

Increase in Mesh Size and Quarterly Quotas
for the Yellowtail Flounder Fishery

Prepared by:

NATIONAL MARINE FISHERIES SERVICE
BIOLOGICAL LABORATORY
WOODS HOLE, MASSACHUSETTS 02543

Laboratory Reference No. 70-6

Revised copy
8 December 1970

Increase in Mesh Size and Quarterly Quotas
for the Yellowtail Flounder Fishery

Mesh change

An increase in mesh size from 4.5 to 5.1 inches will cause a decrease of discards by 27 percent along with a decrease in marketable fish by 4 percent. However with a quota limitation the latter fact only means that a slightly greater effort will be expended to reach the quota. The decrease in discard means that a greater proportion of the catch quota will be landed. The following model illustrates this change.

	West of 69°		East of 69°		Total	
	<u>MT</u>	<u>lbs.in 1000's</u>	<u>MT</u>	<u>lbs.in 1000's</u>	<u>MT</u>	<u>lbs.in 1000's</u>
Catch quota	13000	28660	16000	35274	29000	63934
80% cut off	10400	22928	12800	28219	23200	51147
Est. discard 4.5	3000	6614	3000	6614	6000	13228
Est. discard 5.1	2600	5732	2304	5079	4904	10811
Landings quota 4.5	7400	16314	9800	21605	17200	37919
Landings quota 5.1	7800	17196	10496	23139	18296	40335
Increase with 5.1	400	882	696	1534	1096	2416

The above estimates are based on available data and past fishing patterns. They could be in error because:

- (1) the rate of recruitment of two year old fish is different than predicted;
- (2) the fleet changed either its past culling practices or its traditional fishing locations or its traditional marketing practices;
- (3) the quota allocations change the seasonal patterns of fishing, especially if there is no quarterly allocation;
- (4) the effects of increased fishing intensity in 1969-70 lead to a reduced abundance of older fish and, hence, to a larger proportion of the fish in the size range which is near the cull point.

Quota Allocation Proposals

A. Fishing until 80 percent of the catch is obtained.

According to the regulation, fishing must cease when 80 percent of the quota is reached. This value is 12800 MT (28,219,000 lbs.) for the area east of 69° and 10400 MT (22,928,000 lbs.) for the area west of 69°. In 1969 and 1970 these values were reached in the third quarter during August in the western area and at the end of August for the eastern grounds. Additional 4500 MT (9,922,500 lbs.) captured after closure gives a total catch of 27700 MT (61,078,500 lbs.) or 96 percent quota. The tabular breakdown is given below with the estimated incidental catch.

	East of 69°		West of 69°		Total	
	MT	lbs.in 1000's	MT	lbs.in 1000's	MT	lbs.in 1000's
Quota	12800	28219	10400	22928	23200	51147
Extra Incidental	2000	4409	2500	5512	4500	9921
Total	14800	32628	12900	28440	27700	61068

Quarterly allocation of catch quotas with the 80 percent rule

The quarterly distribution of landings in the two areas for the years 1963 to 1970 is given in table 1. An allocation of quotas on a quarterly basis could be done with the following percentages:

<u>Quarter</u>	<u>East of 69°</u>	<u>West of 69°</u>
1	15	30
2	30	15
3	35	25
4	20	30

This scheme has to consider both the directed catch and the incidental catch after closure. Judging from the patterns of fishing present in 1969 and 1970 the quota could be reached in the first two months of each quarter. Thus the catch in the last month of each quarter would be incidental catch. It is very difficult to predict this value because it depends on the practice of the fishing fleet. However a reasonable estimate can be made. The values for the western area are higher because of the easier access to the smaller vessels in Pt. Judith and Provincetown as well as to the presence of the industrial fishery. In table 2 the quarterly values are presented. They are calculated by applying the above percentages to the 80 percent of the quota allowable

Table 1.--Percentage distribution of yellowtail flounder landings.

<u>Georges Bank Area - East of 69°</u>				
Year	1	2	3	4
1963	6.6	28.7	51.7	13.0
1964	5.7	45.3	34.9	14.1
1965	15.5	36.9	30.1	17.6
1966	22.9	31.0	22.7	23.4
1967	12.6	14.6	35.0	37.7
1968	8.6	23.0	41.4	26.9
1969	14.1	25.6	35.8	24.5
Average	12.3	29.3	35.9	22.5

<u>Southern New England Area - West of 69°</u>				
Year	1	2	3	4
1963	30.3	18.2	21.0	30.5
1964	30.1	4.5	26.7	38.7
1965	27.1	11.9	26.6	34.9
1966	28.1	15.3	36.0	20.6
1967	19.7	22.1	30.1	28.2
1968	28.3	21.1	21.6	29.0
1969	33.4	12.6	19.8	34.2
Average	28.1	15.1	26.0	30.9

as directed fishing except for the fourth quarter. In that quarter the only allowable quota would be the difference between the accumulative catch at the end of the third quarter and the allowable 80 percent of the total quota figure. The exact value would depend on the amount of fish captured after closure in the preceding quota. Thus the value in table 2 is an estimate. If more fish are caught after closure than listed in that table the quota in the fourth quarter would be even less. The last quarter values published in the Federal Register (table 3) did not take this 80 percent closure into consideration.

Under the 80 percent closure rule, the catch after each quarter's closure must be added in the cumulative catch to reach the allowable 80 percent of the totals (12,800 MT) (28 million lbs.) and (10,400 MT) (23 million lbs.). Under the scheme outlined in table 2 these values (accumulative column) would be reached at the end of September or early in October. If another 3500 MT (7,717,500 lbs.) incidental catch was recorded in the late fall the total captured would be 26,700 MT (58,873,500 lbs.), 92 percent of the 29,000 MT (64 million lbs.) allowed.

