

THE FUTURE OF NEW ENGLAND'S MARINE RESOURCES

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To meet our responsibilities in the Northeast Region, we operate research laboratories at Boothbay Harbor, Maine; Gloucester and Woods Hole, Massachusetts; Narragansett, Rhode Island; Milford, Connecticut; Sandy Hook, New Jersey; and Oxford, Maryland. Two high-seas research vessels, the 'Albatross IV' at Woods Hole and the 'Delaware II' at Sandy Hook, and several smaller inshore vessels are utilized by these laboratories. The scientific work in our laboratories is supplemented by such diverse service activities as Enforcement and Surveillance, Statistics and Market News, Economics, Marketing, Financial Assistance, State-Federal Relationships, Water Resource Studies, and Extension.

Although there are many problems facing those interested in the oceans and the utilization of marine resources, I shall discuss only a few of the more important ones--foreign fishing, environmental deterioration, and institutional constraints.

FOREIGN FISHING

We hear much about the great foreign fleets off our shores and probably there is no other single problem which has focused more attention on the ocean. It is indeed a serious matter. The total catch in the Northwest Atlantic increased from 1.8 million metric tons in 1954 to 3.9 million metric tons in 1968. The catch in 1969 decreased slightly, the first time since 1954. The increased catch is almost entirely due to increased fishing by European countries. The United States and Canadian catches in the same period increased from 1.2 million metric tons (67% of total) to only 1.5 million metric tons (38% of total).

Major Fish Stocks

Now what about some of the major stocks of fish? Cod, which has accounted for nearly half the catch in recent years, is now being fished at or beyond the level which will pro-

vide the maximum sustained yield. Herring catches increased from 184,000 tons in 1958 to 922,000 tons in 1968, and some stocks of this species are now overfished. In general, the total fish stocks in the Northwest Atlantic cannot withstand further increases in fishing without being overexploited to the extent of reducing actual yields. Specific stocks in waters fished by the United States, some of which form the primary markets in New England, have been affected greatly by increased foreign fishing. I refer especially to haddock and yellowtail flounder.

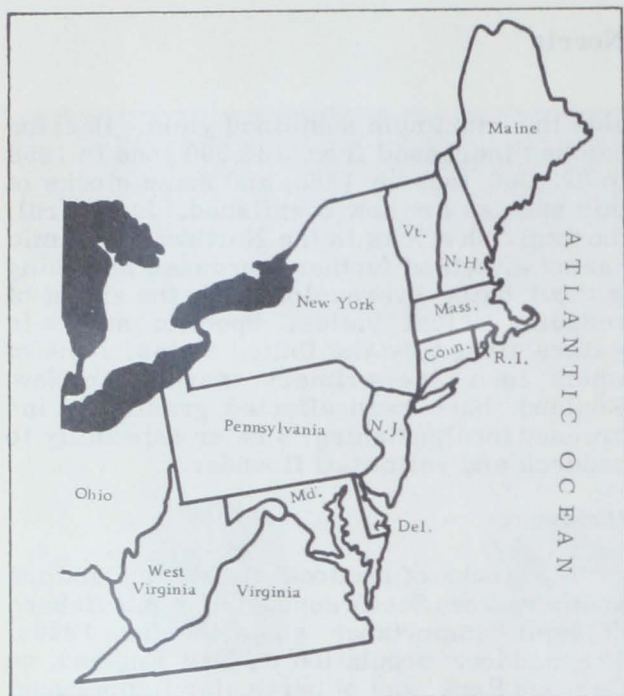
Haddock

The stocks of haddock off New England and southern Nova Scotia supported a U.S. fishery of prime importance since the late 1920s. The haddock population off New England, on Georges Bank, was of particular importance. From 1935 to 1964, the annual catch taken entirely by U. S. fishermen varied from 30,000 to 60,000 metric tons. By 1961, biological studies indicated that the maximum sustainable yield was about 50,000 metric tons, which was very near the actual catches at the time.

In 1963, production and survival of young fish were extremely good. This very abundant year-class entered the exploited phase in the second half of 1965. The high abundance attracted the Soviet Fleet and, over a period of 18 months, the Soviets caught 180,000 metric tons. A significant part of this catch in 1965 consisted of fish smaller than that taken by the regulation 4½-inch mesh. Thus, the U. S. fishery, which did not start significant exploitation of this year- until 1966 did not realize very much benefit in increased catch rate.

