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The United States landed fish from ICNAF Subareas 4 and 5 and Statistical Area 6. Research was conducted in Subareas 3, 4 and 5 and Statistical Area 6. Table 1 gives a summary of US finfish and sea scallops nominal catches for 1972 and 1973.

Table 1. United States finfish and sea scallops nominal catches for 1972 and 1973¹ (metric tons, round fresh).

Species	Year	Subarea			Total
		4	5	6	
Haddock	1972	521	4771	1	5293
	1973	441	3314	2	3757
Cod	1972	665	19704	266	20635
	1973	181	22001	256	22438
Redfish	1972	13476	13161	1	26638
	1973	12928	11922	---	24850
Pollock	1972	493	5233	1	5727
	1973	571	5752	1	6324
Yellowtail	1972	4	24206	8774	32984
	1973	2	26139	4937	31078
Other Flounder	1972	189	12888	4421	17498
	1973	78	13185	6144	19407
Silver hake	1972	--	8036	277	8313
	1973	--	15976	4024	20000
Red hake	1972	1	1711	818	2530
	1973	1	2940	1211	4152
Sea herring	1972	--	40473	522	40995
	1973	--	25505	526	26031
Mackerel	1972	--	1020	976	1996
	1973	--	685	716	1401

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River herring ²	1972	--	1057	10610	11667
	1973	--	1561	8735	10296
Menhaden	1972	--	8962	320137	329099
	1973	--	30780	299760	330540
Other finfish	1972	142	11789	29493	41424
	1973	162	17206	37534	54902
Total finfish	1972	15091	153011	376297	544799
	1973	14364	176966	363846	555176
Sea scallop	1972	--	11226	10884	22110
	1973	--	12853	6404	19864

¹Preliminary data.

²Alewife and blueback herring.

Subarea 3

B. SPECIAL RESEARCH STUDIES

The US Coast Guard conducted oceanographic surveys in support of the International Ice Patrol in Div. 3N, L, and O.

Subarea 4

A. STATUS OF THE FISHERIES

1. Haddock

The US nominal catch of haddock from Subarea 4 in 1973 was only 444 tons. Div. 4X landings in 1973 were 269 tons, a decrease from 1972, while landings from Browns Bank, the principal area fished by US vessels in Div. 4X, also decreased from 1972 (Table 2). Research survey YOY (young of the year) index decreased for 1973, and indications are that abundance will continue low.

Table 2. US haddock statistics, Div. 4X (metric tons, round fresh).

Year	Division 4X		Browns Bank		
	Landings	YOY Survey Index	Landings	Days fished	Landings/ days fished
1965	3,685	1.51	1,786	275	6.5
1966	2,473	1.32	939	200	4.7
1967	5,014	1.10	2,059	381	5.4
1968	3,156	1.51	2,278	506	4.5
1969	1,830	3.31	1,305	389	3.4
1970	1,744	1.03	1,576	493	3.2
1971	751	6.08	605	242	2.5
1972	448	2.28	387	117	3.3
1973	269	1.83	268	107	2.5

¹Mean catch per haul (linear scale retransformed from log₁₀ scale).

2. Cod

The US fleet landed 181 tons of cod from Subarea 4 in 1973, 330 tons more than in 1971.

3. Redfish

US landings of redfish in 1973 from the Gulf of St. Lawrence (Div. 4R, S, and T) were 1638 tons. Landings from the Scotian Shelf (Div. 4V, W, and X) by US vessels were 11,290 tons, a slight decrease from 1972. Commercial landings per day decreased in 1973, however, research survey abundances for the Scotian Shelf increased in 1973.

Table 3. US redfish statistics, Div. 4R, S and T (metric tons, round fresh).

Year	Landings	Days fished	Landings/ days fished
1965	17,099	803	21.3
1966	12,766	608	21.0
1967	15,482	622	24.9
1968	16,437	740	22.2
1969	12,122	689	17.6
1970	7,592	593	12.8
1971	4,706	490	9.6
1972	1,111	104	10.7
1973	1,638	144	11.4

Table 4. US redfish statistics, Div. 4V, W and X (metric tons, round fresh).

Year	Landings	Days fished	Landings/ days fished	Survey Wt/tow ¹
1965	13,082	1,246	10.5	28.7
1966	16,680	1,183	14.1	20.2
1967	6,407	593	10.8	33.4
1968	4,635	297	15.8	15.3
1969	1,142	75	15.3	42.6
1970	1,949	135	14.2	50.4
1971	6,261	404	15.5	39.7
1972	12,365	840	14.7	25.7
1973	11,290	965	11.7	38.6

¹Weight in pounds.

