

HADDOCK MANAGEMENT PROBLEMS^{1/}

The haddock regulation for Subarea 5 was designed to permit the escape of small fish so that they could be taken later at a larger size, thus increasing the yield from the recruited stock. The regulation has been in effect since 1953. Since that time the effort has remained fairly steady, but the landings have not increased as might have been expected. Delaying capture of the smaller fish does not necessarily result in increased total landings, because environmental conditions affect the strength and survival of the new year classes, and, thus, the number of recruits entering the fishery. We should, however, have increased the pounds caught from any given number of recruits.

If the mesh regulation is having the predicted effect, this should be reflected in the size structure of the population. So far it has been difficult to detect the kind of change which one would expect. This may be due to the fact that only one strong year class has completed its life span in the fishery since the regulation was put into effect, and results from studies of weak year classes are not definitive.

^{1/} Prepared for the meeting of the ICNAF Industry Advisory Committee meeting April 18, 1962.

We should like to draw your attention, in this report, to another possible reason for our inability to demonstrate a benefit. We have not reduced the take of small haddock to the extent expected when the mesh regulation was initiated. Over the past eight years a larger number of haddock have been taken with small mesh gear than was expected when the original prediction was made. This is because of the development of the trash fishery, the animal food fishery, and the whiting fishery, all of which use small mesh; and because haddock can be landed by small mesh vessels fishing groundfish specifically under the trip exemption of 5,000 pounds or 10 percent, whichever is larger, and under the 10 percent annual exemption. An increasing amount of haddock has been landed under these exemptions indicating a situation which, in our opinion, represents a serious threat to the benefits to be expected from the cod-haddock regulation. It should be emphasized here that the threat is not so much reflected in the landings themselves, but in the actual catch which is implied by these landings. The landings data represent landings of larger fish for human food only. What the landing data do not show is the catch which is either discarded at sea or landed for industrial uses. These are the smaller fish which should be left in the sea to be caught at a larger size.

Table 1 presents data on haddock landings for different certification categories in 1960 and 1961. Assuming that registered vessels use large mesh (4-1/2" or greater), and non-registered vessels use smaller mesh, apparently 90% of the landings were from vessels using large mesh. In these statistics, however, the entire catch of the cod-haddock registered vessel is allocated to the registered category (c. f. Item 1, table 1) whether or not he suspends the registration for part of the year. It should be explained that some vessels carrying a cod-haddock registration certificate (and, hence, using large mesh) have the certificate suspended temporarily so that they can use a small mesh net to fish redfish and whiting or other species. Some vessels have their cod-haddock certificate suspended more than once a year. Frequently they take out an annual exemption certificate during the period their cod-haddock certificate is in suspension; they can then bring in a few trips of haddock with small mesh and stay within the law. Thus the amount of haddock taken with small mesh is considerably greater than indicated in Table 1, and this hidden amount has increased markedly in 1961.

The number of vessels issued cod-haddock certificates increased from 143 in 1960 to 179 in 1961. The number of suspensions increased from 58 in 1960 to 101 in 1961. Thus the amount of haddock landed with small mesh in 1961 was probably much greater than in 1960. In Table 1A, the 176* vessels which received cod-haddock certificates in 1961 are grouped according to the number of months the

* Data on catch of three of the 179 vessels was not available at the time of this compilation.

certificate was in effect, i. e. not suspended. Their landings of haddock are also listed. The landings of haddock of the "full time" haddock boats (11 - 12 month category) is 77.8 million pounds, or 75% of the total landings of registered vessels (103.7).

We cannot, at the present time, assign the landings of haddock of the "part time" haddock vessels (10 months or less categories) to trips made when the cod-haddock certificate was in effect or suspended; however, the analysis shows that the landings of haddock in 1961 caught by vessels using large mesh is somewhere between 77.8 and 103.7 million pounds, or 66 and 88 percent, respectively, of the total haddock landings of 117.6 million pounds.

Tables 2 and 3 present 1961 landings by fleets, gear, and port.

Table 1.--Analysis of haddock landings by type of certificate, 1960 and 1961, all subareas

Fleet	1960		1961	
	000's lbs.	%	000's lbs.	%
1. Registered cod-haddock vessels ^{1/}	91,600	90.0	107,200 104,600	91.0 89.0
2. Non-registered cod-haddock vessels	10,400	10.0	10,400 13,000	9.0 11.0
a. Annually exempted vessels ^{2/}	3,000	3.0	4,200 ^{3/}	3.5
b. Other landings (mostly under trip exemption)	7,400	7.0	6,200 8,800	5.5 7.5
Total	102,000	100.0	117,600	100.0

1/ If vessel held registration certificate for any part of year, its total annual landings were included here.

2/ For period ending September 30.

3/ 3.9 million pounds of this was taken in Subarea 5.

