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Bathymetrical Distribution of American Plaice By-catches in the Directed Fishery for Greenland Halibut, Thorny Skate and Beaked Redfish in NAFO Divisions 3LMNO in January-July 2000

by

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Abstract

By-catch of American plaice, averaged by months and 100-m depth range, varied from 0 to 5.1%. In Div. 3LM, with a depth increase from 600 to 1399 m, by-catches tended to decline. In Div. 3NO, American plaice by-catches generally declined from 0 to 599 m depth and increased from 600 m and deeper. The largest individuals were observed in the southern Grand Bank to 200 m depth where female length reached 65-69 cm.

Introduction

One of the measures targeting the conservation and restoration of depleted fish stocks in the NAFO Regulatory Area is the 5% limitation on occasional catch of these species (Anon., 2001). The main objects of Russian fisheries in the NAFO Area are presently beaked redfish (*Sebastes mentella*) of the Div. 3M and 3O, Greenland halibut of the area adjacent to the borderline between Div. 3L and 3M and thorny skate on the "tail" of the Grand Bank. American plaice is the traditional by-catches in the fishery for the above species. Directed fishery for American plaice in the NAFO Regulatory Area is not permitted owing to poor stock status.

The report presents data on bathymetrical distribution of catches and length composition of American plaice collected by Russian observers in January-May 2000 during the directed fishery for Greenland halibut and in March-July during the fishery for beaked redfish and thorny skate. Given below are the names of fishing vessels and periods of their operation in the NAFO Regulatory Area.

Vessel	Period
1. KAPITAN NAUMOV	23.02-16.05
2. TYNDA	01.03-17.05
3. SEMYONOVSK	28.09-07.11
4. MAROANJOCA	24.01-12.04
5. MAROANJOCA	03.05-28.06
6. MURMAN	04.06-13.07
7. MATRIOSKA	16.01-11.04
8. MATRIOSKA	03.05-10.07

Results and Discussion

According to the data from fishing trips undertaken in 2000, by-catches of American plaice averaged by months and 100 m depth range, varied from 0 to 5.1% (Table 1). By-catches over 4% was registered in all divisions, being the highest at 600-699 m (Div. 3L), 800-899 m (Div. 3M, 3N), 0-99 m (Div. 3N) and 100-199 m (Div. 3O) depth. A comparatively high by-catches of American plaice in the 800-899 m depth in comparison with adjacent depth ranges was taken in 3 out of 4 divisions.

Quantitatively, the American plaice by-catches were insignificant and seldom exceeded 0.1 t/1 trawling hour. With a depth increase from 600 to 1399 m, they tended to decline in Div. 3LM, while in Div. 3NO they generally declined from 0 to 599 m depth, but considerably increased in depths greater than 600 m.

Length composition of American plaice by-catches by divisions, months and depths was found to vary within a rather wide range (figs. 1-3). The largest individuals were observed in the shallow part of the "tail" of the Grand Bank to 200 m depth where female length reached 65-69 cm (modal length 36-37 and 40-41 cm, mean length 39.4-43.3 cm). With depth increase fish length generally decreased, reaching the minimum at 900-999 m depth of the northeastern slope of the Grand Bank where modal length of females was about 32-33 cm, mean length being 34.7-34.8 cm.

Comparative data on the variations in the length composition of American plaice by-catches by months and depths were obtained only for Div. 3L. Analysis of a relatively small amount of biological material showed that mean fish length in this division increased from January to May, ranging from 31.5 to 34.0 cm in males and from 34.4 to 36.8 cm in females (Table 2). Regarding sex ratio, females markedly prevailed over males, their portion in February and May being 13 times higher than that of males.

American plaice is traditionally thought to be a shallow-water species inhabiting 20-390 fathom (37-714 m) depth (Leim, Scott, 1966) or even a more narrow depth range of 40-150 fathoms (73-275 m) (Pitt, 1976). Anomalous cooling of Northwest Atlantic waters in the early 1990s has probably caused considerable changes in the distribution pattern of American plaice aggregations and shifted them to greater depths. According to the recent data from Canadian autumn surveys in Div. 3LNO and Spanish spring surveys in the NAFO Regulatory Area, this species was observed in the deepest strata to 1463 m depth (Morgan, 2000; Paz et al., 2000). Trawl fishery for Greenland halibut in the Flemish Pass area, where it has been conducted since mid-1980s, covers mainly 700-1200 m depth, which is the lower distribution boundary for American plaice.