B. SPECIAL RESEARCH STUDIES

Research and environmental studies in Div. 4X are part of a larger program carried out in Subarea 5 and Statistical Area 6. They are reported under Subarea 5.

Subarea 5

A. STATUS OF THE FISHERIES

1. Haddock

Haddock landings from Subarea 5 in 1973 were again limited by quota regulations set by the Commission, and US vessels landed 3,314 tons, 26% less than in 1972 (Table 5).

Table 5. US haddock statistics, Subarea 5 (metric tons round fresh).

Year	Subarea 5 landings	Div. 5Y landings	Div. 5Zw landings	Div. 5Ze	
				Landings	Adjusted landing/standard day fished
1965	57,027	4,204	26	52,797	5.68
1966	57,497	4,579	31	52,887	5.27
1967	39,580	4,852	37	34,691	4.02
1968	28,887	3,418	16	25,453	3.11
1969	18,858	2,402	15	16,441	2.47
1970	9,872	1,457	15	8,400	1.82
1971	8,500	1,194	5	7,301	1.72
1972	4,771	901	3	3,867	1.77
1973	3,314	526	3	2,785	2.05

The 0-group index for haddock continues low (Table 6). Poor recruitment now extends to ten years, and will continue to be low through at least 1975.

Table 6. US research vessel index of relative year-class abundance of Georges Bank haddock based on autumn catches of 0-group fish.

Year	Index	Year	Index
1959	9.6	1966	1.7
1960	2.4	1967	1.0
1961	1.4	1968	1.0
1962	2.6	1969	1.1
1963	12.6	1970	1.0
1964	2.0	1971	1.4
1965	1.2	1972	1.6
		1973	1.7

2. Cod

US landings of cod from Subarea 5 in 1973 increased slightly (Table 7). Total catches by all countries in recent years have been high, exceeding or being close to the sustainable yield. US commercial landings per day fished from Georges Bank have increased since 1968; however, this is probably a reflection of change in fishing practices (i.e. a greater directed fishery for cod in the absence of haddock). The research survey index has increased.

Table 7. US cod statistics, Subarea 5 (metric tons, round fresh).

Year	Subarea 5 landings	Div. 5Y landings	Subdiv. 5Zw landings	Subdiv. 5Ze		
				Landings	Landings/day fished	Survey Wt/tow ¹
1965	15,011	3,780	215	11,016	0.9	15.9
1966	15,343	4,008	345	10,990	1.1	11.1
1967	18,057	5,527	684	11,846	1.0	18.5
1968	21,045	6,360	836	13,849	1.4	11.7
1969	24,175	7,823	1,143	15,209	1.7	10.9
1970	22,347	7,812	1,182	13,353	2.1	17.1
1971	23,175	7,380	796	14,999	2.0	13.4
1972	19,704	6,564	662	12,478	2.6	31.3
1973	22,001	6,063	1,092	14,846	4.4	42.0

¹Weight in pounds.

3. Silver hake

Total US silver hake landings from Subarea 5 in 1973 increased by 7,940 tons from 1972 (Table 8). The increase was greatest in Subdiv. 5Ze followed by Div. 5Y and Subdiv. 5Zw.

Better recruitment in the last two years has prevented further large declines in stock with increased catches, but has not permitted recovery (see table 9) as indicated by research vessel surveys.

Table 8. US silver hake statistics, Subarea 5 (metric tons, round fresh).

Year	Subarea 5 landings	Food Fish			Industrial and Food Fish	
		Div. 5Y landings	Div. 5Ze landings	Landings/day fished	Div. 5Zw landings	Landings/day fished
1965	41,809	22,605	11,169	11.3	8,035	4.4
1966	40,771	21,323	16,222	12.7	3,226	1.4
1967	30,986	14,390	12,692	9.3	3,904	3.4
1968	35,919	24,706	6,451	14.0	4,762	4.0
1969	20,333	14,609	1,654	4.9	4,070	4.6
1970	19,379	11,384	4,238	3.7	3,757	2.2
1971	13,332	8,263	3,069	2.6	2,000	3.4
1972	8,036	5,548	879	4.3	1,609	---
1973	15,976	8,348	5,704	7.2	1,924	---

Table 9. Silver hake abundance indices (mean catch/tow in pounds) from US autumn survey cruises.