Table 1a.--Landings of haddock and number of registered vessels grouped by months of fishing with cod-haddock certificate in effect, 1961

	Number of months certificate in effect							Total
	0	1-2	3-4	5-6	7-8	9-10	11-12	
No. of reg. vessels	7	26	12	9	15	22	85	176
Landings of reg. vessels mill. lbs.	0.3	3.5	1.9	1.9	5.5	12.8	77.8	103.7
Percent of total landings of reg. vessels	--	3	2	2	5	12	75	100
Percent of total landings of all vessels	--	3	2	2	5	11	66	88

Table 2. -- Relative landings of haddock, Massachusetts and Maine ports, 1961, from all subareas

Fleet	Gear	All species (000's pounds)	Haddock (000's pounds)	Percent haddock	No. of trips	Landings per trip (000's pounds)	
						All species	Haddock
Registered ^{1/}							
C & H	Large	81,603 ^{83,761}	47,409 ^{49,065}	58.2 ^{58.6}	799 ⁸²¹	102.1	59.1 ^{59.8}
	Med.	153,913 ^{155,212}	54,903 ^{55,879}	35.6 ^{36.0}	3,941 ³⁹⁷³	39.0	13.9 ^{14.1}
	Small	21,647	2,247	10.4	1,258	17.2	1.8
	Total	257,163 ^{260,420}	104,559 ^{107,192}	40.6 ^{41.1}	5,998 ⁶⁰⁵²	42.6 ^{43.1}	17.4 ^{17.7}
	Other	14,323	0	0	--	--	--
	Total	271,486 ^{274,943}	104,559 ^{107,192}	38.5 ^{39.0}	--	--	--
Non-regis- tered ^{2/}							
C & H	Large	76,243 ^{74,085}	2,019 ³⁶³	2.6 ^{0.5}	436 ⁴⁴⁴	174.7 ^{178.9}	4.7 ^{0.9}
	Med.	56,642 ^{55,343}	4,101 ³¹²⁵	7.2 ^{5.6}	1,622 ¹⁵⁷⁰	34.8	2.5 ^{2.0}
	Small	82,040	3,623	4.4	11,251	7.3	0.3
	Total	214,924 ^{211,447}	9,743 ⁷¹¹⁰	4.6 ^{3.4}	13,309 ¹³²⁵⁵	16.0	0.7 ^{0.5}
	Other	145,674	3,297	2.3	--	--	--
	Total	360,598 ^{357,141}	13,040 ¹⁰⁴⁰⁷	3.6 ^{2.9}	--	--	--
Total		632,084	117,599	18.6	--	--	--

^{1/} If vessel held Registration Certificate for any part of year, its annual landings were included here.

^{2/} Includes annually exempted vessels.

Table 3.--Relative landings of haddock, all subareas, 1961. Breakdown by ports

A. Maine ports							
Fleet	Gear	All species (000's pounds)	Haddock (000's pounds)	Percent haddock	No. of trips	Landings per trip (000's pounds)	
						All species	Haddock
Registered							
C & H	Large	3,847	3	0	17	226.3	0.2
	Med.	6,366	350	5.4	142	44.8	2.5
	Small	6,107	312	5.1	472	12.9	0.7
	Total	16,320	665	4.1	631	25.8	1.0
	Other	0	0	0	--	--	--
Total	16,320	665	4.1	--	--	--	
Non-registered							
C & H	Large	50,655	279	0.6	299	169.2	0.9
	Med.	17,897	770	4.3	252	71.0	3.0
	Small	16,087	602	3.7	1,328	12.1	0.4
	Total	84,639	1,651	2.0	1,879	45.0	0.9
	Other	120,000	889	0.7	--	--	--
Total	204,639	2,540	1.2	--	--	--	
Total		220,959	3,205	1.4	--	--	--
B. Boston							
Fleet	Gear	All species (000's pounds)	Haddock (000's pounds)	Percent haddock	No. of trips	Landings per trip (000's pounds)	
						All species	Haddock
Registered							
C & H	Large	65,662 ^{67,820}	45,946 ^{47,602}	70.0 ^{70.2}	668 ⁶⁹⁰	98.3	68.8 ^{68.9}
	Med.	44,997 ^{46,296}	33,936 ^{34,912}	75.4	886 ⁹¹⁸	50.7 ^{50.4}	3.8 ^{38.0}
	Small	438	293	66.8	40	11.0	7.3
	Total	111,097 ^{114,554}	80,175 ^{82,808}	72.1 ^{72.3}	1,594 ^{1,648}	69.7	50.3 ^{50.2}
	Other	0	0	0	--	--	--
Total	111,097 ^{114,554}	80,175 ^{82,808}	72.1 ^{72.3}	--	--	--	
Non-registered							
C & H	Large	2,158 ⁰	1,656 ⁰⁻¹	76.8	220	98.0	75.3
	Med.	1,428 ¹²⁹	1,026 ⁹¹⁶	71.9 ^{58.8}	73 ⁴¹	19.6 ^{3.1}	14.1 ^{1.2}
	Small	472	189	40.1	85	5.4	2.2
	Total	4,058 ⁶⁰¹	2,871 ²³⁸	70.9 ^{59.6}	180 ²⁶	22.5 ^{4.8}	16.0 ^{1.9}
	Other	1,972	1,045	53.0	--	--	--
Total	6,030 ²⁵⁷³	3,916 ¹²⁸³	64.9 ^{49.9}	--	--	--	
Total		117,127	84,091	71.7	--	--	--