In the thorny skate fishery on the "tail" of the Grand Bank, a risk of overfishing of American plaice may arise owing to the coincidence of historical distribution of these two species. In the deepwater part of the Flemish Pass, American plaice is probably a new or temporary species. In a quantitative sense, by-catches of American plaice in the Greenland halibut fishery are rather low. Limitation of occasional catches should, in our opinion, aim at conservation of the stocks within their traditional distribution range. After a sudden migration of American plaice to deeper waters, in some hauls its by-catches exceeded 5%, hindering the traditional Greenland halibut fishery in these depths. By the author's observations made in January-February 1996, by-catches made up 82% at 915 m depth and 20% at 1170 m depth. Considering this, it appears essential to define the reproductive status of deepwater American plaice and to reveal the existence of a relationship between deepwater and shallow-water aggregations. In other words, it is necessary to find out whether fishery on mixed aggregations of Greenland halibut and American plaice in the Flemish Pass area hampers the restoration of the American plaice stock in the shallow part of the Grand Bank. Deepwater American plaice is unlikely to become a target species fished at depths inhabited by Greenland halibut. However, 5% by-catches limitation will entail unreasonable losses of fishing time and catch owing to the necessity to change positions by at least 5 miles. It is therefore intended to develop a biological substantiation for canceling the 5% limit for by-catches of species with paradoxical bathymetrical distribution, which interfere with the traditional international fishery for regulated species.

References

ANON. 2001. Conservation and enforcement measures. *NAFO FC Doc*. 01/1, Serial No. 4349, 28 pp.

LEIM, A. H. and W. B. SCOTT.1966. Fishes of Atlantic coast of Canada. *Fish. Res. Bd. Can*., 485 pp.

MORGAN, M. J. 2000. A stock status update of American plaice in NAFO Div. 3LNO. *NAFO SCR Doc*. 00/41, Serial No. 4271, 15 pp.

PAZ, X., E. ROMAN and P. DURAN MUNOZ. 2000. Results from the 2000 Spanish bottom trawl survey in the NAFO Regulatory Area for Divisions 3NO. *NAFO SCR Doc*. 00/46, Serial No. 4277, 18 pp.

PITT, T. K. 1976. American plaice. - In: Living marine resources of Newfoundland-Labrador: status and potential. *Fish. Res. Bd. Can. Bull*. No. 194, 65 pp.

Table 1. By-catch of American plaice (%) by 100-m depth range in January-July 2000

Division	Month	Depth, m														Aver.	No. of tows
		0	100	200	300	400	500	600	700	800	900	1000	1100	1200	1300		
3L	Jan									1.60	1.06	0.61	0.22	0.48		0.92	65
3L	Feb							2.30	3.86	3.21	0.59	0.20	0.59	0.02	0.01	1.74	183
3L	March								0.69	3.51	1.00	1.43	0.98	0.02	0.03	1.81	318
3L	April								2.02	1.84	0.26	1.08				1.10	197
3L	May							4.43	3.04	2.04	1.54	0.86	0.72			1.98	241
3L	**TOTAL**							**4.13**	**2.05**	**2.61**	**0.82**	**0.97**	**0.69**	**0.05**	**0.02**	**1.64**	**1004**
3M	Jan											0.68	0.20			0.58	5
3M	Feb								1.00		0.90		0.05			0.43	7
3M	March							0.64	4.34	4.14						3.22	11
3M	May							3.92		3.99	3.69	3.07	0.58			3.35	42
3M	**TOTAL**							**2.51**	**3.23**	**4.05**	**2.95**	**2.75**	**0.32**			**2.80**	**65**
3N	March									4.56	3.43	2.42				3.73	36
3N	May	2.44					2.83	3.00	2.40	3.10	3.30					2.58	23
3N	June	5.10			0.50	3.90	0.01	4.30	4.30							5.05	182
3N	July	3.98														0.98	22
3N	**TOTAL**	**4.65**			**0.50**	**3.90**	**2.81**	**3.70**	**3.35**	**4.39**	**3.42**	**2.42**				**3.24**	**263**
3O	March					5.40				3.15						4.84	12
3O	May	2.40	1.47		2.79	2.33										2.13	19
3O	June	4.33	4.82	1.46	3.21	3.11	2.26	2.84	4.00							3.59	181
3O	July	3.73	2.99			0.55	1.68									1.56	66
3O	**TOTAL**	**3.92**	**4.44**	**1.46**	**3.00**	**2.30**	**2.08**	**2.84**	**4.00**	**3.15**						**3.01**	**278**

