

# Soviet Fisheries and Fisheries Research off the East Coast of the United States<sup>1</sup>

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## Abstract

American fishermen have long considered the fishing grounds off the East Coast of the United States to be their own. In 1961, however, large numbers of Soviet trawlers appeared off Massachusetts and American monopoly of the grounds ended.

Trawlers from Poland, East Germany, West Germany, Japan, and several other nations also fish with or near the Soviet fleet. As a result, the overall abundance of groundfishes in some areas has dropped 40% in 4 years. Soviet scouting trawlers were observed on Campeche Bank and the Soviets have taken tuna in the tropical Atlantic. Vessels of Soviet bloc nations fishing as far south as the Patagonian Shelf use Havana, Cuba as a base.

Federal and state fisheries agencies are alarmed at the decline in the abundance of several species fished by the Soviets. In 1967, negotiations were held with the Soviets to draw up a management agreement. At the same time, cooperative fishery-oceanographic cruises, with US and Soviet biologists participating, were launched to survey the New England fishing grounds and the Middle Atlantic Bight. Similar cruises were made each year through 1970. The author served aboard a Soviet fishery research vessel on the first two cruises.

Soviet fishing methods and fishery research techniques are described and illustrated. The scope of the bilateral agreements are outlined and the effects of the regulations are discussed.

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US East Coast to be their own. Although the grounds lay in international waters, they were fished almost exclusively by US and Canadian vessels. In contrast, the Grand Banks off Newfoundland have been regularly exploited for over 500 years by vessels from up to 15 European nations. In 1961, large numbers of Soviet trawlers and fleet support vessels appeared on Georges Bank, and American monopoly of the East Coast fishing grounds was ended.

The Soviets came in fleet strength and by the summer of 1963 at least 200 of their vessels were operating on and around Georges Bank. At various times during that year, Soviet stern trawlers were seen fishing as close as 30 miles south of Block Island, Rhode Island. Fleets of mostly medium trawlers with some stern trawlers were operating not far off the United States coast from Massachusetts to Florida.

On Georges Bank, the Soviets fished mostly for Atlantic herring (*Clupea harengus*). This species is under-utilized by American fishermen and the Soviets

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set long strings of gill nets for the herring from modified side trawlers. The nets prevented many American vessels from fishing the grounds with their otter trawls and, in addition, lost gill nets often fouled the gear and propellers of the trawlers. The Soviets later began using midwater trawls for the herring and US Bureau of Commercial Fisheries (BCF) management agents, observing the vessels from low-flying aircraft, estimated some catches to be on the order of 18 to 22 metric tons per tow.

It was not long before the Soviets also turned their attention to bottom fish, especially silver hake (*Merluccius bilinearis*) and red hake (*Urophycis chuss*). The gill nets were replaced with bottom and mid-water trawls. Later, the Soviets expanded their fisheries in the Northwest Atlantic to include a number of other species, both groundfish and pelagic fishes (Table 1).

TABLE 1  
Finfish Landings (000's metric tons) from Georges Bank and the Gulf of Maine

SPECIES	1961	1962	1963	1964	1965	1966	1967	1968
Herring:								
US	27	72	70	28	34	30	32	42
USSR	67	151	97	131	36	117	124	127
Haddock:								
US	52	54	49	52	57	57	40	29
USSR	-	1	2	5	82	48	2	1
Silver Hake:								
US	46	50	47	53	42	41	31	36
USSR	-	42	107	167	281	121	70	44
Red Hake:								
US	13	12	21	24	13	4	7	7
USSR	-	-	3	4	58	83	38	11

The effort of the Soviet fleet, to which has been added the effort of trawlers from Poland, East Germany, West Germany, Bulgaria, Cuba, Greece, Spain, Japan, and several other nations, has had considerable impact on the stocks of fish in the Atlantic Ocean off the American east coast. The overall abundance of groundfish in the waters off New England and New York has dropped 40%. Haddock (*Melanogrammus aeglefinus*) abundance has dropped over 60% (a result in part, also, of natural declines). The Soviets had entered the Georges Bank haddock fishery in 1965 and in that year, while US trawlers landed 57 thousand tons, USSR trawlers landed 82 thousand tons. The annual maximum sustained yield for Georges Bank haddock is estimated to be 50 thousand tons. To compound the situation, this population of haddock has experienced year-class

failures each year following the very successful 1963 year class. Thus, the haddock fishery is in dire straits. Red hake abundance has dropped to 25% of its former level. Further, while the average annual US catch of silver hake was about 50 thousand tons, Soviet effort on the species raised the 1965 total catch to over 300 thousand tons, after which the catch declined sharply. In 1969, the Soviets again shifted part of their effort to include yellowtail flounder (*Limanda ferruginea*). In that year, US landings were 23 thousand tons (near the maximum sustained yield) and USSR landings were 27 thousand tons. Some of these fisheries are discussed in detail by Graham (1968, 1970).

