KENNEDY ROUND WINS THOUSANDS OF TARIFF CUTS

The United States joined 45 nations in signing at Geneva on June 30 agreements reached in the 3-year-long Kennedy Round of trade talks. Tariff cuts on industrial goods average about 35 percent; they are less on farm items.

Starting January 1, 1968, and ending January 1, 1973, the U. S. will reduce tariffs on about 6,000 items up to 50 percent--some immediately, but most will be put into effect in 5 equal stages. The effects of the concessions will be gradual--but in the end substantial. The American consumer is expected to benefit.

The U. S. will release in mid-July the tariff cuts made by foreign nations that will benefit American exporters.

The Kennedy Round was so named because it was made possible during the Kennedy administration by Congressional passage on October 4, 1962, of the Trade Expansion Act. This gave the President authority until June 30, 1967, to cut tariffs up to 50 percent--and, in certain cases, to eliminate them. President Kennedy signed the Act a week later. The rates of duty existing on July 1, 1962, were the basis for negotiation.

The trade talks were conducted under the General Agreement on Tariffs and Trade (GATT), a largely voluntary agreement that includes nations of widely different political views.

Negotiators Hail Results

U. S. negotiators called the Kennedy Round results "the most comprehensive assault on barriers to international trade that has ever taken place." Eric Wyndham White, director-general of GATT, stated: "Almost 50 countries, accounting for around 80 percent of world trade, have participated in the negotiations... trade in the products on which concessions have been agreed amounts to some $40 billion." About 60,000 items are involved.

Talks Produced Other Important Results

In addition to tariff concessions, the talks also resulted in a new international grains agreement raising the minimum world trading price for wheat. Other industrial nations will join the U. S. in supplying food to poor nations. A new "antidumping code" was adopted. And the negotiators agreed on "closer harmonization" of steel tariffs among major producing nations and concessions on chemicals.

U. S. Exports Greater Than Imports

The U. S. exports more than it imports, reports the Department of Commerce: in 1966, exports totaled $29 billion and imports $25.5 billion. Of U. S. imports, only 20 percent are consumer goods. Imports have remained for years about 3 percent of the Gross National Product (GNP), the sum of all goods and services rendered; in 1966, the GNP was $740 billion.

Based on 1966 imports, the U. S. is granting tariff concessions on about $7.5-8 billion of industrial and farm imports. The U. S. is gaining concessions from foreign nations on about an equal amount.

About one-third of U. S. imports are items not produced here, such as coffee. They enter free of duty.

The tariff cuts adopted cover the bulk of imports on which there are duties.

Listed below are major fishery imports affected by the tariff concessions. They were adapted from the new U. S. "Schedule 20" for Commercial Fisheries Review by Frank Riley, Supervisory Fishery Reporting Specialist, Branch of Fishery Statistics, BCF.

Description	Rates of Duty	
	As of July 1, 1962	Concession Rate (Final Stage)
Halibut and salmon	0.5¢ lb.	Free
Swordfish:		
Fresh	1¢ lb.	Free
Frozen	0.75¢ lb.	Free
Blocks (over 10 lbs.)	1¢ lb.	Free
Canned tuna in brine:		
Under quota	12.5% ad val.	6% ad val.
Excess of quota	25% ad val.	12.5% ad val.
Canned salmon:		
Not in oil	15% ad val.	7.5% ad val.
In oil	25.5% ad val.	12.5% ad val.
Fish sticks and similar products:		
Not cooked nor in oil	20% ad val.	10% ad val.
Other	30% ad val.	15% ad val.
Tuna loins and discs	1¢ lb.	0.5¢ lb.
Canned clams:		
Razor clams	7.5% ad val.	3.5% ad val.
Other	20% ad val.	14% ad val.
Canned crabmeat	22.5% ad val.	11% ad val.
Canned oysters:		
Smoked	4.5¢ lb.	2.2¢ lb.
Other	6¢ lb.	3¢ lb.
Juice	6¢ lb.	3¢ lb.
Pearls:		
Natural	3% ad val.	Free
Cultured	5% ad val.	2.5% ad val.

Note: "Ad val." is "Ad valorem," a percentage rate levied according to value of imported item.

e dangerous age for Africa's children. Protein deficiency rarely is seen in infants at breast because human milk supplies nough protein. When breast feeding stops, it often means loss of life itself for many children.

accustomed to adult food, which often is insufficient for adults, child slips into deficiency diseases. "Kwashiorkor," the ost dangerous, causes retarded growth, discoloration of skin and hair, bloating, swollen belly, and mental apathy. In hoto, UN worker extends a very helpful hand. (Photo: Paul Almasy/WHO)

UN RECOMMENDS PLAN TO PREVENT WORLD PROTEIN CRISIS

Mankind is losing ground in the struggle to feed itself. Today, the limited quantity of food (calories) is a great concern to many parts of the underdeveloped world--but the quality (notably protein) is even more crucial. Supplies of protein are particularly scarce and costly in the poorer nations. For over one-third of their population, the protein-calorie balance of the diet is inadequate. The gap is "widening rapidly." The protein problem is reaching a "critical stage."

As population increases faster than food supply, these nations are losing the capacity to feed themselves. They contain a large part of the world's population--and will have an even larger part of the future population. Supplying enough food to them has become "one of the most important problems for the balance of the twentieth century."

There are over 300 million children who lack sufficient protein and calories and suffer grossly retarded physical growth and development. For many of them, mental development, learning, and behavior also may be impaired. Further, protein-calorie deficiencies directly affect the health and economic productivity of adult populations--and thus hinder the development of nations desperately in need of improving their condition.

The United Nations family must act to close the gap between world protein needs and supplies--to help the present hungry millions and to prevent even more widespread protein deficiency in future generations. Action will require increased spending by the UN family, other institutions, and individual governments throughout the world.

This grim situation inspired the latest UN report on food: "Feeding the expanding world population: recommendations for international action to avert the impending protein crisis." It was prepared by the Advisory Committee on the Application of Science and Technology to Development. One of the world's leading authorities on nutrition and food technology, Dr. Nevin S. Scrimshaw of the Massachusetts Institute of Technology, was general adviser on protein to the committee.

The report recognizes that the "bulk of the funds and efforts needed to realize the policy objectives must come from outside the UN family, mainly from national governments."

It emphasizes that there is no single solution to the complex problem of providing great quantities of proteins of high biological value--in the form the consumer will accept, and at a price he can afford.

The report's program of action contains these key elements:

I. Supply

- Efforts must be intensified to improve production of conventional plant, animal, and fish sources of protein.

- Prevent waste. Mobilize all possible resources and efforts to reduce the preventable waste of protein. Make better use of existing protein resources for human consumption.

- Exploit new sources. Develop and produce new and unconventional sources of protein for human consumption: foods incorporating oil-seed meals, fish protein concentrate (FPC), single-cell protein or fortified cereals, synthetic essential amino acids, and others.

Fig. 1 - Red hake is dropped into grinder--producing, after water and fats are dissolved in alcohol, fish protein concentrate (FPC).

Fig. 2 - FPC fishburger.

To achieve improved use of these sources, there must be greater emphasis on nutrition education, and in the processing, marketing and promotion of food products."

II. Consumption

• It is imperative to put much greater emphasis on improving distribution and marketing of protein foods.

III. Appropriate Research and Training Facilities

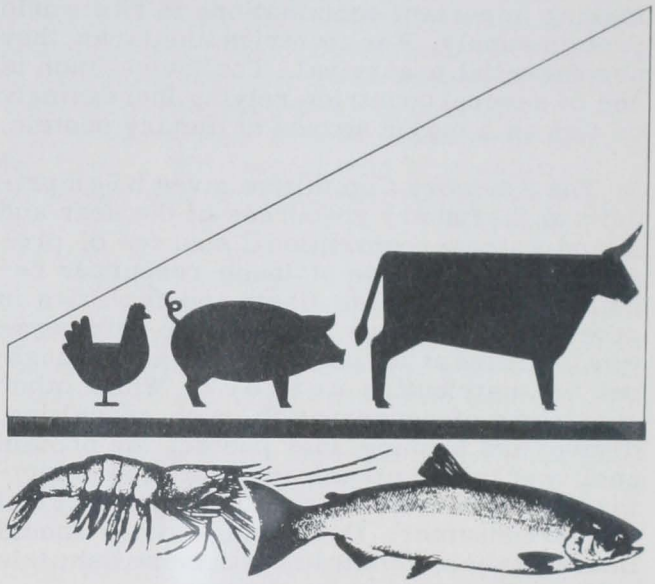
• They must be established to build or strengthen the necessary institutional framework--and to provide technical education and training for the manpower needed to deal with these problems.

The Advisory Committee recommends the creation of a protein-promotion trust fund to be administered by the UN Development Program. It urges strengthening of the coordination machinery within the UN family. It urges more cooperation between developed and developing nations, public and private sectors, and support from the highest political levels.

The Needy Areas Must Produce More

The committee believes that the crisis arising from the protein gap "can only be met or mitigated through rapid increases in food, primarily in the regions where the shortages are most acute."

All proteins are formed from amino acids in varying proportions. Only 8 amino acids are essential to human nutrition. Proteins are divided roughly into 2 classes: First-class proteins have a relative abundance of all 8 essential amino acids. Most proteins in this class are derived from animal sources: meat,



fish, eggs, milk. The value of second-class proteins is limited by the relative absence (seldom complete) of one of the essential amino acids: most vegetable proteins--for example, cereals, legumes.

TO CLOSE THE GAP

Because the largest volume of protein for the foreseeable future must come from the conventional plant, animal, and fishery resources, the report states, their production and conservation should receive first emphasis. This production depends on more highly skilled personnel, adoption of improved plant varieties and animal breeds, greater supply and effective use of mechanical equipment, rural credit, marketing and price supports, agricultural extension programs, assistance in eradicating animal diseases, and incentives to farmers.

The present scale of effort by developing nations and the aid given them by developed nations are "dangerously inadequate."

Livestock will be an increasingly important source of protein in the developing nations. There must be improved efficiency in producing milk and meat from cattle, meat from sheep and pigs, and eggs and meat from poultry throughout the world by applying existing knowledge and by introducing new knowledge.

FISHERY RESOURCES

Fresh and processed fish already are making important contributions to the world protein supply. For countries like Japan, they are essential to survival. The Soviet Union is one of several countries relying increasingly on fish as a major source of dietary protein.

The Advisory Committee gives high priority to the fishery resources of the seas and inland waters--conventional sources of protein. The utilization of these resources requires larger fishing fleets and facilities in developing countries, and suitable refrigeration facilities at the point of catch and throughout the distribution network. While other methods of conservation, such as salting, drying, and canning, may protect the protein quality of fish, the dominant factors in selecting a method are acceptability and price of fish to the consumer. Developing nations should intensify their efforts to catch more fish; this will involve large expenditures.

Fig. 3 - Inspecting algae oyster food at BCF's Oxford, Md., Laboratory.

Fishery industries should be set up or extended to exploit and distribute available sea, river, and lake resources by established procedures or by fish farming methods in natural or artificial ponds. Equally important is the development of distribution systems to ensure economic transport and storage of this highly perishable commodity. Different transport systems and conservation methods may be used in each area. Preservation techniques range from refrigeration, salting, drying, and canning to the production of fish pastes or sauces.

Fig. 4 - Checking sperm used in fertilizing female oysters at BCF's Oxford, Md., Laboratory.

Fig. 5 - Scientists of BCF's Oxford, Md., Laboratory inspect oysters planted in a Chesapeake Bay tributary.
(Photos this page: George Tames, The N. Y. Times)

At present, very large amounts of fish are ed and used to produce animal food in de- oped nations rather than for direct human e in developing nations, where a large part this dried fish meal is produced. The use- lness of fish is even greater than the figures potential production suggest because of the h biological value of this protein. The de- lopment of suitable transport and preserva- n procedures could result in diverting a ge proportion of fishery products directly human consumption. This need may become tritionally desirable and economically im- rtant, if these fisheries are to survive. his is because advances in food technology the developing nations may make it possible r them to produce more of their own animal rotein foods without having to import and use ried fish meal. A large amount of fish by- roducts and fish unsuitable in the natural tate can be converted into foods for human onsumption.

REVENTING WASTE

The unnecessary losses of protein foods in eld, storage, transport, and home must be revented. Loss to insects, birds, rodents, c., and combined effects of high temperature nd humidity may reach over 25 percent in any developing nations. There is urgent need r insecticides, rodenticides, modern storage cilities and practices, and more efficient stribution.

The report states: "Improved cereal-grain illing procedures would salvage consider- le supplies of edible protein as well as cal- ies . . . . There is a tremendous potential the conservation of foods and their preser- tion in a wholesome state."

NCONVENTIONAL SOURCES

But if the world is to have a fighting chance o meet future food needs, the food supply must be supplemented from unconventional ources. Some of the unconventional sources o not depend on the availability of farm land. It is in the development of such sources that he application of modern science and tech- ology can make the greatest additional con- ribution towards closing the protein gap."

From the unconventional sources, the Ad- isory Committee strongly recommends:

1. Promote the production and use of fish protein concentrate (FPC).

2. Increase direct food use by people of oil-seeds and oil-seed protein concentrates. "No other single source of unconventional protein could contribute so greatly and promptly towards closing the protein gap."