Table 2. Average length (cm) of American plaice in Div. 3L by 100 m depth range in January-May 2000

Month	Males							Females							F/M sex ratio
	Depth, m					Av. L	No. sp.	Depth, m					Av. L	No. sp.	
	700	800	900	1000	1100			700	800	900	1000	1100			
Jan			31.5			31.5	11			34.4			34.4	50	4.5
Feb	30.8	36.3	31.8	31.9	31.0	32.6	44	35.5	37.2	34.8	36.9	36.1	35.9	591	13.4
Mar	34.7	31.3				33.0	28	36.4	36.7	35.6			36.5	311	11.1
Apr		33.4	31.3			33.3	47		36.0	34.7	34.4		35.5	256	5.4
May		41.5	33.1			34.0	20		36.3	37.0			36.8	253	12.7

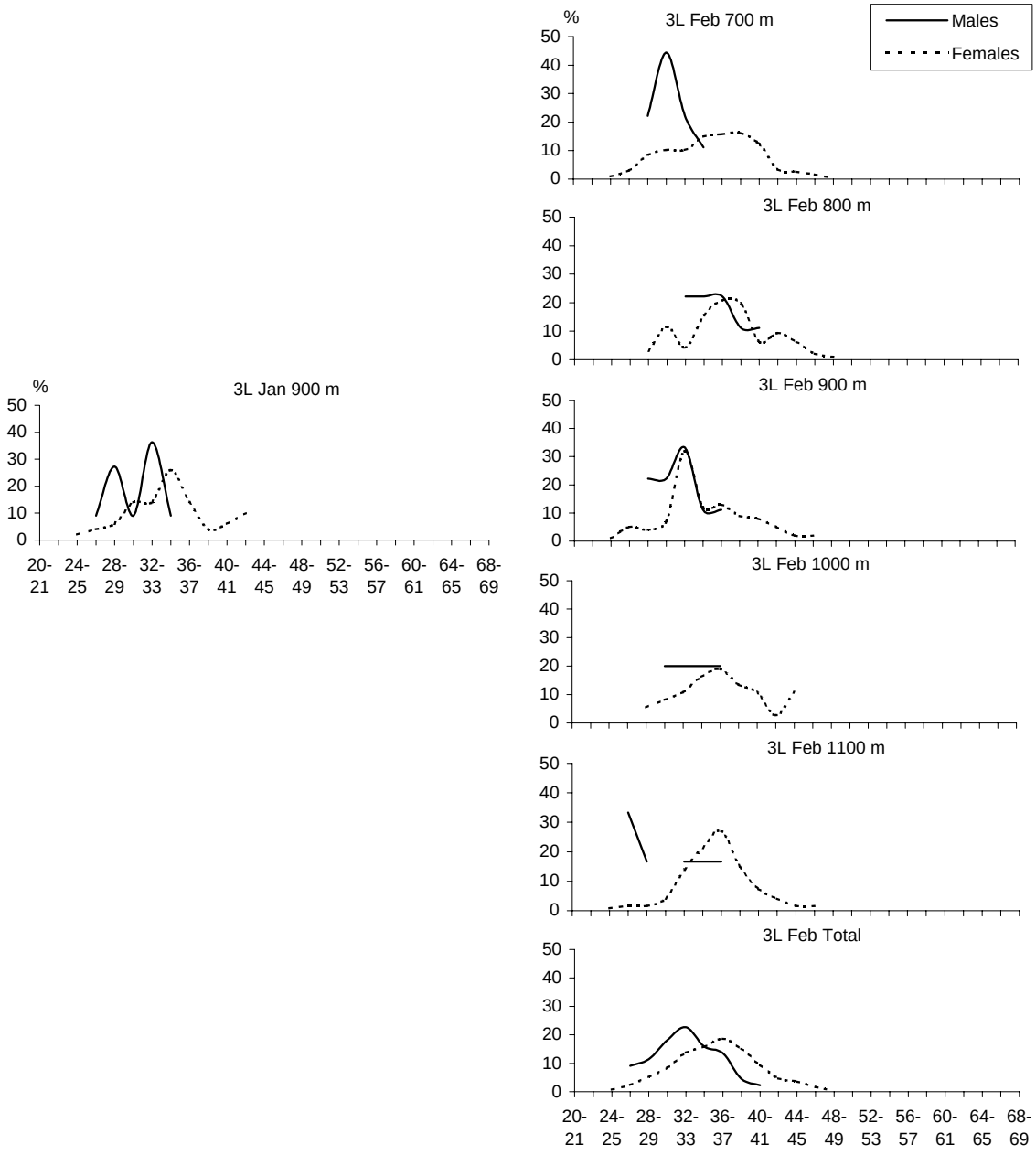

Fig. 1. Length composition of American plaice in January-February 2000.

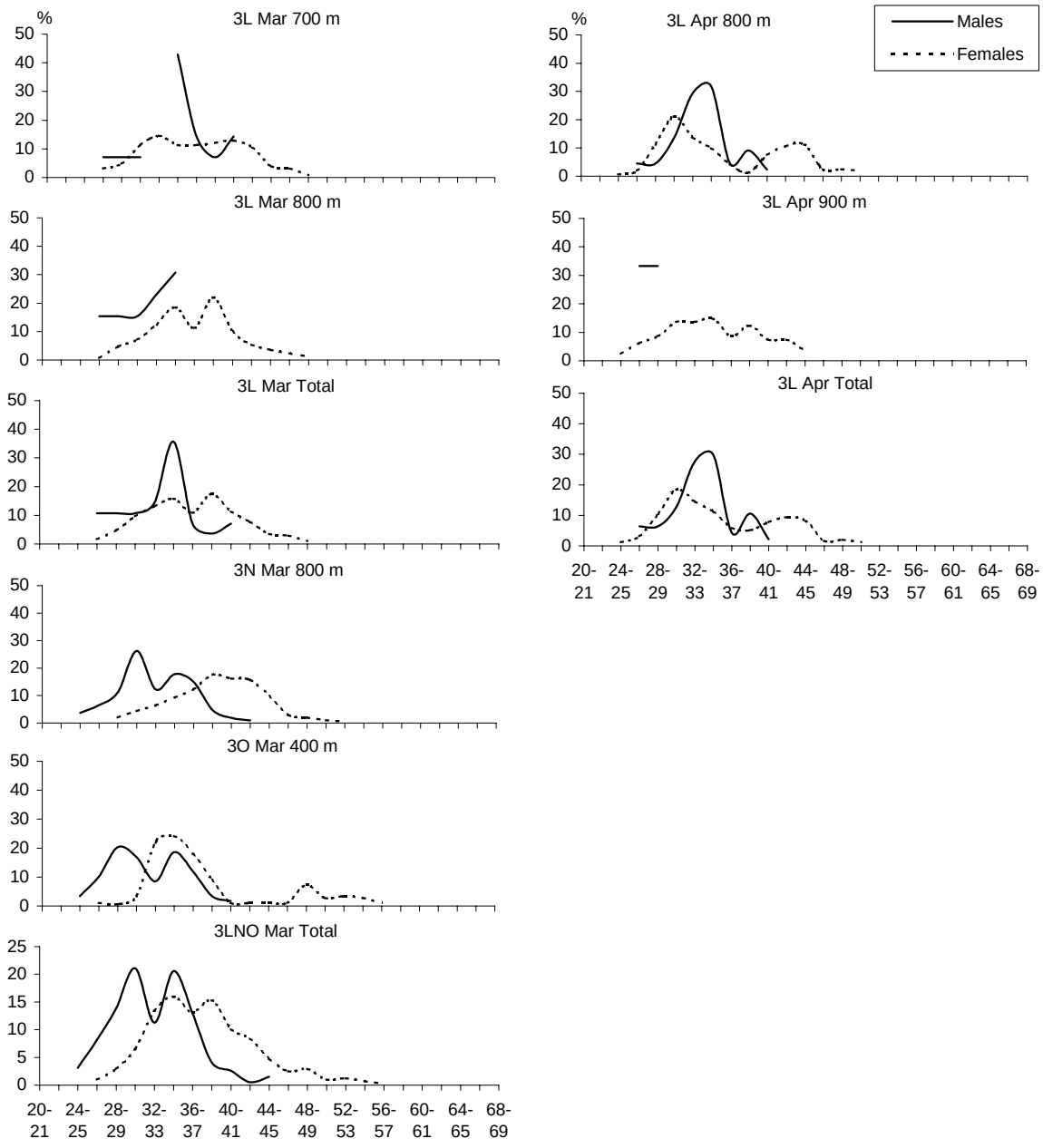

Fig. 2. Length composition of American plaice in March-April 2000.