Year	Div. 5Y (Gulf of Maine)	Subdiv. 5Ze Georges Bank	Subdiv. 5Zw-Div. 6A (S. New England)
1965	18.9	3.8	16.8
1966	9.4	4.3	7.9
1967	2.8	5.9	9.8
1968	2.8	6.9	10.5
1969	4.3	5.3	5.1
1970	5.4	4.9	5.7
1971	5.4	4.0	10.1
1972	13.8	5.2	8.8
1973	8.6	5.4	7.0

4. Redfish

US landings of redfish from Subarea 5 in 1973 were 9% less than in 1972 (Table 10).

Table 10. US redfish statistics, Subarea 5 (metric tons, round fresh).

Year	Total Subarea 5 landings	Div. 5Y (Gulf of Maine)		
		Landings	Days fished	Landings/days fished
1965	6,986	5,045	742	6.8
1966	7,204	4,719	429	11.0
1967	10,442	6,746	649	10.4
1968	6,576	4,060	292	13.9
1969	12,038	9,637	824	11.7
1970	15,534	13,551	1,473	9.2
1971	16,267	12,541	1,695	7.4
1972	13,161	7,150	1,132	6.3
1973	11,922	7,008	1,168	6.0

The stock has shown a significant decrease with the increased fishery of recruit years (Table 11).

Table 11. Redfish abundance indices from US autumn survey cruises.

Year	Div. 5Y (Gulf of Maine)		Subdiv. 52e (Georges Bank)	
	Wt/tow ¹	No/tow	Wt/tow ¹	No/tow
1965	30.8	62.1	2.5	4.1
1966	69.9	96.8	4.4	11.4
1967	56.7	100.8	5.8	18.3
1968	95.3	154.7	7.7	11.3
1969	47.0	66.5	14.4	17.6
1970	74.5	96.3	10.2	13.3
1971	56.0	50.8	4.1	6.2
1972	55.0	54.8	8.5	10.8
1973	38.2	39.8	5.8	6.2

5. Yellowtail

The US total catch of yellowtail (including discards) from Subarea 5 in 1972 was about 1,000 tons (Table 12), below that of 1972. Yellowtail landings for food increased slightly while landings of yellowtail for industrial purposes were negligible.

The Southern New England (West of 69°) survey abundance index, decreased by 90% in 1973. That for Georges Bank remained about the same.

Table 12. US yellowtail statistics, Subarea 5 (metric tons, round fresh).

Year	Food landings	Landings/day fished	Estimated discards	Estimated Industrial landings	Total Catch
1965	36,218	3.1	12,893	972	50,083
1966	28,656	2.0	8,253	2,364	39,273
1967	20,819	2.2	14,407	4,587	39,813
1968	28,645	3.0	10,627	3,939	43,211
1969	28,739	2.7	5,202	4,265	38,206
1970	29,825	2.5	10,689	2,095	42,608
1971	21,700	2.1	7,124	397	29,221
1972	23,886	2.1	3,100	327	27,313
1973	24,710	2.2	1,086	343	26,139

Table 13. Yellowtail abundance indices from US survey cruises.

Year	S. New England (W. of 69°)		Georges Bank (E. of 69°)	
	No/tow	Wt/tow ¹	No/tow	Wt/tow ¹
1963	50.6	32.1	30.1	22.0
1964	60.8	41.9	23.0	23.4
1965	38.7	28.0	15.0	15.7
1966	50.3	20.8	14.8	6.7
1967	57.7	31.0	19.2	13.0
1968	40.2	22.1	25.6	18.1
1969	54.8	31.7	23.1	16.0
1970	39.8	24.7	13.4	8.6
1971	41.7	20.2	15.2	11.0
1972	73.3	44.3	14.6	10.9
1973	7.9	5.0	13.1	9.5

¹Weight in pounds.

6. Red hake

Red hake landings by US vessels from Subarea 5 in 1973 rose from 1972 to 2,940 tons (Table 14).

The 1973 autumn research vessel survey cruise indicated a decrease in stock abundance in Subdivision 5Zw and some increase in Subdivision 5Ze. The survey abundance index had improved in Division 5Y in 1972, but decreased again in 1973.

Table 14. US red hake statistics, Subarea 5 (metric tons, round fresh).

Year	Subarea 5 landings	Food Fish		Industrial Fish	
		Div. 5Y landings	Subdiv. 5Ze landings	Subdiv. 5Zw landings	Landings/day fished
1965	13,493	192	385	12,916	9.1
1966	4,280	634	845	2,801	2.3
1967	5,759	92	169	5,498	5.6
1968	6,216	82	161	5,973	7.0
1969	4,923	140	225	4,558	8.2
1970	4,281	249	100	3,932	6.3
1971	2,783	268	111	2,404	8.4
1972	1,711	373	160	1,178	---
1973	2,940	286	77	2,577	---

Table 15. Red hake abundance indices (mean pounds/tow) from US autumn survey cruises.