C. Alternative quarterly catch quota allocation

Under the allocation scheme in section B (and in the Federal Register, table 4) directed fishing would essentially be non-existent in the fourth quarter in the western area. In order to assure fishing in October in that area the allotments to the first three quarters must be reduced. Each reduction however, means a shorter directed fishing period that quarter with consequentially an increase in the extra incidental catch expected after each quarter's closure. A possible reallocation of quarterly quotas is presented in table 5. Although this scheme would permit a significant catch in the last quarter the cost is a reduction in total expected catch from 26,700 MT (58,873,000 lbs.) to 25,700 MT (56,688,000 lbs.). If this allocation is used in the western area and the previously discussed allocation used in the eastern area it is estimated that 89 percent of the yearly quota will be caught.

Table 2.--Quarterly catch quota allocation under 80 percent rule

<u>Quarter</u>	<u>Cutoff Quota</u>		<u>East of 69°</u>		<u>Accumulative</u>	
	<u>MT</u>	<u>lbs.</u>	<u>Extra Incidental</u>		<u>MT</u>	<u>lbs.</u>
			<u>MT</u>	<u>lbs.</u>		
		1000		1000		1000
1	1900	4190	500	1102	2400	5292
2	3800	8379	500	1102	6700	14774
3	4400	9702	500	1102	11600	25578
4	1200	2646	1000	2205	13800	30429
Totals	11300	24917	2500	5511		

<u>Quarter</u>			<u>West of 69°</u>			
1	3100	6835	1000	2205	4100	9040
2	1500	3308	1000	2205	6600	14553
3	2600	5733	1000	2205	10200	22491
4	200	441	2500	5512	12900	28444
Totals	7400	16317	5500	12127		

<u>Quarter</u>			<u>Combined</u>			
1	5000	11025	1500	3307	6500	14332
2	5300	11686	1500	3307	13300	29326
3	7000	15435	1500	3307	21800	48069
4	1400	3087	3500	7717	26700	58873
Totals	18700	41233	8000	17640		

Table 3.--Quarterly catch quotas published in the Federal Register

<u>Quarter</u>	<u>Cutoff Quota</u>		<u>East of 69°</u>		<u>Accumulative</u>	
	<u>MT</u>	<u>1000 lbs.</u>	<u>Extra Incidental</u>		<u>MT</u>	<u>1000 lbs.</u>
			<u>MT</u>	<u>1000 lbs.</u>		
1	1900	4190	500	1102	2400	5292
2	3800	8379	500	1102	6700	14774
3	4400	9702	500	1102	11600	25578
4	2500	5512	500	1102	14600	32193
Totals	12600	27783	2000	4408		

<u>Quarter</u>			<u>West of 69°</u>			
1	3100	6835	1000	2205	4100	9040
2	1500	3308	1000	2205	6600	14553
3	2600	5733	1000	2205	10200	22491
4	3100	6836	500	1102	13800	30429
Totals	10300	22712	3500	7717		

<u>Quarter</u>			<u>Combined</u>			
1	5000	11025	1500	3307	6500	14332
2	5300	11686	1500	3307	13300	29326
3	7000	15435	1500	3307	21800	48069
4	5600	12348	1000	2205	28400	62622
Totals	22900	50494	5500	12126		

Table 4.--Alternative quarterly quota allocation

<u>Quarter</u>	<u>Cutoff Quota</u>		<u>East of 69°</u>		<u>Accumulative</u>	
	<u>MT</u>	<u>lbs.</u>	<u>Extra Incidental</u>		<u>MT</u>	<u>lbs.</u>
			<u>MT</u>	<u>lbs.</u>		
1	1900	4190	500	1102	2400	5292
2	3800	8379	500	1102	6700	14774
3	4400	9702	500	1102	11600	25578
4	1200	2646	1000	2205	13800	30429
Totals	11300	24917	2500	5511		

<u>Quarter</u>	<u>MT</u>	<u>lbs.</u>	<u>MT</u>	<u>lbs.</u>	<u>MT</u>	<u>lbs.</u>
1	2600	5733	1200	2205	3800	8379
2	1400	3087	1050	2205	6250	13781
3	1850	4079	1300	2205	9400	20727
4	1000	205	1500	3307	11900	26240
Totals	6850	13104	5050	9922		

<u>Quarter</u>	<u>MT</u>	<u>lbs.</u>	<u>MT</u>	<u>lbs.</u>	<u>MT</u>	<u>lbs.</u>
1	4500	9922	1700	3748	6200	13671
2	5200	11466	1550	3418	12950	28555
3	6250	13781	1800	3969	21000	46305
4	2200	4851	2500	5512	25700	56668
Totals	18150	40020	7550	16647		

Table 5.--Comparisons between quota schemes

<u>Scheme</u>	<u>Total Catch</u>		<u>% of Quota</u>
	<u>MT</u>	<u>1000 lbs.</u>	
1	27700	61078	96
2	26700	58873	93
3	25700	56688	89

Type of Fishing Allowed ^{1/}

<u>Scheme</u>	<u>Month</u>											
	<u>Jan</u>	<u>Feb</u>	<u>Mar</u>	<u>Apr</u>	<u>May</u>	<u>Jun</u>	<u>Jul</u>	<u>Aug</u>	<u>Sep</u>	<u>Oct</u>	<u>Nov</u>	<u>Dec</u>
1	D	D	D	D	D	D	D	D,I	I	I	I	I
2	D	D	I	D	D	I	D	D	I	D,I	I	I
3	D	D	I	D	D	I	D	D	I	D	I	I

^{1/} D = directed fishing

I = extra incidental after closure

* 1 = straight fishing

2 = Quarterly quotas under 80% rule

3 = Quarterly quota under 80% rule (alternative)

Figure 1.

