Brief Historical Synopsis of Certain Northeast U.S. Fisheries

by

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COD

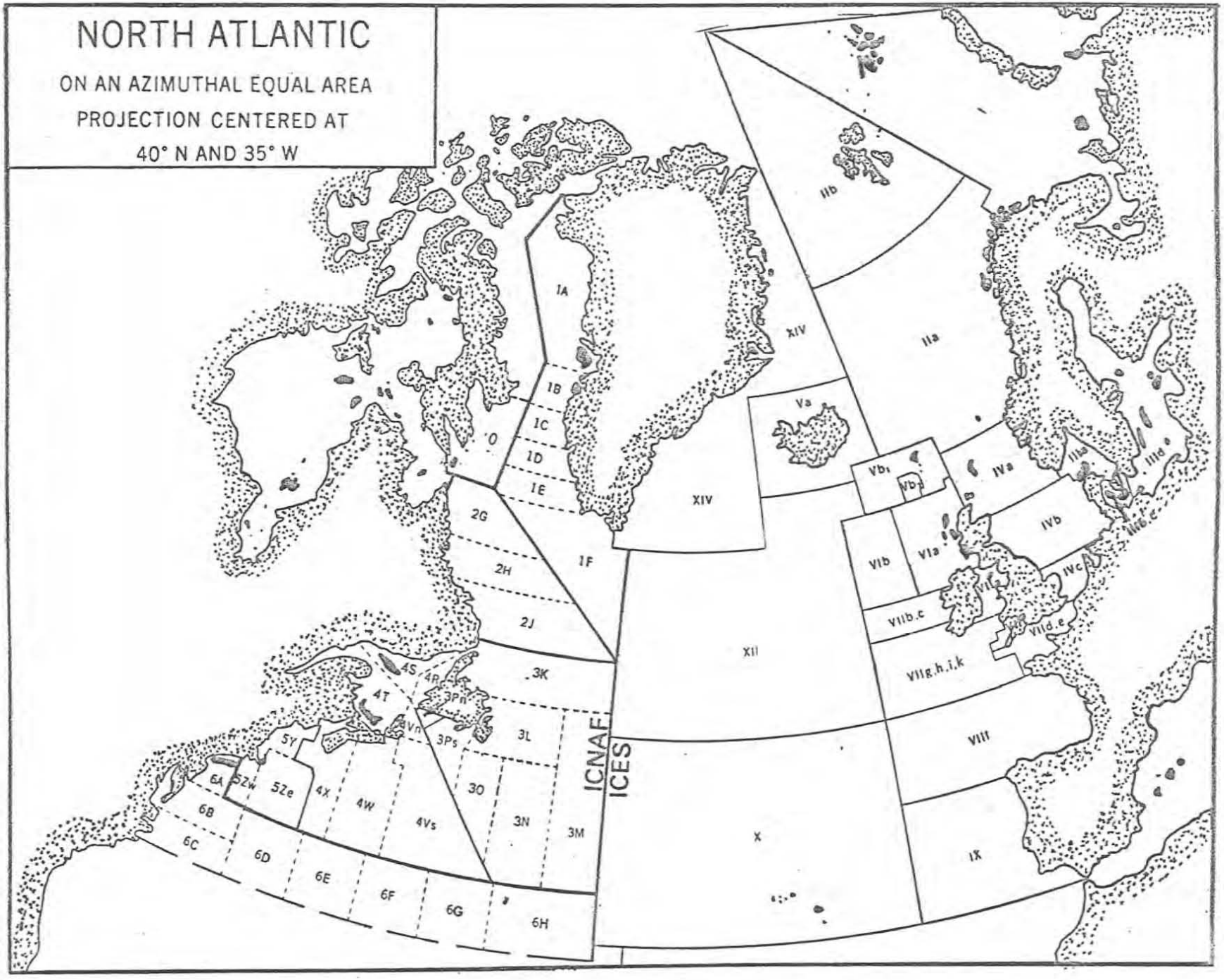
HADDOCK

HERRING

REDFISH

SEA SCALLOPS

Lab Reference #76-11
(6/28/76)


NORTH ATLANTIC
ON AN AZIMUTHAL EQUAL AREA
PROJECTION CENTERED AT
40° N AND 35° W
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IIa
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Atlantic Cod

Early history of fishing in New England is a story of the cod fishery. Fishing for cod by means of small boats and hand liner was a principal activity and source of food for the original white settlers of Massachusetts. It has been suggested that Plymouth Colony could not have survived without the abundant supplies of codfish available in local waters. As New Englanders were able to produce cod catches in excess of their food requirements, an export trade in salted, dried cod developed; capital from the salt cod trade became the support and basis for the industrial development of New England, particularly the shipbuilding and textile industries.

By the year 1708 New England vessels were taking cod from the banks off Nova Scotia and in 1748 cod fishing was started on Georges Bank. In 1757 vessels from Gloucester began to range to the Grand Bank of Newfoundland, and by 1788, sixty Gloucester vessels fished the Grand Bank. Around the end of the 19th Century, however, US fishing effort was concentrated on Georges and Browns Banks by a fleet of 174 dory-carrying schooners. In 1879 41.7 thousand metric tons (round weight) were landed, and an all-time record of 133.2 thousand metric tons was landed by the "salt-bankers" in 1880. The fishing power of the schooner-dorymen had been enhanced in the 1850's by conversion from "hand lining" single lines to "long-lining", whereby a "main-line" with many branch lines and baited hooks was paid out and retrieved by one or two fishermen in dories. Long-line fishing for cod and other species persists today from several New England ports - e.g. Chatham, Massachusetts, the lines being set from 30- to 50-foot power boats and retrieved with power line-haulers.

Bottom set gill net fishing was initiated in 1908 when five or six vessels equipped with mechanical net lifter arrived in Gloucester from the Great Lakes. The gill net fishery for cod, haddock, pollock, flounders, and other groundfish prospered for 30 years but declined in the 1940's and 50's as it was supplanted by small otter trawlers (draggers). Today only a few gill netters are operated from Portland, Maine, and Gloucester, fishing the more inshore banks, particularly areas too rough for otter trawling.

Steam-powered (coal-fired) otter trawlers were developed in England and fished from English ports as early as the 1870's but the first successful steam trawler in New England fisheries was delivered to Boston in 1905. By 1915 nine large otter trawlers were in operation and otter trawling has been the dominant fishing method since that time.

The steam trawlers were generally repowered or replaced by diesel-powered vessels in the 1920's and 1930's. Except possibly for some small long-liners the fleets are diesel-powered today.

Coincident with the evolution to steam and diesel trawlers the dominant market form of codfish changed from the salt-dried product to fresh and fresh-filleted. An essential element of support in this change was the growth of ice-making businesses after 1900 and consequent availability of low cost ice to the trawlers. Consumer preference converted quite completely from salt-drie cod to fresh-iced or frozen products.