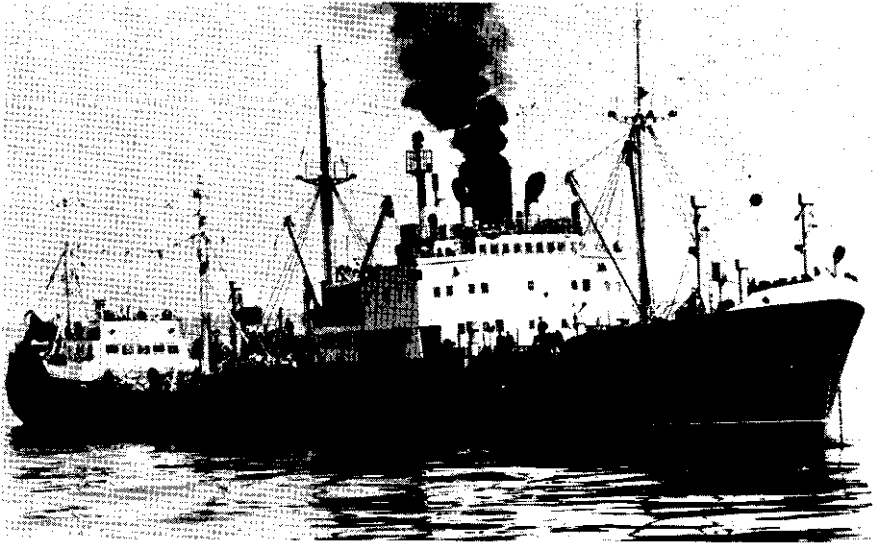


Fig. 1. Soviet base ship, *Ural*, with a trawler (SRT) tied alongside to offload its catch. The plume of black smoke suggests the fish meal and oil plant aboard the *Ural* is operating. (BCF photograph)

#### CHARACTERISTICS OF THE SOVIET FLEET

The Soviet fishing fleet operating in the Western Atlantic is impressive both in size and number of vessels (Hitz, 1968). The vessels are generally new, modern and efficient, and include fishing, processing, transport, and support ships (Fig. 1). The fishing vessels are of two main types: side trawlers and stern trawlers. Smallest of the side trawlers is the SRT (*Sredniy Rybolovnyy Trauler*, medium fishing trawler), about 37.5 meters long and 265 gross tons. The next largest is the SRTR (*SRT Refrizheratornyy*, refrigerated medium fishing trawler), about 50.8 meters long and 505 gross tons. Largest of the side trawlers is the SRTM (*SRT Morozilnyy*, freezer medium trawler), about 54.2 meters long and 700 gross tons. It was the side trawlers that had taken part in the gill-net fisheries for herring.

The largest fishing vessels are the factory stern trawlers. These BMRT's (*Bolshoy Morozilnyy Rybolovnyy Trauler*, large freezer fishing trawler) are most often called, simply, factory trawlers and are about 84.7 meters long and 3,170 gross tons (Fig. 2). The otter trawl is set and hauled back through the stern

chute and the catch is completely processed aboard. Below decks the factory trawlers have automated production facilities that behead and fillet the round fish (cod, haddock, etc.). Flat fish are filleted by hand. Other machines skin the fillets which are moved in packages to blast freezers and then to frozen-cargo storage space. The frozen fish may be returned to the homeland aboard the trawler, or, most commonly, are offloaded at sea to special transports. The skin, bones, and viscera are reduced aboard ship in a meal and oil plant.

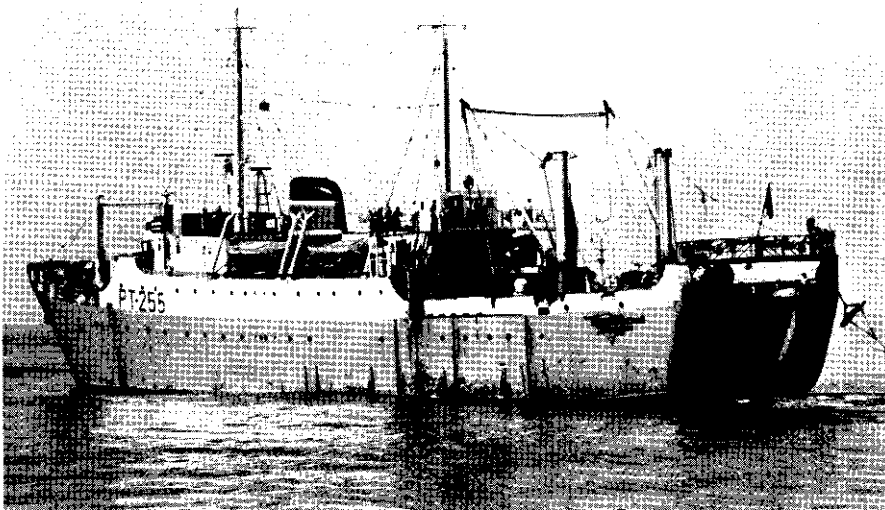


Fig. 2. A Soviet factory stern trawler (BMRT) on Georges Bank hauling back the otter trawl. (BCF photograph)

The service vessels include a variety of transports from 83 to 166 meters long, base ships up to about 166 meters long, tankers, tugs, and repair and salvage ships. The base ships provide medical and dental facilities and, with the transports, bring crews to and from the homeland. They also transport the frozen fish, meal and oil.