The committee says that the technology for carrying out these 2 recommendations is well advanced. But "the biggest difficulties lie on the consumption side. As with other protein sources, the acceptability for human consumption of oil-seed protein and FPC depends upon making them desirable as food because of their physical and other properties. People will not eat protein simply 'because it is good for them'. Millions of tons of good quality protein are presently available in oil-seed cake, and technology is fully developed for processing it to provide a low-cost, safe product of good biological value. But unless this product is made available in a palatable and desirable form, it will not be purchased or eaten. One of the areas of this whole problem requiring most urgent attention and effort is the development, promotion and marketing of protein foods which are desired by the consumer. Present efforts in these directions are pathetically inadequate."

FISH PROTEIN CONCENTRATE (FPC)

The Advisory committee says that the FPCs so far available have not yet proved sufficiently attractive to consumers when incorporated into human foods. The task of winning acceptability for FPC is of major importance, along with research to modify its properties by changing processing conditions during manufacture. Such an investment might yield new products with interesting properties that could improve the characteristics of staple foods.

The application of technical research to fish has provided a highly nutritious concentrate without any unpleasant odor. In all probability, research and development could determine ways in which FPC might offer positive advantages to the consumer when added to acceptable foods.

The committee recommends support for the production and marketing of acceptable FPC for human consumption in developing nations that have substantial marine resources. Several suitable processes are available, but their application will require adequate fishing fleets and processing facili-

ties, research in food technology to develop acceptable and desirable forms to suit local tastes--and market research to determine how the product should be introduced and promoted in local markets.

If acceptable food products containing FPC are promoted and consumed, ample private capital may become available.

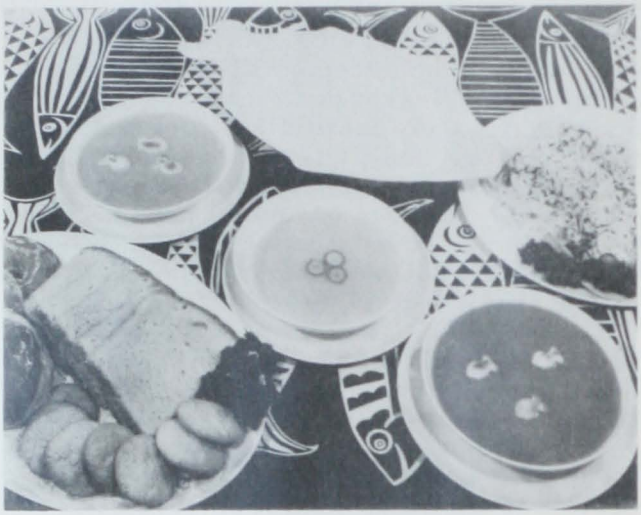


Fig. 6 - All these foods contain FPC.

The report points out that FPC represents a stable form in which fish can be fed even to infants. It can be made from fish that are available in very large amounts and are not suitable for direct human consumption. Also, FPC is cheaper because it can be made from abundant fish which would otherwise not have a ready market except for animal feed or fertilizer.

For infants and young children, fish protein may be made by processing suitable fresh fish into FPC by extracting most of the oil, with or without later removal of flavor and odor. FPC contains about 80 percent protein. The cost of deodorized FPC, even calculated per pound of protein (20 to 30 cents) will be considerably higher than that of oil-seed protein (8 to 12 cents) and comparable with that of nonfat dry milk. While a product that retains a fish odor and taste can be produced more cheaply, marketing it is likely to be more difficult. Further, few developing nations have ocean-going fishing fleets or industry to produce FPC on a commercially practical scale. Some needy nations do not even have access to the sea.

Hurdles for FPC

The obstacles to a major contribution by FPC to developing nations are: (1) need for modern fishing industry to provide raw material; (2) construction and operation of plants to make a wholesome, acceptable product at low cost; (3) finding acceptable ways of using the product in foods; (4) marketing and promoting it.

Whether nations plan to produce FPC or not, if they have access to good fishing waters they can and should develop modern fleets. Fresh, dried, salted, smoked, and canned fish are valuable dietary protein sources. Programs to utilize fish need to be supplemented by production of FPC for human consumption.

OTHER RECOMMENDATIONS

The UN's Advisory Committee on the Application of Science and Technology to Development also recommended:

- Intensify research greatly on single-cell protein sources. "Research to develop feasible means of producing and utilizing on a large scale protein from single cells offers the best hope for major new protein supplies independent of agricultural land use." Its report states that some single cells can grow through utilization of inexpensive energy sources, such as hydrocarbons from petroleum, natural gas, or vegetable starch, and others may derive their energy through photosynthesis. Intensive research is needed on their nutritive value, safety, processing, and incorporation into wholesome and palatable foods for people. A variety of microbial, yeast, and algal species should be explored for possible use by animals and people.

- Support the use of synthetic amino acids or protein concentrates to improve nutritive value of cereal and other plant proteins, and develop the use of other synthetic nutrients. The protein value of world cereal supplies could be increased "tremendously" in a few years by adding small amounts of lysine to wheat, lysine and tryptophan to corn and sorghum, and methionine to some legume-based foods.

- Develop and support regional and national centers for research and training in agricultural technology, food science, food technology, and nutrition. Regional centers to serve a number of developing countries must be large enough to include the disciplines required to deal with the complex food and nutrition problems.

• Assist centers for the animal and clinical sting of new protein foods for developing tions.

• "Support training of personnel in the elds of marketing (including distribution and romotion), market research (including socio- ultural surveys of consumers), and systems alysis to assist the marketing and promotion f new protein foods."

• "Expand the number of fellowships for raining in nutrition, food science and food echnology, and other fields important to the roduction and consumption of protein foods."

• "Governments should review and improve their policies and their legislation and regulations regarding all aspects of food and protein production, processing, and marketing so as to remove unnecessary obstacles and encourage appropriate activities."

• Accelerate development and growing of genetically improved plants of high protein value and improved agronomic characteristics. At present, dramatically improved varieties of corn, rice, and cottonseed are available for immediate introduction into developing nations.

SALT CODFISH STILL HIGHLY FAVORED

The cod is one of the commonest fishes of northern waters and has been highly regarded by the French for several centuries (Escoffier, the internationally famous chef, thought it ranked "among the finest of fish"). It has been a staple food in Portugal, Spain, and Italy for almost as long, and has been glorified in Massachusetts (where the wooden Sacred Cod, in memory of the fish's considerable contribution to the economy of that State, hangs in the State House in Boston.

The cod brought prosperity to New England, as it had to France and the Scandinavian countries long before the New World was settled. Basque fishermen, in the sixteenth century, reached the Newfoundland Banks, site of the greatest codfishing grounds in the world, and brought back large quantities of cod, which the French soon learned to value. The Scandinavians had sailed to those banks earlier, and the Latins swarmed on them later. Cod thus became one of the most important of all food fishes. It was particularly known in its salted, dried state throughout most the Western world.

Salt cod is the basis for hundreds of epicurean preparations, ranging from the delectable "brandade de morue," one of the classics of French cuisine, to codfish balls, once a Sunday breakfast ritual in New England.

At one time, preparing salt cod was something of an ordeal. A housewife of the last century, getting up a codfish dinner, was advised "to lay the fish into the cellar a few days before it is to be cooked, that it may be softened by the dampness. The afternoon before it is to be boiled, wash it carefully in several waters. It is well to keep a brush on purpose to cleanse salt fish and use it repeatedly while it is soaking.

Nowadays, salt cod comes shredded or flaked in packages or wooden boxes, and needs only a brief soaking, if any at all, depending on how it has been processed. American recipes call for salt cod cut from whole salted fish, which is available in most fish markets, and can almost always be found in Spanish and Italian neighborhoods. The fish will require anywhere from 6 to 24 hours of fresh-water soaking, depending on how salty and dried it is. On Fridays, some fish stores sell salt cod already soaked and some of the Italian trade still buy their "bacala" in this manner. ("Gourmet")

UNITED STATES

Great Lakes Commercial Catch Is Up But Value Drops

The Great Lakes Commission reports that 116.2 million pounds of fish were taken from the Great Lakes in 1966 by U. S. and Canadian commercial operators. This is a gain of about 17.5 million pounds over 1965. However, the value of U. S.-Canadian catch declined from $10.8 million in 1965 to $10.2 million. The disparity between weight and value in U. S. catch resulted from a huge increase in the catch of low-value alewife in Lake Michigan waters. This gain obscured the overall decline in other species.

The Canadian situation was due principally to a decline in the market value of yellow perch, leader in Ontario's commercial catch.

The Great Lakes catch in 1965 and 1966, according to BCF and the Ontario Department of Lands and Forests, was (in 000's of pounds):

States	1966	1965
Illinois	80	180
Indiana	-	7
Michigan	21,284	19,748
Minnesota	1,685	1,613
New York	457	442
Ohio	10,516	11,528
Pennsylvania	573	514
Wisconsin	32,822	20,124
Total	67,417	54,156

Lake Basins	U. S. Waters		Canadian Waters	
	1966	1965	1966	1965
Ontario	237	217	1,645	2,647
Erie	12,698	13,524	41,424	35,096
St. Clair	-	-	940	886
Huron[1/]	3,769	4,673	2,913	3,568
Michigan	42,455	26,994	-	-
Superior	8,258	8,748	1,837	2,270
Total	67,417	54,156	48,759	44,467

1/Canadian waters include Georgian Bay and North Channel.
Note: Dollar value (in 000's): U. S. 1966 $5,647, 1965 $5,729; Ontario 1966 $4,564, 1965 $5,112. Ontario 1966 figures are preliminary.

Lake Michigan's Production Higher

In 1966, Lake Michigan increased its leading position in the U. S. Great Lakes commercial catch. This resulted primarily from an increase of 107 percent in alewife landings--from 14 to 29 million pounds. Lake Michigan landings accounted for nearly two-thirds (63%) of the U. S. Lakes total in weight (see table), while the $2,762,000 value was 49 percent of the total for the Lakes states. The Lake Michigan alewife catch was 43 percent of the total U. S. Great Lakes catch and 7.7 percent of the value.

Last year, about 20.3 million pounds of the alewife netted were used to produce fish meal and oil; 8.7 million pounds were used by the pet food industry.

This concentration of alewife landings from Lake Michigan does not reflect the overall abundance of this species in Great Lakes waters. Rather, it indicates where commercial fishermen are utilizing this resource. A BCF survey in fall 1966 discovered large quantities of alewives in lakes Erie and Ontario but, to date, this has not prompted any commercial fishing operation there.

Chub Is Lake Michigan's Most Valuable

Another prominent species in the Lake Michigan commercial catch, and most valuable, is the chub. The larger chubs, smoked for retail market, accounted for 6.3 million pounds of 1966's 7 million total; they were worth nearly $1.4 million. The smaller fish were used in pet foods.

Among other important Lake Michigan species, notable changes occurred in the commercial catch of yellow perch and whitefish. For yellow perch, there was a sharp drop from 5.8 million pounds in 1964 to 1.3 million in 1965, and to an all-time low of 636,000 pounds in 1966. A significant cause has been competition for food from the flourishing alewife; the result has been that the yellow perch has been hampered in its growth to a marketable size.

The whitefish catch presents a bright outlook. The 1966 landings of this high-value fish were over 1.4 million pounds, compared to about 1 million pounds in 1965, and the highest amount since 1952.

Erie Is Most Productive

Lake Erie, the most productive of the Great Lakes for commercial fishing, yielded over 54 million pounds in 1966. The catch in Ontario waters represented about three-quarters of Erie's total--and 85 percent of the total weight of Canadian Great Lakes landings. Yellow perch was the leading species. Increased catches in both U. S.

and Canadian waters amounting to 4.1 and 10.7 million pounds, respectively. Smelt, which ranks second in the Lake Erie commercial catch, is taken almost entirely by Canadian fishermen. The 1966 Canadian harvest reached 15.9 million pounds, compared to 11.7 million in 1965. More suitable trawling grounds on the north shore is a major factor for this localization.

In the Lake Huron area, including Georgian Bay, the 1966 catch of 6.7 million pounds was a decline from 1965 for both U. S. and Canadian sections of the lake basin. Among the leading commercial species--chubs, yellow perch, whitefish and walleyes--only yellow perch landings in the Saginaw Bay area increased.

U. S. Took 4/5 of Lake Superior Catch

In Lake Superior, U. S. commercial fishermen accounted for about four-fifths of 1966's total landings of 10.1 million pounds. This was nearly a million pounds below 1965, but the $1.4 million value was slightly above 1965. The prominent position of lake herring in the total Lake Superior catch is shown by last year's U. S.-Canadian commercial landings of 5.6 million pounds, lowest for this species and also for the lake's total catch since the early 1920's. Lake trout landings in U. S. and Canadian waters totaled a quarter-million pounds in 1966, about the same as 1965. This was due to the control of commercial operations during the rehabitation period for this fishery.

The commercial catch in Lake Ontario is predominantly in Canadian waters. Last year's decline of a million pounds from 1965 was due in large measure to the sharp decrease in landings of yellow and white perch. In Lake St. Clair, commercial fishing operations are carried on only in Canadian waters. Here, modest increases were made in 1966 in the catch of walleyes and carp, the principal species.

Sea Lamprey Control in Lake Superior May Be 94-97% Effective

In early April, electrical barriers to assess the abundance of spawning lampreys in Lake Superior were installed on 16 streams on the U. S. side. By June 2, 997 lampreys had been captured at these barriers. This was about 45 percent of the number taken by June 2, 1966--then the smallest run recorded since chemical control began to show its effects on the lamprey population.

Based on the timing of lamprey migration during the past 10 years, from 37 to 64 percent of the run had appeared at the barriers by June 2. Assuming 1967's run will fall within this range, the season's total will be somewhere between 1,550 and 2,700 lampreys. Such a population range would be 94 to 97 percent below the annual average for the 5-year period prior to chemical control.