Table 3.--Relative landings of haddock, all subareas, 1961. Breakdown by ports
(continued)

C. Gloucester							
Fleet	Gear	All species (000's pounds)	Haddock (000's pounds)	Percent No. of haddock trips	Landings per trip (000's pounds)		
					All species	Haddock	
Registered							
C & H	Large	12,094	1,460	12.1	114	106.1	12.8
	Med.	59,369	10,820	18.2	1,506	39.4	7.2
	Small	6,310	628	9.9	214	29.5	2.9
	Total	<u>77,773</u>	<u>12,908</u>	<u>16.6</u>	<u>1,834</u>	<u>42.4</u>	<u>7.1</u>
	Other	12,204	0	0	--	--	--
Total	<u>89,977</u>	<u>12,908</u>	<u>14.3</u>	<u>--</u>	<u>--</u>	<u>--</u>	
Non-registered							
C & H	Large	23,430	84	0.3	115	203.7	0.7
	Med.	16,002	603	3.8	384	41.6	1.6
	Small	22,054	1,146	5.2	3,298	6.7	0.3
	Total	<u>61,486</u>	<u>1,833</u>	<u>3.0</u>	<u>3,797</u>	<u>16.2</u>	<u>0.5</u>
	Other	11,390	266	2.3	--	--	--
Total	<u>72,876</u>	<u>2,099</u>	<u>2.9</u>	<u>--</u>	<u>--</u>	<u>--</u>	
Total	<u>162,853</u>	<u>15,007</u>	<u>9.2</u>	<u>--</u>	<u>--</u>	<u>--</u>	
D. New Bedford							
Fleet	Gear	All species (000's pounds)	Haddock (000's pounds)	Percent No. of haddock trips	Landings per trip (000's pounds)		
					All species	Haddock	
Registered							
C & H	Large	0	0	0	0	--	--
	Med.	34,209	9,332	27.3	1,146	29.8	8.1
	Small	8,702	1,013	11.6	515	16.9	2.0
	Total	<u>42,911</u>	<u>10,345</u>	<u>24.1</u>	<u>1,661</u>	<u>25.8</u>	<u>6.2</u>
	Other	2,119	0	0	--	--	--
Total	<u>45,030</u>	<u>10,345</u>	<u>23.0</u>	<u>--</u>	<u>--</u>	<u>--</u>	
Non-registered							
C & H	Large	0	0	0	0	--	--
	Med.	14,991	1,350	9.0	480	31.2	2.8
	Small	17,795	292	1.6	1,318	13.5	0.2
	Total	<u>32,786</u>	<u>1,642</u>	<u>4.6</u>	<u>1,798</u>	<u>18.2</u>	<u>0.9</u>
	Other	3,124	0	0	--	--	--
Total	<u>35,910</u>	<u>1,642</u>	<u>4.6</u>	<u>--</u>	<u>--</u>	<u>--</u>	
Total	<u>80,940</u>	<u>11,987</u>	<u>14.8</u>	<u>--</u>	<u>--</u>	<u>--</u>	

Table 3. -- Relative landings of haddock, all subareas, 1961. Breakdown by ports
(continued)

E. Cape ports							
Fleet	Gear	All species (000's pounds)	Haddock (000's pounds)	Percent haddock	No. of trips	Landings per trip (000's pounds)	
						All species	Haddock
Registered							
C & H	Large	0	0	0	0	--	--
	Med.	8,972	465	5.2	260	34.5	1.8
	Small	90	1	1.1	17	5.3	0.1
	Total	<u>9,062</u>	<u>466</u>	<u>5.1</u>	<u>277</u>	<u>32.7</u>	<u>1.7</u>
No other							
Non-registered							
C & H	Large	0	0	0	0	--	--
	Med.	6,324	352	5.6	433	14.6	0.8
	Small	25,632	1,394	5.4	5,222	4.9	0.3
	Total	<u>31,956</u>	<u>1,746</u>	<u>5.5</u>	<u>5,655</u>	<u>5.6</u>	<u>0.3</u>
	Other	9,188	1,097	11.9	--	--	--
Total	<u>41,144</u>	<u>2,843</u>	<u>6.9</u>	<u>--</u>	<u>--</u>	<u>--</u>	
Total		<u>50,206</u>	<u>3,309</u>	<u>6.6</u>	<u>--</u>	<u>--</u>	<u>--</u>

Sizes of fish. The landings by small mesh vessels in themselves do not present the whole picture. These landings come for the most part from inshore grounds where the haddock populations are composed largely of immature fish.

Table 4 presents the length of haddock taken by the "haddock fleet" in 1960. "Haddock fleet" consists primarily of the large Boston trawlers. These are full time registered vessels. In these landings less than 1 percent of the fish are under the 50 percent selection point of the 4-1/2-inch mesh (38 cm.). Furthermore, there is practically no discard; the landings represent the catch.