Landings in Recent Years

Total US landings of cod in the recent decades in thousands of metric tons were: in the 1930's from a low of 42.2 to a high of 63.5; 1940's 28.1 to 65.8; 1950's 14.9 to 25.8; 1960's 16.8 to 26.3. During the five years from 1970 through 1974 landings were 23.6 24, 21, 22, and 26 thousand metric tons, respectively. Landings since 1966 have not fallen below 20 thousand metic tons reflecting an increase in effort for cod associated with the decline of haddock and the effect of regulatory measures on catches of groundfish and other species.****

Cod
(Landings in Metric Tons, Round-Fresh)

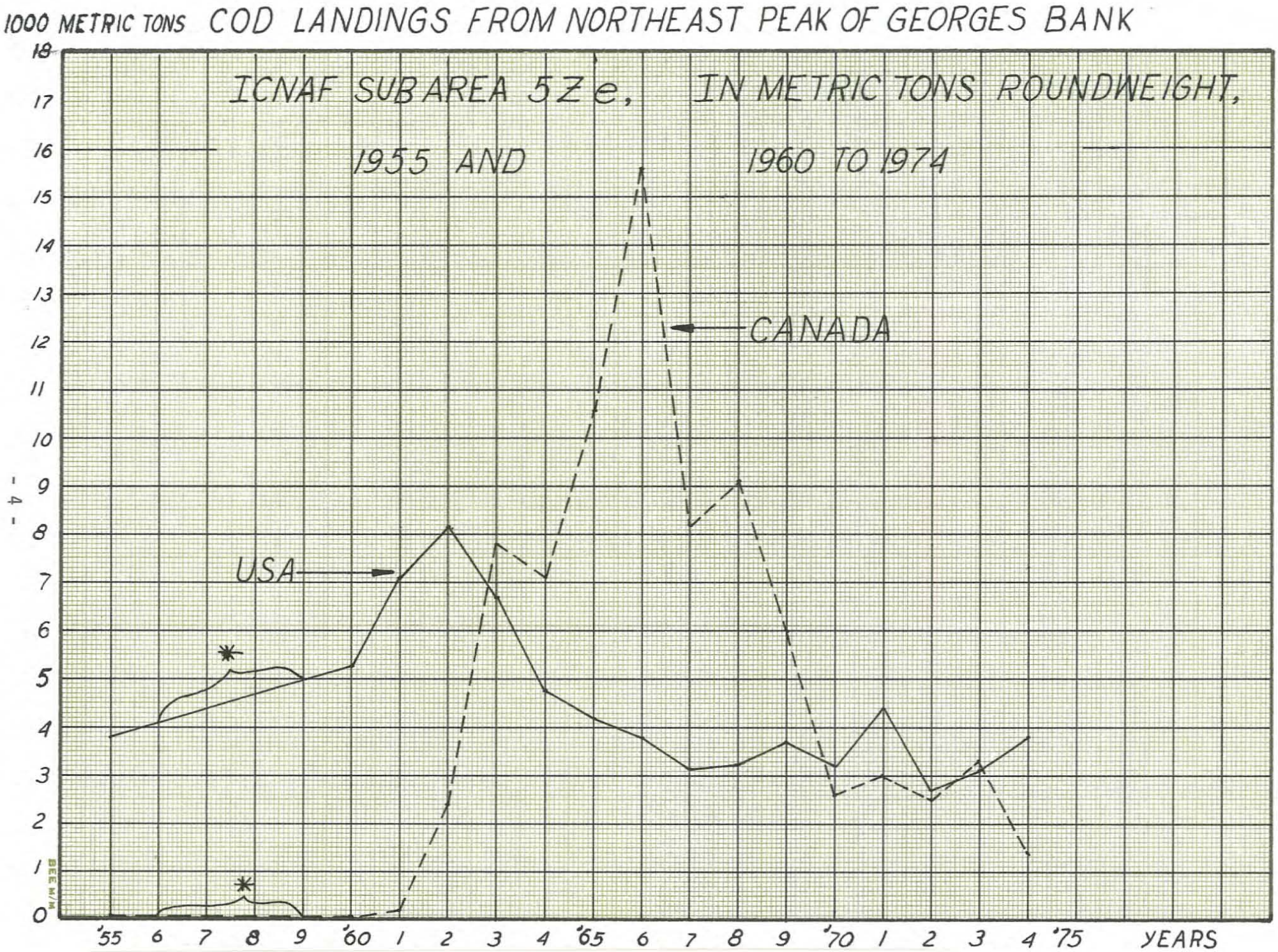
			Northeast Peak of Georges Bank		
Year	Subarea 3* USA	Subarea 4** USA	5Z*** USA	5Z*** Canada	Gulf of Maine Canada
1950					
1951					
1952	64	5558			
1953	116	3524			4
1954	36	3653			
1955	3	2228	3851	8	12
1956	15	1856			8
1957	22	1553			21
1958	-	1283			64
1959	13	2097			132
1960	-	1703	5329	19	29
1961	2	1306	7144	223	18
1962	2	1257	8116	2404	83
1963	-	1347	6723	7832	3
1964	-	1452	4815	7108	25
1965	-	890	4272	10598	148
1966	-	983	3860	15601	384
1967	-	1453	3115	8232	297
1968	-	860	3244	9127	61
1969	40	448	3676	5997	59
1970	55	615	3211	2583	26
1971	-	335	4389	2979	119
1972	-	323	2708	2515	53
1973	-	184	3064	3220	68
1974	-	409	3792	1373	120
1975	-	497			

* Grand Bank

** Gulf of St. Lawrence and Nova Scotian Shelf

*** US landings for Statistical Areas 523, 524 (Northeast Peak); Canadian landings primarily from these two statistical areas but recorded in statistics as follows: 5Z until 1967, 5Ze since 1968.

**** Landings referred to here are gutted weight.



*(5Ze breakout not available this period)

TABLE 2 1. UNITED STATES — COD LANDED

In Metric Tons Round Fresh

Year	Sub-area			Total	Year	Sub-area			Total	Year	Sub-area			Total
	5	4	3			5	4	3			5	4	3	
1893	48,641	7,129	19,646	75,416	1913	24,719	12,701	9,298	46,718	1933	37,498	18,569	134	56,201
1894	57,350	8,821	19,709	85,880	1914	33,661	11,591	4,809	50,061	1934	32,410	33,062	431	65,903
1895	63,687	8,551	23,796	96,034	1915	18,932	15,038	3,520	37,490	1935	36,185	29,518	275	65,978
1896	49,232	6,168	19,246	74,646	1916	19,268	13,685	3,733	36,686	1936	36,380	23,036	1,414	60,830
1897	47,106	5,953	13,035	66,094	1917	21,877	21,833	837	44,547	1937	46,396	27,358	1,271	75,025
1898	45,282	11,553	12,370	69,205	1918	30,563	19,553	1,300	51,416	1938	37,452	28,502	2,434	68,388
1899	49,528	23,149	19,333	92,010	1919	30,721	19,033	1,363	51,117	1939	31,903	28,195	120	60,218
1900	34,870	17,669	17,541	70,080	1920	28,046	15,201	1,131	44,378	1940	28,302	17,692	47	46,041
1901	46,398	21,994	13,864	82,256	1921	32,866	8,683	3,268	44,817	1941	32,263	22,954	3	55,220
1902	43,033	17,960	12,401	73,394	1922	31,638	11,381	1,937	44,956	1942	29,177	7,592	9	36,778
1903	40,209	10,898	14,015	65,122	1923	31,280	14,785	1,273	47,338	1943	31,232	5,650	—	36,882
1904	31,176	9,239	13,508	53,923	1924	33,475	12,925	581	46,981	1944	33,556	18,540	—	52,096
1905	37,247	15,344	4,006	56,697	1925	35,200	10,584	120	45,904	1945	33,709	43,885	—	77,594
1906	63,276	11,942	4,085	79,303	1926	41,130	22,291	342	63,763	1946	35,166	14,614	—	49,780
1907	57,965	18,727	2,056	78,748	1927	42,815	9,811	300	52,926	1947	27,538	7,989	—	35,527
1908	41,433	19,065	4,890	65,388	1928	40,756	8,663	337	49,756	1948	29,379	8,523	53	37,955
1909	40,689	34,905	4,195	79,789	1929	43,302	5,086	305	48,693	1949	28,873	4,220	—	33,093
1910	35,688	26,896	3,284	65,868	1930	48,390	8,107	118	56,615	1950	24,256	6,665	35	30,956
1911	27,105	26,009	1,641	54,755	1931	39,089	11,933	7	51,029	1951	18,358	4,340	79	22,777*
1912	28,678	18,761	5,467	52,906	1932	36,161	12,148	195	48,504					

SOURCE: Statistics submitted by North Atlantic Fishery Investigations, Fish and Wildlife Service. Recorded in thousand pounds, head on, eviscerated fish.

NOTE: Converted to round fresh weights, using conversion factor 1.20. *—Provisional.