The U. S. and Canada share the work of the Great Lakes Fishery Commission in lamprey control. The Bureau of Commercial Fisheries conducts the U. S. operation.

Lake Michigan Alewife Fishery Is Active

The Lake Michigan alewife fishery was in full swing during May and total production was estimated at over 10 million lbs. by month's end. Heaviest production was from pound nets and trawlers at Milwaukee, and from trawlers at Two Rivers, Wisc.

Four converted gillnetters at Two Rivers each landed consistently about 40,000 lbs. per day, and several 60,000 to 85,000 lb. days were achieved by vessels making 2 or 3 trips. Meal plants at Milwaukee, Pensaukee, and Menominee were running 8 to 16 hours per day. Green Bay poundnetters set nets for full production by mid-June.

U. S. Urges Removal of 90% of Pollutants in a N. Y.-N. J. Area

Interior Department's Federal Water Pollution Control Administration (FWPCA) recommended in mid-May that 90 percent of the major pollutants of waters in the Raritan Bay area between Staten Island, N. Y., and New Jersey be removed by building municipal and industrial waste-treatment plants.

The recommendation was one of several made public at a 2-day conference in New York City on pollution of Raritan Bay and neighboring interstate waters. The meeting, called by FWPCA, was attended by more than 150 New York and New Jersey officials and industrialists.

A FWPCA study has shown that high bacterial counts made shellfish in most of Raritan Bay unfit for human consumption--and swimming at some Staten Island beaches a health hazard. New York and New Jersey have banned the harvesting of shellfish.

Suggests Timetable

FWPCA suggested agreement on a timetable to complete designs for treatment works by the end of 1967, construction to begin no later than mid-1968, and operations to start in mid-1970.

The bay area and Arthur Kill between Staten Island and New Jersey was described as "virtually a cesspool". The cost of cleaning the mess was estimated at a half-billion dollars.

Pollution was attributed to municipal and industrial waste being discharged into the bay, at the southwest tip of Staten Island, and along the New Jersey shore. Waste also is fed in from the Raritan River, which empties into the upper bay from New Jersey.

The Federal Water Pollution Control Act authorizes Federal financial support for the States' anti-pollution programs, but Congress must approve specific appropriations.

OCEANOGRAPHY

Core Drilling Begins On Continental Slope Off Atlantic Coast

The Department of the Interior approved plans for Humble Oil and Refining Company to carry out a core-drilling program on the Continental Slope beyond the Continental Shelf off Florida and northward to points off Cape Cod and Georges Bank. The program, scheduled to be completed this summer, is gathering geologic data beyond the 100-fathom curve. It features the first drill probes of the Slope by a private company.

Robert E. Speer, U. S. Geological Survey's Oil and Gas Supervisor for the eastern region, said that "about 21 core holes will be drilled beneath the floor of the Atlantic Ocean in water ranging in depth from 650 feet to 5,000 feet." He added that "the depth of sediment penetration in each core test will be limited to a maximum of 1,000 feet. The drilling operation which, hopefully, will recover sediment cores from beneath the sea floor thick enough to provide a useful stratigraphic 'profile' will begin about July 1, and will probably last through the summer months."

Speer noted that the core holes continue the type of industry studies carried on in the Gulf of Mexico for the past two years.

Special Equipment Involved

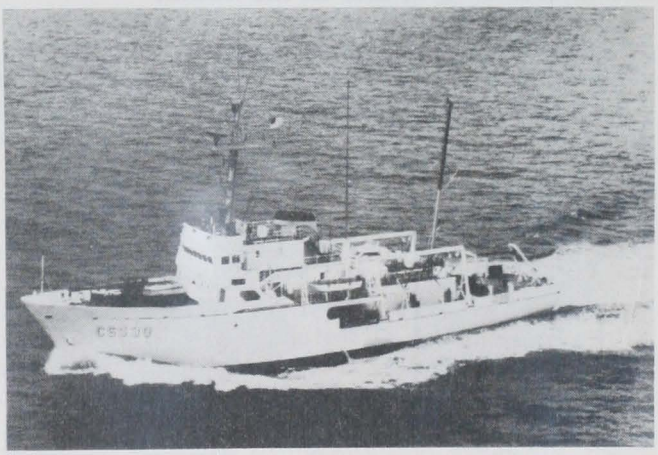
The drilling is conducted from a specially equipped vessel. In addition, a geophysical survey is being made using a "sparker" technique, which involves measuring acoustical waves from the vessel to the rock formations below the sea flood, and back to the vessel. This method obtains clues to the configuration of the rock strata.

Also, a shipborne gravity meter and magnetometer are supporting the core-drilling program. These devices measure variations in gravitational and magnetic properties of rocks. By making contour lines of such variations on a map, geologists learn about the nature of subsurface rocks.

Speer noted that the approval granted to Humble to drill core holes is not exclusive. Other interested parties are invited to request approval for similar programs. "No rights to any mineral leases will be obtained from these core drilling programs," he said.

New Survey Vessel Leaves for Honolulu Base

The new $2.4 million hydrographic survey ship of the Coast and Geodetic Survey, the USC&GSS "McArthur," left Norfolk, Va., on May 30 for Honolulu, her future home port. The ship is scheduled to reach her destination July 8 after a 40-day, 8,300-mile trip via the Panama Canal. She will be the first Survey ship in 35 years to make Honolulu her permanent home base.



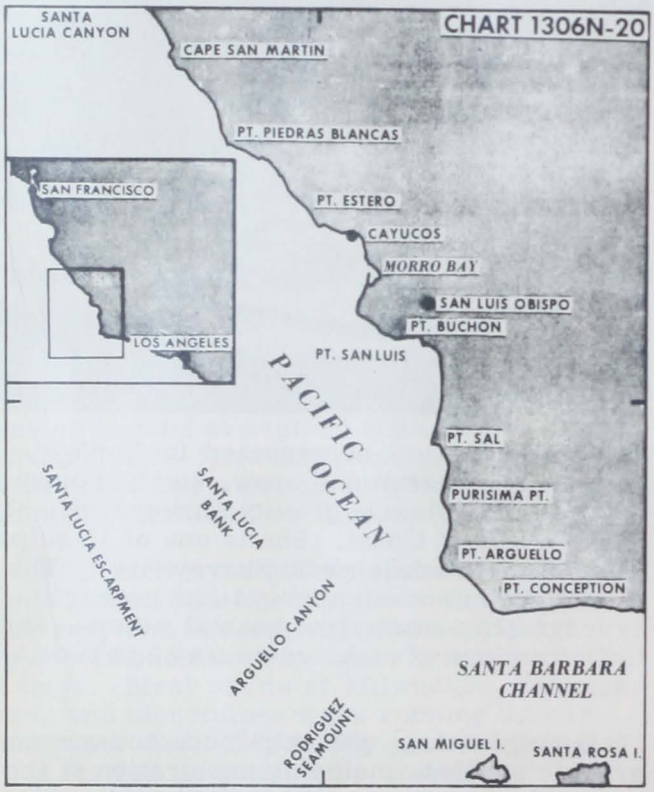
The McArthur, constructed in Norfolk, carries 37 officers and crew, and has been engaged in cable and gravity surveys off Florida's East Coast. She is one of 15 ships in the Coast and Geodetic Survey fleet. The fleet conducts ocean surveys and research, hydrographic surveys of coastal waters, and investigations of underwater navigational hazards.

During her trip, the ship conducted oceanographic studies, including exploration of the sea bed's topography and investigation of the sea's temperature, salt content, and magnetic force. After leaving Kingston, the McArthur gathered more information on the Explorer Bank, a submerged mountain discovered in 1960 by the USC&GSS "Explorer" southeast of Swan Island off Central America.

In addition to hydrographic surveys, the McArthur can carry out sophisticated oceanographic investigations. She is expected to advance hydrographic and oceanographic research of importance to Hawaii's economic growth by hydrographic and current surveys, magnetic and gravity observations, and general oceanographic research.

New Map Shows California Sea Bed

The Coast and Geodetic Survey has published a detailed map of the sea bottom off the California coast about midway between Los Angeles and San Francisco. The bathymetric map, which covers about 10,000 square miles, embraces an area extending seaward up to 75 nautical miles--from Cape San Martin in the North to east of Point Conception and Santa Rosa Island in the South.



New bathymetric map issued by Coast & Geodetic Survey-ESSA covers seabottom off California coast in areas shown above.

The map is the second in a series of topographic maps of the sea bottom that will cover the entire west coast. The first map was issued in February and covered the area immediately south to Huntington Beach, Calif. Similar maps are being made off the Gulf and Atlantic coasts.

Maps Needed for Exploration

The maps are designed to aid Federal, State, and industrial interests explore and develop the potentially vast resources of the Continental Shelf in and under the ocean. Their economic development depends heavily on bottom topographic maps; few exist now. Knowledge of the sea bottom is essential to marine engineering, scientific studies in recovering offshore oil and minerals, and to evaluate shoreline addition and erosion.

In the new map, the sea floor is shown in detail by depth contours for the first time. The depths range from a few feet off the coast to 13,300 feet at the most seaward point. The map is a compilation of surveying activities that began back in the 1930s. Underwater features include the western portion of Santa Barbara Basin; Rodriguez Seamount; Arguello Canyon; and Santa Lucia Bank, Canyon, and Escarpment. Also included are the offshore islands of San Miguel and part of Santa Rosa.

The map, designated 1306-20, may be bought for 50 cents from the Coast and Geodetic Survey (attn: C44), Washington Science Center, Rockville, Md. 20852, or from chart distribution centers of the Coast and Geodetic Survey at 121 Customhouse, San Francisco, Calif. 94126, and 602 Federal Office Bldg., 90 Church St., New York, N. Y. 10007.

Sharks Repelled by Plastic Bag

U. S. Navy researchers have found that men in shark-infested waters are protected from attack by a 5-foot-long, water-filled, plastic bag. The bag is held up at its open upper end by an inflatable ring. The man, supported by a life jacket, floats inside the bag, apparently screened from the senses of cruising sharks. Tests have shown that several types of sharks ignore the bag. Some sharks even went out of their way to avoid the bag. (From "Sea Secrets," May 1967, published by The International Oceanographic Foundation.)

oreign Fishing Off U. S. Coasts, lay 1967

NORTHWEST ATLANTIC

Soviet: Weekly sightings showed that the oviet fleet increased rapidly from 140 fish- g and support vessels early in May to about 00 vessels by month's end, mostly by the rrival of 50-60 medium side trawlers (SRT). he SRT class made up almost three-fourths f fleet.

During May, 171 vessels (exclusive of du- lication) were sighted and identified: 18 actory stern trawlers, 10 large refrigerated ide trawlers, 30 medium refrigerated side rawlers, 98 medium side trawlers, 5 factory ase ships, 9 refrigerated fish transports and argo vessels, and one tug. This is consid- erably more than the 140 vessels sighted dur- ng April 1967 and the 125 of May 1966.

Throughout May, the fleet was divided into large groups dispersed for 200 miles along the 50- and 100-fathom curves, from about 75 miles south of Block Island, Rhode Island (Block Canyon) to 100 miles east of Nantucket Light- ship (Lydonia Canyon) off the Massachusetts coast. Smaller groups operated intermittent- y on northeast slopes of Georges Bank and ff New Jersey coast.

In early May, most of the fleet (140 ves- els--mostly side trawlers) remained be- ween Block Canyon and south of Nantucket Lightship. Moderate catches of fish on deck

Fig. 1 - Large catches of red hake are temporarily heaped in open storage areas aboard Soviet refrigerated fish carrier servicing fleet south of Block Island (Rhode Island) in Northwest Atlantic. The smaller vessel, medium refrigerated side trawler "Kurzeme--9084," caught the fish and delivered them to carrier. (Photo: C. L. Philbrook)

appeared to be mainly whiting and red hake. Some evidence of herring catches was observed on isolated vessels (SRTM's) in more shallow waters far from main fleet.

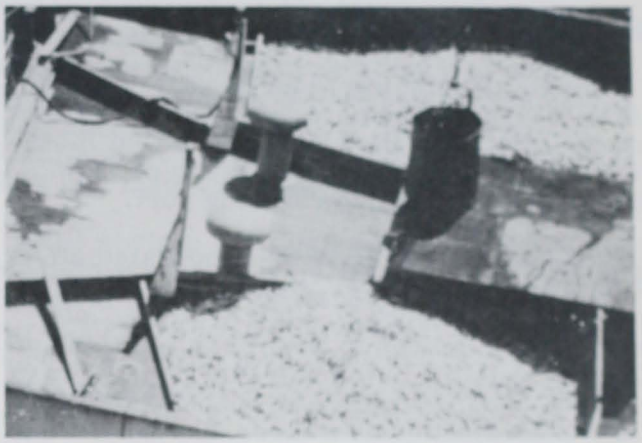


Fig. 2 - A close-up of the open storage areas aboard unidentified vessel with large catch of red hake. The huge bucket on hatch is used to hoist fish from catching vessels. (Photo: C. L. Philbrook)

Fish were heaped in open storage areas on board the transports and processing ships (see photos 1 and 2), indicating good average landings.

By mid-month the main fleet had gradually shifted to more shallow depths (30-40 fathoms) covering a 60-mile area from 45 miles south of Block Island to 40 miles south of Nantucket Island. Moderate catches appeared to be mostly herring (alewife or river herring) and some whiting. It is believed that Soviet research vessels have located lucrative stocks of these fish during their spring migration inshore to rivers and streams. A temporary decline in abundance of whiting and red hake may have prompted this move. This is the first time a large Soviet fleet fished for river herring so far north; in March 1966, a river herring fishery developed off Virginia's coasts.