By 1964, Canada had also increased its fishery on Georges Bank haddock. So, during 1964-1966, the fishing mortality had doubled. Year-class production from 1965 to date has been very poor. The combination of heavy fishing and poor recruitment caused the stock to decline by 1969 to 25% of the level

The author is Regional Director, Northeast Region, NMFS. This article is nearly all of his talk at the Environmental Action Symposium, Museum of Science, Boston, Mass., Dec. 2, 1971.



that produced the 50,000 ton sustained yield. In 1969, the catch with unrestricted fishing was 25,000 metric tons. An international quota was established to limit catches in 1970 and 1971 to 12,000 metric tons. This will be further reduced to 6,000 tons in 1972. Even this limited catch is greater than current production--so no improvement in stock density is expected for several years at least.

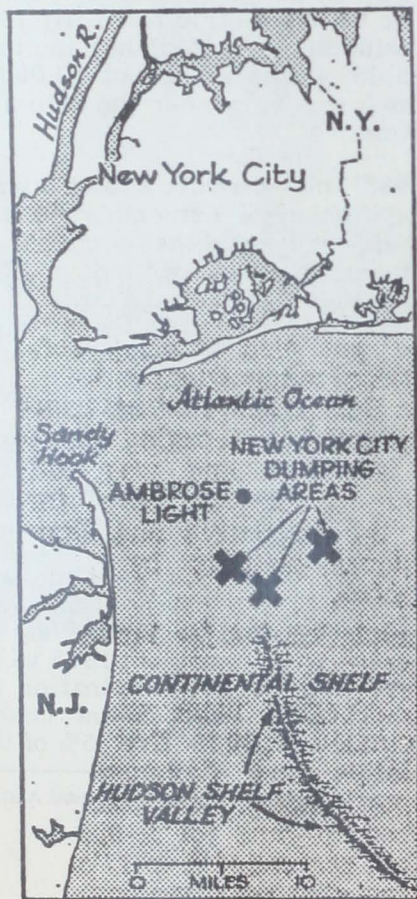
Yellowtail Flounder

The stocks of yellowtail flounder off New England have supported a U. S. fishery since the late 1930s. It has been of increasing importance since the late 1950s. From 1961 to 1969, the U. S. catch ranged from 25,000 to 50,000 metric tons, exceeding, in some years, the maximum sustainable yield. Prior to 1969, the foreign catch was small. However, in that year, the foreign catch, essentially Soviet, was 20,000 metric tons. This caused the resulting effort to be double what the stocks can probably support. Strong 1966 and 1967 year-classes have been followed by lesser ones. The increased catch in 1969 would be expected to have reduced the stock size, and the 1970 survey cruises indicate this may be the case.

ENVIRONMENTAL DETERIORATION

Now let us focus on environmental deterioration and its effects on living marine resources. Unfortunately, most of my remarks will deal with areas outside New England, specifically the New York Bight, because our organization has been actively engaged there. However, I suspect that many of the same conditions prevail in New England.

For some time, the New York Bight has served as the ocean disposal area for unbelievable quantities of sewer sludge and contaminated dredging spoils. For example, every day one billion gallons of raw industrial and domestic sewage flows under the Verrazano Bridge (the world's longest suspension bridge connecting Staten Island to Brooklyn--Ed.). This current practice of disposal has had serious effects on the living resources of the Bight. Important bottom-dwelling forage species used as food by finfish have been eliminated from an area of over 20 square miles.



Recently, large areas have been closed to the harvesting of the surf clam, economically one of the Nation's most important shellfish. With its distribution limited essentially to the coastal waters of the New York Bight, this resource is very vulnerable to contamination and subsequent closure to harvesting.