Haddock Fishery

In the heyday of salt-bankers, haddock were considered trash fish to be avoided when possible, discarded when unavoidable, or salted only as a last resort. Sabine (1835) noted: "The hake and haddock are poor fish, and neither commands more than half the price of the cod. . . .The haddock, when fresh, suits the taste of some; but when dried, it is without reputation even in the hut of the (poorest man), who is doomed to be its principal consumer."

The use of ice aboard some of the bank fishing vessels toward the close of the 19th Century made more fresh haddock available to a still limited but growing market. From 1880 to the early 1900's New England haddock landings were fairly stable; the average annual landings were on the order of about 24.5 thousand metric tons.

The greatest boon to the haddock fishery was the innovation of filleting fish at the port, in Boston, in the autumn of 1921 (White, 1954). Before then, fish had been filleted at the retail markets to the order of individual customers. Haddock was the first species in which fillets rather than whole fish were shipped to retailers. Soon, brand-identified fresh fillets were offered, followed by packages of frozen fillets that made haddock available on a nationwide basis. Landings soon increased rapidly from about 41 thousand metric tons in 1921 to a peak of 132 thousand metric tons in 1929. The bulk of the catch came from Georges Bank; some came from Browns Bank, Nantucket Shoals, and the various inshore grounds (Table 3e).

From 1929 to 1934, severe declines of haddock abundance and fishing effort brought a marked decrease in New England landings. In 1935 to 1941, however, landings increased because of an increase in haddock abundance and fishing effort on Georges Bank. In the 1940's, landings of haddock from Georges Bank were about 45.3 thousand metric tons per year, but during the 1950's landings declined to about 37.6 thousand metric tons.[1/]

During the period of 1960 through 1966 catches generally increased averaging 47.6 thousand metric tons per year for the seven years, the lowest catch being 44.1 in 1963. However, a combination of the lack of recruitment of large "year-classes" of haddock since the 1963 year-class and the heavy influx of foreign fishing effort contributed to rapid decline of the Georges Bank fishery after 1966. The US landings for 1970 were only 8.4 thousand metric tons, declining to 2.4 in 1974 with a small increase to 4.0 in 1975.

1/ From A.C. Jensen, A Brief History of New England Offshore Fisheries.

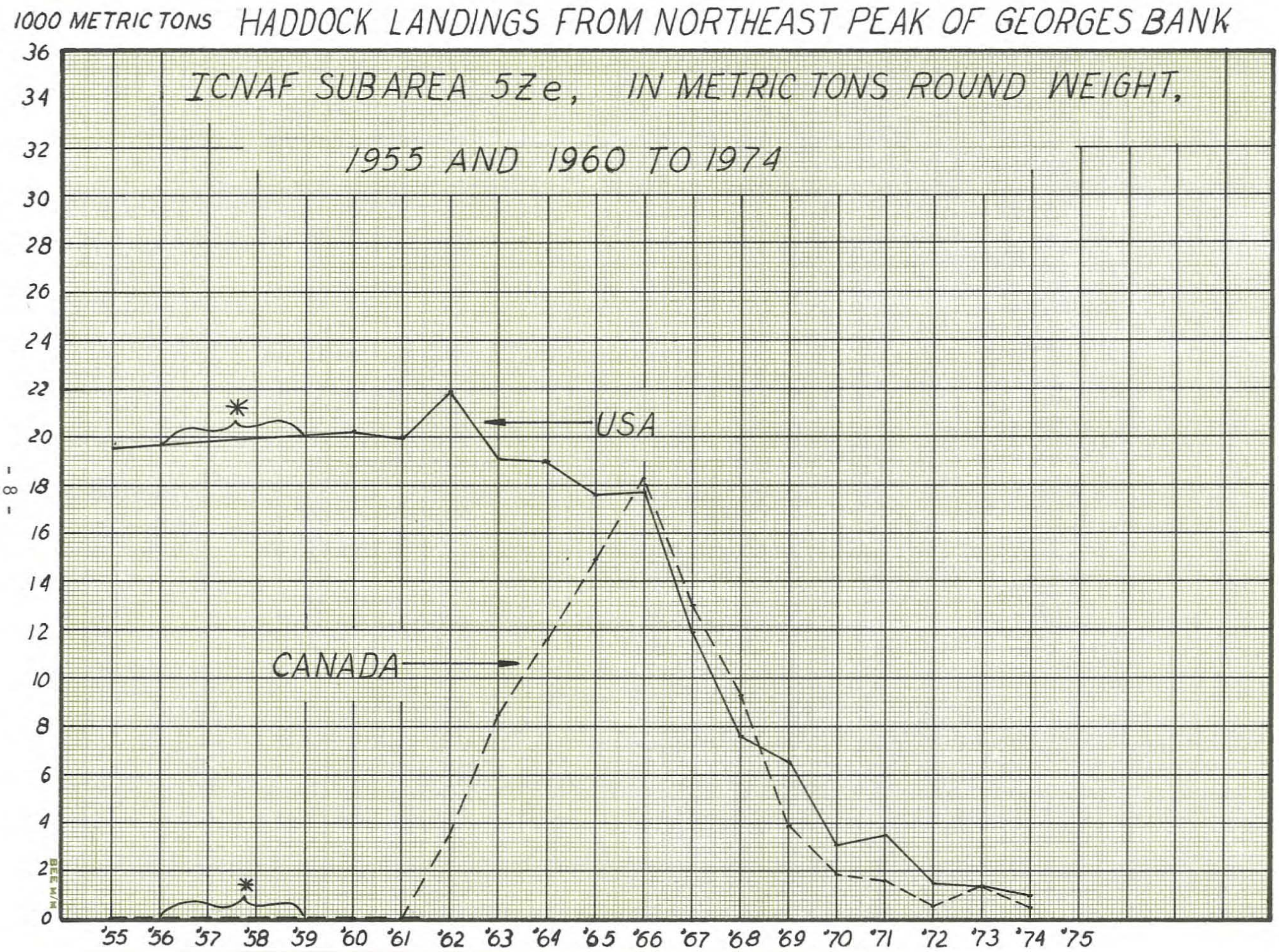
Haddock

(Landings in metric tons, Round-Fresh)

Year	Subarea 3 USA	Subarea 4 USA	Northeast Peak of Georges Bank * (5Ze) USA	Northeast Peak of Georges Bank * (5Ze) CANADA	Gulf of Maine 5Y CANADA
1952	4	25009			
1953	334	18339			11
1954	390	18034			-
1955	14	13901	19519	31	150
1956	190	14024	1/		29
1957	10	8951			25
1958	6	12639			285
1959	26	10544			163
1960	1	8466	20297	77	383
1961	1	9330	20030	133	56
1962	2	6440	21921	3461	107
1963	1	7286	19142	8370	3
1964	1	8541	19048	11625	70
19-5	-	3693	17637	14859	159
1966	-	2492	17672	18292	1125
1967	-	5019	11999	13040	589
1968	-	3157	7646	9323	120
1969	-	1830	6621	3990	59
1970	-	2319	3154	1978	38
1971	-	1248	3533	1630	85
1972	-	448	1551	509	23
1973	-	442	1396	1563	49
1974	-	674	955	462	198
1975	-	2162			
1976	-				

1/ Table used presents catches for 1955 and 1960 to 1975. Catches were made in 1956-1959 but the 5Ze breakout is not immediately available. 1955 catch is presented as example of years prior to 1960.

* See footnote marked *** on page 3



5Ze breakout not available this period.