The Soviets have developed a catamaran fishing vessel. The ship, named *Experiment*, was fabricated from two SRT hulls with two stern ramps and trawl decks. It can be used for bottom and midwater trawling and for purse seining and is said to have better maneuverability and stability than single-hull trawlers. It was first tested in the Baltic Sea, and in May 1969 it was seen by BCF management agents on sea trials off the New England Coast (US Bureau of Commercial Fisheries, 1969b). To date there have been no reports of the fishing success of this vessel.

### ***Soviet Fishing Strategy***

Much of the success of the Soviet fishing vessels lies in their method of fleet operation. Vessels in a particular area usually are under the command of an individual aboard one of the vessels who is designated the "Fleet Commander." The trawlers in the fleet, research vessels, and specially assigned scouting vessels

transmit information to the commander enabling him to make prompt decisions about the best strategy and deployment for the fleet. Mathisen and Bevan (1968) state, "Once a day during the 'captain's hour,' weather observations, water temperature, other physical and biological information and catch data are circulated among the fleet." The captain of each trawler has some leeway in his actions, but his decisions are based on the information available to the entire fleet and on the recommendations of the fleet commander.

The fleet technique has enabled the Soviets to be extremely mobile in their search for concentrations of fish. For example, BCF management agents, on a routine reconnaissance flight on April 9, 1969, observed a fleet of 107 Soviet vessels in a 25-mile area, 25 to 30 miles east of Currituck Sound, North Carolina. Moderate catches of fish on board were identified from the air as herring (species). In addition, a number of trawlers were alongside the large factory base ships off-loading fish. The agents had observed this fleet over a period of 10 days and had seen it shift operations north and south several times. At the end of March, the fleet had been located east of the entrance to Chesapeake Bay. Within 2 days, the fleet moved northward to the offing of Delaware Bay, and then returned southward off Chesapeake Bay to the area in the offing of North Carolina (US Bureau of Commercial Fisheries, 1969a).

#### ***Observations of Soviet Vessels***

A number of US agencies are interested in the activities of the Soviet vessels fishing off the North American coast for a variety of reasons; one is national security. Other agencies are interested because of the obviously large removals of fishery resources being made by the fleets. Some information can be gleaned from surface vessels, and American trawlers, fishing among the Soviet fleets, made many reports to government officials. However, the reports often were colored by the emotions of the Americans who felt they were being forced out of traditional fishing grounds. Both the US Navy and the US Coast Guard sent vessels among the foreign ships to observe and photograph their activities. BCF research vessels occasionally occupied stations near Soviet trawlers so that American biologists could carefully study the fleet and vessel operations. Finally, the Coast Guard began to make aerial observations of the fleets during routine search and rescue flights. To get the most information out of the observations, BCF fishery management agents and biologists accompanied the Coast Guard crews on the flights.

As part of New York State's contribution to the surveillance program, I accompanied the Coast Guard on two flights over the Middle Atlantic Bight. The aircraft flew at altitudes as low as 35 meters and it was possible to clearly see the foreign fishermen and their catches. The species of fish were quite easy to identify at such a low height – at least to differentiate between herring and silver hake, and between red hake and scup (*Stenotomus chrysops*). High-resolution color photographs of the catches were studied ashore for detailed species identification. Coverage on the two flights generally was confined to the waters off Long Island (New York) and New Jersey. A total of 97 foreign fishing and support vessels were sighted on one flight and identified as 76 Soviet and 21 Polish ships. The Soviet fleet consisted of 2 BMRT's, 67 side trawlers (56 SRT's, 10 SRTR's, and 1 SRTM), 3 refrigerated fish transports, 2 cargo vessels, and 2 factory base ships. The Polish fleet included 3 BMRT's, 15 SRT's, 2 supply vessels and 1 factory base ship.

Of particular interest was the presence of at least five Soviet SRTR's

completely equipped for purse seining. The vessels were rigged with power blocks and the seine nets were arranged on the stern section of each ship. One ship was making a set. This was the first known instance of the Soviets purse seining in the Middle Atlantic Bight although they have done so in other parts of their world ocean fishery.

#### ***Cooperative US-USSR Fishery-Oceanographic Surveys***

Although observations of the Soviet fishing fleets from aircraft and surface vessels provided a great deal of information about their activities, it was soon obvious there were details not readily apparent. Thus, after negotiations between the US and the USSR, cooperative fishery-oceanographic surveys were begun off the New England-Middle Atlantic coast. The first cruise took place in 1967 and they have continued each autumn through 1970. The sampling scheme and the rationale for the stations occupied are described by Grosslein (1969). Details of the first two surveys are described by Jensen and Poole (1968, 1969) who were participants aboard the Soviet research vessels in the surveys (Fig. 3).



Fig. 3. US and Soviet biologists sort fish aboard the USSR research trawler during the cooperative fishery survey.

Two vessels make the surveys, the BCF R/V *Albatross IV* and a Soviet scout trawler. *Albatross IV* is a 54-meter-long stern trawler especially designed for fishery-oceanographic research. The scout trawler (SRTR) was converted for research by the addition of a small chemical laboratory under the whaleback and hydrographic winch and boom on the port side of the boat deck. The winch and boom are used for making bathythermograph and Nansen bottle casts (Fig. 4).