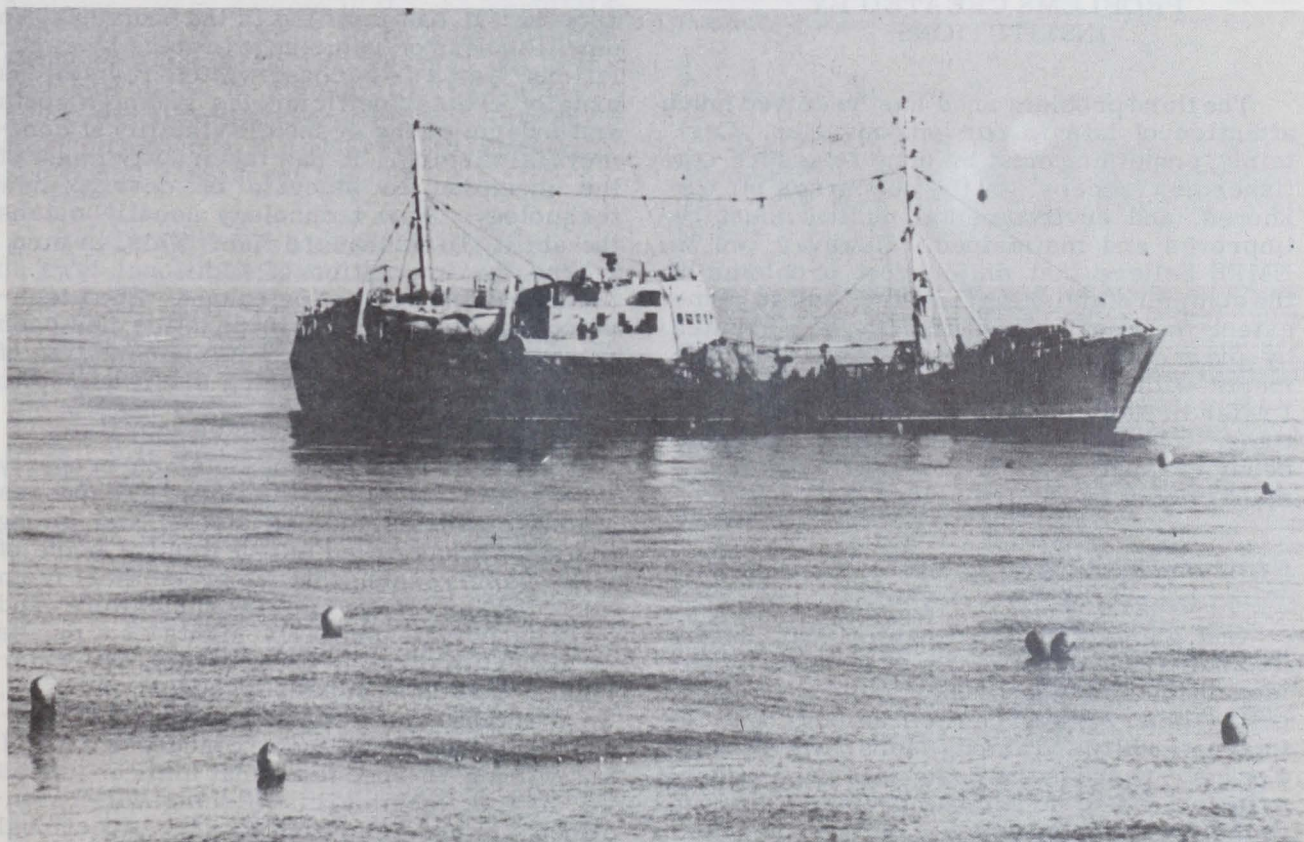
Effects on Marine Life

Even more important than the public health effects of environmental deterioration is the continued gross decline of water quality in estuarine and coastal environments and its effect on their carrying capacity for marine life. This has not occurred without adequate warnings. Government publications in 1887 noted that water quality in Newark Bay (N.J.) had reached a point where fishermen could no longer sell finfish or shellfish taken there--they tasted of coal oil. Three decades later, a Rutgers University (N.J.) professor warned that unless the waters of Raritan Bay were cleared of industrial and domestic

wastes--in particular, heavy metals--society would see the decline and disappearance of the oyster beds and other shellfish in that bay. Only a decade later, his prophecy was fulfilled.

Today we witness the exportation of these conditions to offshore coastal shellfish beds and environments. The New York Bight is characterized by sediments containing several hundred parts per million (ppm) of copper, chromium, lead, and zinc. The effects of these metals and other wastes on bivalves, lobsters, crabs, and other invertebrates are not thoroughly understood, but preliminary observations, measurements, and experiments indicate that something should be done now, not a decade from 1971. The earlier unheeded warning should be ample evidence for this.