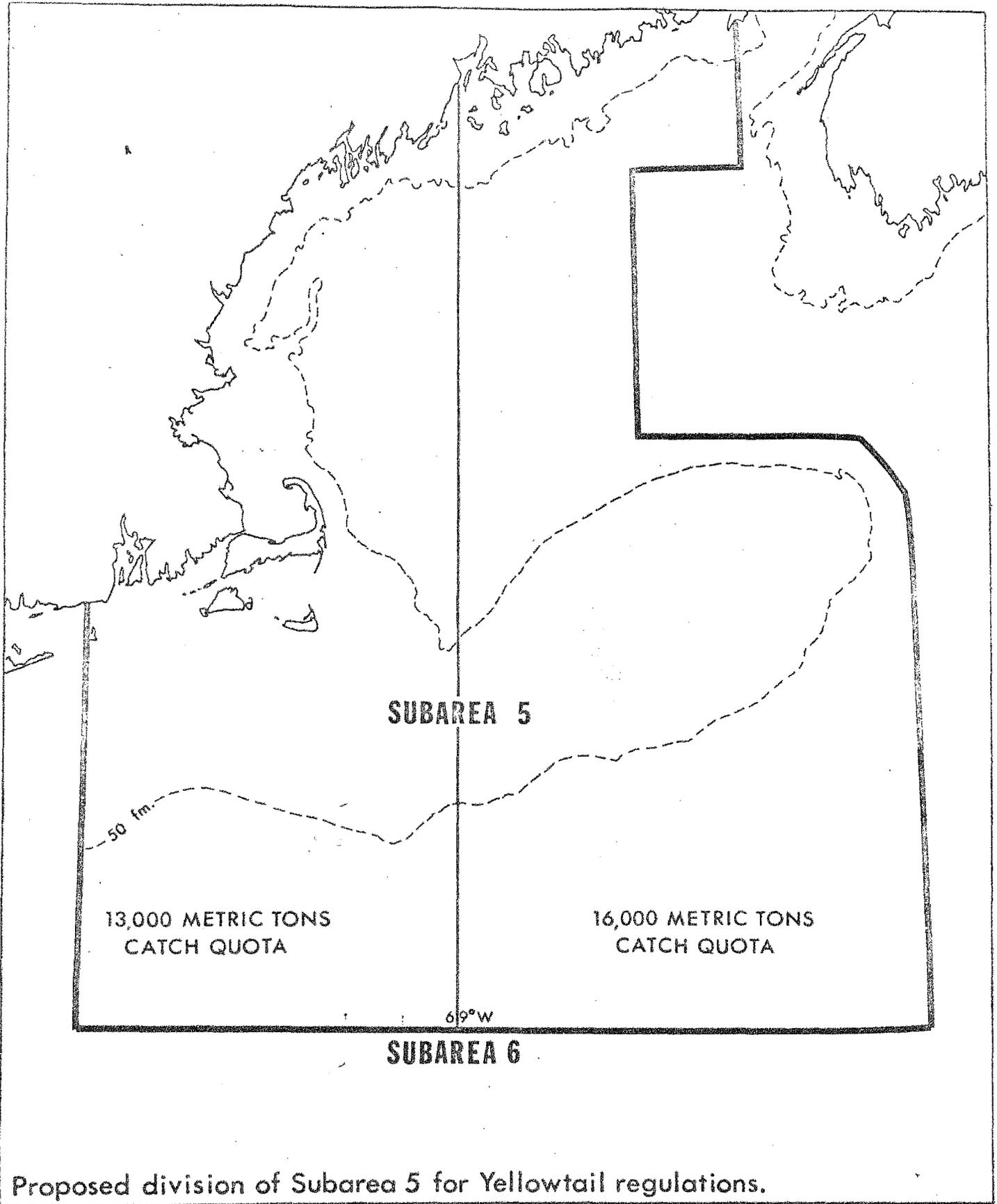


Figure 2. Yellowtail Flounder - 1963-69
 Percent of year's catch taken each quarter.