TABLE 3 e. UNITED STATES — HADDOCK LANDED

In Metric Tons Round Fresh

Year	Sub-area			Total	Year	Sub-area			Total	Year	Sub-area			Total
	5	4	3			5	4	3			5	4	3	
1893	15,937	1,620	—	17,557	1913	21,039	6,806	30	27,875	1933	51,707	24,022	17	75,746
1894	21,279	2,309	—	23,588	1914	28,015	8,631	15	36,661	1934	31,808	42,661	99	74,568
1895	19,808	1,721	—	21,529	1915	29,196	9,465	14	38,675	1935	43,500	47,949	—	91,449
1896	14,089	1,510	—	15,599	1916	25,067	9,968	178	35,213	1936	49,611	33,798	3	83,412
1897	14,366	1,652	—	16,018	1917	18,575	12,498	55	31,128	1937	53,964	25,490	123	79,577
1898	13,935	2,899	—	16,834	1918	26,579	10,675	166	37,420	1938	52,008	26,668	41	78,717
1899	14,349	2,881	—	17,230	1919	44,419	7,731	75	52,225	1939	59,397	20,289	194	79,880
1900	14,781	2,311	—	17,092	1920	45,736	4,354	17	50,107	1940	54,219	16,318	29	70,566
1901	12,194	2,812	—	15,006	1921	36,326	4,844	—	41,170	1941	69,413	15,956	—	85,369
1902	17,462	2,284	109	19,855	1922	36,074	9,036	—	45,110	1942	58,702	6,758	—	65,460
1903	18,177	2,686	—	20,863	1923	37,158	10,169	—	47,327	1943	52,321	4,591	—	56,912
1904	21,599	3,142	379	25,120	1924	44,742	6,869	—	51,611	1944	51,948	12,796	—	64,744
1905	30,196	3,454	75	33,725	1925	51,451	6,246	—	57,697	1945	44,907	25,691	—	70,598
1906	29,512	2,525	33	32,070	1926	56,784	4,156	—	60,940	1946	56,545	14,230	27	70,802
1907	17,939	4,130	25	22,094	1927	84,136	3,996	—	88,132	1947	59,053	16,151	7	75,211
1908	20,913	4,235	33	25,181	1928	107,837	4,400	—	112,237	1948	53,542	17,902	790	72,234
1909	17,859	4,493	17	22,369	1929	126,204	6,012	—	132,216	1949	49,319	12,189	—	61,508
1910	22,328	3,463	16	25,807	1930	107,634	15,668	—	123,302	1950	47,152	24,355	148	71,655
1911	24,651	4,524	112	29,287	1931	67,829	21,964	—	89,793	1951	53,248	15,098	8	68,354*
1912	27,725	5,263	38	33,026	1932	59,689	16,039	32	75,760					

SOURCE: Statistics submitted by North Atlantic Fishery Investigations, Fish and Wildlife Service. Recorded in thousand pounds head on eviscerated fish.

NOTE: Converted to round fresh weight, using conversion factor 1.14. * — Provisional.

Redfish (Ocean Perch)[1/]

The Cinderella of New England commercial fishes is the ocean perch (Haberland, 1946). Few were caught on the old hook-and-line gear, but the otter trawl began to make some inroads on the, until then, unexploited stocks. The ocean perch, with its spiny projections, was unsuitable for salting, and most of those that were caught were discarded as trash. Before World War I, a few million pounds were landed each year in Europe for the fresh fish market. After the war, some also was sold fresh in the United States, but the ocean perch was never a great competitor in the market for salt cod and, later, fresh haddock.

The situation changed radically, however, in the middle 1930's. By chance a fish cutter found that the ocean perch yielded a small white fillet with a taste and texture similar to fresh-water perch. The product found a ready market in the Middle West and South where the taste of yellow perch was familiar. Changing the name of the product to "ocean perch" (it is sometimes also marketed as rosefish) increased its acceptance. Thus, a whole new fishery was born.

The filleting of ocean perch originated in Boston, but space was insufficient for handling the new product Gloucester seemed a likely location. Although it once reigned as the salt fish capital, fish processing in Gloucester had declined, mostly because of foreign competition beginning about 1900, and hit the economic bottom in 1933 (White, 1954).

Empty wharves and buildings were available for the ocean perch processing plant and this space paved the way for a new "Golden Era of Fishing" for the city of Gloucester.

The New England ocean Perch fishery has concentrated on a series of areas. The earliest fishing in the Gulf of Maine took place in the deep water along the edges of Cashes Ledge, the Great South Channel, and many of the various holes in the area.

Later, the fleet moved eastward as new ocean perch stocks were discovered on the Nova Scotia banks, Newfoundland banks, and in the Gulf of St. Lawrence. In each area, landings rose to a peak as fishing effort increased for a few years. Later, as catch-per-day began to decline in one area, the effort was diverted to new areas.

The trend in annual average catch-per-day of ocean perch has been slowly downward in the four fishing areas mentioned above, each area approaching equilibrium at a different level. The ocean perch landings from the combined areas reached a peak in 1951 and then declined as catch-per-day diminished and effort was reduced.

1/ From A.C. Jensen, A Brief History of New England Offshore Fisheries

Redfish
(Landings in Metric Tons Round Weight)

Year	Subarea 3* USA	Subarea 4** USA	Northeast Peak of Georges Bank 5Z USA	5Z CANADA	Gulf of Maine 5Y CANADA
1950					
1951					
1952	31464	31345			
1953	33114	19574			
1954	31263	38123			
1955	13406	44069	14		
1956	13304	41138			
1957	4748	37529			
1958	10211	38963			4
1059	16483	29917			
1960	15231	37592	10		2
1961	16703	29160	9	25	
1962	14225	29437	6	3	
1963	12098	28161	21	89	
1964	4694	27919	53	54	2
1965	772	30181	38	17	51
1966	347	29445	51	128	292
1967	149	21996	50	119	75
1968	198	21072	53	169	22
1969	33	13264	40	235	25
1970	-	9541	89	251	87
1971	-	10967	77	199	120
1972	-	9702	61	110	14
1973	-	12378	40		
1974	198	9923	75		
1975		5464			

* Grand Bank
** Gulf of St. Lawrence and Nova Scotian Shelf.

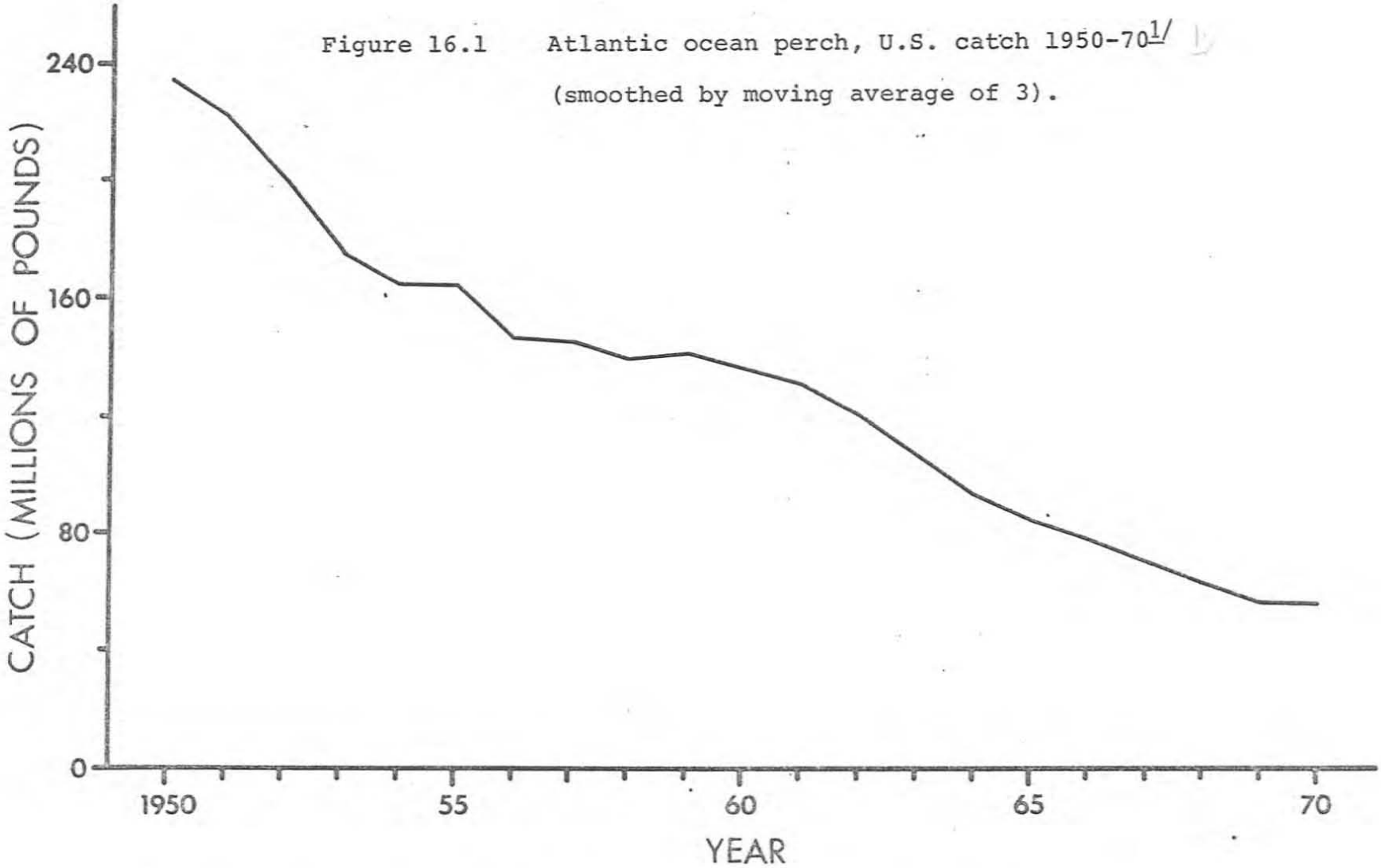
Table 16.1-Atlantic ocean perch, U.S. catch from[1/] all grounds, 1935-70.