In addition to the actual contamination of coastal waterways and estuaries in recent years, man has physically damaged these environments through dredging, filling, and



A Soviet drifter-trawler at the Northern Edge of Georges Bank hauls its gill nets. The large balloon floats visible on surface are attached to float lines of nets.

bulkheading activities. In doing this, he conspicuously removed breeding and nursery areas and disturbed shellfish beds. All of this was done in the name of progress or "improving" waste marshland.

Oil on Georges Bank

Coming back to New England, we hear much about oil on Georges Bank. Oil companies are apparently interested in exploring and possibly developing these resources. This is a very complex situation: the oil interests are looking at what are reported to be vast resources--and the fishing industry, already beleaguered with other problems, views oil exploration as a serious threat to its livelihood. It is concerned about possible spills and physical obstructions on the bottom. While these concerns are very real, fishing interests in the Gulf of Mexico have managed to co-exist with large oil and gas developments.

PROBLEMS CREATED BY INSTITUTIONS

The third problem area has received much attention of late in our organization. Certainly, something must be done to assure our fishermen access to the resources off our shores, and environmental quality must be improved and maintained. However, we in NMFS believe that major root problems of the commercial fishing industry, and to some extent the recreational fishery, are created by and are a part of the institutional arrangements within which we must function today. I refer broadly to the established laws, customs, traditions, organizations, and group behavior associated with the utilization and management of our fisheries.

Common Property

One element of this institutional setting which is particularly guilty of creating problems is the common-property basis for allocating fishery resources both among countries internationally and among users domestically. For many years in the past, this open-access principle posed no serious problems so long as there were relatively few people (or countries) interested in fishing what then appeared to be relatively plentiful resources. As the

numbers of fishermen and countries who want to fish a rather fixed amount of resources have continued to increase, however, we have experienced some critical allocation problems. At worst, under these conditions of growing numbers of participants, our regulatory mechanism has failed us. We have been unable to control fishing effort and the result has been overfishing. At best, we have been able to control total effort, but we have accomplished this by applying increasingly severe regulations that impose inefficiencies and high costs on too many units of effort. The result has been overcapitalization and depressed economic conditions.

Constraints of Common-Property Status

The common-property status of the resource has constrained us in other ways. It has taken away much of the incentive of the individual in private enterprise to help protect or conserve the resource--for what is conserved by one fisherman will be taken by another. It has instilled in the individual an unwillingness or reluctance to abide by regulations because conservation regulations usually create inefficiencies and high costs and undermine the economic viability of commercial fishing. It has taken away much of the incentive to innovate or develop new technology. New technology usually means the ability to catch more fish. This, in turn, means the imposition of additional laws so that more fish will not be caught. Each technological development in practice has been rendered ineffective by the implementation of offsetting regulations, which are required to protect the resource.

For these reasons, the common-property mechanism for allocating fishery resources among countries, among states, and among individuals has failed us. It was for some of these same reasons that we broke away from this concept long ago in agriculture and created private property rights as a means of allocating land, grazing rights, and water rights. For these same reasons, in my view, we are going to have to break out of this tradition in allocating fishery resources also. I am willing to speculate that until or unless we do this, commercial fishing will be inclined toward depression, and allocational disputes will actually increase in number and in severity.

Jurisdictional Split In Managing Fisheries

Another institutional constraint that hampers the optimum utilization and management of fisheries is the jurisdictional split in managing fisheries. How can we possibly regulate a fishery resource when part of it may lie within the 3-mile territorial waters of two or more states, part may be in the contiguous zone where no one, to date, has exercised full jurisdiction, and part may be located beyond 12 miles where many countries can fish it. To this day, states generally have no power outside their narrow territorial waters over fishermen landing in other states or in other countries, although recent action by Governor Sargent would seem to indicate that Massachusetts would like to change this. The Federal Government has chosen not to exercise power over domestic fishermen outside 3 miles unless these fishermen are fishing a resource under international agreement. International organizations or agreements for managing fisheries are slow and awkward in their operations. Very seldom is there a regulation bold or timely enough to be fully effective. Most regulations that finally come out of this obsolete maze of jurisdictional complexity are a compromise where political considerations often outweigh conservation, economic, and social considerations.