A measure of the catches of small mesh vessels is difficult to obtain. When the haddock are landed for food, the small fish are culled out and discarded at sea, in which case, of course, the landed catch shows few fish under 38 cm. However, an indication of the discard can be obtained by examining samples of the size composition of haddock which is landed as trash when trash is in demand. This represents more closely the catch of haddock.

Table 5 presents such a sample. It will be noted that 98 percent of the industrial landings of haddock is under 38 cm. Research vessel sampling in the inshore areas corroborate conclusions drawn from above data.

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Conclusions.

1. Extension of the 4-1/2 inch minimum mesh size regulation in Subarea 5 to ^{all} species other than cod and haddock is not desirable as it ^{cannot be shown to be} ~~would not be~~ beneficial from a conservation standpoint and would be injurious to a number of fisheries.

2. Adoption of a minimum mesh size of 3-1/2 inches (double manila) for species other than cod and haddock is of some merit and is worth considering. It would materially reduce the destruction of undersized haddock; produce cleaner catches of all species by reducing the debris in the net; reduce the quantity of undesirable sizes of many species; and increase the long term yield of whiting. On the negative side it would immediately reduce the amounts landed of red hake (8 percent) and silver hake (21 percent) and possibly some other industrial species unless some exemptions were worked out for these.

~~4/5/63~~

It is impossible to estimate the total numbers or weight of haddock discarded by the small mesh fleets since various sizes of mesh are used, and the catch of small fish is determined by the size of mesh. However, when the industrial trawl fishery was in operation sufficient samples were obtained from the industrial landings to allow an estimate of total take of undersized haddock by this fleet and the whiting fleet. During the period 1957-59 the annual take of small haddock averaged 3 million pounds. If this fish had been fished with a 4-1/2 inch mesh, they would ultimately have yielded 11 million pounds per year.

In the past year this situation has been aggravated by increased fishing under the 10 percent annual exemption. In the last report year the number of vessels with annual exemption certificates increased from 43 to 73; the number of trips of these vessels in Subarea 5 from 1,324 to 1,799; and the amount of haddock increased from 2.7 million pounds to 3.9 million pounds.

There are several possible solutions to this problem:

1. Allow no landings of haddock taken with meshes under 4-1/2 inches. This is impractical. There is an incidental catch of haddock in the redfish and whiting fisheries which would be discarded under this provision.
2. Impose a minimum size limit on haddock. This is also impractical. Enforcement problems appear insurmountable.

3. Close all areas where small fish occur. This also is not practical. It would have serious effect on other fisheries, and would present serious enforcement problems.

4. Require a 3-1/2-inch minimum mesh size (double manilla of equivalent) for all species other than cod and haddock. This appears to be the best solution to the problem.

Effects of 3-1/2-inch mesh

Haddock and Cod

The 3-1/2-inch mesh has a 50% selection point for cod and haddock at about 32 cm. Use of this mesh would essentially eliminate the catch of one-year-old cod and haddock, which are now being caught by the whiting and industrial fleets (see table 5). By postponing their capture to age 2, the yield-per-recruit of these fish could be more than doubled. There would be no immediate effect on the catch of cod and haddock of sizes desirable for food-fish.

Redfish

There would be an immediate loss of small fish of about 7 percent (see figure 1a). The benefit to the industry of eliminating these small fish from the catch would probably compensate for the initial weight loss. Long-term changes in yield cannot be calculated but would probably be nil.

Silver Hake

There would be an immediate loss of about 8 percent to food-fish landings of silver hake (figure 1b). Here again, the loss of the smallest sizes would not appear to be particularly detrimental to the food-fish market.

The total catch of silver hake, i. e., the industrial landings, would suffer an immediate loss of about 24 percent (figures 3a and 3b). Long-term changes in yield cannot be estimated; however, such a large release of small fish would probably be beneficial in the long run, both to the industrial and food-fish industry, particularly if fishing intensity is high.

~~Table 5~~

Table 5. -- Sizes of haddock landed by Gloucester industrial fishery, 1957-59^{1/}

Length (cm.)	Ipswich Bay number	Stellwagen Bay number	Nausets number	Total	
				Number	Percent
>9			4	4	-
9			9	9	1
12	1	5	9	15	1
15	4	30	5	39	3
18	16	29	23	68	5
21	35	28	85	148	12
24	33	41	117	191	15
27	35	84	141	260	21
30	19	142	103	264	21
<u>B</u>					<u>B</u>
33	27	78	65	170	14
36	17	12	27	56	4
<u>A</u>					<u>A</u>
39	10	3	7	20	2
42	3	1	--	4	-
45		1	--	1	-
48			1	1	-
51			1	1	-
Total				1,251	100

1/ From Edwards and Skerry, 1961.

A-A - 50% selected from 4 1/2" mesh.
B-B - " " " 3 1/2" mesh.

(12)

Red Hake

The immediate loss of landings would be about 13 percent (figure 2a). We cannot estimate the long-term effect.

Dab

There would be no immediate effect on the landings of food-fish, since all dabs greater than 25 centimeters (10 inches) are retained by the 3-1/2-inch mesh. The elimination of necessity to cull would certainly be beneficial.