New York State's interest in the surveys was sparked by the Soviet fishery for species sought by New York's commercial and sport fishermen. In 1963, the Soviet fleets shifted their fishing from the waters off New England to the Middle Atlantic Bight (Cape Cod, Massachusetts to Cape Hatteras, North Carolina). Here they took large quantities of red hake and silver hake, and incidental quantities of summer flounder (*Paralichthys dentatus*), and scup. The trawlers concen-

trated on the red hake and silver hake when they were grouped in pre-spawning aggregations in the deep water of the Continental Shelf near the Hudson Canyon. United States landings from the Middle Atlantic Bight in 1963 included 2.8 thousand tons of silver hake and 0.7 thousand tons of red hake (Table 2). By 1966, the domestic landings remained steady at 3.0 thousand tons of silver hake and 0.6 thousand tons of red hake. The 1966 Soviet catch of red hake, however, was 25.7 tons. The landings of summer flounder and scup already were greatly reduced because the two species were in low abundance (a result, some biologists believe, of the cooling of the waters off the Northeast coast).

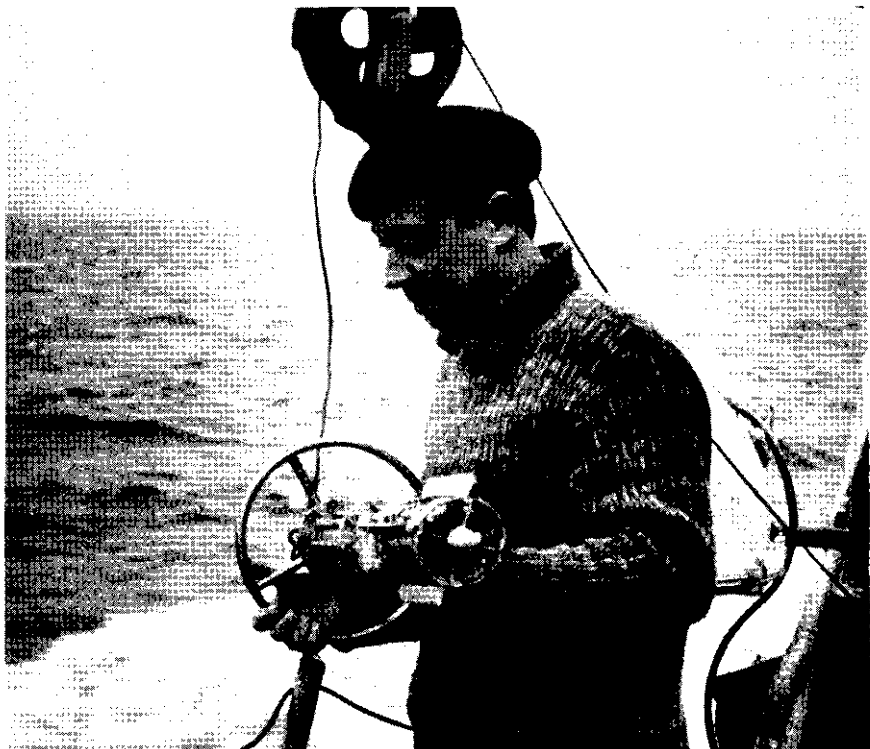


Fig. 4. Scout trawlers used as fishery research vessels by the Soviets are equipped with a small hydrographic winch and platform. Here the Soviet hydrographer prepares to cast the bathythermograph.

#### FISHERIES AGREEMENTS IN THE NORTHWEST ATLANTIC

In the 1940's, the European nations fishing the Grand Banks organized to formulate an international agreement controlling fishing in that part of the Northwest Atlantic (Graham, 1970). The result was the International Commission for the Northwest Atlantic Fisheries (ICNAF) that held its first meeting in

**TABLE 2**  
**Finfish Landings (000's metric tons) from the Middle Atlantic Bight**

SPECIES	1963	1964	1965	1966	1967	1968
Herring:	0.7	0.4	2.2	3.0	3.8	29.2
US	0.1	0.2	0.3	0.2	0.6	0.2
Foreign	0.6	0.2	1.9	2.8	3.2	29.0
Silver Hake:	7.0	19.9	21.0	95.9	28.1	18.4
US	2.8	3.0	3.3	3.0	4.4	3.4
Foreign	4.2	16.9	17.7	92.9	23.7	15.0
Red Hake:	1.4	9.0	12.4	26.3	15.6	2.2
US	0.7	0.6	0.6	0.6	0.6	0.4
Foreign	0.7	8.4	11.8	25.7	15.0	1.8
Scup:	15.8	13.5	11.8	7.7	6.1	4.5
US	14.5	13.0	11.1	7.2	5.6	4.0
Foreign	1.3	0.5	0.7	0.5	0.5	0.5
Mackerel:	0.4	0.5	0.6	2.0	6.8	8.9
US	0.1	0.4	0.5	0.8	0.7	0.9
Foreign	0.3	0.1	0.1	1.2	6.1	8.0

1951. One of the earliest management decisions of the commission was to regulate the mesh opening in otter trawls used in the haddock fishery. Eventually the mesh regulation was signed by all 15 member nations of the commission including the Soviet Union (when she became a member in 1958).