FUTURE OF LIVING MARINE RESOURCES

Now what does the future hold for our living marine resources? Although the National Marine Fisheries Service cannot solve all the problems discussed here, I want to tell you what is being done, within NMFS and on other fronts.

First, the foreign fishing situation. Until 1961, Georges Bank, one of the world's richest fishing grounds located just off our shores, was almost exclusively fished by U. S. vessels, although Canadian scallopers were taking increasing amounts of that ocean shellfish. The exploratory vessels of the Soviet Union first appeared early in 1961. The Soviet fleet grew, along with vessels from other European nations. At times there have been about 300 vessels from 7 or 8 nations fishing these grounds at the same time. Reports from our most recent surveillance flights indicate substantial numbers there today. In fact, it

is not uncommon to see a fleet of over 100 large vessels from half a dozen nations concentrated within a 10-mile radius competing for sea herring.

ICNAF Established

Over two decades ago, the International Commission for the Northwest Atlantic Fisheries (ICNAF) was established to investigate, protect, and conserve the fisheries of the Northwest Atlantic Ocean. Fifteen nations, including the United States, are now members. Mesh regulations for cod and haddock went into effect under ICNAF in 1953. These contributed to the conservation of the stocks for several years during a stable fishery. The regulations failed in 1965, however, with the dramatic increase in fishing pressure. Many New England fishermen do not think ICNAF has served their interests very well, and some have suggested that the United States withdraw. Some of us think this would be a mistake, for ICNAF, with all its deficiencies, is the best tool we have at the present time.

Can ICNAF Do More?

What more can be done under ICNAF? International quotas have been established. This is a step in the right direction, even though it is too late.

A new protocol is now nearing adoption within ICNAF which, among other things, will allow for national quotas. Schemes for allocating catches to nations based on historical fishing patterns, coastal state needs, and allowing for developing fishing countries have been generally accepted by the member nations. This will be a big advance in international fisheries management.

However, these actions, under ICNAF, both implemented and proposed, do not satisfy the demands of U.S. fishermen and conservationists. This is understandable because international machinery moves slowly, and these new tools are coming after much damage has been done to the stocks.

Pressure For 200-Mile Jurisdiction

Many people interested in the oceans and the fisheries advocate unilateral action by the United States to declare extended jurisdiction

to 200 miles, to the edge of the continental shelf, or to the 100-fathom curve. Fishing interests in New England particularly are adamant that such action must be taken. There is considerable support for the position in some other parts of the nation, but the fishing industry has not always been unanimous in supporting this position. For example, some of our distant-water fleets fish off the shores of other nations. Their operators and fishermen believe extended jurisdiction by the United States would trigger retaliatory action and restrict their fishing.

1973 Law of Sea Conference

A third Law of the Sea Conference is scheduled for Geneva in 1973. NOAA is playing a very active role in preparing the U. S. Government position. Members of the fishing industry are being consulted. It appears that industry in various sections of the country is nearing agreement on a position that will be acceptable to all. Of course, fishing represents only one small part of broad discussions at Geneva on uses of the oceans. For example, the Department of Defense becomes deeply involved when a proposed broadening of the territorial sea might restrict the movements of the U.S. Navy or Air Force.

It is my opinion that our Government will not take any action in the foreseeable future to extend jurisdiction beyond the present 12-mile fishing zone.

What NMFS Is Doing

Through a major realignment of programs in NMFS, we are directing substantial new efforts towards the problems I have mentioned. Our Woods Hole Laboratory is accelerating ongoing efforts, including joint research cruises with the Soviet Union, to assure that adequate information will be available for our negotiators at the conference table when national allocations of fish stocks off our shores are decided. Furthermore, we nearly doubled our enforcement and surveillance activities in New England in 1971 to get a continuing record of the foreign effort and to be better able to enforce ICNAF regulations. The recently adopted International Inspection System under ICNAF

is a fine new tool that allows our agents to board foreign vessels.

We have recently reprogrammed substantial amounts of money, which is augmented by new appropriations for our laboratories in Milford, Connecticut; Sandy Hook, New Jersey; and Oxford, Maryland. These new programs will be aimed at determining the effects of environmental deterioration and alteration on marine sport and commercial fishes. Work has been underway for some time in the New York Bight. It will be expanded initially into Long Island Sound and, ultimately, into other areas. Since some species, such as bluefish and striped bass, are migratory in nature and may be found from Cape Hatteras, N.C., to north of Cape Cod, Mass., our studies have broad applicability.