Year	Catch
1935	17 million pounds
1936	67
1937	58
1938	65
1939	77
1940	85
1941	155
1942	128
1943	115
1944	120
1945	131
1946	178
1947	148
1948	238
1949	237
1950	208
1951	258
1952	189
1953	154
1954	181
1955	157
1956	151
1957	134
1958	149
1959	137
1960	141
1961	132
1962	124
1963	108
1964	89
1965	84
1966	82
1967	72
1968	61
1969	56
1970	55

1/ From: The United States Marine Fishery Resource. MARMAP Contribution No. 1. John P. Wise, Editor.

Figure 16.1 Atlantic ocean perch, U.S. catch 1950-70[1/]

(smoothed by moving average of 3).



1/ From: The United States Marine Fishery Resource. MARMAP Contribution No. 1. John P. Wise, Editor.

TABLE 4 f. UNITED STATES — REDFISH LANDED

In Metric Tons Round Fresh

Year	Total Sub-area 5	Year	Sub-area 5	Sub-area 4	Total	Year	Sub-area 5	Sub-area 4	Total	Year	Sub-area 5	Sub-area 4	Total
1916	53	1925	25	—	25	1934	519	361	880	1943	48,349	3,695	52,044
1917	82	1926	30	—	30	1935	7,549	233	7,782	1944	50,439	4,089	54,528
1918	41	1927	30	—	30	1936	23,162	7,195	30,357	1945	37,912	21,886	59,798
1919	25	1928	55	2	57	1937	14,823	11,647	26,470	1946	42,423	38,383	80,806
1920	31	1929	32	2	34	1938	20,640	8,846	29,486	1947	40,160	26,330	66,490
1921	13	1930	47	6	53	1939	25,406	9,799	35,205	1948	43,631	64,367	107,998
1922	14	1931	80	28	108	1940	26,763	11,856	38,619	1949	30,743	76,751	107,494
1923	7	1932	28	29	57	1941	59,796	10,436	70,232	1950	34,308	59,662	93,970
1924	35	1933	85	35	120	1942	55,893	2,208	58,101	1951	30,077	83,315	113,392*

SOURCE: Statistics submitted by North Atlantic Fishery Investigations, Fish and Wildlife Service. Recorded in thousand pounds round weight fish.
NOTE: Negligible landings prior to 1916. In 1950, 282 metric tons were landed from Sub-area 3, and in 1951, 2,737 metric tons. * — Provisional. While this report was being printed 15,199 metric tons were reported from Sub-area 3.

Sea Scallops Fishery

The Atlantic sea scallop, *Placopecten magellanicus* (Gmelin), occurs from the Gulf of St. Lawrence to the Virginia Capes. Density levels sufficient to support a fishery are normally found at depths between 40-100 meters. Few areas within ICNAF Subarea 5 and Statistical Area 6 have consistent populations dense enough to support a fishery. The Gulf of Maine (ICNAF Division 5Y) has shown only spotty recruitment, and, with the exception of a few randomly distributed years, has contributed very little to the USA catch. The Hudson Canyon area has shown an appreciable contribution to the total catch, but the most consistent source of the sea scallop has been the Georges Bank area.

For the last 30 years (1946-1975), New Bedford has been the leading scallop port, with Provincetown and "other Maine ports" providing the remainder of the landings in the New England area. New England landings have constituted approximately 80 percent of the USA landings since 1946.

The majority of the New Bedford scallop vessels are between 50 and 200 gross tons, average 12-15 years of age, and are full-time scallopers. The gear utilized by these vessels is the scallop dredge. The by-catch of the scallop dredge is very minor (i.e. less than 100 metric tons per year), with three species comprising about 80 percent of the by-catch and divided fairly equally (yellowtail flounder, winter flounder, and - since ca. 1970 - sea urchins).

USA landings of sea scallops from Georges Bank averaged 63,000 metric tons live weight (= meat weight x 8.33) per year during the period 1950-1964, with an historical peak of 89,000 MT occurring in 1961. In the last 11 years (1965-1975) the average annual landing has been about 9,500 metric tons.

Canada entered the sea scallop fishery on Georges Bank, to an appreciable degree, in 1951. From 1957 to 1962 her catch rose from .758 MT to 47,000 MT. Since 1962 Canadian catch has averaged approximately 42,000 MT. Both 1974 (50,900 MT) and 1975 (62,100 MT) exceeded that of any previous year.

Statistical Area 6 has been exclusively a USA fishery with the exception of a few years when Canada fished in the area. Only in the years 1965, 1966, and 1968 was Canada's catch significant; but the large catches in 1965-1966, combined with the USA catch, appear to be responsible for the rapid decline in stock to a level which has remained fairly constant since 1970.

At present the age of first recruitment in Subarea 5 is age 3 (Canada) and age 4 (USA), while in Statistical Area 6 it is about 3.5 for the USA. Since meat weight increases by more than 100% per year until age 4 and about 30% per year from age 4 to age 7, it is unwise to harvest before the age of 4 and probably much better to harvest at age 5 or 6.

1/ From ICNAF Res. Doc. 76/ , by Paul W. Wood

In recognition of this fact, Canada proposed, in 1972, and ICNAF accepted a regulation prohibiting the taking of scallops less than 95 mm measured from the hinge to the opposite margin, or the landing of meats resulting in more than 40 per pound in Division 5Z. Canada took reservation to the regulation and the USA then also objected; therefore, the regulation was and is non-binding on the two nations. These reservations should be withdrawn to facilitate replenishment of the stocks.

Under extended jurisdiction the location of the border for USA-Canada waters could place the highly productive Northern Edge and Northeast Peak of Georges Bank under the jurisdiction of either country.

A table and line graph of US and Canadian catches in the "disputed area" are presented below. These figures represent the major part of US and Canadian catches on Georges Bank.

