bottom trawl, their duration was 1 hour. A fine-mesh kapron netting (mesh size 8 mm from knot to knot) was inserted in the trawl sack. Only accident-free trawlings were taken into consideration. More detailed description of materials and methods of total trawl survey see in paper by Konstantinov (1981).

Data on horizontal and vertical distribution are used only for 1978 when the richest material was collected.

Fig.4 gives average number of specimens of each species of eelpouts per hour trawling with bottom trawl at different depths and different bottom temperature. Number of trawlings the results of which are used in this paper is shown in Table 1. "Frequency of occurence" represents a relationship (in per cent) between those trawlings which brought eelpouts and total number of trawlings carried out at certain depth and at certain temperature (Tables 2, 3 and 4).

# Distribution of eelpouts in Divisions of Newfoundland and South Labrador

Distribution of Arctic, patterned and Vahl's eelpouts in Divisions of Newfoundland and South Labrador according to the data of 1978 is presented on Figures 1,2,3.

In their horizontal distribution eelpouts follow the near-bottom temperatures. Cold-loving Arctic eelpout are distributed mainly at temperatures from  $0^{\circ}$  to  $3^{\circ}$ C on the Grand Bank eastern slope and also in Div.2J (Hamilton Bank) at temperatures from  $1^{\circ}$  to  $3^{\circ}$ C. In distribution of patterned eelpout their relation to bottom temperatures is less distinct. They were found at temperature higher than  $3^{\circ}$ C and in less quantities at temperatures from 1 to  $3^{\circ}$ C.

Vahl's eelpout being more heat-loving than Arctic and patterned ones and dwelling in waters with higher salinity (Andriyashev, 1954) were not found in polar waters. They are distributed mainly in waters of moderate latitudes which have higher temperatures and salinity (Elizarov, 1963). The most numerous Vahl's eelpout are at temperatures over 3°C.

- 3 -

Distribution of eelpouts at different depths and bottom temperatures

Arctic eelpouts are distributed in a wide range of depths: from 70 to 720 m at water temperature near bottom from 1 to  $3.5^{\circ}$ C (Fig.4). The largest catches of this species were at depths 200-300m at temperatures  $1.6 - 2.0^{\circ}$ C. These depths and temperatures may be considered as optimal for Arctic eelpout.

In their relation to temperature patterned eelpout are in an intermediate position between Arctic and Vahl's eelpouts. This species is distributed at bottom temperatures from  $0^{\circ}$  to  $5^{\circ}$ C at depths from 70 to 740 m (Fig.4). Temperatures 2.6 - 3.5°C and depths 250 -350 m are optimal for this species. In other words, patterned eelpout prefer higher bottom temperatures and deeper waters than Arctic eelpout.

Being still more heat-loving Vahl's eelpout are found only at positive temperatures from 0.6 to 4.5°C at depths from 185 to 600 m (Fig.4). Average catch of this species per hour trawling does not show sharp variations by depths and by different bottom temperatures. Though in shallow-water areas and at temperatures of water less than 2°C Vahl's eelpout are very seldom in trawls.

Frequency of occurence of the 3 species of eelpouts in catches at different depths and different bottom temperature is shown in Tables 2,3,4. Comparing it with average number of specimens taken during one hour trawling (Fig.4) we may see the similarity in eelpouts distribution characteristics.

#### Size composition

The material obtained is insufficient for determining any interannual or interseasonal variations in eelpout size composition, it allows only to compare average lengths of different species in different areas. Arctic eelpout is larger than patterned and Vahl's eelpouts. This species reached length of 75 cm in our catches. Their size composition in Divisions 3N, 3L and 2J is presented on Fig.5J Average length of Arctic eelpout in these Divisions was 50.8, 45.8, 43.0 cm, respectively; they are larger in the south than in the north.

Patterned eelpout reached 63 cm in our catches. Their size composition in Div. 3L, 3K and 2J is presented on Fig.6. Average length in these Divisions was 34.2, 34.8 and 35.8 cm, respectively, i.e. it didn't change significantly.

The longest Vahl's eelpout described by Leim and Scott (1966) reaches 33 cm. According to Jensen (1952) Greenland form of this species reaches 52 cm. In our catches we had an individual of 51 cm long. Age composition of Vahl's eelpout in Div. 3K and 2J is given on Fig. 7. Their average length varies from 33.4 to 34.3 cm.

## Abundance and biomass

As it was stated above eelpouts are not the main commercial species, they are found only as by-catch. Nevertheless, frequency of their occurence is rather high. It is worth mentioning that eelpouts play a certain role in predatory fish (particularly, cod and halibut) nutrition.

Mean catch per hour trawling with fine-mesh trawl was 4.5 kg of the most numerous Arctic eelpout in Div. 2J, and that in Div.3L was 3.4 kg. Maximal catch of this species per hour trawling was 85 kg in Div.2J. Maximal number of specimens of patterned and Vahl's eelpouts per hour trawling was also registered in Div.2J; there were 129 and 74 specimens, respectively.