Year	Div. 5Y	Subdiv. 5Ze	Subdiv. 5Zw
1965	2.7	3.4	12.4
1966	2.1	2.4	6.4
1967	1.0	1.3	5.9
1968	0.6	2.2	9.7
1969	0.7	3.3	10.6
1970	1.0	1.1	8.6
1971	2.8	3.5	8.8
1972	4.7	2.2	14.6
1973	2.5	4.3	6.7

7. Sea herring

The US herring catch from Div. 5Y in 1973 declined 40% (Table 16).

The US catch of herring from Div. 5Z and Stat. Area 6 was 4,603 tons, about 15% above the 1972 catch.

Table 16. US sea herring landings from Subarea 5 (metric tons, round fresh).

Year	Subarea 5	Div. 5Y	Subdiv. 5Ze	Subdiv. 5Zw	Statistical area 6
1965	34,495	33,634	861 ¹	---	
1966	30,589	29,365	1,224 ¹	---	
1967	31,778	31,158	620 ¹	---	
1968	42,083	41,476	9	598	
1969	30,780	28,687	832	1,261	
1970	30,484	29,181	272	1,031	
1971	33,890	31,491	1,194	1,205	
1972	40,473	38,211	11	2,251	
1973	25,675	21,601	162	3,912	529

¹Div. 5Z.

Table 17. US research cruise indices of herring abundance (mean number/tow).

Year	Autumn cruises	Spring cruises	Spring cruises
	Georges Bank	S. New England	Mid-Atlantic
1963	7.02		
1964	1.13		
1965	6.45		
1966	10.41		
1967	3.26		
1968	1.36	120.6	17.4
1969	1.14	45.8	6.4
1970	0.66	34.7	1.2
1971	0.55	4.1	3.7
1972	1.06	5.7	2.6
1973	0.12	7.2	5.6

8. Industrial Groundfish Fishery

New England landings for industrial purposes from Subarea 5 (predominantly Subdiv. 5Zw) increased about 50% in 1973 (Table 18).

Table 18. New England groundfish landings from Subarea 5 for industrial purposes (metric tons, round fresh).

Year	Total landings	Species composition (%) for Subdiv. 5Zw				
		Silver hake	Red hake	Flounder	Eel pout	Other
1965	33,990	20.4	38.0	6.9	1.8	32.9
1966	27,461	9.6	10.2	18.2	25.0	37.0
1967	37,400	10.2	14.7	18.5	18.9	37.7
1968	34,729	9.9	17.2	16.5	24.2	32.2
1969	26,813	9.5	17.0	21.3	20.8	31.4
1970	20,696	6.3	17.9	16.7	28.3	30.8
1971	8,823	10.1	25.8	6.6	33.7	26.3
1972	5,944	2.1	17.9	10.3	35.3	35.8
1973	11,854	7.4	20.8	10.4	26.2	35.2

9. Sea Scallops

US sea scallop landings from Subarea 5 in 1973 were 12,853 tons (in the round), an increase of 12% from 1972 (Table 19). Because of low abundance, the number of US vessels fishing for scallops has declined significantly in recent years.

Table 19. US sea scallop statistics, Subarea 5 (metric tons, weight of adductor muscle only).

Year	Landings	Days fished	Landings day fished
1965	1,509	2,156	0.7
1966	901	1,001	0.9
1967	1,309	1,870	0.7
1968	1,163	1,938	0.6
1969	1,465	2,930	0.5
1970	1,553	2,588	0.6
1971	1,697	3,394	0.5
1972	1,347	2,694	0.5
1973	1,543	2,572	0.6

B. SPECIAL RESEARCH STUDIES

1. Environmental Studies

A total of about 270 hydrographic stations were completed utilizing an electronic STD/DO continuous profiling system. In addition 1260 temperature profiles were obtained using an expendable bathythermograph system. Surface meteorological observations, including sea conditions, surface temperature readings, and surface salinity samples were logged at most bathythermograph locations. Table 1 lists the cruises and locations that are of general interest to ICNAF.

Table 1. Cruises conducted by NEFC within the ICNAF area during 1973.

Cruise	Purpose	Stations	Bathythermographs	General area
73-3	Spring groundfish	38	302	Cape Hatteras-Western Nova Scotia
73-7	September juvenile fish	15	84	Georges Bank
73-8	Autumn groundfish	52	360	Cape Hatteras-Western Nova Scotia
73-9	December Larval herring	49	115	Georges Bank

Although the data from the groundfish surveys are only in preliminary analyses, comparison of these data with previous station data indicates that increased sampling would provide valuable information on special changes of water masses and the influence of these changes on the distributions of various groundfish.