Concerning the result of institutional arrangements, we in NMFS are placing top priority on a new initiative to attack these root problems of our fisheries. We hope this will be a fully integrated and cooperative effort with the several states. We believe it is the responsibility of state and Federal governments and of leaders in industry and the academic community to address these problems.

The overall mission of this cooperative effort is to seek workable alternatives to some of these institutional constraints--particularly the common-property problem, and the split jurisdiction over fishery resources. Any solution of these deep-rooted domestic problems will require simultaneous action regarding stabilization of the international situation. It is our intention to move forward on both fronts so, when some national allocation of ocean resources is agreed upon, we shall be ready to manage our domestic fisheries, both recreational and commercial, most efficiently.

Efforts Will Bear Fruit

While the future of New England's living marine resources does not appear bright at the moment, we in NMFS are moving ahead aggressively in several directions. I am confident that these efforts and those of others will eventually bear fruit--and that Americans, whether commercial fishermen or sport fishermen, will be able to share in the bounty of the sea.

U.S. SHRIMP FLEET'S RECORD-SETTING CATCHES CONTINUE

In 1971 U.S. shrimp fishermen caught about 10 million pounds more than they had in 1970. It was their third consecutive record year. The 1971 preliminary figure was a little over 234 million pounds, heads-off weight.

Shrimp catches in the Gulf of Mexico and the South Atlantic accounted for 66% of the 1971 catch. These areas have produced large catches during the past 5 years.

The Alaskan shrimp catch has increased over 300% since 1966 and now represents about 25% of the total.

3 States Produced 70%

Three States--Alaska, Louisiana, and Texas--produced 70% of the total.

About 6% of the shrimp are taken off the Northeast, and 3% off Washington and Oregon.

Three species--white, pink, and brown--form the catch in the Gulf and South Atlantic; only a smaller, different species of pink shrimp is taken off Alaska, the Northeast, and Oregon and Washington. In the Gulf, shrimp are an annual crop. Off Alaska, the Northeast, and Washington and Oregon, they are not harvested until they are 3 to 5 years old.

In some areas shrimp are landed with their heads on. The figures given here have been converted to heads-off weight.

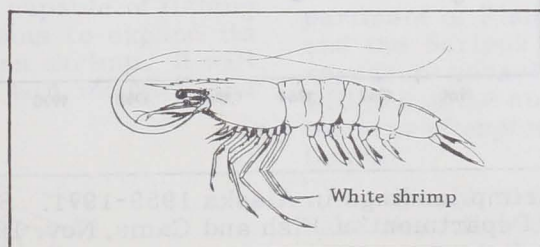
Most Valuable Species

NMFS Director Philip M. Roedel stated that shrimp are the most valuable commercial species--in 1971, worth \$166.2 million to the fishermen.

"The increasing catch may be attributed primarily to an abundant resource, and to the growing number of vessels in the shrimp fishery, mostly in Alaska and in the Gulf of Mexico.

"However, it takes more than a plentiful resource and an aggressive fishing fleet to achieve the present status of the shrimp industry. Shrimp has long been one of our most popular seafoods, with more than a million pounds consumed every day in the United States. The processing and marketing segments of the industry have shown great imagination in providing consumers a wide variety of attractive products, including fresh, frozen, canned and breaded shrimp.

"All these factors contribute to the continuing strong market for shrimp and shrimp products."



ALASKA'S SHRIMP CATCH TOPS 100 MILLION POUNDS

In 1971, Alaska's shrimp catch exceeded 100 million pounds. This climaxed a steady upward trend that started in 1964 (see figure).