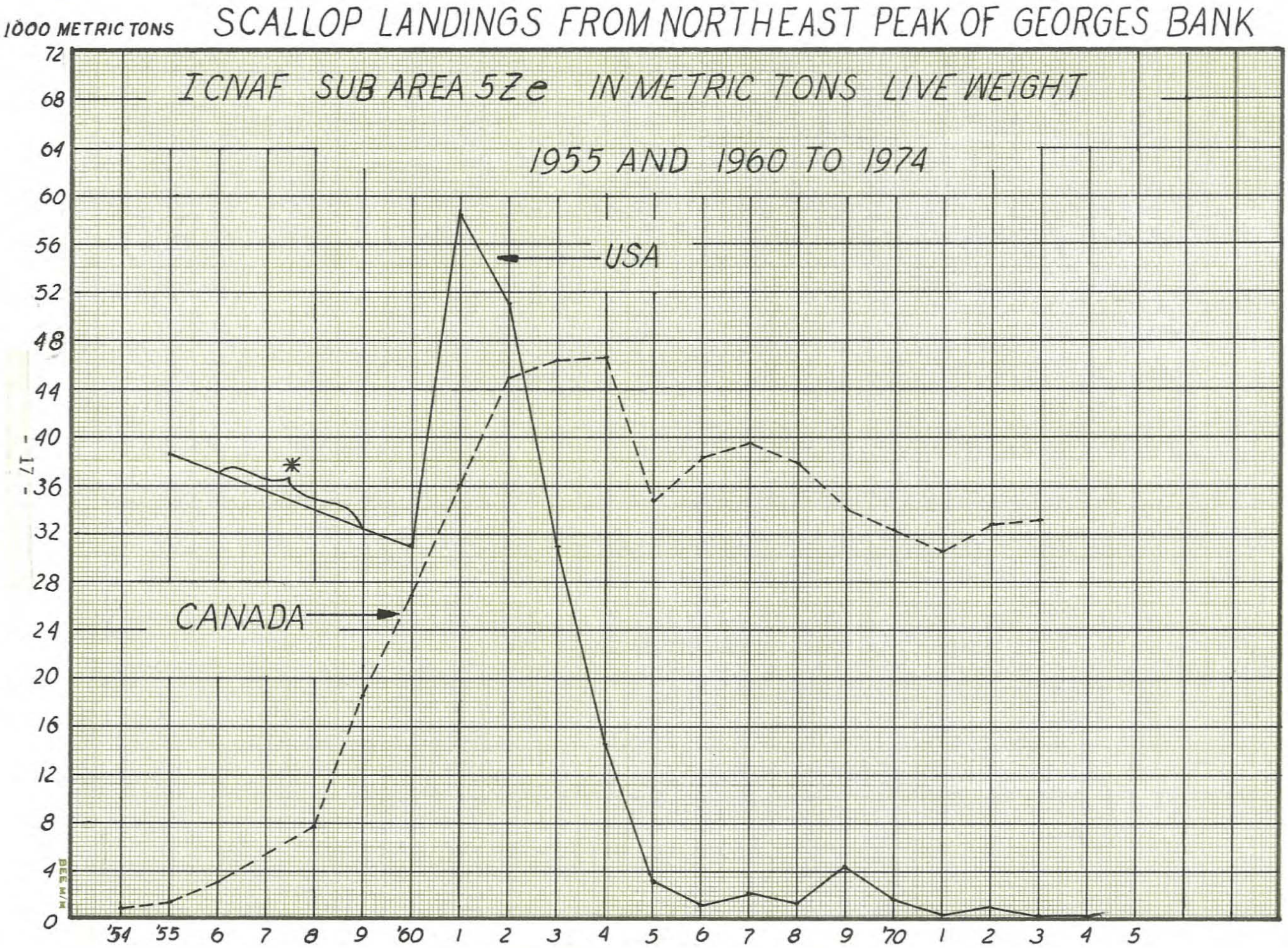
Scallops

Landings in metric tons live weight from Northeast Peak of Georges Bank

Year	USA*	Canada**	Year	USA	Canada
1951			1964	14688	46698
1953			1965	3460	34963
1954		982	1966	1196	38465
1955	38880	1282	1967	2243	39574
1956		3221	1968	1356	38023
1957			1969	4344	34044
1958		11679	1970	1561	32306
1959		18711	1971	197	30812
1960	31155	26825	1972	1120	32808
1961	58351	35995	1973	137	33302
1962	51306	45062	1974	172	
1963	31045	46509	1975		

* Estimated catches - NMFS Woods Hole
** Estimated Canadian catch - ICNAF Statistical Bulletin.

1/ From ICNAF Res. Doc. 76/ , by Paul W. Wood



(5Ze breakout not available this period '56 to '59)

A Brief History of the Herring Fishery in the US

Herring have been harvested from inshore waters along the New England coast since records have been kept. The Plymouth Colony had a herring weir at least as early as 1641 and prior to the Revolution herring were caught for trade from North Carolina to Newfoundland by US fishermen. The greatest fishing area for herring was near Passamaquoddy Bay in the Bay of Fundy. Torching was the principal method of catching herring prior to 1820 when brush weirs were first used. In 1849 the number of weirs had increased to 65 in Maine and 55 on the Canadian side of Passamaquoddy Bay. By 1880 the Canadian waters had 142 weirs compared with 66 in US waters. Gill nets were introduced to this area in 1829. Nearly all of the herring caught on both the Canadian and US sides of Passamaquoddy Bay in the 1800's were processed in Eastport and Lubec as sardines, smoked or pickled herring. For example in 1894, 26,660 metric tons were caught in this area with 76% packed as sardines, 20% smoked and 4% pickled in Eastport and Lubec, Maine.

The first smoked herring cured in Maine was in 1797 and this method was introduced to the Passamaquoddy area in 1808. From 1845 to 1865, an average of 2.7 thousand metric tons of herring per year were smoked in eastern Maine. This industry reached its peak in 1870 and gradually declined from 1870 to 1890 with the quantities of herring taken for smoking varying from 1.5 to 2.3 thousand metric tons. After 1890 the quantity increased again until 1898 when 4.8 thousand metric tons were shipped from Lubec, Maine, worth just under $200,000. Herring are smoked today but in very limited quantities. From 1957 to 1971, for example, the average quantity used annually for smoking was only 683 metric tons.

The frozen herring fishery out of Gloucester began in the winter of 1853-54 when the schooner Flying Cloud was unable to obtain a cargo of halibut from waters off Newfoundland. To make the voyage pay the vessel was loaded with cod and herring, the herring to be used as bait by the Georges Bank cod fishermen and some as food. This winter fishery soon developed into one of considerable importance and profit. About 1865, the frozen herring fishery turned to the Bay of Fundy for its supply of herring and gradually this area supplanted the Newfoundland herring in the US markets.

The Maine sardine industry began in Eastport, Maine, in 1875 with the building of the first sardine cannery. In the four succeeding years one factory was added each year. By 1886 there were 45 sardine canneries in the State of Maine, thirty-two of which bordered on Passamaquoddy Bay and thirteen factories located along the eastern coast of Maine. In 1900 the industry had grown to 75 sardine factories. From 1920 to about 1940 a little less than 2 million cases a year on the average were packed by the Maine Sardine Industry. From about 1940 into the mid-fifties the pack averaged around 3 million cases or slightly more. During the late fifties and sixties the pack declined first due to a decrease in market demand and competition from foreign suppliers and then finally due to a lack of fish.

The Maine catch of herring has fluctuated greatly since 1880 (Figure 1 and Table 1). From 1896 to 1916 the catch averaged around 60 thousand metric tons then declined to around 25 thousand metric tons from 1917 to 1940 when the catch increased again. From the late forties through the fifties the catch resembled that of 1896 to 1916. From 1964 to 1969 the catch has been consistently low at about 28 thousand metric tons and from 1970 to 1975 the catch along the Maine coast has averaged only 17.4 thousand metric tons.