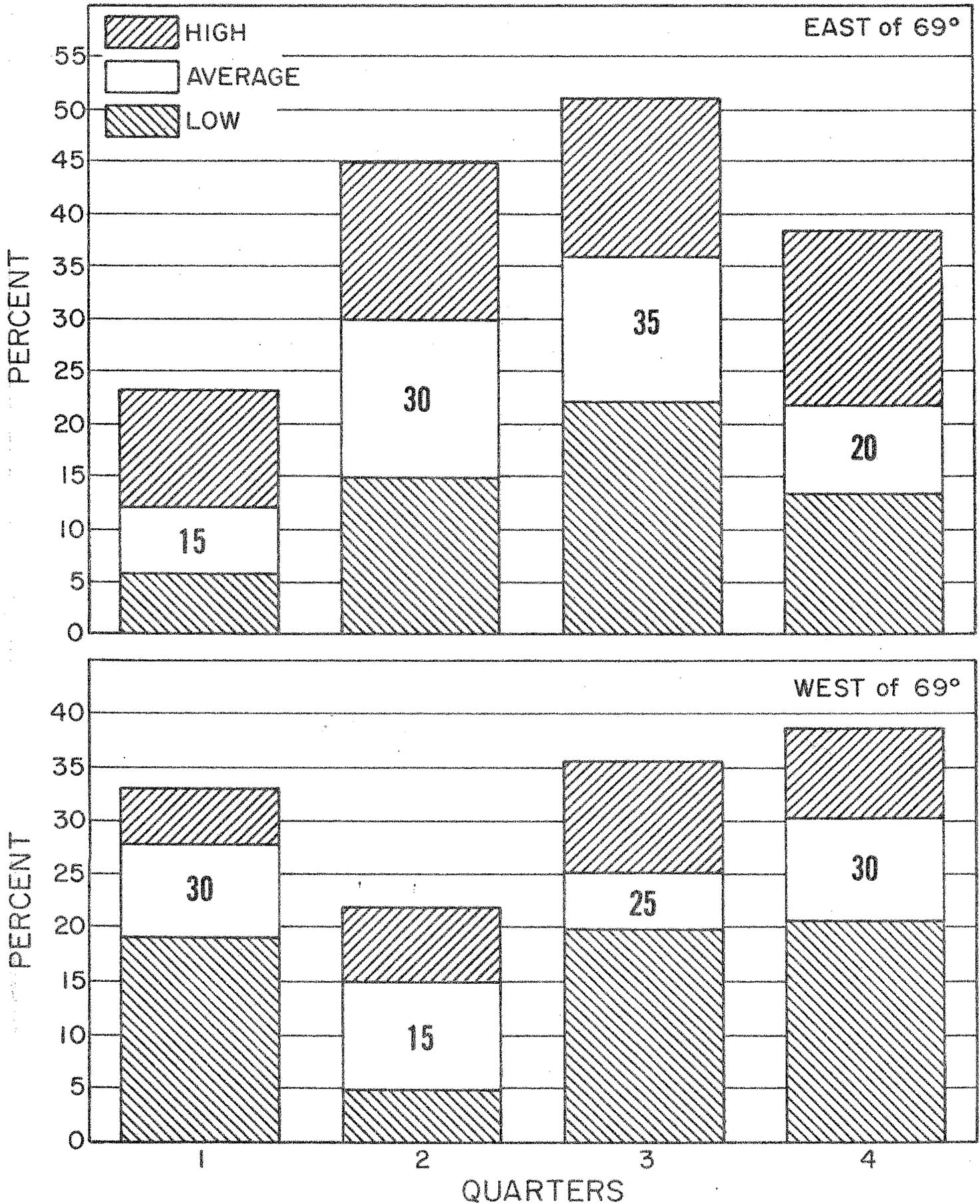


Figure 3.--U. S. fall survey cruise yellowtail flounder length frequencies for West 69°