By month's end, the fleet expanded in number of vessels and areas. Vessels between Block Canyon and south of Nantucket Island were taking mostly whiting, red hake, and some herring; on Georges Bank, vessels were fishing for herring and some haddock.

OFF MID-ATLANTIC COASTS

Soviet: Virginia fishermen from Hampton reported 30-40 Soviet vessels taking large quantities of herring (probably alewives), mackerel, and small scup (porgies) off Maryland and south New Jersey coasts.

Soviet fishing off mid-Atlantic coasts has been sporadic in 1967. In 1966, 30-60 vessels consistently fished this area from March to mid-May.

IN THE GULF OF MEXICO

Soviet: No fishing vessels were sighted close to U. S. shores. A few continued fishing on Campeche Bank off Mexico, but most vessels were sighted in transit to or from Havana Bay, site of new fishing port.

Cuban: No fishing vessels operated off U. S. coasts. However, many were scattered throughout Caribbean. Fishing in Gulf of Mexico was limited to traditional grounds on Campeche Bank, but only a few vessels were sighted. The fleet seemed concentrated off Cuba's northern coasts (over 20 vessels) and north of Bahamas. Early in May, a few fished north and northeast of Grand Bahama Island. Throughout May, this fleet increased by month's end, at least 25 were fishing north of Great Abaco Island; apparently on high seas beyond limits of Little Bahama Bank's submarine shelf.

OFF CALIFORNIA

Soviet: The fleet fluctuated from a few in mid-month to about 15 at end. Ten large stern factory trawlers sighted in last week of April suddenly left for fisheries off Pacific Northwest. By May 10, only 1 stern trawler was fishing off California near Oregon border. Within one week, however, the same vessel moved farther south, others arrived; by May 22-25, at least 12 large stern trawlers again were fishing off California accompanied by research vessel of Pacific Institute for Fisheries and Oceanography (probably on exploratory research mission).

The fleets fished mainly Pacific rockfishes and hake. Little information is available on amounts landed, but they could be substantial. Some leading stern trawlers were catching an estimated 60-70 metric tons a day.

OFF PACIFIC NORTHWEST

Soviet: Fishing and support vessels off Oregon and Washington exceeded 100 units for most of May. Weekly sightings revealed fleet increased rapidly from about 60 vessels at the end of April to 106 by May 4. For rest of May, the number fluctuated between 100 and 110 units.

In May 1966, the number off Pacific Northwest did not exceed 45 units. This indicates that Soviet effort in hake fishery this year is more than double last year's at this time. In 1966, number increased until July when over 100 units were operating. There are Soviet plans to increase catch of Pacific hake to about 200,000 metric tons in 1967 (53 percent above 1966's 130,000 tons) and it is likely that fishing effort will increase proportionately.

Most vessels were identified as medium side trawlers of various types including a few research trawlers. Large stern factory trawlers were less than 10 percent of all Soviet vessels (see table). The capacity of a stern trawler, however, is much greater than medium trawler's; on average, a factory stern trawler will land 5 to 6 times as many fish.

Soviet Fishery Vessels Operating Off Pacific Northwest in May 1967

Week of	Type of Vessel			
	Medium Side Trawlers	Stern Factory Trawlers	Support Vessels	Total
May 4	71	4	29	104
11	73	9	32	114
19	64	5	29	98
25	71	9	25	105
31	61	6	23	90

Through first 3 weeks of May, almost all vessels fished off Oregon, mostly between Heceta Head and Yaquina Head, but at times as far north as mouth of Columbia River, and as far south as Cape Blanco on Oregon's southern edge.

In last week, the fleet split and about 40 vessels began fishing off Washington, scattered from Cape Disappointment to Grays Harbor seaward of area restricted to Pacific ocean perch fishing (under 1967 U.S. - USSR Pacific Northwest Fishing Agreement).

A few vessels fished in areas off Pacific Northwest restricted under the 1967 Agreement. When captains were confronted with this fact by U. S. Coast Guard officials, their vessels departed promptly. U. S. State Department officials promptly notified Soviet Embassy in Washington, D. C., of these events.

Principal species fished was hake. The fleets had good-to-excellent catches early in May but dwindled towards month's end.

Early in May, BCF Resource Management Agents observed 10 Soviet vessels complete

auls averaging about 8,000 pounds of hake er haul (moderate fishing). During second eek, the largest catch observed per haul was 0,000-60,000 pounds (excellent fishing) but few days later the best catch haul was estiated at about 20,000 pounds. Hauls yielding o fish were also observed. During last two eeks, catches ranged from poor to fair. he vessels were scattered, apparently earching for better grounds; 4-5 exploraory research vessels supported fleet during ay.

Pair trawling was being used more often han last year when, apparently, it was on verage the most successful technique. Paific ocean perch and other rockfishes were ccasionally observed aboard the vessels, pparently incidental catches.

No salmon were seen on board vessels or in catches.

Japanese: One stern trawler was reported in May northwest of Strait of Juan de Fuca, off coast of Washington, but well outside the U. S. 12-mile fisheries zone. It was not fishing.

OFF ALASKA

Soviet: The number of vessels increased from over 40 units in early May to about 85 units during mid-month; it decreased to about 65 units in late May. The mid-month increase was mainly due to the arrival of 3 whaling fleets, and the decrease at month's end was caused by departure of Gulf of Alaska shrimp fleet.

During May, the number of fleets increased along Aleutian Islands, while vessels withdrew from Gulf of Alaska.

During May, an average of 70 vessels operated off Alaska's coasts, compared with 158 vessels in May 1966. The number was so much smaller because large-scale Soviet fishing began one month earlier this year and many vessels that normally fish off Alaska in May shifted to fishing grounds off Washington and Oregon.

The number fishing for perch in Gulf of Alaska began to decline in late April, continued into May, and ended by mid-month.

Along Aleutian Islands, the perch fishing effort also decreased in late April but trend was reversed in early May. At first vessels were concentrated south and north of the Fox Islands but, during second week, this area was also abandoned and fishing (7 vessels) switched to central Aleutians. A few days later, another small fleet began a perch fishery in western Aleutians along Tahoma Reef. By month's end, about 30 vessels were fishing along Aleutians, about half in western Aleutians. Catches were reportedly good but data are inadequate for estimate.

The shrimp fleet of 1 factoryship and 7 medium freezer trawlers fishing on Portlock Bank east of Afognak Island was joined in early May by 6 medium trawlers. In late May, the entire fleet departed. Last year, the Soviet's Gulf shrimp fishery displayed a similar pattern; it was terminated by mid-June. Apparently, the shrimp move inshore during summer months and are no longer available outside U. S. 12-mile fishing limit.

The eastern Bering Sea king crab fishery was continued by 3 factoryships, 9 net-setting trawlers, and 2 exploratory trawlers. Operations were conducted generally northeast of Amak Island, where crabs migrate during early summer months. When a BCF agent boarded one crab factoryship, in late April, he was advised that Soviets would continue fishing until late June, the pattern during recent years.

Whaling operations off Alaska began this year in mid-May. One fleet was sighted off western Aleutians and another south of central Aleutians. Each fleet is believed to consist of a factoryship and about 9 killer vessels. Lack of sightings of these fleets in late May indicates they remained well offshore, as in previous years.

Japanese: About 140 vessels fished off Alaska during first 2 weeks in May. With arrival of high-seas salmon and whaling fleets, number increased to about 450 for remainder of May.

In early May, the perch fishery in Gulf of Alaska was continued by 2 trawlers off Southeastern Alaska, 1 trawler off Fairweather grounds, 3 trawlers southwest of Middleton Island, and 1 trawler on Albatross Bank. By mid-May, 2 additional trawlers had joined Gulf of Alaska perch fleet with 7 trawlers operating on Albatross Bank, 1 southwest of Middleton Island, and 1 on the Fairweather grounds. In late May, the number in the Gulf

decreased to 6, when 2 vessels transferred to the perch fishery in eastern Aleutians and 1 presumably returned to Japan. Of the 6 remaining trawlers, 4 were on Albatross Bank, 1 on Portlock Bank, and 1 off Middleton Island.

During second week, the Japanese renewed perch fishery south of Fox Islands in eastern Aleutians with arrival of 1 factory trawler. In late May, she was joined by 2 factory trawlers from Gulf of Alaska.

Perch operations in eastern Bering Sea were continued by 1 factory trawler during first week along the 100-fathom curve south of Pribilof Islands. By mid-month, there were 3 factory trawlers in eastern Bering Sea along 100-fathom curve north and south of Pribilofs.

In early May, 1 factoryship accompanied by 12 trawlers was reported along 100-fathom curve well northwest of Pribilof Islands in central Bering Sea. It is believed this fleet was involved in perch operations and continued fishing through May.

The Alaska pollock fishery north of Fox Islands in eastern Aleutians was continued by 4 factoryships accompanied by 85-90 trawlers during first 3 weeks of May. In late May, those fleets moved northward to Bristol Bay "flats" and, presumably, began fishing for flatfish rather than Alaska pollock.

During first week, the Eastern Bering Sea king crab fishery on Bristol Bay "flats" was continued by 2 factoryships, each accompanied by 5 net-setting trawlers. During second week, one fleet shifted to Pribilof Islands area, the custom for several years. The fleets remained split--1 in Pribilof area and 1 on Bristol Bay "flats"--for remainder of May.

After 2 years of limited experimental pot fishing for king crab in eastern Bering Sea, the first commercial-scale pot fishery was initiated in early May. The trawlers "Tenryu Maru" and "Chiyo Maru No. 15" (reportedly to fish 740 pots) began operating in "pot sanctuary" area north of Unimak Island amid similar gear of several U. S. vessels. King crab catches are reportedly being frozen (both ships have freezing facilities). Operations continued through May and, despite continuing rumors of U. S. gear losses caused by this fishery, no documentation has been received.

Japanese sources reported that 3 whaling fleets (same as past several years) were scheduled to depart Japan between May 12-15 for the 1967 North Pacific whaling expedition. Generally, each whaling factoryship is accompanied by 8 to 12 whale killer vessels and about 3 support vessels. Within third week of May, one fleet was reported north of central Aleutians. It is believed the other 2 fleets were also operating along Aleutian chain, presumably well offshore (the pattern of the last few years).

Ships of the 1967 high-seas salmon fishery departed Japan about mid-month. By late May, at least 8 of the 11 fleets were operating south of western Aleutians, generally between latitudes 48° and 51° N. and longitudes 169° and 176° E.

Japanese long-line vessels fishing for sablefish were active in Gulf of Alaska and along central and western Aleutians through May. Two to 3 long-liners fished off Southeastern Alaska coast during first 3 weeks. During late May, operations were shifted into central Gulf, when 2 vessels fished off Middleton Island and 2 west of Chirikof Island. Two long-liners fished for sablefish off western Aleutians during first half of May. By month's end, they were joined by a long-liner; operations were extended to central Aleutians.

STATES

Alaska

THE ART OF FORECASTING RED SALMON RUNS

The Bristol Bay area of southwestern Alaska is the world's largest producer of red salmon, states BCF Juneau, and processors and fishermen must have a reasonable forecast of the run to Bristol Bay to plan their activities: boats, fishing gear, and canning lines must be readied; fishermen and cannery employes flown to Bristol Bay and arrangements made for housing and for supplies. If preparations are inadequate for the run, part of it will be wasted; if the run is smaller than expected, there will be an overinvestment in labor and material. These considerations are important for all salmon fisheries--but especially so for Bristol Bay: it is isolated, has a short but extremely intensive fishing season, and it has a great year-to-year fluctuation in run size. So attempts to develop accurate predictions have been concentrated on Bristol Bay runs.

Since 1960, biologists of BCF, the Alaska Department of Fish and Game, and the Fisheries Research Institute of the University of Washington have worked together to forecast the red salmon runs in Bristol Bay. They have used several types of relationships to prepare these forecasts. The number of adults that escape the fishery to spawn in their natal stream can be related to the number of their offspring that will return to the fishery in later years. These escapement-return relationships provide forecasts for individual river systems. Relationships between young salmon migrating to sea from their nursery lakes (called out-migrant smolts) and returning adults also provide individual river systems forecasts. Forecasts of 3-winters-at-sea fish can be made using data on returns of 2-winters-at-sea fish from previous years.

Bristol Bay Forecasts

Table 1 shows the Bristol Bay forecasts and the actual runs observed since 1960. Although predictions are more accurate for Bristol Bay red salmon than for other Alaskan red salmon runs, they are far from perfect. Total returns over a period of years from a given escapement or seaward migration of smolts can be forecast with fair accuracy, but forecasts of returns in specific years are less accurate. This is because Bristol Bay red salmon mature after 2 or 3 winters at sea, with the proportion returning after 2 winters varying from 20 to 80 percent. Other sources of error include: variable ocean survival rates (from 5 to 30 percent); inaccurate indices of smolt abundance; and an inaccurate high seas index of immature salmon abundance. Efforts to improve the accuracy of forecasting Bristol Bay red salmon runs concentrate on: (1) continued research on causes of salmon mortality in the ocean; (2) research on factors related to the adult maturation process; (3) continued refinement of the mathematical techniques used; and (4) improvement of sampling techniques used in determining population sizes of smolts and immature salmon.