### Conclusions

Eelpouts are non-commercial fish which are almost permanently met with as a by-catch during bottom trawl fishery at depths 100-300m. Mean catch per hour trawling with fine-mesh trawl was 4.5 kg of the most numerous Arctic eelpout in Div.2J, and that in Div.3L was 3.4 kg.

In their horizontal distribution eelpouts to a great extent follow the bottom layer temperature. Arctic eelpout are distributed mainly at temperatures from  $0^{\circ}$  to  $3^{\circ}C$ .

Distribution of patterned eelpout is less related to bottom temperature, though most frequently they are found at temperatures  $1-3^{\circ}C$ .

Vahl's eelpout contrary to Arctic and patterned ones is absent in Polar waters. They are distributed mainly in moderate latitude waters at temperatures over  $3^{\circ}$ C.

There exists a difference between these 3 species distribution in different depths. Arctic eelpout prefer lesser depths than the other species.

Arctic eelpout is the largest. In the north their average length is less than that in the south.

Average length of patterned and Vahl's eelpouts varies insignificantly in different divisions.

## REFERENCES

- 5 -

Andriyashev, A.P., 1954. Fishes of the USSR North seas. M., p.266-307.

Elizarov, A.A., 1963. On oceanologic conditions determining productivity of main commercial fish in the northwestern part of North Atlantic. "Oceanologiya", vol.3, No.6, m.

Jensen, A.S., 1904. The North European and Greenland Lycodinae. The Danisk Ingolf Expedition, vol.11, No.4, pp.99.

Jensen, A.S., 1952. Meddelelser om Grønland, 142, No.7, 1-28.

Knipovich, N.M., 1926. Determinator of fish of the Barents, White and Kara seas. M., p.101-112.

Konstantinov, K.G., Methods and results of the total trawl survey of bottom fish in subarea 3 in 1971-1980. NAFO SCR. Doc. 81/VI/73, Ser.No.358, pp.6.

Leim, A.H., Scott, W.B., 1966. Fishes of the Atlantic Coast of Canada, pp.320-326.

1 20

Lütken Ch., 1898. Det ichthyologiske udbytte. Den. Danske Ihgolf-Expedition. Andet bind, Nr.1, 19-22. Table 1 Number of trawlings carried out with measurements of temperature in the bottom layer

ģ

(R/V "Persey III", May-August 1978)

۱

•			
1	tal tal	и стала и стал И стала и стала И стала и стала И стала и стала И стала и стал И стала и стала И стала и стала и И стала и стал И стала и стала	640
	0.5		
	H H O		\$
	9,6 IO,	$\infty$ $H$ $H$	10
įΫ.	HU	€ €	
1			€2
4	<b>8</b> 0		
ł	ထိထိ	нн∞н	ß
. 1 1	7,6	$\sim$	N
IIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII	нω		
	2.2		R
	9 6	$\mathbf{H}_{\mathbf{a}}$	Н
	ню		
	0.0		н
	0 0	$\mathbf{H} = \mathbf{H}$	ы
	10 H		с С
			~
	Т:4 5.5		ι.v.
	er 4	н ф ー н о н	OT
	д, С 4, С	$\alpha$	33
	າ ⊢ ດີ ⊢ ບິ	м 4°22°002°4°H40	40
			с С
	3 S	ннн	4
	N N N		18
	H Q	H M Q H M	52
	1 2 I	<b>6 2 4 4 2 H</b>	ത
	9.0	4 N O N H	н
	H D		Ĥ
	400		6T
1	$\dot{\phi}$	す す 3 王	12
1	0,9		
4			L L
1	H H		
ï	ptp.		ota.
i		269005504403305505111 26800520440330550	E

- 6 -

Table 2 Frequency of occurence of Arctic eelpout according to results of total trawl survey in

NO.