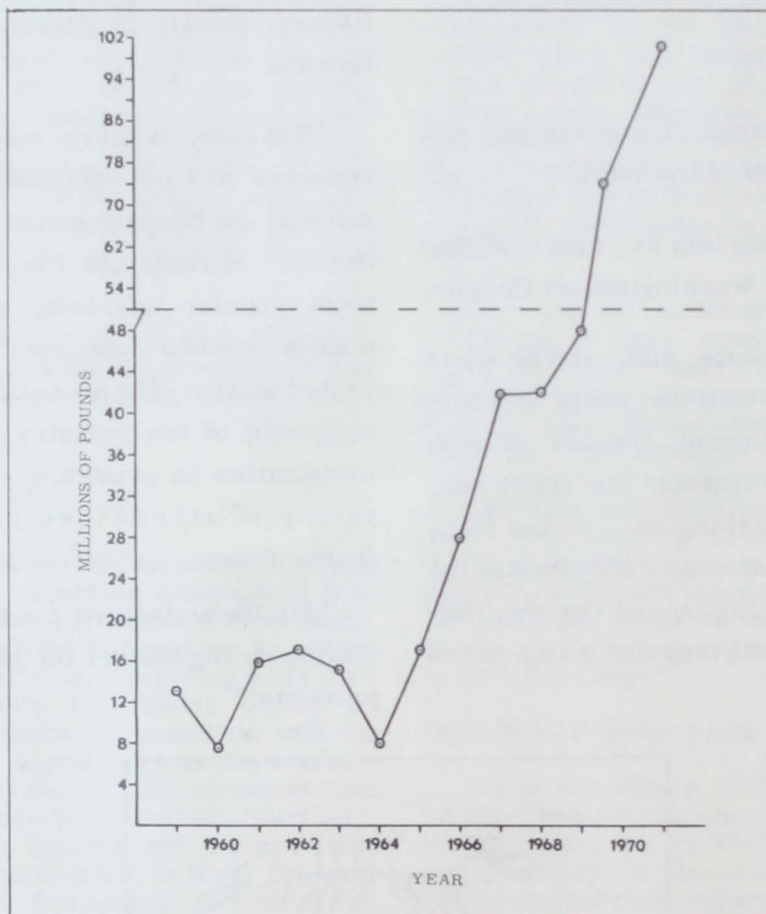
Almost all the increase over the 1970 catch of 74 million pounds was due to the growth of the Kodiak Island pink-shrimp fishery. The number of shrimp processors in Kodiak increased from 4 in 1970 to 8 in 1971; the number of vessels from 20 to 40. The annual catch for some high-line vessels was close to 10 million pounds.

In April 1971, a 58-million pound annual quota was established in historic inshore shrimp-producing areas. This quota will not be met because most of the 1971 increase

was from a nonquota area--the Marmot Bay region. The catch rate in this region through August 1971 was 4,459 pounds per hour.

Shrimp-Management Problem

Refined scientific methods for managing pandalid shrimp essentially do not exist in the circumpolar areas of the world where they are harvested. All pandalid shrimp change to females after spending the early part of their lives as males. This could lead to an unstable resource condition because the fishery operates almost exclusively on females, say NMFS Alaska Region personnel. "This condition may not be apparent, however, until it shows in depressed levels of future recruitment."



Annual shrimp landings in Alaska 1959-1971. Source: Alaska Department of Fish and Game, Nov. 1971.

ALASKA'S NO. 2 CATCH IS KODIAK SHRIMP

The shrimp fishery in the Kodiak Island, Alaska, area produced 80 million pounds in 1971, second only to salmon in Alaska's catch figures. The number of shrimp vessels rose from 16-18 in 1970 to 45-50 in 1971. Five new plants nearly doubled the processing industry's capacity.

In 1970, local fishermen recommended to Alaska's Department of Fish and Game that it establish a quarterly quota for shrimp catches in each major inshore fishing area. The Department did. It had 2 goals: to establish a basis for conservation, and to encourage exploration in new areas after inshore quotas were filled. Fishermen credit the quota system with providing the incentive that developed, in 1971, the new grounds in Marmot Gully, southeast of Kodiak Island.

Catch per unit of effort on established fishing grounds was somewhat less than in 1970; it was the highest on the new grounds. More than 20 million pounds of shrimp were taken from Marmot Gully in 1971. But as winter progressed, fishing became increasingly difficult in this exposed offshore area.