The total catch would have an immediate loss of about 21 percent (figure 2b). These are very small fish and contribute very little weight to the industrial landings as a whole. Although no formal estimates of long-term effects can be made, some benefit is anticipated.

Other Flounders

The catch of yellowtail, graysole, blackback, and fluke would be effected in much the same manner as the dab. That is, all sizes of fish desirable as food-fish would be retained, and release of the undersized fish would have negligible immediate effects and probable long-term benefits.

Other Species

Very little information about the effects on catches of other species is available. For most, the elimination of small fish would be more beneficial than detrimental. The landings of sizes of scup and butterfish utilized as food-fish would probably suffer some immediate loss, but neither the magnitude of this, nor that of the long-term changes can be estimated at the present time.

The factor of increased efficiency of nets of larger mesh is not well documented, but may be of real importance. Much of the immediate loss outlined above could be more than compensated for by an increased catch of fish due to increased efficiency.

Exemptions. It is obvious that exemptions have been detrimental to the haddock fishery. Theoretically there should be no exemptions, but they are necessary for defining a haddock vessel, and in allowing the landing of incidental catches. The degree of effectiveness of the haddock mesh regulation depends on the degree of exempted catch. The present exemptions should be drastically reduced in order to prevent the taking of large quantities of small haddock.

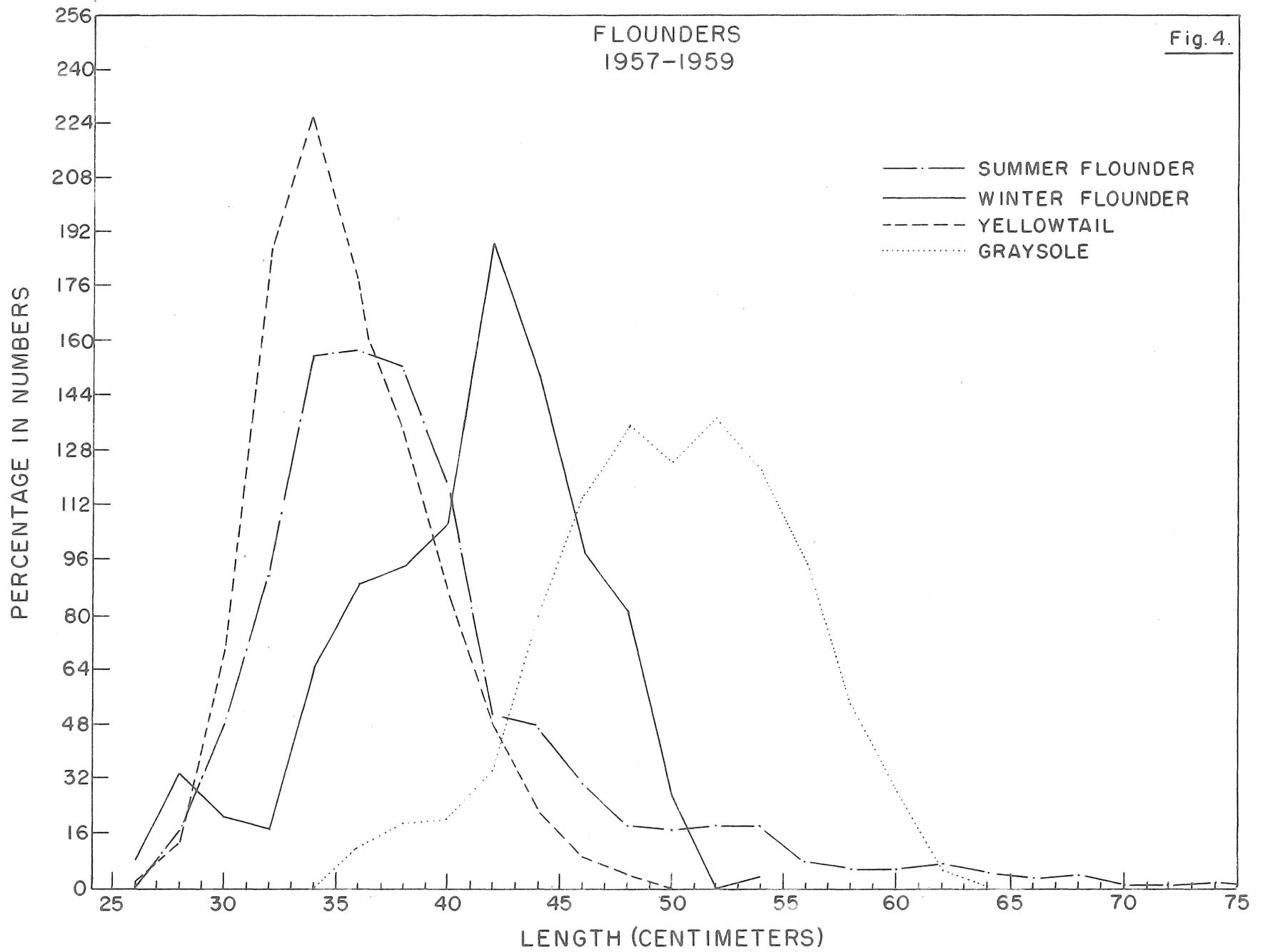
However, management problems are so complex that it seems desirable to postpone reduction of exemptions until later. After the 3-1/2-inch minimum is instituted, a thorough analysis of catches can be made to assess the operation of this regulation, and to determine the level of exemption which might be allowed.