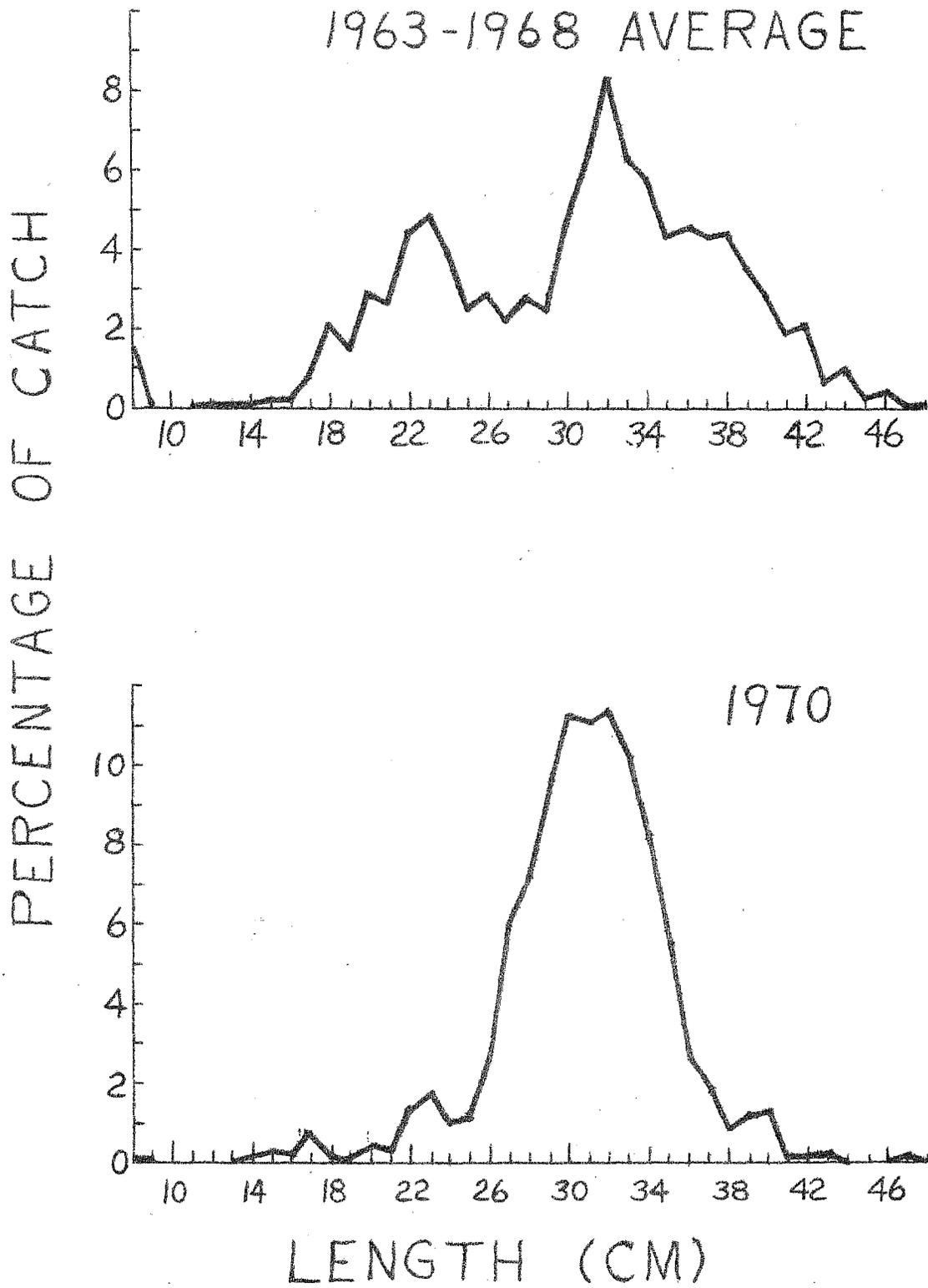


Figure 4.--U. S. fall survey cruise yellowtail flounder length frequencies for East 69°