				4	lay-Aug	ust 1978	3, %					I	
	     	1	(result	s of sir	igle tr	awlings	are in b	Taces)	) . • .       	ן ו ו ו	י ו ו ו		1
	•••			Bot	stom la	yer tem	perature,	de G					
Depth, m	-I,4 -I,0	0°0 -0°0	0.0. 0.0	н с с о	9 <b>0</b>	н с н н	т,6 2,0	5 H	0°0°0°	ສີ. ສີ. ສີ.	4 9 0	4,H	4,6 5,0
	1 1 1	(0,0)		100	50,0			0.0	(0,0)				
I01-150		66,7	75,0	66,7	0'0	0.0		(0,0)			0.0		
I51-200	(100'(	(0,00I)(C	66,7	80,0	83,3	I00,0	(0,0)	66,7	(0,0)		0,0		
201-250			(0,00I)	100°0	50,0	100°0	100°0	100°0	40,0	100°0	0.0	(0,0)	
251-300						0,0	20,02	66,7	53,8	57,I	0,0	0,0	
30I-350						(0,0)	(IOO,OOI)	0.0	33,3	64,7	0.0	(0,0)	
351-400						· · ·			0,0	40,0	0.0	(0,0)	
40I-450						· · · · · · · · · · · · · · · · · · ·				20,02	(0,0)	0.0	(0,0)
451-500					(0,0)				(0,0)	IO,I	(0,0)	(0,0)	
50I-550	ŝ.,									50,0	0,0		(0,0)
55 <b>I-</b> 600										0,0	0,0		
60I-650									(0,0)	(0,0)	(0,0)		
651-700										(0,0)			
70I-750			•						(0,0)	50,0	-		
												4	

- 7 -

Table 3 irequency of occurence of patterned eelpout according to the results of total trawl survey in

- Second

May-August 1978, %

			(resul	lts of s	ingle t:	rawling:	s are in	braces)					
		1	1		Bottom.	Layer	temperati	tre, Co.	1		1 1 1	1 1 1	i 1 1
Depth, m	-1,4 -1,0	0.0 0.0	-0,4	о С С	0.6 I.0	н С Г	ц.6 2,0	5 Р 5 Р	3 0 3 0	а 3 н 3 н 1 с	3,6 4,0	4, T 4, 5	4,6 5,0
	1 4 1											1 1 1 1	1
				C . 31			<b>)</b>						
101-150			0,0	33,3	0,0	0,0		(0,0)			0.0		•
I5I-200	(0,0)	(0,0)	33,3	0,0	I6,7	50,0	33,3		(0,0)		0,0		•
20I-250			(0,0)	20,02	0.0	25,0	0,0	20,02	20,02	50,0	0.0	(0,0)	
251-300						0.0	0,0	66,7	6 <b>I</b> ,5	42,9	I2,55	0.0	
30I-350						(0,0)	(0,0)	0,0	41,7	4I,I	0,0	(0,0)	··· · · · · ·
351-400									0,0	60°0° (	(0,001)	(0,0)	
40I-450										0,0	(0,0)	50,0	(IOO,O
45I-500					(IOO, O			1	(0,0)	20,0	0.0	(0,0)	0,0)
50I-550											0,0		0.0)
55 <b>I-</b> 600										0.0	(0°°0)]		
60I-650									(0, 0)	(0,0)	(0'0)		
65I-700									•	(0,0)			
701-750									)(0,0)	(0,00I			

- 8 -

y in		۱ ۱ ۱ ۱ ۱		4, I · · 4, 6 4, 5 - · · 5, 0 -				(0 <b>°</b> 0)	(IO0°0)	(0,0)	(0°0))	50,0 (0,0)	(0,0)	(0,0)				
otal trawl surve;				3,1 . 3,6 	0.0	0.0	0,0	50,0 0,0	35,0 37,5	47,0 (IO0,0)	20,0 50,0	40,0 (0,0)	0,0 (IOO,0)	0,0 0,0	IOO,O)(IOO,O)	(0,00)(IO0,0)	(0,0)	0,0
ts of to		n braces)		ດ ດ I	(0.0)		(0,0)	30,0	I5,4	41°,	0,0		(0,0)		<u> </u>	(0,0)	-	(0,0)
he resul		given in	ture, C'	5 N	0.0	(0,0)	0,0	20,02	50,0	(IOO,O)								
ng to t	78, %	lgs are	tempera	001 H Q1	0.0		(0,0)	0,0	0,0	(0,0)								
accordi	igust 19	trawlir	n layer	н н н н н	0.0		25,0	0,0	0,0	(0,0)			· ,					
eelpout	May-Au	single	Bottoi	9 01 9 11			0.0	50,02					0,0)					
Vahl's		ults of		0,5 0,5			0.0	0,0 (										
ence of		(res			U U		0,0	<b>0,</b> 0)							-			
f occure				0 0 0 0 1 1	U U		0,0) (		•									
juency o				н 1			(0,0)											
4 Fre				Depth, I	51-100	I0I-150	I5I-200	20I-250	25 <b>I-</b> 300	30I-350	35I-400	40I-450	45 <b>I-</b> 500	50I-550	55I-600	60I-650	65 <b>I-</b> 700	701-750
Table			•	•														

Ġ

U.N.U







ž D

Fig. 2. Distribution of patterned eelpout; distribution of near-bottom temperatures in areas of Newfoundland and South Labrador according to the data of trawl survey in 1978.



- 11 -

2 2 6



- 12 -



Fig.7. Size composition of Vahl's eelpout in areas of Newfoundland and South Labrador according to the data of total trawl surveys in 1978-1980. (N - number of specimens).