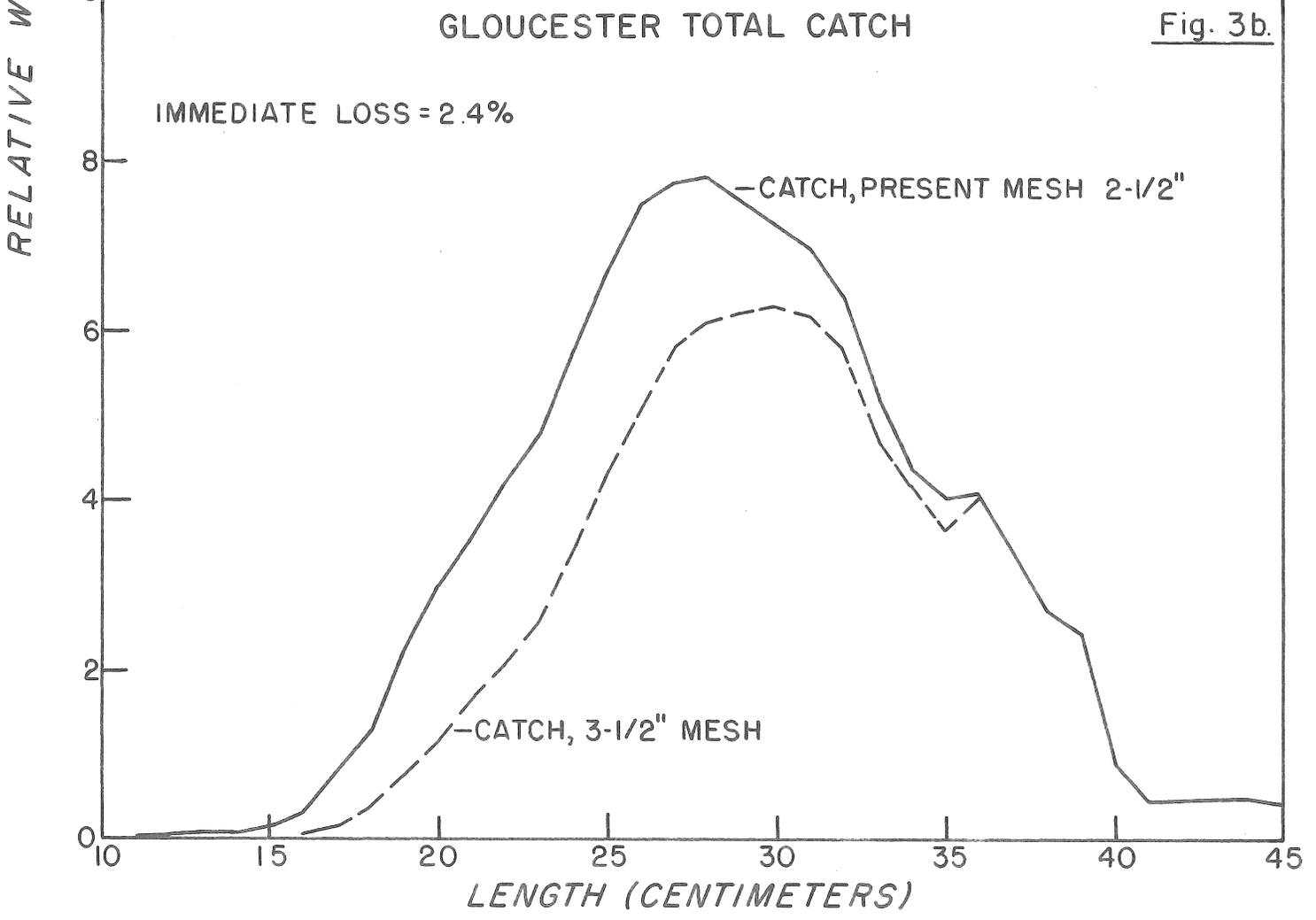
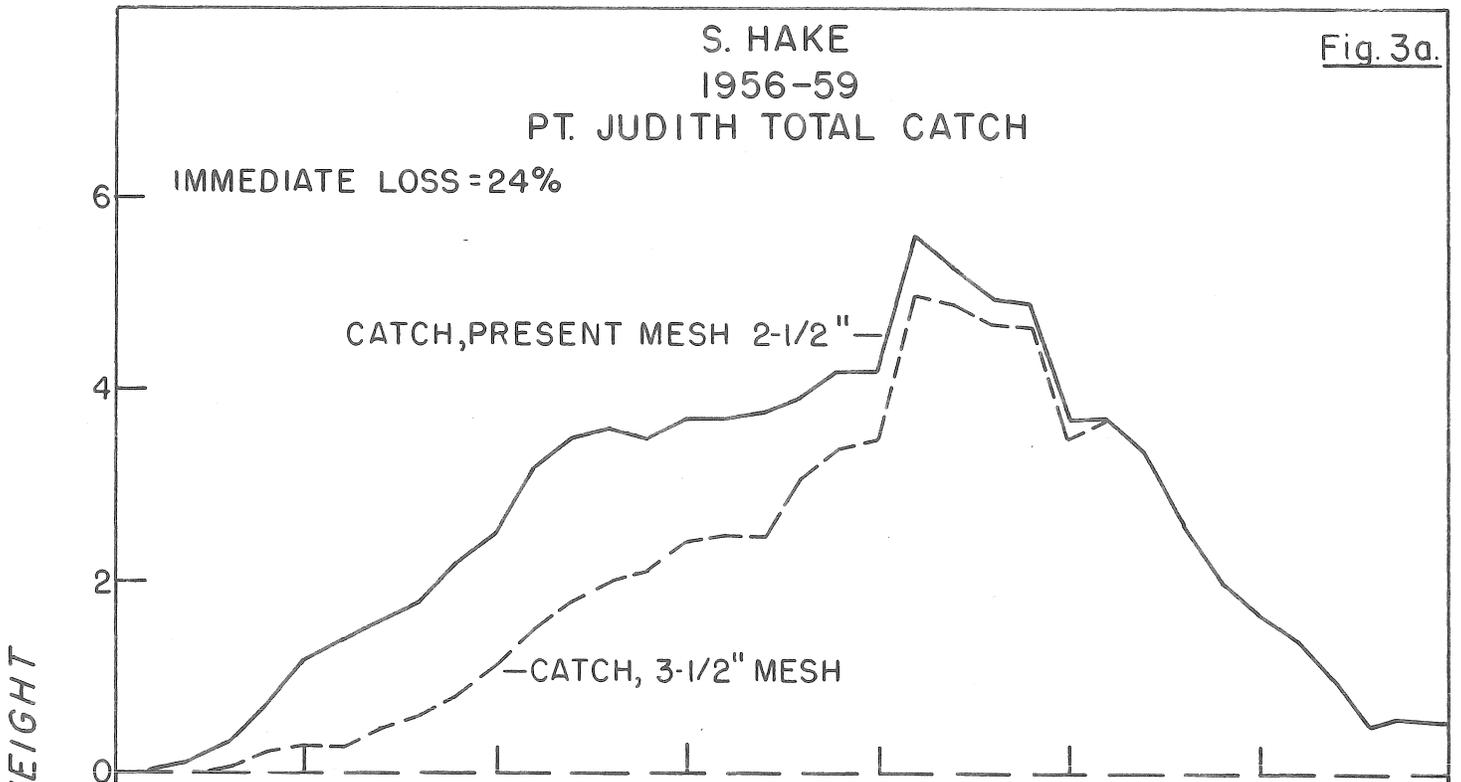
Scientific need for uniform minimum mesh size. At the present time unregistered vessels are using mesh sizes ranging from 1 to 4-1/2 inches. Under these circumstances, it is impossible to make an accurate assessment of the effect of these vessels fishing on the stocks of fish. First of all when we sample the landings it is difficult to determine the size of mesh used and secondly, even if all sizes were known for all samples taken, it is impossible to obtain sufficient samples for each mesh size. Pooling samples under these circumstances cannot be done.