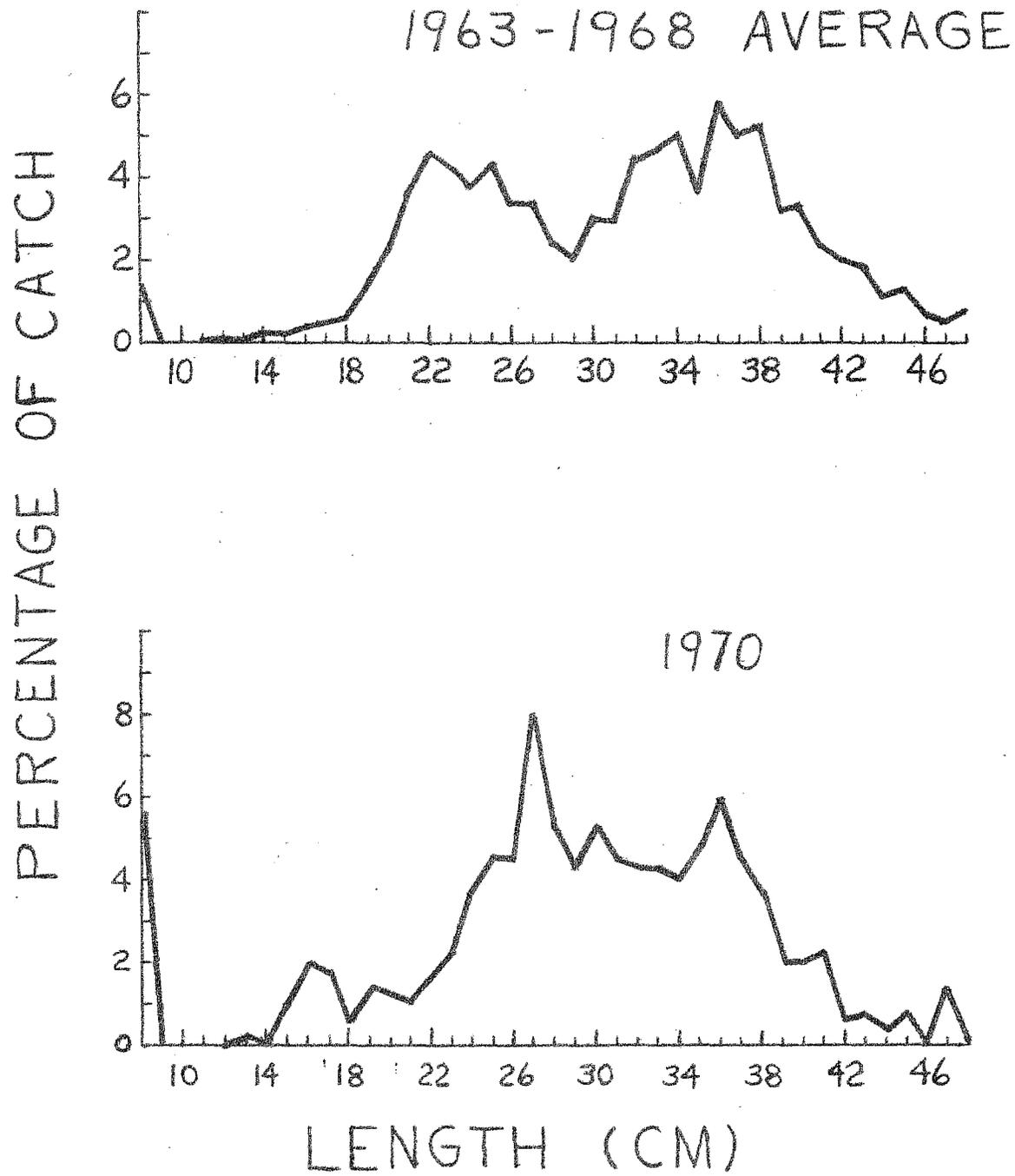


Figure 5.--Age frequency of yellowtail flounder landings

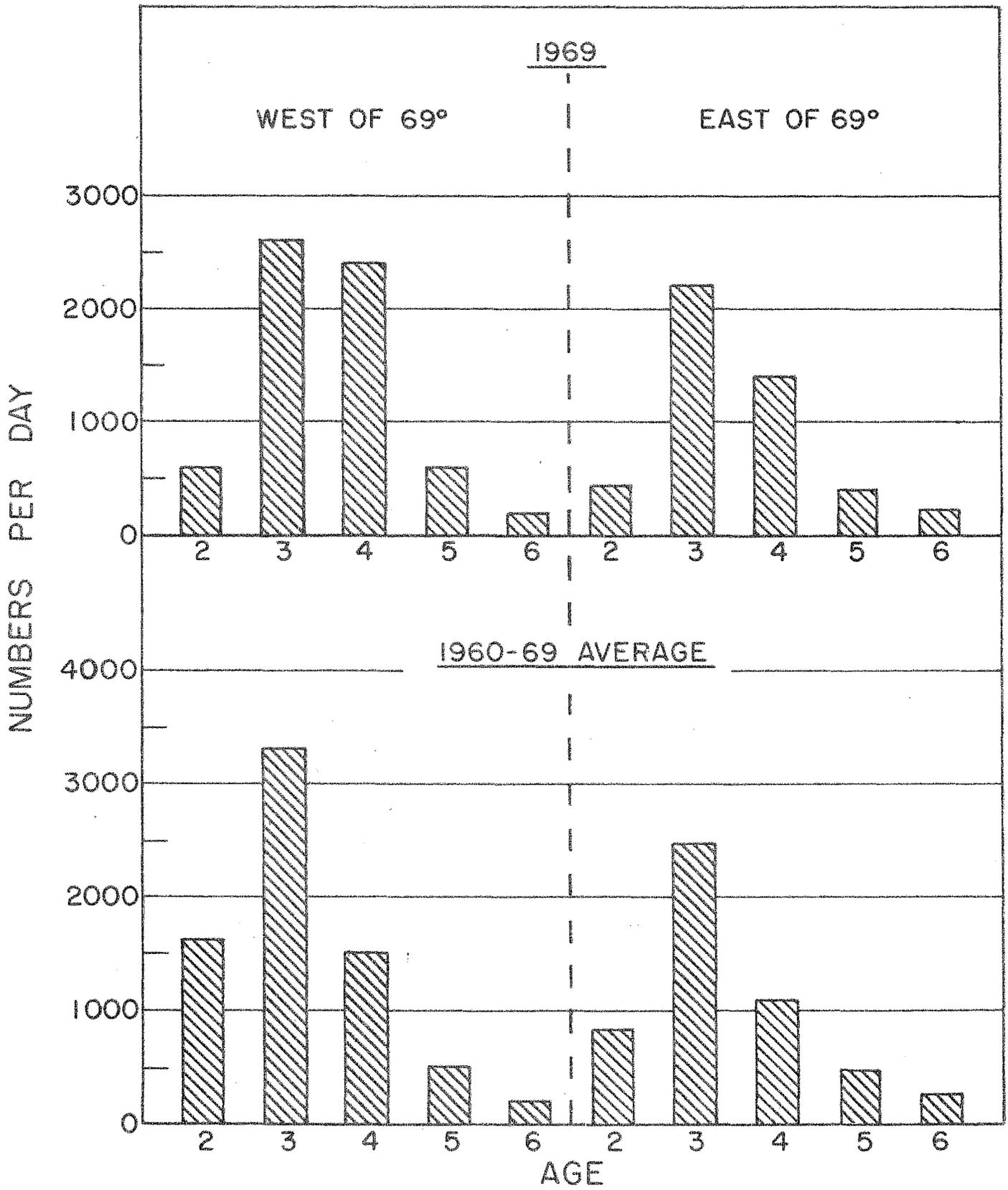


Figure 6.--Age frequency of yellowtail flounder catch

(landing plus discard)

