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Dynamics of Yellowtail Flounder Stock on the Grand Newfoundland Bank in 1973-81

by

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Abstract

The results of bottom fish total trawl survey show that during recent years abundance and biomass of yellowtail flounder in the Grand Newfoundland Bank area (Divisions 3LNO) have increased. It is determined that after limitation on catches was introduced in 1973 the largest stock of yellowtail flounder was registered in 1980: 993.7 x 10^6 specimens or 472 400 tons. In 1981 these indices were still above average level for the period 1973-1981.

Introduction

Yellowtail flounder (Limanda ferruginea Storer) dwell in bottom layers, they do not perform considerable vertical migrations. The Grand Newfoundland Bank is the northern part of their area of dwelling. Some individuals have length over 60 cm and weight 1.5 kg.

Since 1973 the International Commission on the Northwest Atlantic Fisheries (former ICNAF, now NAFO) has been limiting this species catches. The regulation of fishery effected favourably on yellowtail flounder stock state: since 1977 both TAC and actual catches have increased.

The present paper gives an approximate estimate of yellowtail flounder absolute abundance and biomass(for the Grand Newfoundland Bank area and 1973-1981 period).

Methods

Biologic materials on yellowtail flounder were collected during bottom fish total trawl survey. Its technique was described previously (Chekhova, Chumakov, Postolaky, 1978; Konstantinov, 1981). Taken aboard the ship yellowtail flounder were measured separately by sexes, those from catches exceeding 1 ton were counted by the pieces. Inasmuch as deeper than 100 m yellowtail flounder do not practically occur (Pitt, 1970,1976; Nevinsky, 1973) only accident-free one-hour trawling at depths up to 100 m were taken into consideration.

Coefficient of catchability of trawl for yellowtail flounder

of the Georges Bank and the south of New England equal to 0.39 (Edwards, 1968) was used by us without any accurate definitions because parameters of the trawl given by Edwards are very similar to those of our trawl (1625-A) used for total trawl surveys.

Taking into account that when speed of the vessel is 3.5 knots the horizontal opening of the 1625-A trawl equals to 14.3 m (Bidenko, 1976), so during 1 hour 0.027 sq. mile of bottom surface is trawled (according to Edwards - 0.032 sq. miles)

Having obtained data on average catches per hour trawling for each division of the Grand Newfoundland Bank (3 LNO) we calculated the absolute abundance of yellowtail flounder for every year using the formula:

$$N = \frac{1}{k} \cdot \frac{S \cdot n}{s}$$, where

N - absolute abundance of yellowtail flounder in Div., spec.;
k - catchability coefficient;
S - bottom area at depth up to 100 m, sq. miles;
s - bottom area trawled per 1 hour, sq. miles;
n - average catch per hour trawling in Div., spec.

Dependence between length and weight of yellowtail flounder was estimated for 292 specimens without separation by sexes (Fig.1). Having estimated average weight of fish in every size-group we could estimate their biomass.

Age of yellowtail flounder was determined by [illegible] otoliths from 272 specimens taken in Div. 3N by trawl (mesh size 125 mm). Dependence of fish length on their age is presented on Fig.2.

Results

Stocks of yellowtail flounder on the Grand Newfoundland Bank varied considerably but their largest part was always concentrated on the Southeast slope (Div. 3N). According to the total trawl survey data the abundance and biomass of yellowtail flounder were decreasing in Divs 3LN up to 1975, and in Div. 3O - up to 1976 (Table 1). In the following years the stocks had a general trend to an increase, excluding 1979 when average catch per hour trawling by bottom trawl had decreased on the Southwest slope. The next year, 1980, was the best in abundance and biomass: 993.7 x 10^6 specimens or 472.4 x 10^3 tons, respectively. In 1981 these indices decreased though they were higher than the average level for 1973-1981 period.

An analysis of size-age composition based on catches by conventional trawl in Div. 3N showed that in 1981 fish at age of 6-7 years (38%) and 38-41 cm long were dominant in the stock (Fig.2). The number of reqruits at age of 4-5 years may be considered as relatively abundant, they amounted 29% of fish investigated.

Discussion

The results obtained testify to the fact that yellowtail flounder stock is in a good state. Their abundance and biomass in 1981 corres-

pond to the level of 1974 when TAC equalled 40 x 10^3 tons. The increase of yellowtail flounder stock is confirmed by increase of Canadian commercial catches per hour trawling since 1976 (Brodie, Pitt, 1981). This fact allowed to augment TAC from 9 000 tons in 1976 to 21 000 tons in 1981. TAC for 1982 equal to 23 000 tons may be augmented in future.

The Soviet Union has long-standing traditions in Pleuronectidae fishery on the Grand Newfoundland Bank. Maximum catches of the USSR in Divs 3 LNO were in 1971 and equalled to 13.1 x 10^3 tons (Nevinsky, 1973)

Good state of yellowtail flounder stocks testifies to good prospects of the fishery in future.