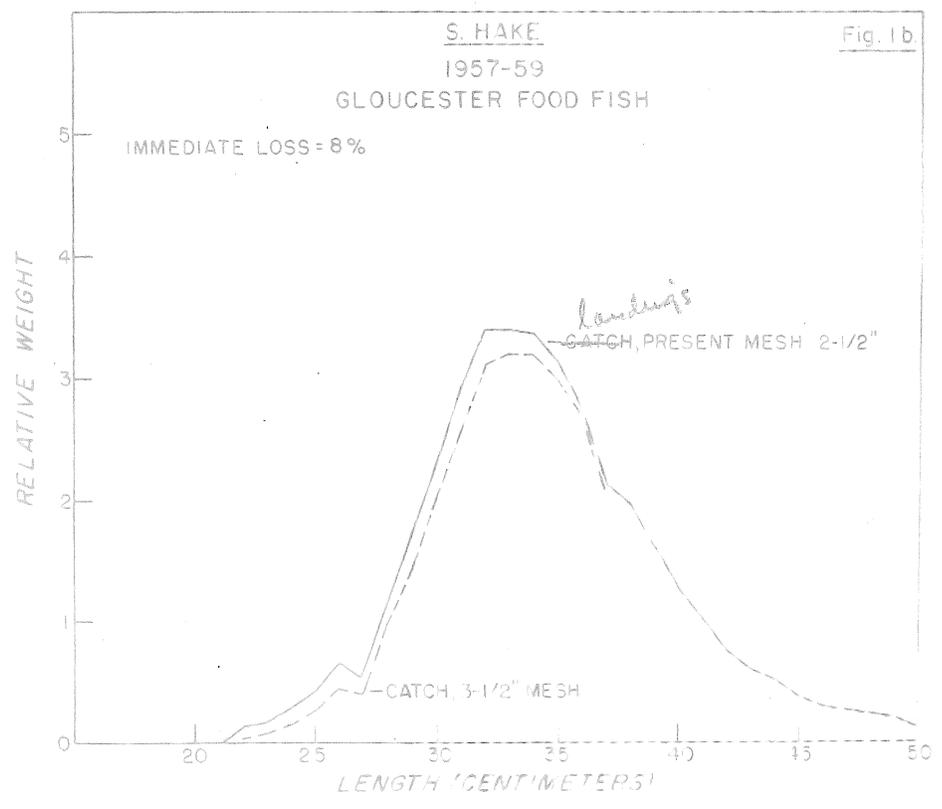
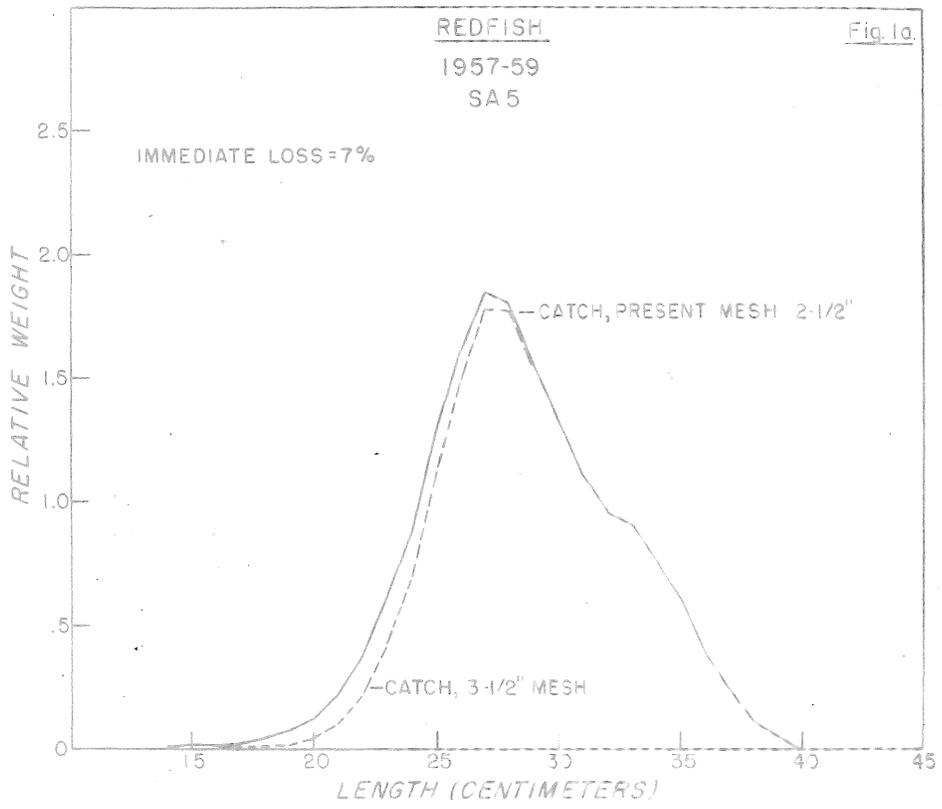
There is some discard of small haddock by unregistered vessels. Estimates of this is important, but cannot be determined by sampling as too many vessels are involved using various sizes of mesh. If there were a uniform minimum mesh size, the quantity and size composition of the discard could be estimated from a reasonable number of sea samples or samples of the landings.