At first the mesh regulation applied only to haddock. Eventually it was broadened to include a number of other species including cod (*Gadus morhua*), a most important species in the Greenland-Grand Bank grounds. Graham (1970) says of the mesh sizes, "Today all subareas [of the ICNAF convention area] have specified minimums: 5-1/8 inches (130 mm) in Subarea 1 and 4-1/2 inches (114 mm) in Subareas 2 to 5. The minimums apply to cod and haddock in Subarea 5 and to several species -- as many as 10 -- in the other subareas."

The results of the mesh regulation in the haddock fishery have demonstrated the need for further control, especially of fishing effort and catch. Thus, when agreements were drawn up to regulate the fisheries in the Middle Atlantic Bight, these other controls were written in as major elements of the documents.

#### ***US-USSR Fisheries Agreements***

In November 1967, the US and the USSR signed a 1-year agreement in Moscow to regulate their fisheries in the Middle Atlantic Bight. Under the agreement, the two nations closed a rectangular area of about 5,000 square miles south of Long Island, New York, and Block Island, Rhode Island, to fishing by vessels of both nations more than 33 meters long during January through March 1968. This area is in international waters and includes a major part of the wintering grounds of red hake, scup, silver hake and summer flounder. The



Soviets agreed not to increase their total catch here in 1968 beyond their 1967 catch. They also agreed to hold their incidental catch of scup and summer flounder at or below the 1967 level and not to start specialized fisheries for these species.

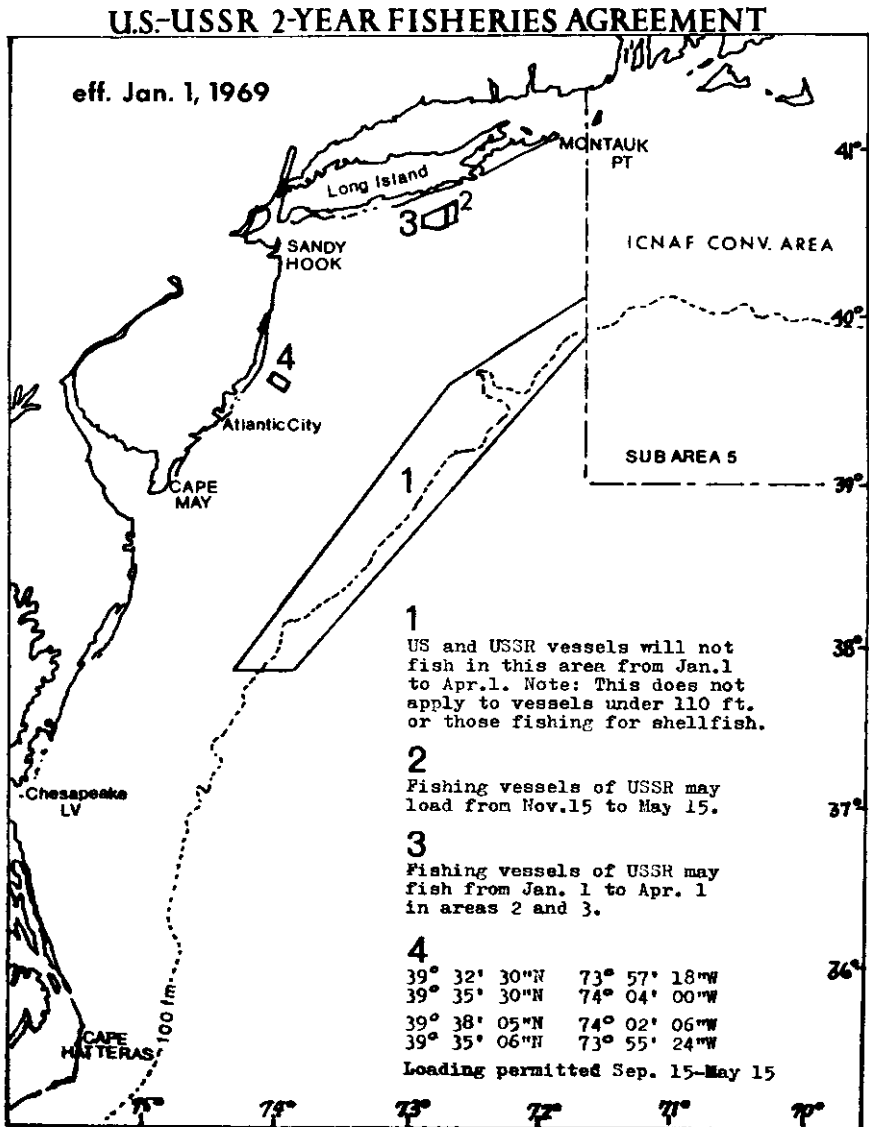


Fig. 5. Areas of special interest established as part of the US-USSR fishing agreements in the Middle Atlantic Bight. The areas are essentially the same in the US-Polish fishing agreement. (From Lundy, 1969; with permission)