Table 1 - Total Bristol Bay Runs and Forecasts of the Run, 1960-66

Year	Total Run	Forecast	Deviation
	. . (Millions of Fish) . .		Percent
1960	42.6	35.0	-17.8
1961	26.3	27.0	+ 2.6
1962	12.3	9.7	-21.1
1963	8.6	15.6	+81.4
1964	13.4	17.7	+32.1
1965	64.0	27.8	-56.6
1966	22.0	33.0	+50.0
Average absolute deviation			±34.4

An accurate forecast has a very large economic value. A recent study by Stephan B. Mathews at the University of Washington demonstrates that a forecast of the run with a margin of error (difference between forecast and actual return) of ± 100 percent of the actual return saves the industry about $500,000 in preseason investment. Since present forecasts near this level of accuracy cost about $250,000 per year to prepare, the forecast is worthwhile on this basis alone.

Also, the forecast is valuable as a basis for regulating the fishery so that each tributary receives the desired number of spawners. The forecast of 1967 Bristol Bay red salmon to each tributary is shown in table 2. In some streams, so few red salmon are expected that no catch can be allowed, while others can stand a catch of over 60 percent of the total run.

Table 2 - Bristol Bay Red Salmon Forecast, 1967				
River System	Prediction	Escapement Goal	Estimated Harvest	Percent Harvest
Kvichak	3,993,000	3,500,000	493,000	12
Branch	810,000	300,000	510,000	63
Naknek	2,564,000	1,000,000	1,564,000	61
Total Naknek-Kvichak	7,367,000	4,800,000	2,567,000	35
Egegik	2,381,000	1,000,000	1,381,000	58
Ugashik	933,000	850,000	83,000	9
Togiak	180,000	100,000	80,000	44
Igushik	153,000	153,000	0	0
Snake	77,000	77,000	0	0
Nuyakuk	128,000	128,000	0	0
Wood	2,484,000	1,100,000	1,384,000	56
Nushagak/ Mulchatna	46,000	40,000	6,000	13
Total Nushagak	2,888,000	1,498,000	1,390,000	48
Total Bristol Bay	13,749,000	8,248,000	5,501,000	40

FORECASTING PINK SALMON RUNS

Since 1960, the Alaska Department of Fish and Game has expanded its work on forecast research at a rapid pace. Egg and fry sampling techniques are continually being refined. Fairly accurate forecasts of pink salmon to Prince William Sound have been made since 1962. In 1964, predictions were made for Kodiak, outer Cook Inlet, and Southeastern Alaska. Annual forecasts are now being released for all 4 areas (table). Accuracy of the forecasts is less reliable, however, for the pink salmon runs in Kodiak, Cook Inlet, and Southeastern Alaska than it is for Prince William Sound because the history of forecasting for these areas is too limited.

The techniques used to predict what long was regarded as an "unpredictable species" depends upon estimating juvenile abundance while the populations are still in the stream gravels during early spring months. Near the end of the freshwater life, some 15 months before the return as adults, pre-emergent fry are excavated with hydraulic pumps from randomly selected plots in key spawning streams. The resultant fry index is related to adult return using observed ratios from past years. This gives forecasts sufficiently early to allow planning of industry operations and management regulations.

The pre-emergent fry system of pink salmon forecast depends upon stable marine survival rates. To date, lack of such stability has not been an important factor in accuracy of forecasts. Thus, mortalities during spawning, fall floods, and winter incubation set the stage for brood year success in Alaska. However, recent research in southern and central British Columbia has pointed to relatively major differences in early sea life survival from year to year. Both the Department of Fish and Game and BCF have continued studies of the early sea life of pink salmon in Southeastern Alaska to establish its impact on the overall survival of Alaskan pink salmon.

The following forecasts for 1967 were released by the Department of Fish and Game to the Alaska fishing industry:

Forecasts of Alaskan Pink Salmon Runs, 1967		
Fishing Area	Approximate Range of Total Run[1]/	Rating
	Millions	
Kodiak	2.0-4.0	Very poor
Cook Inlet	0.4-0.6	Very poor
Prince William Sound	2.5-4.1	Very poor
Northern Southeastern Alaska	4.9	Fair
Southern Southeastern Alaska	4.2-5.4	Fair
1/Catch plus escapement.		

The prospects for 1967 are not good in any major pink salmon fishery. Low estimates reflect exceedingly poor survival conditions that existed throughout Alaska's southern coast during winter 1965-1966. The Alaska Board of Fish and Game already has adopted severely restrictive regulations for the Kodiak, Cook Inlet, and Prince William Sound 1967 seasons.

Methods of predicting pink salmon accurately are still in a primitive stage. BCF is experimenting with methods other than the State's.

Migration of Juvenile Salmon

Juvenile salmon migrate into the Gulf of Alaska each summer from important salmon producing areas from Washington to Alaska. The young salmon leave the coastal waters and immediately enter the northward moving Alaska stream that flows along the Alaska Continental Shelf. Fish within this relatively narrow band are completely mixed and the various races of salmon cannot be easily identified. Since many commercial salmon fisheries along the coast depend on fish originating in particular streams or from small local areas, accurate forecasts must be based on sampling the abundance of young salmon before they become mixed in the Gulf of Alaska--but as late as possible before this mixing occurs. Forecasts based on abundance of pink salmon during this seaward migration

could be more accurate than those now being made based on stream sampling. Therefore, BCF is learning the migration routes of juvenile pink salmon and measuring the environmental factors that affect these routes from each area in Southeast Alaska.

Migrations of juvenile salmon seem to correspond to surface ocean currents. As the knowledge of surface currents improves, researchers may be able to determine changes from year to year and forecast migration routes of salmon. Surface currents near shore may contain traces of "homestream" water that could provide cues for adult salmon returning to spawn.

California

REPORTS PELAGIC FISH CATCH

The May report of the Resources Agency of California contains the following breakdown of the pelagic fish catch:

Species	May		January 1-May 31		
	1967 1/	1966	1967 1/	1966	10 Yr. Mean 1956-1965
	(Landings in Tons)				
Anchovy	7	176	28,160	17,537	3,799
Mackerel, jack	2,425	4,929	9,193	9,296	12,536
Mackerel, Pacific	8	178	122	559	5,028
Sardines	6	71	61	150	1,468
Squid	879	734	3,457	3,073	2,568
Total	3,325	6,088	40,993	30,615	25,399

1/Estimated. Accumulated landings are revised monthly.

Louisiana

SHRIMP SEASON STARTS WELL

The "inside" shrimp season in Louisiana waters, which runs from May 15-July 15, was off to a very good start. Dr. Ted Ford of the State's Department of Wildlife and Fisheries said large runs were being reported throughout Louisiana waters, the largest shrimp nursery in the U. S.

"Inside" waters are inside lakes, bayous, and inlets along the State's shoreline or nursery area. Here shrimp grow an inch every 10 days.

Dr. Ford predicted that the 1967 runs would make for a bountiful year. He emphasized that the shrimp caught early in the season were brown shrimp. The season on white shrimp runs from the third week in August to December 20. White shrimp are much larger than brown and are the profit margin for fishermen, Dr. Ford said. There is no size limit on brown shrimp, but for white it is no smaller than 68 to the pound.

BCF Specialist Agrees

George Snow of BCF confirmed Dr. Ford's optimistic view. In May, Louisiana fishermen marketed 9 million pounds of brown shrimp, heads-off weight. The best year in the past decade was 1963, when 4.9 million pounds were marketed in May.

While Louisiana's shrimp production is the largest in the continental U. S., Snow added, more shrimp are marketed in Texas. The Texas catch is off Mexico and in part of the Sabine River area west of Louisiana. In 1966, Texas marketed 43.8 million pounds, Louisiana 39.6.

Maine

STATE WILL TEST POLLUTION AS POSSIBLE AID TO LOBSTER INDUSTRY

Maine is expected to receive a $90,000 grant from the Federal Water Pollution Control Administration to find out if pollution can help the state's troubled lobster industry.

The first phase of the unusual experiments will involve use of "thermal pollution"--heated water discharged from the Central Maine Power Co. plant on Yarmouth's Cousins Island.

Later phases would include use of treated sewage from Yarmouth as food for lobsters.

Robert L. Dow, director of marine research for the Maine Department of Sea and Shore Fisheries, said the experiments would be the Nation's first in lobster farming and in the "positive use" of thermal pollution. He said the recent decline in the Maine lobster catch has a direct correlation with water temperature in the Gulf of Maine.

"According to scientists, there will be 20 more years of low temperatures in the present cycle," Dow said. "The warmer the water, the better the lobsters grow. Having a source of heated water to experiment with lobster cultivation is marvelous."

To Build Reef

The two-year first phase of the Cousins Island project will consist of building an artificial reef and experiments with mixing warm water and sea water.

The artificial reef will be built of stone, pieces of ledge, and concrete blocks to provide "apartments" and a natural habitat for the lobsters. SCUBA-diving students from Southern Maine Vocational Institute and members of the Rural Youth Corps may be used to build reef.

Later phases of the program would include experiments with plastic capsules on the ocean floor to protect lobster populations from their natural enemies, and the use of treated sewage from nearby Yarmouth as food for lobsters.

The plastic capsules would have attached hoses supplying heated water to protect young lobsters from natural enemies.

Ronald W. Green, commissioner of Sea and Shore Fisheries, said his department was "excited about the proposal."

He noted that his department has been interested in warming sea water for lobster growth since the evaluation of the defunct Passamaquoddy tidal power study proved its feasibility.

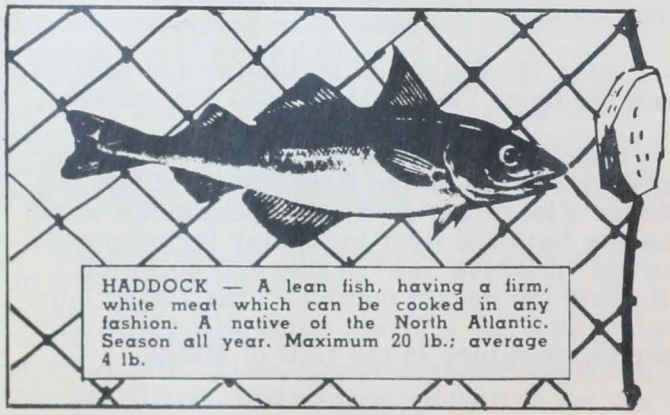
Successful completion of the project could "increase the value of commercial fisheries in Maine," Green added. He said his department would work closely with BCF at Boothbay Harbor.

Washington

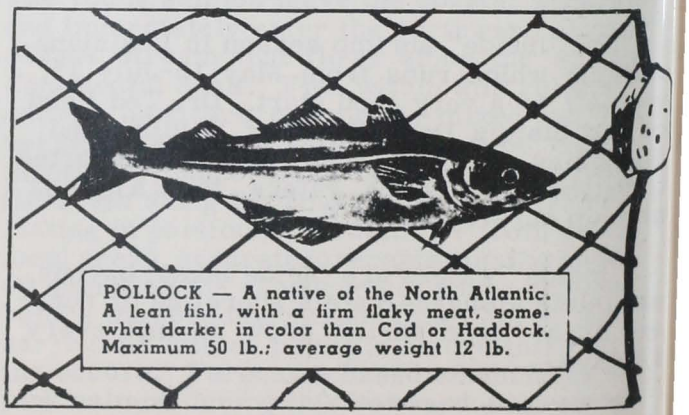
PACIFIC HAKE FISHERY STARTS WELL

Hake were becoming more available in the fishery off Washington State. By June 1, 17 trips yielding 549 tons, at ex-vessel value of $8,784, were landed at the Aberdeen plant. The rapidly improving picture was evidenced by the fact that almost 60 percent of total landings of 549 tons were taken by the last trip of the "Baron," "Recruit," "Junior," and "St. Michael."

Best fishing has been in relatively shallow water well within the newly established U. S. 12-mile fishing zone. Based on previous years' experience it is expected that as season progresses some of the fish will move northward along the Washington coast and into deeper water. Considerable protection will be afforded U. S. fishermen by the 12-mile fishing zone, and by agreement with the Soviet Union. The latter's vessels will stay seaward of the 60-fathom bottom depth contour line between the Columbia River and Grays Harbor.



HADDOCK — A lean fish, having a firm, white meat which can be cooked in any fashion. A native of the North Atlantic. Season all year. Maximum 20 lb.; average 4 lb.



POLLOCK — A native of the North Atlantic. A lean fish, with a firm flaky meat, somewhat darker in color than Cod or Haddock. Maximum 50 lb.; average weight 12 lb.

BUREAU OF COMMERCIAL FISHERIES PROGRAMS

North Pacific Fishery Investigations

WINTER SALMON DISTRIBUTION AND OCEANOGRAPHIC CONDITIONS STUDIED BY "KELEZ" SCIENTISTS

The Seattle-based BCF research vessel "George B. Kelez" returned to home port on March 27, 1967, after a 9-week cruise in the northeastern Pacific Ocean. It was the Seattle Biological Laboratory's sixth annual winter cruise. The main objective was to study the winter distribution and abundance of salmon in relation to major oceanographic features--especially the Alaskan Stream and the Alaskan Gyre. The information gained on the cruise will be used to develop the laboratory's Bristol Bay forecasting program.

Fishing and oceanographic stations were located along two tracks: south of Cold Bay, Alaska, along long. 162° W., from lat. 54° to 46°05' N. (Jan. 30-Feb. 18) and south from Kodiak Island, along long. 155° W. from lat. 55°18' to 46°50' N. (March 4-22). Fishing stations were at about 50-mile intervals during the southbound trip along both lines and extended beyond the southern range of salmon distribution; stations were established at intermediate points on the return north on the basis of the oceanographic data. The sequence was altered on the western track due to an unusually severe storm and generally unfavorable weather. Nevertheless, 15 sets were made along long. 162° W. and 16 along long. 155° W. Oceanographic stations were located at each fishing station and at intermediate points.