A uniform minimum mesh size, regardless of size per se, is a basic requisite for meeting our responsibilities in attempting to measure the benefits of the haddock regulation.

Flounders should not be included in the 4-1/2-inch minimum mesh size regulation. We have no evidence to indicate that yellowtail flounder or fluke are in need of any protection, and therefore, we propose that they not be included under the 4-1/2-inch regulation. They would get some protection from the 3-1/2-inch minimum in any case. Including them under the 4-1/2-inch regulation would only create problems in southern New England similar to those which we already have north of Cape Cod. Black-back may be better utilized by a larger mesh than that now in use, but the optimum mesh size may be well below 4-1/2 inches.







ICNAF
Advisory Comm. '62

Chief, Branch of Marine Fisheries, BCF
Washington 25, D. C.

16 March 1962

Laboratory Director, BCF
Woods Hole, Mass.

Draft of report for ICNAF Industry Advisory Committee

Mr. Gharrett asked me to send, directly to you, a draft of our report which is to be circulated to members of the ICNAF Industry Advisory Committee concerning haddock management problems.

Concerning the necessity for including an item on the Panel 5 agenda in order to legalize discussion of the problem at the next annual meeting, I note that many recommendations were made at the last annual meeting for minimum mesh size regulations under a blanket item (8b) "Possible amendments or additions to mesh size regulation". Perhaps the same could be done this year without committing us to anything specific.

Herbert W. Graham

Enc.

cc: W. F. Terry, Office of International Relations, Wash.
BCF Region 3