In return for the Soviet concessions, the US agreed to permit the loading and transfer of cargos between Soviet vessels in a 20-square-mile area 6 to 12 miles off Long Island from November 15 to May 15, and in a similar area off New Jersey from September 15 to May 15. A third concession the Soviets won aroused a great deal of criticism among many Americans. Trawlers from the USSR were allowed to fish within the contiguous fishery zone -- in a 60-square-mile area, 6 to 12 miles off Fire Island, New York -- from January 1 to April 1. To date, the Soviets have not exercised this last right and probably will not do so. The area is almost totally barren of fishes during the period specified. The concession, however, has tremendous geo-political implications and would be a powerful lever for the Soviets in their negotiations with other nations; for example, to fish for hake off South America.

In December 1968, the US and the USSR signed a new agreement for the fisheries off the mid-Atlantic coast. It extended and modified the 1967 agreement, although the basic provisions of the two agreements are similar (Lundy, 1969). There are two principal differences. The agreement was made for 2 years, to cover the fishing seasons of 1969-70. Also, the area closed to fishing (Fig. 5) was an elongated belt roughly along the 50 to 100 fathom line from Rhode Island to Virginia.

#### ***US-Polish Fisheries Agreements***

The Iron Curtain countries fishing off the US more or less followed the lead of the Soviets in their strategy. However, Polish trawlers often fished in the closed zone, and since they made up the second greatest number of foreign vessels, it soon became urgent that an agreement be worked out between the US and Poland. This was done in Warsaw in June 1969 with the same basic provisions as in the agreement between the US and the USSR. The agreement was in force for 1 year and was renegotiated in Washington in June 1970. The new agreement added protection to Atlantic menhaden (*Brevoortia tyrannus*), alewife (*Alosa pseudoharengus*), and black sea bass (*Centropristis striata*). The time period for the closed fishing zone was extended to April 15. A third loading zone was provided the Polish fleets off the coast of Virginia, north of Chesapeake Bay, but they were not permitted to fish within the US contiguous fishing zone.

#### ***Haddock Fishing Restrictions***

The Soviet Union had insisted that her fishing agreements in the Middle Atlantic Bight be negotiated bilaterally rather than multilaterally within the 15-member ICNAF. They argued that the area in question was outside the ICNAF Convention Area and thus did not come under the jurisdiction of that commission. However, a multilateral agreement to regulate the haddock fishery was drawn up with ICNAF in 1970 inasmuch as the grounds involved -- Subarea 5; Georges Bank and the Gulf of Maine -- were entirely within the Convention Area.

This agreement closed three areas on the banks (including one south of Nova Scotia, Subarea 4) to haddock fishing during the haddock spawning season, March and April 1970-1972. The areas are known centers of haddock spawning and it was hoped that the closure would permit the stocks to reproduce without being disturbed by groundfishing operations. Fishermen were specifically restricted from using otter trawls or similar devices, hook and line gear, or gill

nets. In addition, a total annual catch quota of 12 thousand tons was set for the haddock fishery in Subarea 5. This contrasts sharply with historical US annual landings of about 49 thousand tons. Under the protocol established for this regulation, the 15 member nations of the commission agreed that when 80% (or about 9.0 thousand tons) of the quota was reached, fishing for haddock in the area would cease. Eighty per cent of the quota was reached and the haddock fishery in Subarea 5 was closed on October 23, 1970.

## SOVIET RESEARCH AND DEVELOPMENT IN THE NORTHWEST ATLANTIC

Over the past half century, as Soviet fishing fleets and areas of operation expanded, she has given more and more attention to research in oceanography, fisheries biology, and exploratory fishing. Mathisen and Bevan (1968) characterize the USSR as "...one of the greatest contributors of marine biological data today." The major thrust, in terms of capital investment, has been in oceanographic research. The most famous of the Soviet research vessels, the 102.6 meter long *Mikhail Lomonosov*, and the newer, 115-meter-long *Akademik Kurchator*, have been engaged over most of the world ocean on a variety of lengthy expeditions. Fishery biologists, however, have had to accompany large trawlers to make their observations and collections. Or, as often as not, scout trawlers, such as those that take part in the cooperative US-USSR fishery surveys, are used for research.

### **Exploratory Fishing**

Much of the success of Soviet fishing operations is that her fishermen know where to find large available stocks of fishes. This information is gained from the exploratory fishing carried on by the scout trawlers. These SRT's search for new fishing grounds and also explore traditional grounds for unutilized stocks (such as the herring off the East Coast of the US). Some of the exploratory surveys have been conducted in cooperation with her allies, Cuba, for example (Sal'nikov, 1965). And in January 1968, Soviet exploratory vessels were seen off Campeche, possibly as a prelude to future exploitation of the fishery resources of the area (US Bureau of Commercial Fisheries, 1968). The results of some of the exploratory expeditions are shown in Fig. 6.