The gill-net string was $1\frac{3}{4}$ miles long and consisted of 32 nets (6 each of $2\frac{1}{4}$-, and 2-inch mesh, and 5 each of $5\frac{1}{4}$-, $4\frac{1}{2}$-, $3\frac{7}{8}$-, and $3\frac{1}{4}$-inch mesh, stretched measure). Nets were set between 1930 and 2200 hours and hauled about 0800 the following day.

Salmon Abundance

Catches were relatively small on both legs of the cruise. The combined catch of 765 salmonids was composed of 631 sockeye, 58 chum, 1 pink, 69 coho, and 2 chinook salmon, and 4 steelhead trout. Salmon were taken south of the Alaska Peninsula to about lat. 47° N. along both cruise tracks.

An obvious difference in the north to south distribution of age .1 (1-winter-at-sea) and age .2 and .3 (2- and 3-winters-at-sea) sockeye salmon was apparent from the catches (fig. 1). The younger fish were more abundant south of lat. 50° N. along long. 162° W. and were exclusively from stations south of lat. 50° N. along long. 155° W., whereas the older sockeye salmon were distributed rather uniformly. Although sockeye salmon were widely distributed from the Alaska Peninsula to about lat. 47° N. on both tracks, the other species were found exclusively south of lat. 50° N. Coho salmon were most abundant at lat. 47°30' N. on long. 162° W. and chum salmon at lat. 47°57' N. on long. 155° W.

Oceanographic Conditions

A new electronic instrument enabled the oceanographers to collect more and better data and permitted quick interpretation of changes in water characteristics aboard ship. With the Hytech[1] model 9006 [salinity, temperature, depth system (STD)], we obtained continuous profiles of temperature and salinity to depths of 1,500 m. at 41 locations on and between the fishing stations (fig. 2). Other operations included 28 Nansen bottle casts and 116 BT's. The principal currents and zones with discrete temperature and salinity characteristics are shown schematically in figure 3.

The major current systems in this area are the Alaskan Stream, which flows westward just south of the Alaska Peninsula and the Aleutian Islands, and the Subarctic Current, which flows eastward near lat. 47° and 48° N. The Alaskan Gyre is the boundary area of relatively weak flow between these two major current systems. A zone of cold water--the Oyashio Extension--is distinguished by temperatures below 3.6° C. between 300 and 400 m.; this cold water drifts slowly eastward from the western North Pacific between 50° N. and the main axis of the Subarctic Current. Horizontal mixing at depth complicated the temperature structure between the Oyashio Extension and the Alaskan Gyre. Oceanographic features varied in extent and detail along each track, but showed east-west continuity. Similarly, the distribution of age groups and species of salmon was consistent along both longitudes.

[1] Trade names referred to do not imply BCF endorsement of commercial products.

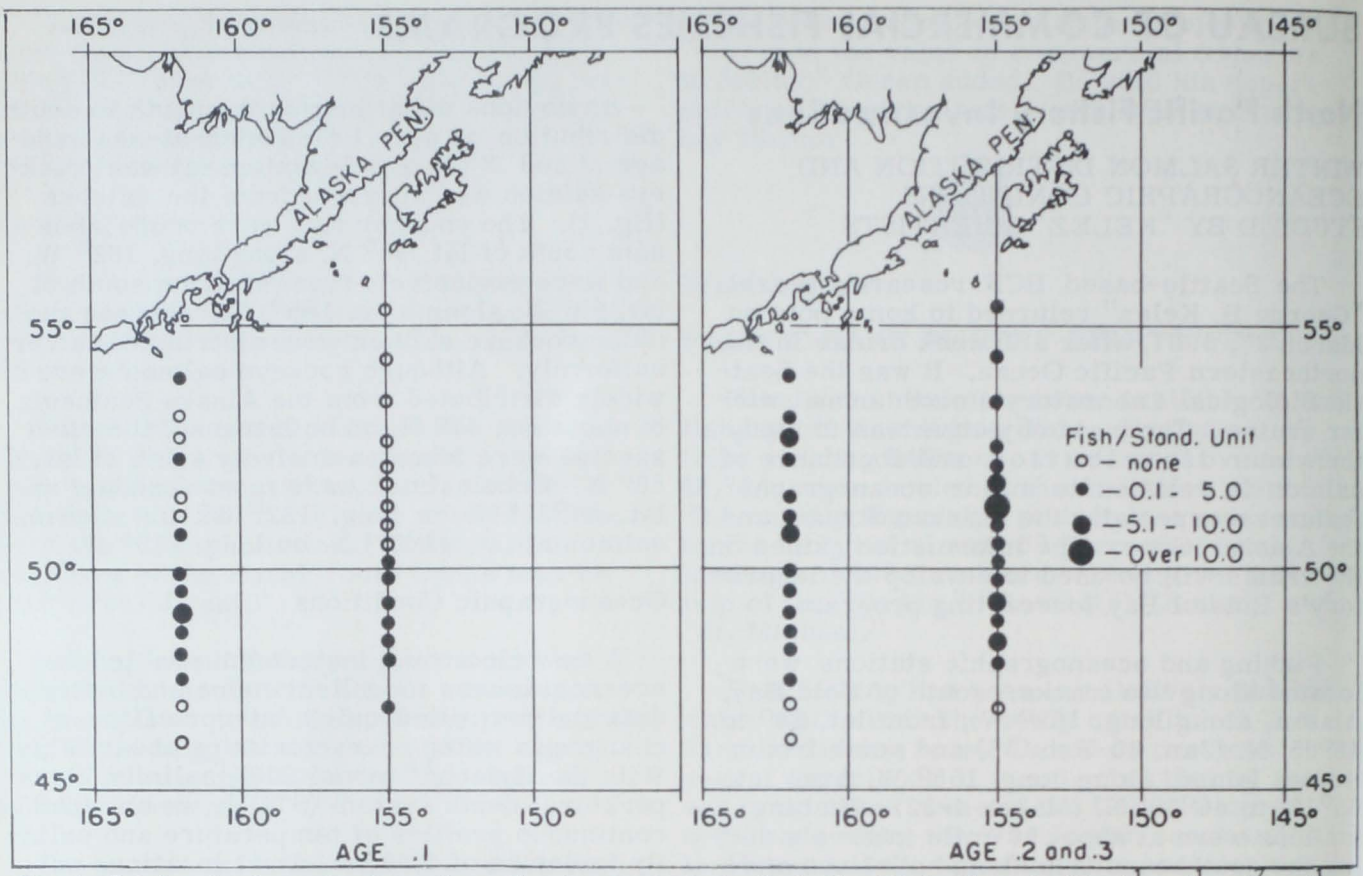


Fig. 1 - Relative abundance of sockeye salmon taken in a standardized unit of gill net (1 shackle each of 2-, $2\frac{1}{2}$ -, $3\frac{1}{4}$ -, $3\frac{7}{8}$ -, $4\frac{1}{2}$ -, and $5\frac{1}{4}$ -inch mesh nets) by R/V George B. Kelez, January 30-March 22, 1967.

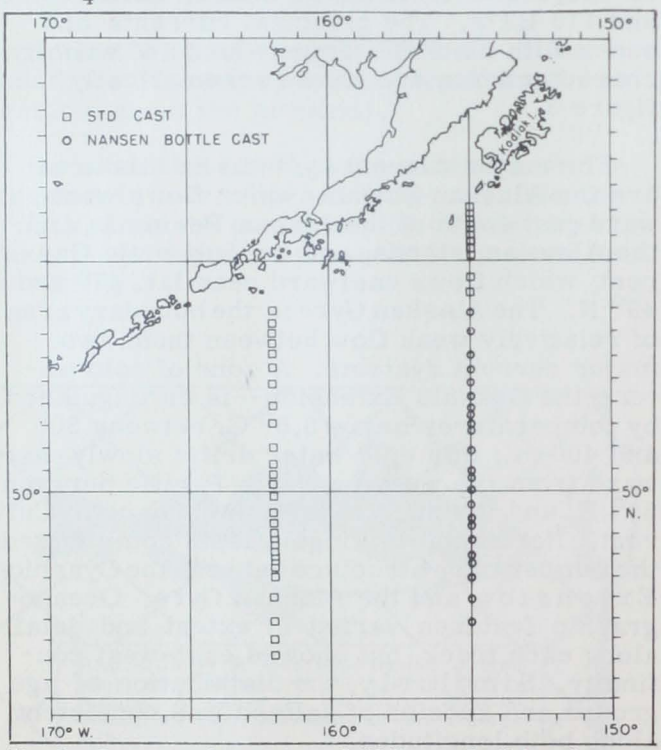


Fig. 2 - Oceanographic stations, R/V George B. Kelez, January 30-March 22, 1967.

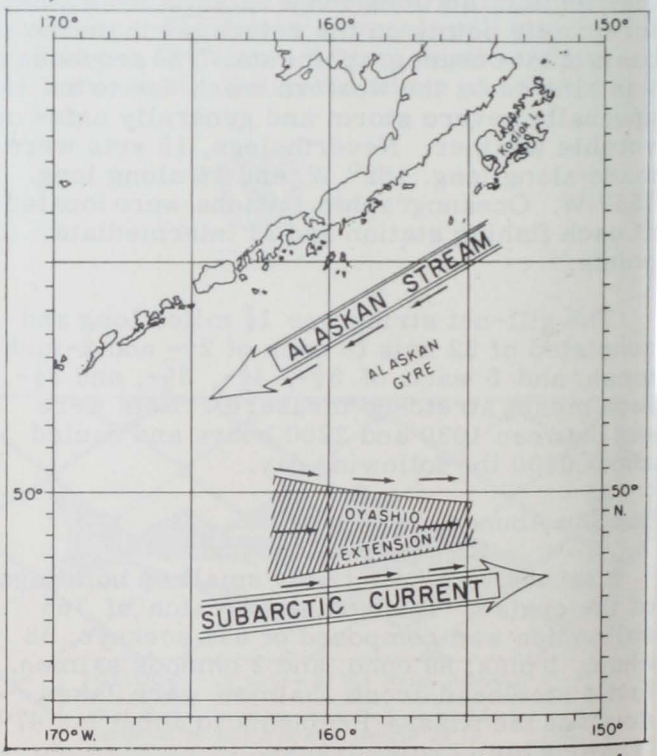


Fig. 3 - Schematic representation of oceanographic features of North Pacific Ocean, January 30-March 22, 1967.

A comparison of 1967 data with oceanographic conditions along long. 155° W. during the winter of 1962 (the only other year with comparable data) indicated less flow for both current systems in 1967. During 1962, much more (and slightly warmer) water flowed westward in the Alaskan Stream; its main axis was then about 75 miles farther offshore. Also, greater eastward flow in 1962 was suggested from the wider, lower temperature core of the Oyashio Extension.

Present oceanographic conditions (fig. 3) were compared with fish catches (fig. 1). The older (age .2 and .3) sockeye salmon were uniformly distributed north to south across the major oceanographic features, but the southern limit of the species was the axis of the Subarctic Current. Nearly all of the younger (age .1) sockeye salmon were in the Oyashio Extension-Subarctic Current area; other salmon species were only in the Subarctic-Current area. These data suggest, therefore, a preference during the winter of certain age groups or species of salmon for ocean areas with a unique environment.

--By Donovan R. Craddock, Fishery Biologist, and W. James Ingraham Jr., Oceanographer, BCF Biological Laboratory, Seattle, Wash. 98102

"Cromwell" Tests Midwater Trawl Successfully

A new midwater trawl was tested successfully on May 10-14 from the research vessel "Townsend Cromwell" of BCF's Biological Laboratory in Honolulu, reports John C. Marr, Area Director.

The purpose of the test was to evaluate the performance of the new net. In the crystal-clear blue water off Oahu's leeward coast, scuba divers could easily see the net traveling through the water with a perfect configuration. Small pelagic fish swam ahead of the net, maintained a speed (about 2 knots) equal to the net's for a time, then lagged behind--and eventually ended up inside the $\frac{1}{4}$-inch mesh bag at the end of the net. In addition to capturing over 300 juvenile opelu (Decapturus pinnulatus) in one tow, 6 juvenile skipjack tuna (Katsuwonus pelamis) were taken in all 7 experimental tows.

Results Unexpected and Encouraging

These results were encouraging but unexpected, says Bruce E. Higgins, Fishery Biologist with the Laboratory's Tuna Ecology Program. The peak spawning season for skipjack does not start until July in Hawaiian waters. Moreover, most trial tows were made just beneath the surface during daylight hours when the fish, particularly small skipjack, might be expected to avoid capture. The fact that they did not attests the collecting efficiency of the new net, which opens up to 40 feet in diameter and is 145 feet long. Small mesh netting ($\frac{3}{4}$-inch stretched mesh) makes up the main part of the net, so that once a fish is inside, escape is difficult.

The new trawl was designed by Richard L. McNeely, Chief, Gear Research Unit, BCF Exploratory Fishing and Gear Research Base, Seattle, Wash. McNeely and his colleagues use their nets to catch anchovy and other pelagic fish. They predict continued success for the nets in collecting juvenile tunas.