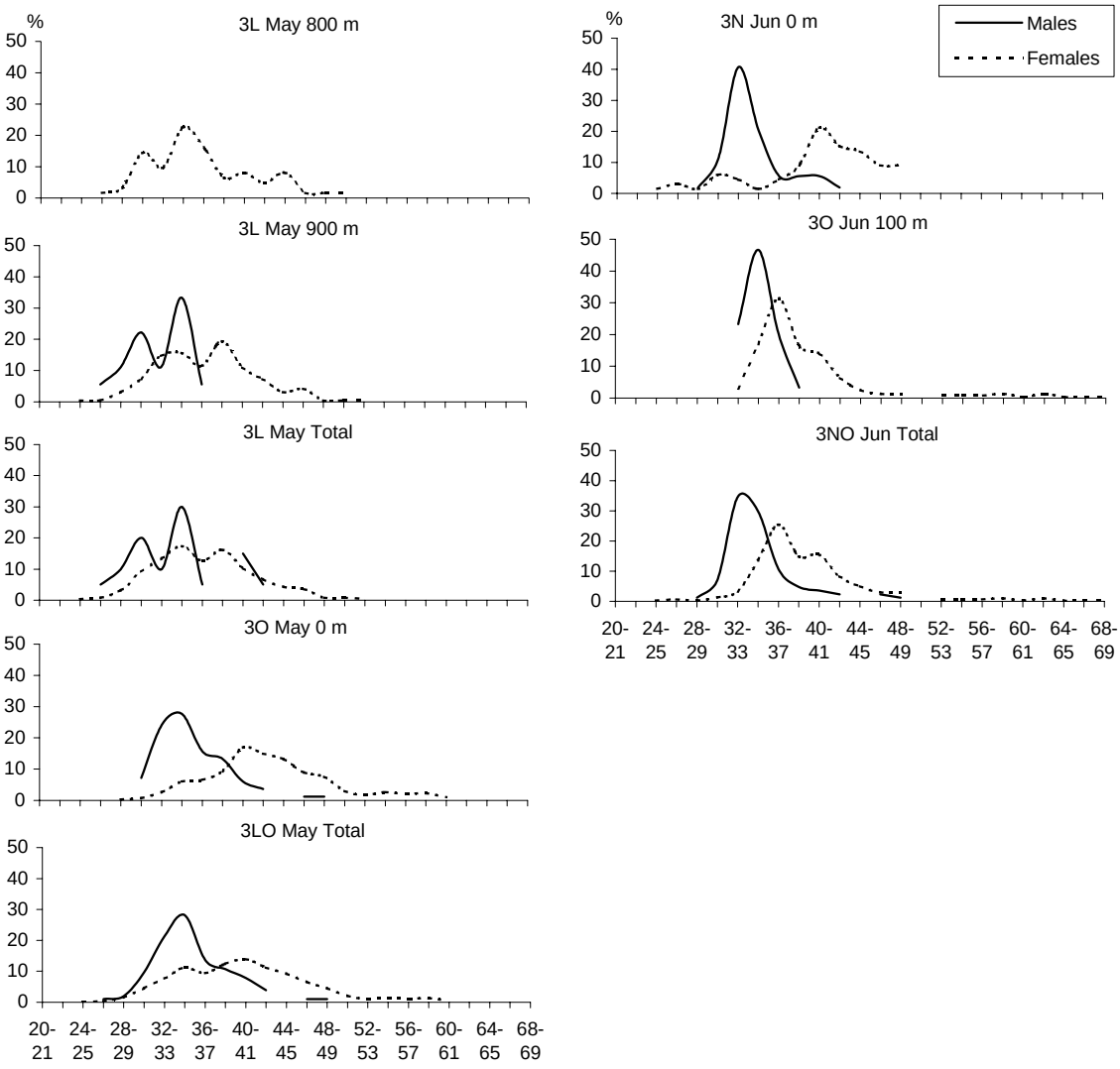

Fig.3. Length composition of American plaice in May-June 2000.