### **Gear Research**

The Soviets have put considerable effort into developing the most efficient otter trawl to use in their fisheries for groundfish. The trawl used most commonly on the SRT's is a type called a "herring trawl." It is 42 meters long from wings to codend knot. The footrope is 27.4 meters long and is fished without the rollers used by US trawlers, for example, on rough bottom. The headrope is rigged with closely-spaced floats (Fig. 7) and fishes 4 to 6 meters off the bottom. This gives the mouth of the net a wide opening and enables it to filter a large volume of water. The twine throughout is *Kapron*, a Soviet synthetic fiber similar to nylon. The net is fished with 600 kilogram oval otter boards and because there are no rollers on the footrope, it tends bottom closely. During comparative tows on the cooperative surveys, the Soviet net outfished a standard Yankee 36 trawl about 2 to 1, and sometimes more for certain species. For example, the catch of flounders was about the same for both nets but for red hake, silver hake, Atlantic mackerel (*Scomber scombrus*), and butterfish

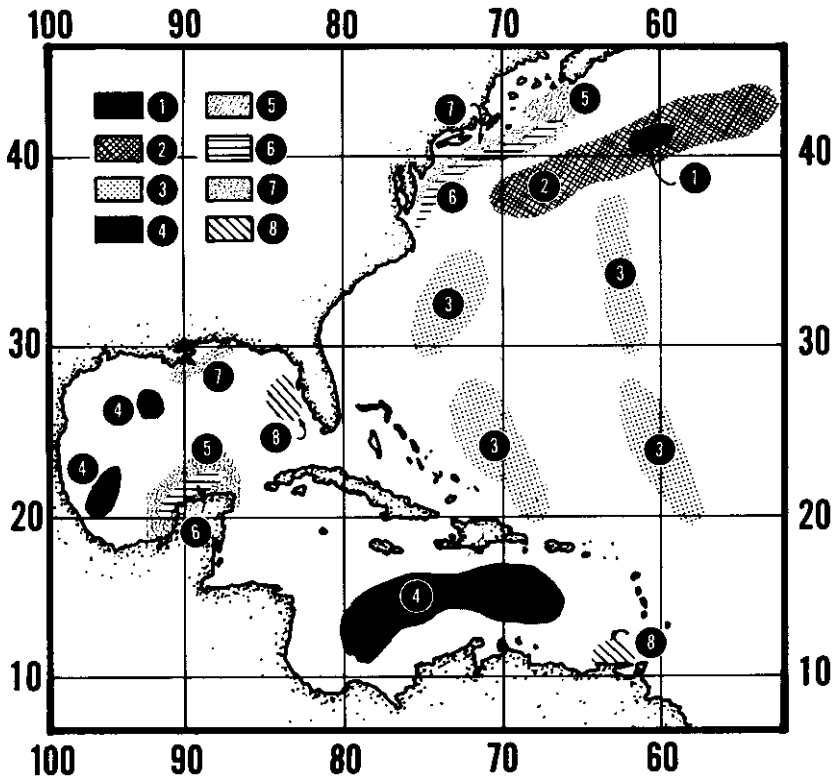


Fig. 6. As a result of their fishing efforts and exploratory cruises, the Soviets and their allies have evaluated the resources on the Atlantic and Gulf fishing grounds. The symbols are: (After Sal'nikov, 1965; with permission)

- |                           |                                             |
|---------------------------|---------------------------------------------|
| 1. Very high tuna catches | 5. Medium trawl catches                     |
| 2. High tuna catches      | 6. High trawl catches                       |
| 3. Good tuna catches      | 7. Good trawl catches                       |
| 4. Medium tuna catches    | 8. Research on trawling should be continued |

(*Peprilus triacanthus*), the catches made by the Yankee 36 trawl were only 10% to 25% of those made with the Soviet net.

The Soviets are furthering their gear research with experiments on deep-water trawls (Office of Foreign Fisheries, 1970). Early in 1969, the Soviet Northern Fisheries Administration ordered all BMRT's of the Murmansk fleet to be equipped by year's end with deep-water trawls (with special otter boards) to fish at 1,300 meters. In May 1970, the Soviet Western Fisheries Administration reported that one of its BMRT's had succeeded in fishing as deep as 2,000 meters off Canada's Labrador Peninsula. The Soviet Deputy Minister for Shipbuilding explained the rationale behind this interest in deep trawling as follows: "... many coastal states will extend their territorial zones considerably



Fig. 7. Crewmen aboard a Soviet trawler prepare to rig a "herring trawl" for fishing. The design of this net has made it a very efficient piece of gear.

[thus there is a need] to develop means to bring marine animals from greater depths than before . . . ."

The catamaran trawler mentioned previously represents another avenue of Soviet gear research. The *Experiment* was designed to meet a growing requirement of the Soviet fleet for versatile vessels capable of fishing different kinds of gear in different areas under the most severe weather conditions (Fishing News International, 1970).

#### **Reports of Soviet Research**

The results of Soviet fisheries research have been published for many years, of course, in Russian in their own journals. Recently, however, more and more of them are appearing in English in journals published outside the Iron Curtain. For example, the Research Bulletin of ICNAF frequently contains reports by Soviet scientists of their work in the Northwest Atlantic. Translations of Soviet reports also are available. One important and informative publication is the compilation of papers included in the volume *Soviet-Cuban Fishery Research*, edited by A. S. Bogdanov (1965). It was translated from the Russian by the Israel Program for Scientific Translations under an agreement with the US Department of the Interior and the National Science Foundation through the US Department of Commerce Clearing House for Federal Scientific and Technical Information.