Higgins plans to use the new midwater trawl in intensive investigation of the distribution of skipjack and other tunas in space and time in Hawaiian waters during July, August, and September 1967. He hopes to devise techniques for collecting juvenile tunas with the trawl that will have widespread application. If he achieves this, it will assist in solving problems of identifying larval tunas--and delineating spawning areas of various racial groups of adult skipjack caught in central and eastern Pacific fisheries.

A Vessel and Sled Pursue the Precious "Nehu"

The June 1967 issue of Commercial Fisheries Review reported the efforts of BCF's Honolulu-based "Gilbert" to study the behavior of the "nehu." This $1\frac{1}{2}$ to 3-inch long silver anchovy is the major local bait for skipjack (or aku), the State of Hawaii's largest commercial fishing industry.

Following are some photos taken on the Gilbert's 100th cruise.

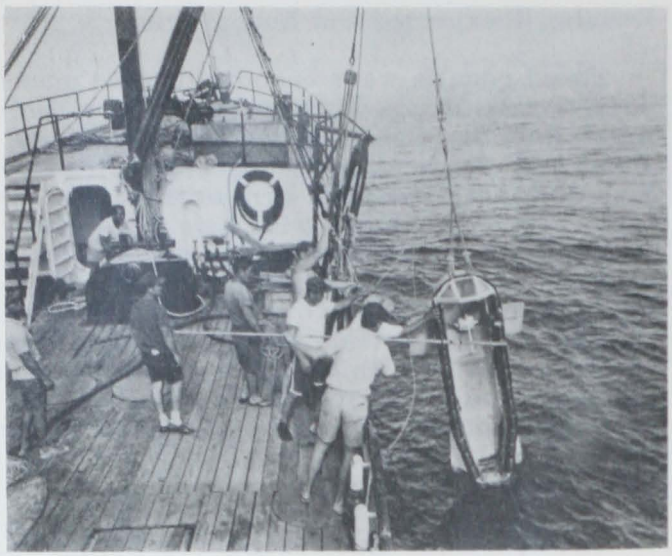


Fig. 1 - Sea sled lowered into Hawaiian waters.

Fig. 2 - Scuba diver jumps into water to board sled rigged for towing.

Fig. 3 - J. J. Naughton, BCF Honolulu Laboratory's diving supervisor, and R. M. Gooding, Fishery Biologist, get set to go sledding.

Fig. 4 - Ocean is scientists' vastest laboratory.
(All photos except fig. 6: Warren R. Roll, Honolulu Star-Bulletin.)

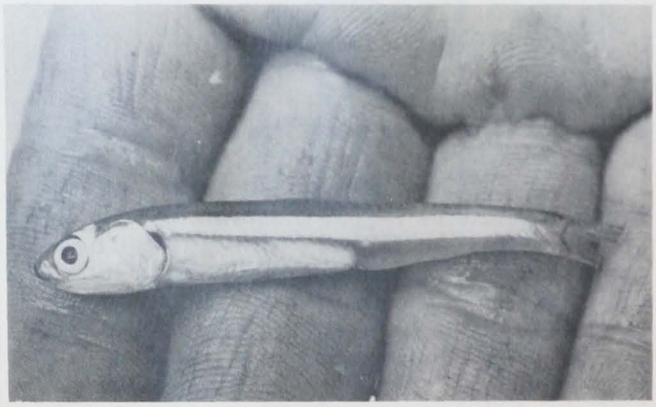
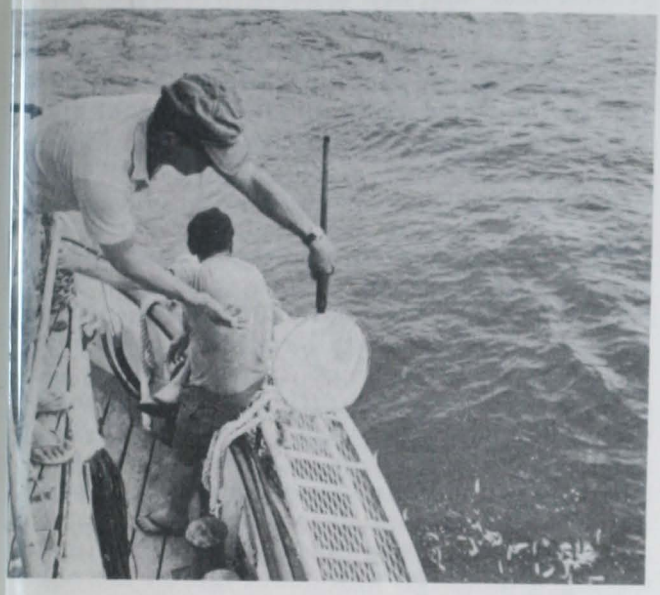


Fig. 5 - This tiny silver fish--nehu--feeds Hawaiian tuna industry. It is the bait.

Fig. 6 - Camera used under water in photo by scuba diver.
(Photo: J. J. Naughton, BCF.)



g. 7 - Nehu tossed into water, where sled waits to see what they b. (Photo: Warren R. Roll, Honolulu Star-Bulletin)

'Gilbert" Studies Hawaii Swordfish Potential

BCF's Honolulu-based Charles H. Gilbert eturned to Kewalo Basin after a month-long ruise in Hawaiian waters, reports John C. larr, Hawaii Area Director.

Its primary mission was to determine hether the catch rates of broadbill sword- sh (Xiphias gladius) by longline fishing in awaiian waters could be increased substan- ally by fishing at night. Presently, the Ha- aiian longline or flagline boats catch only a mall number of swordfishes annually. Big- er catches of swordfishes could help to re- ive the flagging local longline fishery. Di- ector Marr says this fish is considered a elicacy in many places.

A night longline fishery for broadbill wordfish has been based for some time in apan. Off the New England coast, where here is a harpoon fishery for swordfish, BCF's Gloucester Laboratory reported that wordfish were caught by longlines in greater uantities at night.

Gear Drifted With Currents

The Gilbert used fishing gear similar to gear being used regularly by the local long-line fleet. The gear was set about an hour before sundown, allowed to drift all night with the currents, and hauled in the next morning after sunrise. In contrast, the local boats usually set and retrieve their gear during daylight hours.

Six swordfish totaling over half a ton were caught in 22 fishing operations off Waianae, Oahu, and Hilo, Hawaii. The largest weighed 448 pounds and measured over 10 feet from the tip of its snout to its tail. The catch rates at night were somewhat better than those made by the local longline boats during the day. But, judged on the basis of this single cruise, the rates were not high enough to form the basis of a fishery.

"Cobb" Finds Hake But No Anchovy

BCF's John N. Cobb returned to Seattle on June 2 after a 19-day exploratory survey for hake and northern anchovy in continental shelf waters off the Washington-Oregon coasts (Cruise No. 87).

The cruise's primary objectives were to: (1) determine distribution, relative abundance, and dimensions of hake schools in areas not being surveyed and fished by commercial vessels; (2) determine relative density of these schools by sampling with the BCF Universal trawl; (3) inform commercial vessels of hake concentrations; (4) continue testing the efficiency of the BCF Universal trawl, particularly its efficiency in capturing fish located on bottom; (5) collect hake and anchovy samples for various biological studies being conducted by the Exploratory Fishing Unit and the Biological Laboratory.

The Methods Used

Standard echo sounding survey methods, supplemented by sonar ranging, were used to locate hake schools. Onshore-offshore transects were run at oblique angles to the coast. The searching effort was confined principally to the area between the 15 and 100 fathom isobaths. The coastal area between Cape Flat-

tery, Washington, and Heceta Head, Oregon, was surveyed, but relatively little time was spent inside 50 fathoms in the area between Grays Harbor and the Columbia River. As many as 8 commercial hake vessels were working in this area during the survey period.

A BCF Universal trawl ($2\frac{1}{2}$-inch mesh), which is constructed to fish both on and off bottom, was the only net used. It was equipped with a $\frac{1}{2}$-inch mesh liner in the codend and was fished with aluminum hydrofoil doors. A dual electrical depth telemetry system was used to determine net (footrope) and door depths.

A random sample of hake was processed from each haul to determine size (fork length) and sex composition. Samples of hake were also collected for stomach analysis. Blood was extracted from one sample of hake for use in a racial study being conducted by the Biological Laboratory.

Found Hake But No Anchovy

No anchovy schools were located. Significant concentrations of hake were not found except between Grays Harbor and the Columbia River inside of 50 fathoms. This area was cursorily surveyed on May 19 and 20, when 4 commercial hake vessels were fishing. Scattered schools of hake were being harvested, but the catch per unit of effort was low. About a week later, the catch rates of commercial vessels increased sharply; by June 1, roughly 1,600,000 pounds of hake had been harvested.

Two hauls were made in the Grays Harbor-Columbia River area. A one-hour haul was made along the bottom on moderate-to-heavy patches of anchovy-smelt-like sign, located southwest of the mouth of Grays Harbor at 49 fathoms. This yielded 1950 pounds of whitebait smelt (Allosmerus elongatus), and 50 pounds of miscellaneous species. A 10-minute bottom haul, at 18 fathoms off Peacock Spit at the mouth of the Columbia, caught 150 pounds of hake for blood samples. Moderate-to-heavy fish sign (hake mixed with anchovy-smelt sign) was observed, but excessive tidal currents prevented effective fishing.

Considerable anchovy-smelt-like sign was seen in the Grays Harbor-to-Columbia River area but apparently consisted of smelt only. With the exception of .5 pound of anchovy in the haul off Peacock Spit, no anchovies were caught.

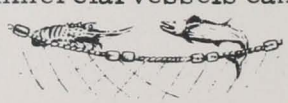
Small concentrations of hake sign were observed near the 100-fathom contour at the tip of the canyon off Willapa Bay, off Cape Lookout, Oregon, at 55-58 fathoms, and on Heceta Bank between the 40 and 55 fathom contours. Two hauls were made on Heceta Bank, and one on the sign off Cape Lookout.

What It Caught

Off Cape Lookout, a $1\frac{1}{2}$-hour haul on light-to-moderate sign on bottom, along the 57 fathom contour, yielded 5500 pounds of hake, 130 pounds of yellowtail rockfish (Sebastodes flavidus), 150 pounds of flatfish, mainly Dover sole (Microstomus pacificus) and rex sole (Glyptocephalus zachirus), and 35 pounds of miscellaneous species. On Heceta Bank, Oregon, two 1-hour hauls, one on bottom at 54 fathoms, and one 1-fathom off the bottom at 46 fathoms, were made. In the first haul, during which sign was observed on the echo sounder for less than 5 minutes, 4500 pounds of hake were caught, plus 115 pounds of sole, mainly rex sole, and 60 pounds of miscellaneous species. In the haul one fathom off bottom, 150 pounds of hake and 10 pounds of rex sole were taken. No sign was observed during the haul.

Throughout the cruise, the main purpose in making hauls was to test the BCF Universal trawl. Very little significant fish sign was observed, so evaluation of its species composition and density was of secondary importance. The trawl appeared to fish effectively on bottom with the doors off bottom. The footrope chain was noticeably shined after each drag, and various flatfish and permanently benthic (dwelling on sea bottom) invertebrates were caught consistently. An example of the net's ability to catch hake close to the bottom and not visible on the echo sounder was provided by the on-bottom haul on Heceta Bank. The towing resistance of the Universal trawl, compared to the Cobb pelagic trawl, could not be evaluated effectively. Only a few hauls were made and these at different depths and different tidal conditions (the latter often severe).

Judgment of the fishing capabilities of the Universal trawl, compared to various Cobb models, cannot be made--until either controlled comparative fishing experiments are conducted, or until experience now being obtained by commercial vessels can be evaluated



"Kaho" Conducts LASER Fish Detecting Study

BCF fishing gear research specialists aboard the Kaho completed the initial phase of a LASER fish detecting study in Lake Michigan off Saugatuck, Michigan, during May 8 - 12 (Cruise 40). (LASER means light amplification by stimulated emission of radiation.) The investigation was made in cooperation with BCF, Seattle, Washington, and Spear Seigler, Inc., Ann Arbor, Michigan.

This study is part of BCF efforts to update systems used by commercial fishing industry and research agencies in marine and inland waters to detect and measure concentrations of fish. The successful development of such a system would allow high-speed scanning of large areas from aircraft or satellite because a LASER beam can penetrate the air-water interface. Sound or radio signals do not have this capability.

How LASER Used

The compact LASER system consisted of the optical transmitter and receiver mounted on a bracket fastened to the superstructure of the Kaho (see Fig. 1); the cathode ray tube readout unit was in the pilothouse (see Fig. 2).

Fig. 1 - Compact LASER, optical transmitter and receiver, secured to the superstructure of the R/V Kaho.

The LASER head was designed to provide a 10 millijoule, 20 nanosecond pulse at 5,300 Angstroms. The optical configuration consisted of an 8-inch by $\frac{3}{8}$-inch neodymium doped glass rod pumped by a close-coupled linear Xenon flashlamp. The signal impulse and return were intermittently recorded on film for later study. For comparison purposes, a high resolution "white line" echo sounder was used to record bottom topography plus fish abundance and distribution.

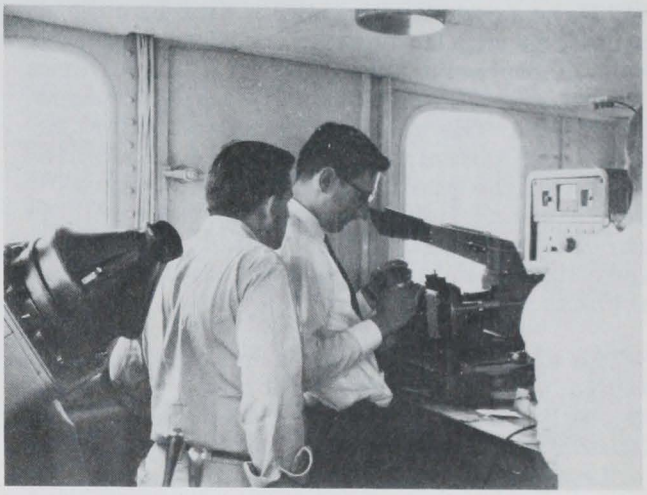


Fig. 2 - Oscilloscope with camera attached used to record LASER transmitted and reflected impulses.