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Table 1 Abundance and biomass of yellowtail flounder on the Grand Newfoundland Bank in 1973–1981

Div.		Relative and absolute indices of abundance and biomass	Years									Mean for 1973–81
			1973	1974	1975	1976	1977	1978	1979	1980	1981	
3	L	Number of specimens per hour trawling	I00	84	I6	23	24	62	57	I00	I26	66
		Catch per hour trawl., kg	38,7	40,0	7,0	I0,0	II,0	23,3	28,0	50,0	64,0	30,2
		Absolute abundance, x 10^6 specimens	83,6	70,3	I3,4	I9,2	20,I	5I,9	47,7	83,6	I05,3	55,0
		Biomass, thou. of tons	32,4	33,5	5,9	8,4	9,2	I9,5	23,4	4I,8	53,5	25,3
		Number of spec. per hour trawling	467	395	227	440	289	30I	327	576	3I7	370
3	M	Catch per hour trawl., kg	I70,I	I37,0	88,0	I7I,0	II7,7	I29,0	I48,0	260,5	I35,5	I50,8
		Absolute abundance x 10^6 spec.	553,2	474,0	272,4	528,0	346,8	36I,2	392,4	69I,2	380,4	444,4
		Biomass, thou. of tons	204,I	I64,4	I05,6	205,2	I4I,2	I54,8	I77,6	3I2,6	I62,6	I80,9
30		Number of spec. per hour trawling	256	223	I99	I2I	2I2	248	68	I72	243	I94
		Catch per hour trawl., kg	I04,9	I04,7	8I,6	52,0	I00,0	II4,0	32,0	92,7	II3,3	88,4
		Absolute abundance x 10^6 spec.	325,8	283,8	253,3	I54,0	269,8	3I5,6	86,5	2I8,9	309,3	246,3
		Biomass, thou. of tons	I33,5	I33,3	I03,9	66,2	I27,3	I45,I	40,7	II8,0	I44,2	II2,5
		Number of spec. per hour trawling	272	234	I47	I95	I75	204	I5I	283	229	2I0
3	LNO	Catch per hour trawl., kg	I04,6	93,9	58,9	77,7	76,2	88,8	69,3	I34,4	I04,3	89,8
		Absolute abundance x 10^6 spec.	962,6	828,I	539,I	70I,2	636,7	728,7	526,6	993,7	795,0	745,7
		Biomass, thou. of tons	370,0	33I,2	2I5,4	279,8	277,7	3I9,4	24I,7	472,4	360,3	3I8,7

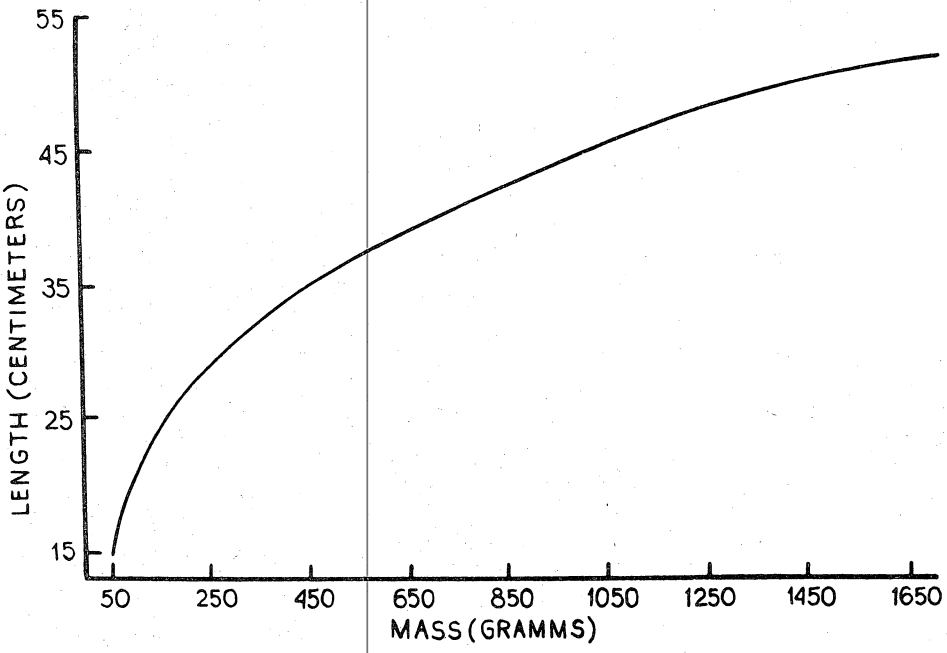

Fig.1. Relation between length and weight of yellowtail flounder in Div. 3N.

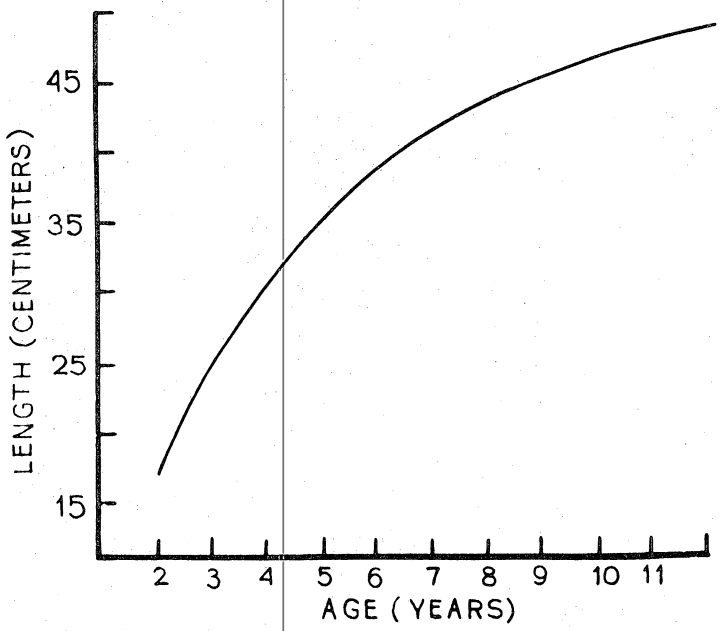

Fig.2. Relation between length and age of yellowtail flounder in Div. 3N.