The majority of herring caught along the Maine coast since 1875 have been of age-groups 1-3 from a fishery selective to age 2 herring, of about 17 cm (6.7 inches) total length. The capture of large fish has been of minor importance since the canning of sardines became important around 1870. Larger herring have been used in limited quantities, however, for fish meal, fertilizer, lobster bait, pet food and as smoked fish. Small amounts of large herring have been caught along the coast from Massachusetts to Virginia for oil and pet food for many years. The United States catch of adult herring before 1967 averaged about 2,000 metric tons annually except for 1949 and 1964 when 5,259 and 8,179 metric tons were caught, respectively. Young herring of the proper size for use as "sardines" have not been abundant enough south of Maine to support any large sardine canneries such as are found between Portland, Maine and Black's Harbor, New Brunswick. Recently, however, a fishery has developed for large herring in the Gulf of Maine off Massachusetts in the Jeffreys Ledge area. The Div 5Y fishery for adult herring in the Jeffreys Ledge area became established in 1967 with a catch of 7,807 metric tons. The catch rapidly increased to a high of 42,918 tons in 1972 and then declined to 16,859, 18,019, and 21,467 tons in 1973-1975 (Table 2).

This fishery began on adult spawning herring on the spawning grounds in the fall of the year taking, on the average, 57% of the catch as fish age 6 and older during 1967-1973. The stock size (age 4 and older) declined steadily from 1969-1970 (127-130,000 tons) to the beginning of 1973 (31,000 tons). The recruitment (age 3) also declined steadily from 1969 (32,000 tons) to 1972 (8,000 tons) just before the good 1970 year-class (64,000 tons) entered the fishery. In 1974 and 1975, the 1970 year-class accounted for 60% and 58% of the catch by weight, respectively. Canada has been a significant member of this fishery since it began, taking 39% of the catch by weight since 1967.

Although herring have been caught on Georges Bank as early as the seventeenth century (for bait in the cod fisheries) intensive fishing on this stock did not begin until the early 1960's. The USSR began fishing for herring in 1961 with Poland joining the fishery in 1966 and other countries in 1967 (Table 3). Two very strong year-classes (1960 and 1961) increased the stock size to 1.2 million metric tons by 1967. Fishing effort increased rapidly after 1967 as the stock size declined to 146,000 tons by 1973. The catch reached a maximum in 1968 of 373,600 tons. The TACs of 150,000 tons set for this stock in 1972 and 1973 were exceeded as 202,000 and 174,000 tons were taken in those two years. The strong 1970 year-class which was recruited in 1973 and 1974 prevented the stock from being further reduced below the 1973 level. The stock size actually increased to 359,000 tons in 1974 due to the 1970 year-class but then declined to 285,000 and 204,000 tons at the beginning of 1975 and 1976.

The USA herring fishery occurs off Pt. Judith, RI, in Div 5Zw and SA 6A during the period January-March. The catch is very small - 2,000 tons to 4,600 tons annually since 1970. The Canadian catch has declined from a peak catch of 13,674 tons in 1968 to 217 in 1974 and zero in 1975 in 5Z.

Herring imported from Canada have been very important to the herring economy of the US. Herring used for pearl essence and reduction have generally been imported from Canada. From 1957 to 1971, 96% of the herring used for pearl essence and 82% of the herring used for reduction purposes in Maine were imported from Canada. Beginning in 1971, herring used for the production of pearl essence decreased markedly due to new Canadian restrictions against the taking of small herring by the New Brunswick purse seine fishery.

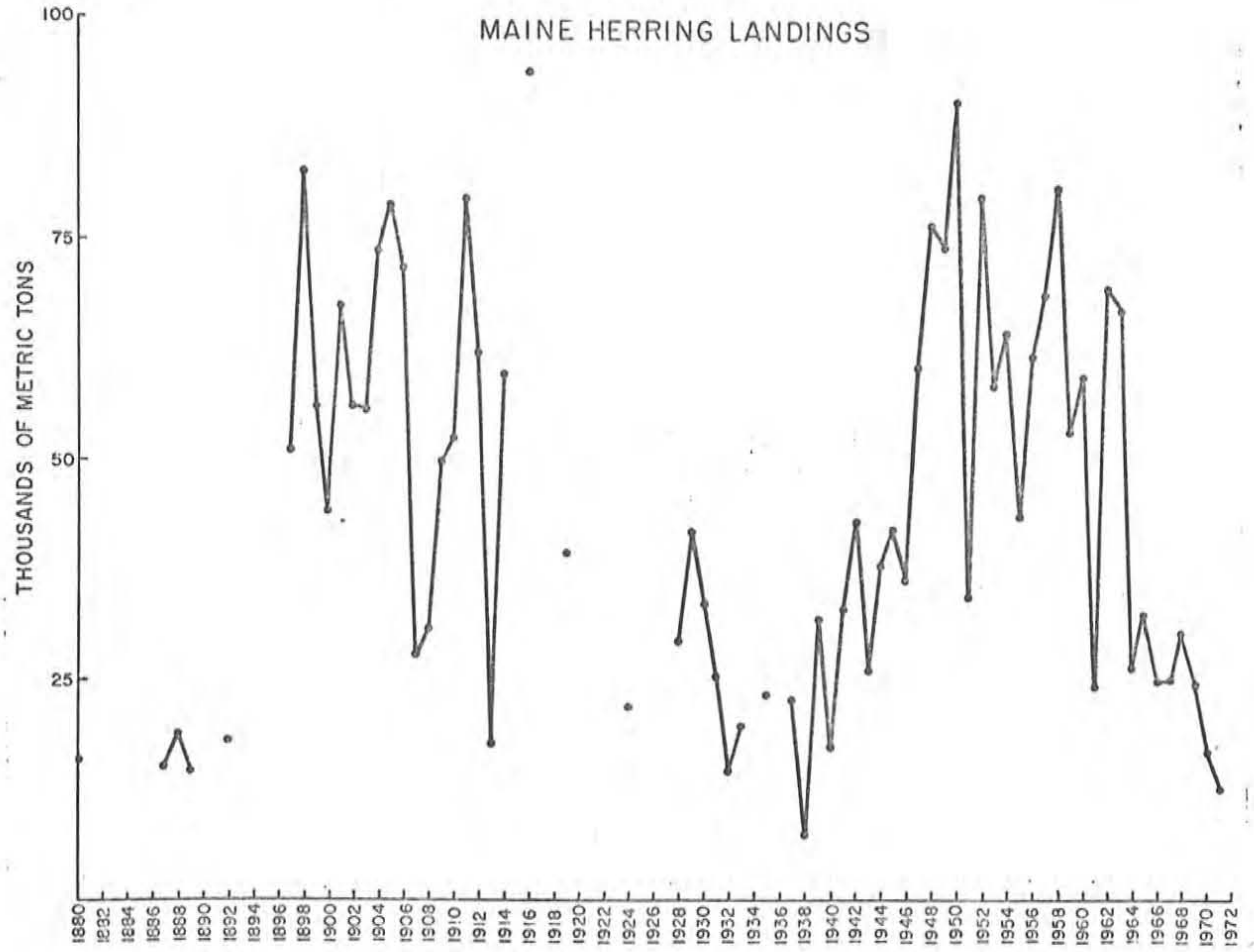


Figure 1. The catch of Atlantic herring along the coast of Maine used primarily by the sardine industry.

Table 1.

Quantities of Herring Processed in Maine Sardine Plants (metric tons) and Imports from Canada.