All LASER readings were taken while drifting, with the unit mounted 12 feet above the water. Water turbidity was recorded by a secchi disk.

Results

The results of this brief preliminary study were encouraging enough to warrant further investigation, in the laboratory and in the field. The deepest penetration, about 105 feet, was achieved about 15 miles offshore in 47 fathoms of water at 2100 hours. The secchi disk rading was 9 feet 4 inches in this location at 1930 hours. In shallower water where alewife were highly concentrated, penetration of about 9 feet was achieved in 7 fathoms. Because the LASER system is so sensitive to background light and it is difficult to penetrate the severe turbidity in the inshore waters, good fish identifications could not be obtained. Further tests are planned when waters are less turbid and the data obtained have been analysed thoroughly.

Surface water temperature ranged from 46.0° to 47.0° F. and air temperature from 45.0° to 52.0° F. during sounding operations. Water color varied from dark brown at 6 fathoms to blue-green at 47 fathoms.

"Kaho" Studies Potential of Purse and Lampara Seines

BCF fishing gear specialists aboard the R/V Kaho conducted experimental fishing operations with a purse seine and a lampara seine in southern Lake Michigan for 6 weeks between April 10 and May 26, 1967 (Cruises 39 and 40). The seines are being studied to learn their potential for the more economic harvest of the prolific alewife, which now dominates the fish population of Lake Michigan. The specialists also tested a mercury vapor light for concentrating fish during darkness.

The experiments were conducted off Gary, Indiana, and Saugatuck, Michigan. Some lampara seine trials were carried out aboard the "Chambers Bros.", a converted Lake Michigan trawler that cooperated in the experiments. Fish concentrations were monitored with a high resolution "white line" echo sounder.

Prolonged strong northerly winds the past spring severely limited the number of days suitable for open water seining and also caused alewife schools to move off shore into deeper waters. Although catches were generally small, the vessel and crew handled nets and equipment competently by end of cruises.

How Experiments Were Conducted

Fishing equipment tested included a modified menhaden purse seine 1,500 feet long by 90 feet deep (Figs. 1, 2 & 3) and a lampara seine 1,000 feet long by 35 feet deep (Figs. 4, 5 &6). A 400-watt mercury vapor light

Fig. 1 - 1,500 foot modified menhaden purse seine and allied gear aboard R/V Kaho.

Fig. 2 - Pursing 1,500 foot modified menhaden purse seine aboard R/V Kaho.

Fig. 3 - Retrieving 1,500 foot modified menhaden purse seine through power block aboard R/V Kaho.

Fig. 4 - Setting 1,000 foot lampara seine from commercial trawler Chambers Bros.

g. 5 - Fishing lampara seine using Suberkrub type doors to spread net from commercial trawler Chambers Bros.

g. 6 - Retrieving lampara seine aboard commercial trawler Chambers Bros.

ight (32,000 foot candle power) was used with he lampara seine operations at night.

Experimental fishing tests of the purse eine were inconclusive because the tests were limited by weather conditions and dispersed fish schools.

Fishing experiments with the lampara seine included towing it with special spreading devices and setting it in the conventional circular pattern. Devices used for spreading the seine in the towing trials included V-shaped aluminum trawl doors, fitted with trawl floats for buoyancy and Suberkrub-type midwater doors, 4 by 8 feet, made from $\frac{3}{8}$-inch marine plywood.

Setting and towing the lampara seine "trawl fashion" resulted in the bunt end closing from its normal vertical opening of 35 feet to only 4 feet. The modified V-aluminum trawl doors with floats gave about 40 feet spread with 200 feet of warp. The Suberkrub-type midwater doors gave about 83 feet spread with 200 feet of warp.

Best catch results with the lampara seine were achieved at night; the gear was set in the conventional circular fashion. Before setting the seine, the 32,000 foot candle mercury vapor light was turned on for 30 minutes to attract alewife. The lamp was then turned off and the seine set around a drifting buoy mounted with a propane gas light. One haul of the seine using this method yielded 900 pounds of alewife. It was not possible to compare the effectiveness of lampara seining with and without the lights because the weather interfered. Echo sounder recordings revealed nothing about the reaction of fish to the light.

Echo Sounding Surveys

Large bottom schools of alewife were detected at 7 fathoms and shallower from Benton Harbor, Michigan, to Gary, Indiana, on April 16. On April 28, large concentrations were located in the same depth range off Gary and Saugatuck.

U. S. Fishery Products Will Be Shown At Cologne Fair

The U. S. will show its fishery products at the world's premier food fair--the one in Cologne, Germany, September 30-October 8, 1967. This biennial fair draws about 2,500 exhibitors and 250,000 trade and public visitors from 5 continents. The 1965 fair included exhibitors from 60 countries and 45 official national displays. It was the first overseas exhibition in which BCF took part. As a result of it, more than $300,000 of U. S. fishery products were sold.

During the first 2 years of BCF's Foreign Trade Expansion Program, U. S. fishery products have been displayed, sampled, and promoted at 11 food trade fairs in 6 western European countries.

Information about the fair may be obtained from the Office of International Trade Promotion, Bureau of Commercial Fisheries, U. S. Department of the Interior, Washington, D. C. 20240.

European Oysters Cultured for U. S. Research

In March, researchers at BCF's Milford, Conn., laboratory obtained a setting of European oysters in tanks from artificial spawning of adults in mid-January. The original oysters were imported from Holland 15 years ago and have been maintained at the laboratory through annual spawning of mature adults.

Researchers throughout the U. S. use oysters cultured at Milford to study growth and survival under different environments. This long-term program demonstrates the degree to which some species can be maintained under controlled conditions.

Lake Trout Return to Same Spawning Reef

Tagging experiments in Lake Superior show that adult lake trout disperse widely between spawning seasons--but return to the same spawning reef each year. The experiments were conducted by biologists of BCF's Ann Arbor, Mich., Biological Laboratory.

They also report that sea lamprey control produced substantial gains in the abundance index of legal trout in 1966. Natural production of lake trout now is augmenting hatchery releases.

MSX Still Found in Chesapeake Bay Oysters

Scientists of BCF's Oxford (Md.) laboratory found Minchinia nelsoni (MSX) in oysters they took from Eastern Bay (Md.) in March. This pathogen never has been reported so far north in Chesapeake Bay.

Oysters from nearby areas did not contain the blight. Holland Straits, Kedges Straits, Fishing Bay, Honga River, and Potomac River continue to have high prevalence.

This latest finding does not indicate a significant change. But the disease remains a serious threat to middle Bay oysters, despite last year's seeming remission.

Investigates Blue Crab Mortalities

Blue crab mortality in a stretch of the South Atlantic from Charleston, South Carolina, to Sapelo Island, Georgia, brought requests of BCF to investigate the cause. Researchers at BCF laboratories began analyzing samples for pesticide residues and other possible causes of mortality. Two biologists were sent to the area to assist the affected states.

This general area experienced heavy blue crab mortality last year. It was attributed to bacterial infection of the gills. This year's mortality appears to be caused by the same disease and to be more serious.

Prepares "Outdoor Fish Cookery" Materials

BCF's National Marketing Services Office prepared an 8-page brochure for use by the Agricultural Cooperative Extension Services. The publication is one of many materials developed by BCF for the Government-Industry "Outdoor Fish Cookery" campaign.

The brochure includes information on buying fishery products, tips for barbecuing and 6 recipes on outdoor fish cookery.

Retail merchandising flyers and retail ad inserts also were developed to stimulate and help the managers of retail stores and seafood countermen in the campaign. Several national retail food chains will use these materials during the campaign.

FEDERAL ACTIONS

Commerce Department

PUBLISHES PROPOSED PROCEDURES UNDER FAIR PACKAGING AND LABELING ACT

The Department of Commerce published in the "Federal Register" of May 23 a "Notice of Proposed Rule Making" under the Fair Packaging and Labeling Act of 1966.

The Commerce Department does not have responsibility or authority under the Act to issue regulations governing the packaging or labeling practices of private industry. But it does have responsibility and authority to:

(1) Determine whether there is "undue proliferation" (excessive growth) of weights, measures, or quantities in which any consumer commodity is being distributed in packages for retail sale, which "impairs the reasonable ability of consumers to make value comparisons."

(2) Request manufacturers, packers, and distributors--where a determination of undue proliferation has been made--to help develop a voluntary product standard under procedures governing the Department's voluntary standards program.

(3) Recommend to Congress whether legislation providing regulatory authority should be enacted. The Department would do this if, after one year from date private industry was asked to develop a voluntary product standard, the Department determines that a standard will not be published, or be observed if published.

How Department Would Proceed

When the Department receives information about undue proliferation--and finds good cause for action exists--it will begin inquiry to find facts.

It will publish a notice of the inquiry--including a description of the consumer commodity--and give the public a chance to submit data or statements.

The Department of Commerce would publish a proposed determination whether there is undue proliferation. After that, interested persons could request an oral hearing. A final determination would be published.

Interior Department

NEW TUNA REGULATIONS ANNOUNCED

Amended regulations for taking yellowfin tuna from the eastern tropical Pacific Ocean were published in the "Federal Register" on June 23, 1967, by the Director, BCF.

The announcement explained that the experience gained since the adoption of the regulations (effective September 15, 1966) had shown a need for minor revisions to clarify their scope and intent and to make them more effective.

The new yellowfin tuna regulations involve changes in sections on: (1) Definitions (par. "n"--"closed season"); (2) Basis and purpose; (3) Open season; (4) Restrictions applicable to fishing vessels; (5) Restrictions applicable to cargo vessels; and (6) Reports and record keeping.

* * *

PROPOSES REGULATIONS FOR GRANTING U. S. FUNDS TO CONTROL JELLYFISH

On June 13, Secretary of the Interior Stewart L. Udall announced proposed regulations for granting Federal matching funds to the States to control jellyfish, floating seaweeds, and other pests. Congress is considering a $100,000 appropriation for fiscal year 1968.

Under the regulations, priority will be given to projects having "an immediate effect" on jellyfish, often called sea nettles, or floating seaweed. Payments will be made to states as work "progresses and is completed."

The Jellyfish Act of 1966 authorized U. S. financial assistance to States to protect fish and shellfish resources and recreational areas in U. S. and Puerto Rican coastal waters from jellyfish.

The program, administered by BCF, will fund specific research projects in the coastal States. It will encourage cooperative agreements between States to carry out the law's objectives.

A Notice of Proposed Rule Making setting procedures to be used by the Secretary of the Interior in providing financial assistance was published in the "Federal Register" June 13.

Labor Department

NEW WAGE RATES FOR TUNA CANNERIES IN AMERICAN SAMOA RECOMMENDED

A review of minimum wage rates under the Fair Labor Standards Act for all industries in American Samoa, including tuna canneries, was recently conducted by Special Industry Committee No. 7 for American Samoa appointed by the Secretary of Labor.

Following investigation and public hearings, the committee's report containing findings and recommendations was filed with the Administrator of the Wage and Hour and Public Contracts Division, Department of Labor.

Slight Increase for Cannery Workers

Tuna canneries were included in the hearings because the minimum wage for tuna canneries in American Samoa is less than the mainland's. The committee recommended that minimum wage for employes in fish canning and processing and can manufacturing be increased from present $1.00 an hour to $1.05 an hour, effective June 24, 1967, and to $1.10 on June 24, 1968.

The recommendations were published in the "Federal Register," June 8, 1967.

Corps of Engineers

A DENIAL OF DREDGE-AND-FILL PERMIT IS CONTESTED

In March 1967, the District Office of the U. S. Army Corps of Engineers in Jacksonville, Florida, denied a permit for dredging and filling in Boca Aega Bay, Pinellas County. Its reason was that the operation would be harmful to the area's fish and wildlife resources.

On May 11, the company that had requested the permit filed suit in Federal District Court in Tampa to order the Corps to issue the permit. The company questions the conservation grounds for denying the permit. More important, it questions the Corps' authority to deny a permit under the Fish and Wildlife Coordination Act.

The Corps intends to fight the case. It has asked the Fish and Wildlife Service to supply expert testimony. A court hearing will be held later this summer.

CANNING OF FISHERY PRODUCTS PREVENTS MICROBIOLOGICAL SPOILAGE

"The canning of fishery products in hermetically-sealed, heat-sterilized containers has for its objective the prevention of spoilage through microbiological action. Fresh, dried, salted, or smoked fishery products may be rendered unfit for use by a wide variety of causes, but to protect canned fishery products careful consideration must be given to microorganisms which are the cause of putrefaction or spoilage under ordinary circumstances.

"Microorganisms, as the name indicates, are a class of living things too small to be seen except by the aid of a high-powered microscope. They are unicellular; that is, each life cell is a separate and complete organism, though they may be joined in chains or masses. Microorganisms are intermediate between plant and animal life, some almost plants, other animals. They are divided into three general groups: yeast, molds, and bacteria."

--"Principles and Methods in Canning of Fishery Products," Research Report No. 7, p. 15, U. S. Fish and Wildlife Service.