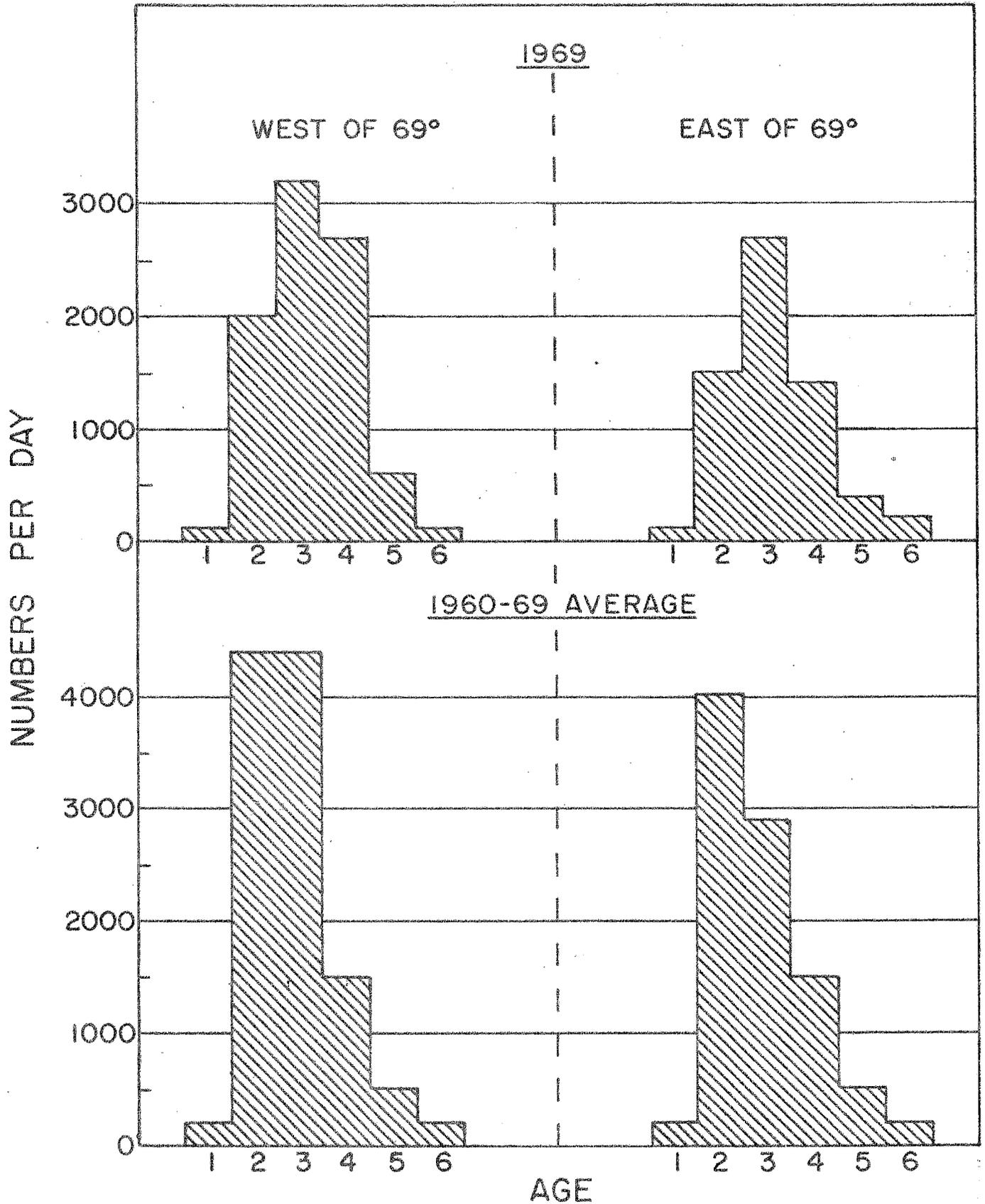


Table 6.--Yellowtail flounder removals in metric tons (000's) and days fished (000's)

Year	U.S. Food	Discard	Ind.-	U.S. Total	Foreign	Grand Total	Days Fished	Abund.- Index
<u>West of 69'</u>								
1963	24.1	5.9	0.3	30.3	0.2	30.5	5.4	5.6
1964	20.8	10.4	0.4	31.6	-	31.6	5.2	6.1
1965	22.0	8.7	1.0	31.7	1.4	33.1	6.6	5.0
1966	16.8	6.0	2.4	25.2	0.7	25.9	8.1	3.2
1967	12.4	8.9	4.5	25.8	2.8	28.6	6.3	4.5
1968	15.8	7.0	3.9	26.7	3.5	30.2	6.6	4.6
1969	12.8	2.7	4.3	19.8	17.6	37.4	10.1	3.7
<u>East of 69'</u>								
1963	11.0	5.6	-	16.6	0.1	16.7	2.4	6.9
1964	14.9	4.9	-	19.8	-	19.8	3.6	5.5
1965	14.2	4.2	-	18.9	0.8	19.2	4.7	4.1
1966	11.3	2.1	-	13.4	0.3	13.7	6.0	2.3
1967	8.4	5.5	-	13.9	1.4	15.3	4.0	3.8
1968	12.8	3.6	-	16.4	1.8	18.2	4.7	3.9
1969	15.9	2.5	-	18.4	2.4	20.8	6.7	3.1
<u>Total</u>								
1963	35.1	11.5	0.3	46.9	0.3	47.2	7.8	6.0
1964	35.7	15.3	0.4	51.4	-	51.4	8.8	5.8
1965	36.2	12.9	1.0	50.6	2.2	52.3	11.3	4.6
1966	28.1	8.1	2.4	38.6	1.0	39.6	14.1	2.8
1967	20.8	14.4	4.5	39.7	4.2	43.9	10.3	4.3
1968	28.6	10.6	3.9	43.1	5.3	48.4	11.3	4.3
1969	28.7	5.2	4.3	38.2	20.0	58.2	16.8	3.5

Table 6A.--Yellowtail flounder removals in pounds (000's) and days fished (000's)

Year	U.S. Food	Discard	Ind.-	U.S. Total	Foreign	Grand Total	Days Fished	Abund.- Index
<u>West of 69'</u>								
1963	53.1	13.0	0.6	66.7	0.4	67.1	5.4	12.3
1964	45.8	22.9	0.9	69.6	-	69.6	5.2	13.4
1965	48.5	19.2	2.2	69.9	3.1	73.0	6.6	11.1
1966	37.0	13.2	5.3	55.5	1.5	57.0	8.1	7.0
1967	27.3	19.6	9.9	56.8	6.8	63.0	6.3	10.0
1968	34.8	15.4	8.6	58.8	7.7	66.5	6.6	10.1
1969	28.2	5.9	9.5	43.6	38.8	82.4	10.1	8.2
<u>East of 69'</u>								
1963	24.2	12.3	-	36.5	0.2	36.7	2.4	15.3
1964	32.8	10.8	-	43.6	-	43.6	3.6	12.1
1965	31.3	9.2	-	40.5	1.8	42.3	4.7	9.0
1966	24.9	4.6	-	29.5	0.7	30.2	6.0	5.0
1967	18.5	12.1	-	30.6	3.1	33.7	4.0	8.4
1968	28.2	7.9	-	36.1	4.0	40.1	4.7	8.5
1969	35.0	5.5	-	40.5	5.3	45.8	6.7	6.8
<u>Total</u>								
1963	77.3	25.3	0.6	103.2	0.6	103.8	7.8	13.3
1964	78.6	33.7	0.9	113.2	-	113.2	8.8	12.9
1965	79.8	28.4	2.2	110.4	4.9	115.3	11.3	10.2
1966	61.9	17.8	5.3	85.0	2.2	87.2	14.1	6.2
1967	45.8	31.7	9.9	87.4	9.3	96.7	10.3	9.4
1968	63.0	23.3	8.6	94.9	11.7	106.6	11.3	9.4
1969	63.8	11.4	9.5	84.1	44.1	128.2	16.8	7.6