The United States Coast Guard has continued the ocean station programs of station BRAVO (56° 30' N, 51° W) and ocean weather station HOTEL (38° N, 71° W) throughout the year but BRAVO is scheduled to be discontinued 1 July 1974. The standard monitoring sections were continued for the entire year. In addition the International Ice Patrol support continued in the Grand Banks region from April-July.

Private research institutions and universities carried out various research projects within the ICNAF region. Particular emphasis has been within Massachusetts Bay, under the BIOME project, south of New England by the Woods Hole Oceanographic Institution and within New York Bight under the MESA project.

2. Biological Studies

a. Gadoids - Studies of spawning and fecundity in the Northwest Atlantic were continued with emphasis on haddock, cod, and pollock. A survey to monitor progress of spawning and to collect fecundity samples was conducted on Georges Bank from April 9 to 25 and in the Gulf of Maine and off the Nova Scotian shelf from May 2 to 16. On Georges Bank 20 percent of the haddock were spawning and 52 percent were past spawning; 5 percent of the cod were spawning and 86 percent were past spawning; all pollock were past spawning. In the Gulf of Maine and off Nova Scotia 10 percent of the haddock were spawning and 37 percent were past spawning; 6 percent of the cod were spawning and 61 percent were past spawning. The data for pollock are not yet analyzed.

Of note during the 1973 spawning season was the occurrence of immature haddock belonging to the 1971 and 1972 year classes which made up 76 percent of the samples on Georges Bank and 41 percent on Browns Bank.

Fecundity estimates were completed on 130 haddock in 1972 and 79 in 1973. In 1972 fecundity increased with length by a factor of 3.24; a slightly greater increase was noted in 1973.

b. Demersal Food Chain Investigation - A summarization of a quantitative food-habits study of cod, haddock, and silver hake, from Subareas 4, 5, and 6, is being prepared. A comparison of the food habits of sea herring with those of Atlantic mackerel has been initiated; the purpose is to determine whether those two species compete for food during juvenile and adult life stages.

Preliminary results are being summarized from the Megabenthic Invertebrate Survey conducted in the Veatch Canyon region (located 80 miles southeast of Nantucket, Massachusetts) in 1973. One of the principal objectives of this survey was to compare the efficiency of various methods of determining the abundance of lobsters, crabs, and bottom-dwelling fishes. The results showed clearly that the Towed Underwater Benthic Sled, equipped with a 70 mm camera, gave better estimates of density of these animals than did the otter trawl.

3. Gear Selectivity Studies

Effort was continued in 1973 to develop a new standard ground-fish survey trawl capable of taking larger samples of bottomfish and semi-pelagic fishes. Cooperative cruises were conducted aboard the U.S. R/V Albatross IV and the U.S.S.R. R/V Belogorsk to measure, test, and calibrate a modified, high-opening "Yankee No. 41" survey trawl. Interim use of the new trawl was made during the 1973 Spring survey aboard the Albatross IV and during the Fall survey aboard the Belogorsk.

A Towed Underwater Benthic Photograph Sled was designed, assembled, and utilized for conduct of a photograph survey of benthic fauna. During June 1973 20,000 photographs of selected bottom areas were made by means of a 70 mm camera and strobe-light system.

Research and testing were continued to develop modified lobster traps that will conserve the resource by eliminating the continued fishing capability of lost traps and permit the escape of undersized lobsters.

Investigation was continued to assess the potential for hydro-acoustic fishing survey and assessment system and to define problem areas where additional research and development are required.

4. Assessment Studies

A major assessment effort was devoted to providing analyses of herring total allowable catches, and an evaluation of the relative precision of setting TACs in June of year M-1 contrasted with January in year M. An assessment of mackerel abundance indices showed continued decline in that stock. An assessment was made of red hake stocks on both Southern New England and Georges Bank. Yellowtail flounder assessment on SA5 was updated and a new assessment of SA6 accomplished. These stocks have declined to very low levels. Updates of assessment were made by all stocks under ICNAF management in SA5 and 6 including the total overall TAC. The latter consumed the greatest proportion of effort. Considerable effort was devoted to analyzing the precision of the sampling data on which assessments are based.

Statistical Area 6

A. STATUS OF THE FISHERIES

See Table 1 for finfish and sea scallop landings in Statistical Area 6.

B. SPECIAL RESEARCH STUDIES

Biological and Environmental Studies, where pertinent, are reported under Subarea 5.