Concern About Stocks

Biologists are concerned that this catch already may exceed the maximum sustained yield for Kodiak stocks. They anticipate a rapid shift to new stocks. But where will new stocks be found? Results of joint research by NMFS, Alaska, and Soviet's 'Krill' in 1971 discouraged hope that significant new shrimp stocks will be found offshore, south of Kodiak Island on Albatross Bank. However, Soviet commercial efforts on Portlock Bank each spring in recent years suggest that offshore area beyond Marmot Gully may prove productive to those boats capable of fishing there. In 1972, NMFS plans to expand its research effort on northern shrimp. It will be coordinated carefully with industry and Alaska.



U.S. COOPERATES WITH USSR IN SURVEY OFF CALIFORNIA

On February 16, the 270-foot Soviet research vessel ALBA docked in San Pedro, Calif. It took aboard a U.S. scientist as an observer and its scientists discussed plans for the cooperative winter study of the distribution of hake spawning stocks off central and northern California. The vessel is operated by the Far Eastern Seas Fisheries Research Institute (TINRO) of Vladivostok. This was announced by Izadore Barrett, Acting Director of NOAA's National Marine Fisheries Service Southwest Fisheries Center in La Jolla, Calif.

The U.S. observer aboard the ALBA is James R. Trailkill, fishery biologist at the NMFS Southwest Fisheries Center. He is working with Soviet technicians to familiarize them with U.S. equipment and techniques for collecting samples and to assure standardization of sampling methods. The ALBA carries a crew of 72. Its scientific leader is Mikhail Stepanenko.

Continuing Research

Barrett said assignment of the ALBA to the 1972 research program was made at the annual meeting of U.S. and Soviet scientists in Seattle, Washington, November 1971. Both sides agreed on the necessity to continue studies on the life history, distribution, and abundance of the Pacific hake and Pacific ocean perch. These studies have been conducted cooperatively under the bilateral fisheries agreement since 1969.

ALBA's Role

The ALBA will conduct a fish egg and larva survey off Pt. Conception to the Oregon border for 15-18 days following tracklines supplied by the La Jolla Center. In addition to the ALBA, the NMFS research vessel, DAVID STARR JORDAN, the California Department of Fish and Game vessel, ALASKA, and the Scripps Institution of Oceanography research vessel, ALEXANDER AGASSIZ, will join in the cooperative survey, extending the area of exploration to south of Baja California.

In recent years, Barrett explained, hake have been fished by the Soviet fleet. Information about the resource is necessary to provide both nations with the scientific bases for agreements that will protect the fish.

NOAA WILL CHART ALASKAN WATERS & STUDY FISH RESOURCES

Twelve NOAA ships and an aerial photo plane will survey Alaskan waters this year, Howard W. Pollock, NOAA Deputy Administrator, announced on February 1. Purposes are to provide data for detailed up-to-date charts--and to conduct fish-resource studies for Alaska's increased marine activities and economic development.

NOAA's National Ocean Survey will operate 5 ships and the plane; NMFS will operate 7 ships.

New, large-scale, nautical charts of the narrow southeast Alaska waters are needed by all commercial and private vessels. The fishing, mining, forestry, and tourist industries have requested them.

NMFS Fish-Research Surveys

These NMFS vessels will conduct the fish-research surveys:

'Pribilof' will make 4 round trips between St. Paul in the Aleutians and her home port of Seattle, Wash., to transport supplies, return seal skins, and to carry high school students to and from winter classes.

'Oregon' will work out of Kodiak Island with special "separator" shrimp trawls

around Shumagin Island in the Gulf of Alaska. These trawls are being developed to separate directly shrimp from small fish and other undesirable matter; now, the whole catch is brought aboard and separated by hand. Also, 'Oregon' will cruise to the Bering Sea to purse seine for salmon, test bottom trawls for crab and bottomfish, and take oceanographic observations.

'George B. Kelez' of Seattle will cruise south of Alaska Peninsula and to area of Aleutian Islands to assess salmon distribution. The information will be used to predict relative abundance of salmon and possible spawning-run strength.

'John N. Cobb' will work from Seattle into southern Alaskan waters to investigate groundfish abundance. This information will define further the relatively unused stocks of fish there.

'Miller Freeman' will be reactivated and may be able to conduct one survey of fish eggs and larvae in Alaskan waters during 1972.

'Murre II' will work out of Auke Bay, Alaska, and 'Cripple Creek' out of Kodiak Island in support of local biological and experimental fishing programs of their laboratories.