Table 7.--Yellowtail flounder statistics 1969 and 1970 (weight in metric tons) 12/7/70

Year	Period	Landings	Discard	Industrial	Total	Landings/ Day	Catch/ Day (Food)	Days Fished
<u>Southern New England</u>								
1970	Jul-Sept	3200	1500	1800	6500	2.4	3.5	1857
	Jan-Sept	9100	3000	3400	15500	2.4	3.2	4844
1969	Jul-Sept	2300	700	1500	4500	3.0	3.9	1153
	Jan-Sept	7500	1700	3700	12900	2.8	3.4	3794
<u>Georges Bank</u>								
1970	Jul-Sept	4400	1800	-	6200	2.3	3.2	1913
	Jan-Sept	12000	4200	-	16200	2.4	3.2	5002
1969	Jul-Sept	5700	1200	-	6900	2.7	3.3	2100
	Jan-Sept	12000	2000	-	14000	2.7	3.1	4478
<u>Total</u>								
1970	Jul-Sept	7600	3300	1800	12700	2.3	3.4	3770
	Jan-Sept	21100	7200	3400	31700	2.4	3.2	9846
1969	Jul-Sept	8000	1900	1500	11400	2.8	3.5	3253
	Jan-Sept	19500	3700	3700	26900	2.7	3.3	8272

Table 7A.--Yellowtail flounder statistics 1969 and 1970 (weight in 1000's of lbs.) 12/7/70

Year	Period	Landings	Discard	Industrial	Total	Landings/ Day	Catch/ Day	Days Fished
<u>Southern New England</u>								
1970	Jul-Sept	7055	3307	3968	14330	5.3	7.7	1857
	Jan-Sept	20062	6614	7496	34172	5.3	7.0	4844
1969	Jul-Sept	4850	1543	3307	9700	6.3	8.4	1153
	Jan-Sept	16534	3748	8157	28439	6.2	7.5	3794
<u>George's Bank</u>								
1970	Jul-Sept	9700	3968	-	13668	5.1	7.1	1913
	Jan-Sept	26455	9259	-	35714	5.3	7.1	5002
1969	Jul-Sept	12566	2646	-	15212	6.0	7.2	2100
	Jan-Sept	26455	4409	-	30864	5.9	6.9	4478
<u>Total</u>								
1970	Jul-Sept	16755	7275	3968	27998	5.1	7.5	3770
	Jan-Sept	46517	15873	7496	69886	5.3	7.0	9846
1969	Jul-Sept	17416	4189	3307	24912	6.2	7.7	3253
	Jan-Sept	42989	8157	8157	59303	6.0	7.3	8272

Table 8.--Yellowtail flounder statistics percent change from
1969 to 1970 (12/7/70)

Period	Land- ings	Discard	Indus- trial	Total	Landings per day	Catch per day	Days fished
Southern New England							
Jul-Sep	+39.1	+114.3	+20.0	+44.4	-20.0	-10.2	+61.0
Jan-Sep	+21.3	+76.5	-8.1	+16.8	-14.3	-5.9	+27.8
Georges Bank							
Jul-Sep	-22.8	+50.0	-	-10.1	-14.8	-3.0	-9.0
Jan-Sep	0.0	+110.0	-	+15.7	-11.1	+3.0	+11.7
Total							
Jul-Sep	-5.0	+73.7	+20.0	+22.1	-17.8	-2.8	+15.9
Jan-Sep	+8.2	+94.6	-8.1	+17.8	-11.1	-3.0	+19.0

National allocation aspects

Under the ICNAF proposal, the quota is not assigned to individual countries. Hence, the 20 percent remaining after U. S. quarterly allocation must accommodate both U. S. and other nations' incidental catches. We are justified in estimating other nations catch to be small based on informal agreements.

We have estimated a balance of 1200 metric tons for other nations incidental catch east of 69°, where we expect most concentration of their fleets in yellowtail areas. West of 69° incidental catches of the U. S. alone may cause a slight over quota catch (900 tons or 7%). We expect minimal fishing here by other nations.

Because of the variability in our estimates and the inability to predict exactly the pattern of fishing in 1971, any of the three schemes may result in actual catches being within +10 percent of the quota. Thus, it seems proper to pick the one best suited to management of the U. S. fishery under the quota, i.e. quarterly allocations with no overall cut off at 80% of total catch. The conservation aspects of the ICNAF proposal are more effectively met with this scheme and the 5.1 inch mesh.

Table 9.--Fall abundance index from survey cruise

Year	<u>Southern New England</u>				<u>Georges Bank</u>			
	U.S.A.		U.S.S.R.		U.S.A.		U.S.S.R.	
	Nos.	Wt.	Nos.	Wt.	Nos.	Wt.	Nos.	Wt.
1963	50.6	32.1			30.1	22.0		
1964	60.8	41.9			22.5	23.4		
1965	38.7	28.0			15.0	15.7		
1966	50.2	20.8			14.8	6.7		
1967	57.7	31.0	40.0	22.2	18.6	13.0		
1968	40.2	22.1	21.3	14.5	25.6	18.1	26.5	16.4
1969	54.7	31.7	62.7	33.5	23.1	15.9	62.7	41.1
1970	39.2	23.9	39.6	28.4	12.2	8.3	28.7	17.8

Table 10.--Age Group I+ abundance from survey cruise

Year	<u>Southern New England</u>	<u>Georges Bank</u>
	Nos./Day	Nos./Day
1963	16.3	12.7
1964	18.5	2.2
1965	11.7	1.3
1966	34.4	9.9
1967	19.9	7.7
1968	9.0	9.7
1969	7.9	6.0
1970	8.3	4.5