The Soviet serial publications, *Problems of Ichthyology* and *Hydrobiological Journal*, are available bimonthly in English from the American Fisheries Society.

The Soviets report their fisheries landings to ICNAF and the Food and Agriculture Organization (FAO) for publication. Thus, fisheries workers in other parts of the world are able to keep fairly well informed about Soviet researches and about their exploration and exploitation of diverse stocks of fishes.

## DISCUSSION

At this point the question may well be raised: What is behind the Soviet push in world-wide fishing? The answer seems rather simple; there is a near-desperate need for animal protein in the homeland and in the satellite nations with whom the Soviets have trade pacts. A series of agricultural failures in the USSR have forced Soviet officials to look elsewhere for animal protein food. Nor does there seem to be any likelihood that the agricultural picture will improve in the near future. An analysis of Soviet agricultural economy (Schwartz, 1969) blamed poor production on extremely severe winter weather. There were serious farm losses during a harsh winter and deliveries of livestock to state-run slaughterhouses fell well below the planned levels. In the winter wheat areas of the Ukraine and the North Caucasus, storms with hurricane-force winds ruined many of the previous autumn plantings of wheat. Thus, faced with shortages of animal protein and grain, the Soviets seek elsewhere for food.

Saltwater fish has never traditionally been an important part of the Russian diet. Toward the end of the Czarist era, in 1913, fish production in Russia amounted to 1.05 million tons with 86.9% of the catch derived from inland waters (Mathisen and Bevan, 1968). For the period 1957-59, Gulland and Carroz (1968) report that fish contributed (per capita) only 2.0% of the total protein and 5.9% of the animal protein supply in Eastern Europe and the USSR. The Soviets, of course, lacked easy access to the sea but territorial expansion following World War II soon gave the access needed. Further, in the mid-1950's the Soviets embarked on a program to recruit fishermen for distant water fisheries and acquired a modern fleet of fishing vessels capable of using a variety of gear in any part of the world ocean. As we have seen, this program has proven to be quite fruitful.

With fisheries intelligence supplied to them by the explorations of the scout trawlers, the Soviet fleets have demonstrated an effectiveness that is challenging many traditional fisheries efforts. As Graham (1970) points out, their long-range, mobile fleets are in a position to take advantage of unusual fish abundance at great distances from the home port. They may harvest the crop to the disadvantage of the adjacent coastal state.

Although the Soviets are efficiently and systematically cropping a number of abundant stocks of fishes, they appear anxious to avoid being pictured as mere exploiters of the marine resources. Thus they have been quick to espouse conservation-oriented programs in their distant-water fisheries. In a number of areas around the world, Soviet entry into existing conservation treaties closely followed the expansion of fishing operations by her fleet into treaty waters. However, Mathisen and Bevan (1968) emphasize that, "Membership in a fishery convention is sought by the U.S.S.R. . . .when it is necessitated by economic interests." In the Middle Atlantic fishing agreements, the USSR has been largely cooperative, both in the drafting of the agreements and in carrying out their provisions. Admittedly, some of her motives may be geo-political in nature but her actions appear to at least carry out the concept of conservation of fishery resources. With relatively few exceptions, Soviet vessels have avoided the Middle

Atlantic closed fishing zone. The trawlers that did fish in the zone during the closed season (either through genuine navigation error or willful disobedience) were warned off by US Coast Guard aircraft and surface vessels. In addition, the large identification numbers on the trawlers' hulls were reported to the Soviet fishery administration through their Washington embassy. Embassy officials advised the US State Department that the erring fishermen were returned to the USSR to be reprimanded. Before the US-Polish agreement in the Middle Atlantic was signed, the Soviets similarly took care of infractions by Polish trawlers that trespassed in the closed zone.

## CONCLUSIONS

The efficient, massive fishing effort of the USSR in the waters off the East Coast of North America has had a profound effect on some of the stocks being exploited. The haddock, already suffering consecutive years of spawning failure, was placed in serious jeopardy by the Soviet fishing effort. Similarly, the yellowtail flounder, being fished at or near the maximum sustained yield by American fishermen, has recently been the object of intensive Soviet fishing. The resulting decline in abundance of both these species has meant serious economic hardship in the fishing communities of Boston and New Bedford, Massachusetts.

Although commercial fishing forms only a very small part of the gross national product of the US, it is of considerable importance to her coastal states. There have been many convincing arguments for the US to establish a 200-mile coastal limit to protect the marine fisheries from foreign exploitation. For the moment, however, there is little likelihood of such a limit being included in US foreign policy. It is obvious, of course, that the interests of the coastal states should be preserved. But this presently is best accomplished within the framework of a regulation or agreement negotiated with a nation engaged in high seas fisheries off the coastal states. The exclusive rights of coastal nations to fish off their own shores and the freedom for all nations to fish on the high seas are still the basic principles on which international fishery law rests.

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