Year	Total Maine catch	Total imports of Canadian herring into Maine	Canadian herring purchased by Maine sardine plants	Cases of sardines packed (millions)	Year	Total Maine catch	Total imports of Canadian herring into Maine	Canadian herring purchased by Maine sardine plants	Cases of sardines packed (millions)
1880	15,738				1935	23,107	21,893		1656
	-				1936	-	27,662		1846
1887	15,227				1937	22,658	14,870		1680
1888	18,508				1938	7,283	7,528		672
1889	14,586				1939	31,572	18,103		2210
	-				1940	17,244	12,521		1118
1892	18,446				1941	32,931	37,674		3165
	-				1942	42,637	33,584		2873
1897	51,079				1943	25,941	44,014		2505
1898	82,673				1944	37,244	41,470		3262
1899	56,086				1945	41,999	33,769		2725
1900	44,068				1946	36,337	51,889		3276
1901	67,390				1947	65,486	44,220		3014
1902	55,967				1948	76,437	37,327		3682
1903	55,549				1949	74,029	21,123		3075
1904	73,642				1950	90,557	22,282		3844
1905	78,694				1951	34,411	22,833	12,083	1677
1906	71,615				1952	79,139	17,462	9,724	3531
1907	27,649				1953	58,337	13,715	11,694	2783
1908	30,940				1954	64,067	16,287	15,522	2935
1909	49,716				1955	43,506	3,502	1,836	1269
1910	52,399				1956	66,494	5,015	4,104	2231
1911	79,466				1957	68,623	23,772	5,316	2217
1912	62,138				1958	80,759	17,575	1,655	2100
1913	17,772				1959	53,037	29,350	9,785	1753
1914	59,743				1960	59,348	33,704	9,253	1998
1915	-				1961	24,131	19,732	3,827	754
1916	93,935				1962	69,376	28,153	5,425	2144
1917	-				1963	66,895	20,618	4,992	1637
1918	-				1964	26,295	44,125	3,727	866
1919	39,453			2450	1965	32,088	53,521	9,223	1227
	-				1966	26,177	70,121	14,070	1333
1924	21,741			1900	1967	28,576	54,521	19,179	1250
	-				1968	31,072	75,207	30,059	1730
1926	-	26,302		1718	1969	23,852	42,887	15,600	1043
1927	-	10,418		1262	1970	15,617	35,595	12,194	807
1928	29,341	31,241		2056	1971	12,960	30,238	21,734	951
1929	41,668	21,206		2026	1972	20,271	41,973	25,520	1562
1930	33,538	15,545		1399	1973	16,886	33,299	17,181	955
1931	25,304	8,967		885	1974	21,499	34,918	22,540	1088
1932	14,510	6,793		546	1975	17,348	39,571	23,646	1704
1933	19,856	14,361		981					
1934	-	21,207		1143					

Table 2. Catch of herring in ICNAF Subarea 5Y in metric tons.

Year	Juvenile	Adult								
	U.S.	U.S.	Canada	FRG	GDR	USSR	Poland	Other	Total	Grand Total
1930	33,548	3,940	------	------	------	------	------	------	3,940	37,488
1931	25,304	3,574	------	------	------	------	------	------	3,574	28,878
1932	14,510	2,580	------	------	------	------	------	------	2,580	17,090
1933	19,856	1,621	------	------	------	------	------	------	1,621	21,477
1934	No data	No data	------	------	------	------	------	------	No data	No data
1935	23,107	1,447	------	------	------	------	------	------	1,447	24,554
1936	No data	No data	------	------	------	------	------	------	No data	No data
1937	22,658	1,313	------	------	------	------	------	------	1,313	23,971
1938	7,283	2,214	------	------	------	------	------	------	2,214	9,497
1939	31,572	2,513	------	------	------	------	------	------	2,513	34,085
1940	17,244	2,676	------	------	------	------	------	------	2,676	19,920
1941	32,931	No data	------	------	------	------	------	------	No data	32,931
1942	42,637	2,561	------	------	------	------	------	------	2,561	45,198
1943	25,941	1,329	------	------	------	------	------	------	1,329	27,270
1944	37,243	598	------	------	------	------	------	------	598	37,841
1945	41,999	705	------	------	------	------	------	------	705	42,704
1946	36,336	929	------	------	------	------	------	------	929	37,265
1947	65,486	1,084	------	------	------	------	------	------	1,084	66,570
1948	76,437	2,315	------	------	------	------	------	------	2,315	78,752
1949	74,029	5,259	------	------	------	------	------	------	5,259	79,288
1950	90,557	3,661	------	------	------	------	------	------	3,661	94,218
1951	34,411	1,305	------	------	------	------	------	------	1,305	35,716
1952	79,139	1,598	------	------	------	------	------	------	1,598	80,737
1953	58,337	2,032	------	------	------	------	------	------	2,032	60,369
1954	64,067	1,303	------	------	------	------	------	------	1,303	65,370
1955	43,506	1,561	------	------	------	------	------	------	1,561	45,067
1956	66,494	2,058	------	------	------	------	------	------	2,058	68,552
1957	68,623	3,007	------	------	------	------	------	------	3,007	71,630
1958	80,759	3,182	------	------	------	------	------	------	3,182	83,941
1959	53,036	1,472	------	------	------	------	------	------	1,472	54,508
1960	59,111	1,126	------	------	------	------	------	------	1,126	60,237
1961	23,310	3,178	------	------	------	------	------	------	3,178	26,488
1962	69,307	2,371	114	------	------	------	------	------	2,485	71,792
1963	66,895	2,990	------	------	------	------	------	227	3,217	70,112
1964	19,537	8,179	636	------	------	------	------	------	8,815	28,352
1965	31,029	2,605	30	------	------	------	------	------	2,635	33,664
1966	25,052	4,313	47	------	------	------	------	------	4,360	29,418
1967	21,461	9,697	6,601	------	------	------	------	450	16,748	38,209
1968	29,891	11,585	21,497	------	------	------	------	76	33,158	63,049
1969	22,659	6,028	10,106	10,446	7,020	------	------	------	33,600	56,259
1970	11,119	18,061	17,912	6,079	2,580	------	43	9	26,623	37,742
1971	12,408	19,077	15,518	1,723	2,257	------	------	------	38,515	50,983
1972	19,498	18,698	11,638	2,930	9,296	256	100	------	42,918	62,416
1973	16,400	5,201	5,040	876	5,284	69	11	378	16,859	33,259
1974	19,142	10,233	4,044	2,384	1,008	98	103	149	18,019	37,161
1975	15,182	16,864	4,500	------	------	------	71	32	21,467	36,649

Table 3. Catch of herring in ICNAF Divisions 5Z and SA6.

Year	U.S.	Canada	F.R.G.	G.D.R.	USSR	Poland	Japan	Bulgaria	France	Iceland	Norway	Romania	Others	Total
1960														
1961	105				67,550									67,655
1962	101				151,864	277								152,242
1963	322				97,646									97,968
1964	489				130,914	35								131,438
1965	1,191				38,262	1,447						1,982		42,882
1966	4,308			1,133	120,113	14,473						2,677		142,704
1967	1,211	1,306	28,171	22,159	126,759	37,677	40					1,420		218,743
1968	758	13,674	71,086	67,719	143,097	75,080	171			292		1,656	65	373,598
1969	3,678	945	61,990	44,624	138,673	45,021	583	812		12,786	1,224	337	85	310,758
1970	2,011	7	82,498	28,063	61,579	70,691	1,412	348				685		247,294
1971	3,822	12,863	54,744	18,447	81,258	88,325	2,466	4,551				898		267,374
1972	2,782 (4,000)	53 (5,800)	27,703 (31,600)	40,016	48,072 (48,200)	49,392 (49,400)	1,161 (1,200)	2,355	500			2,156 (600)	(8,200)	174,190 (150,000)
1973	4,627 (5,250)	5,083 (5,050)	31,501 (31,600)	53,326	52,340 (48,200)	49,275 (49,400)	1,722 (1,200)	1,380	2,784			297 (1,300)	(8,000)	(150,000)
1974	3,385 (6,955)	217 (2,980)	23,690 (23,900)	31,530 (31,440)	41,541 (41,725)	39,312 (39,000)	2,442	1,773	3,617			2,018	(4,000)	147,970 (150,000)
1/1975	4,492 (8,400)	0 (3,000)	23,230 (23,750)	30,901 (31,150)	38,600 (41,100)	38,392 (38,400)	1,876	416	2,848			2,000	600 (4,200)	143,256 (150,000)

Note: National allocations in parentheses.

1/ Preliminary 1/2/76