

# TRENDS AND DEVELOPMENTS

## Abstract

STUDIES OF BACTERIOLOGICAL AGAR: Fishery Leaflet No. 335, "Studies of Bacteriological Agar," recently issued by the Service consists of two parts: I - "Physical and Chemical Properties" by Leonard S. Stoloff and Charles F. Lee; II - "Bacteriological Studies" by Leslie A. Sandholzer, Margaret E. Dean, William Arcisz, and Martha C. Bradley.

The physical and chemical properties have been determined for 73 samples of Japanese agar from the U. S. Government wartime stockpile and for 7 special agars representative of the commercial product of bacteriological grade. Data on 12 properties of the stockpile agars are presented in tabular form, and also in histograms. The relative importance of the various tests in determining (1) the type and source of seaweed used, (2) the grade of purity of the gum extract, and (3) the suitability of the gels formed from the extracts, for bacteriological use, are discussed. The critical properties determining the suitability of agar for bacteriological use are stated and limits of tolerance for certain of the properties are suggested.

Both lots of agars were used in the preparation of media for a number of standard bacteriological procedures. The effect of differences in the presumably inert agar base upon total plate count and colony size was studied using several different inocula in different nutrient broth mixtures. Differences occurred apparently due to nutrients in the agars, and vitamin supplements were added in an attempt to identify the nutritive agent or agents responsible. The possibility of an effect of differences in the agar base upon the colonial and cultural characteristics of a number of pure strains of several genera of bacteria was studied through 10 serial transfers. A sample of Gracilaria extract was included in several of the test series for comparison. The agars tested were generally satisfactory for bacteriological purposes. However, the nutritive level of some of the standard media would appear to be undesirably low in some factors, so as to permit an affect upon plate counts and colony size of small quantities of unknown impurities present to some extent in all commercial agars.

A copy of this leaflet may be obtained free upon request from the Division of Information, U. S. Fish and Wildlife Service, Washington 25, D. C.



## Additions to the Fleet of U. S. Fishing Vessels

A total of 57 vessels of five net tons and over received their first documents as fishing craft during January 1949--12 more than during January 1948, according to the Bureau of Customs of the Treasury Department. Texas led with 11 vessels documented during January 1949, while Louisiana had 9 vessels.

Vessels Obtaining Their First Documents as Fishing Craft, January, 1949

Section	January		Total 1948
	1949	1948	
	Number	Number	Number
New England.....	2	2	52
Middle Atlantic.....	1	-	40
Chesapeake Bay.....	6	1	59
South Atlantic and Gulf.....	34	18	541
Pacific Coast.....	7	16	347
Great Lakes.....	5	1	51
Alaska.....	1	6	81
Hawaii.....	1	1	12
Total.....	57	45	1,183

Note: Vessels have been assigned to the various sections on the basis of their home port.



ECA Procurement Authorizations for Fishery Products

The procurement authorizations for commodities and raw materials announced during March 1949 by the Economic Cooperation Administration included \$1,440,000 for the purchase of fishery products (all from the United States and Possessions) compared with \$415,000 during February 1949. The total amount authorized through March 31, 1949, for purchases in the United States and Possessions is \$3,481,800.

ECA Procurement Authorizations for Fishery Products, March 1949

Product	Country of Origin	Procuring Agency	Recipient Country	Amount Authorized
Fish, canned <sup>2/</sup>	U.S. & Possessions	Ireland	Ireland	\$ 500,000
	U.S. & Possessions	Belgium	Belgium	300,000
	U.S. & Possessions	Italy	Italy	350,000
Oil, fish	U.S. & Possessions	Bizone Germany	Bizone Germany	290,000
Total.....				1,440,000

Total ECA Procurement Authorizations for Fishery Products, April 1-March 31, 1949

Fish, canned	U.S. & Possessions	Greece, Italy & Belgium	Greece, Italy & Belgium	2,228,800
Fish, salted	Newf. & Canada	Italy & Fr. W. Indies	Italy & Fr. W. Indies	5,179,000
Fish Meal	Canada, Iceland, Norway & Angola	Denmark, Austria, & U.S. Dept. Army	Denmark, Austria, & Bizonia	3,457,361
Oil, herring	Iceland	U.S. Dept. Army	Bizone Germany	1,694,000
" , seal	Newfoundland	France	France	257,600
" , shark liver	Latin America except Argentine & Brazil	France	France	250,000
" , fish	U.S. & Possessions	Bizone Germany	Bizone Germany	290,000
" , technical fish	U.S.	U.S. Dept Army	Bizone Germany	100,000
" , whale	Netherlands, Belgium, Norway & U.S.	Austria, France U.S. Dept. Army	Austria, Bizone Germany & Fr. Zone Germany	7,074,150
Vit. A (Commercial Grade, for stock feed)	U.S.	Netherlands	Netherlands	567,000
Grand Total Authorized.....				21,097,911

<sup>1/</sup> Where the recipient country is shown as the procuring agency, the Government of the participating country or its authorized agents or importers do the purchasing.

<sup>2/</sup> Except salmon and tuna.

On March 24, the ECA announced that the period during which delivery of goods may be made against Fourth Quarter 1948 procurement authorizations has been extended to June 30, provided contracts were completed before April 1. This is an extension of 90 days over the previous expiration date. Letters of commitment on these authorizations have already been extended to July 31. Deliveries against First Quarter 1949 procurement authorizations must also be made by June 30. The provision that suppliers must promise delivery within the quarter specified on the authorization was eliminated. Contracts, however, must have been made before April 1.

Regarding authorizations issued against the Second and Third Quarters 1948, ECA stated that if participating governments supply lists of outstanding contracts for goods undelivered on March 31, delivery dates will be extended to June 30.

The rulings do not apply to authorizations containing specific delivery dates. The extensions were made because of delays encountered by participating countries in contracting and obtaining deliveries.



## Federal Purchases of Fishery Products

DEPARTMENT OF THE ARMY, January 1949: Purchases of fresh and frozen fishery products during January 1949 by the Army Quartermaster Corps for the U. S. Army, Navy, Marine Corps, and Air Force for military feeding amounted to 931,197 pounds valued at \$344,732 compared with 1,309,139 pounds valued at \$509,674 in January 1948.



## Fish Meal and Oil Plant in Utah

A new processing company in Utah constructed a plant in the summer of 1948 on the shores of Deer Creek Reservoir near Charleston, Utah, in order to process trash fish, according to the Utah Fish and Game Bulletin. Although yet in the experimental state, the plant, installed at a cost of \$60,000, is capable of handling about 10 tons of trash fish per hour. The machinery in the plant consists of large rotary steam cookers, presses, dryers, and grinder. The trash fish consist of carp, chubs, and suckers seined from nearby waters.

Besides aiding in the removal of undesirable species (which are quite numerous) in the fishing waters of Utah, this new plant will produce both green and dry fish food for hatcheries, and for mink and fox farms; fish meal for poultry feeding; fish oil, pressed from the trash fish; and body water for fertilizer to be used by local farmers.

By July 1948, about 100 tons of trash fish had been removed from Strawberry Lake and processed by the plant.



## Florida West Coast Fisheries Trends, March 1949

MACKEREL: The Gulf of Mexico "mackerel" season lasted longer than usual this winter due to the unusually warm weather, according to a March 15 report from the Service's Fishery Marketing Specialist conducting a survey on the west coast of Florida. Catches of both Spanish and king mackerel had been good. The "bonito" of the Gulf, now believed to be the little tuna, usually follows the run of mackerel and considerable quantities were caught by fishermen trolling for king mackerel.

PACKAGED FISH: More southern varieties of fish and shellfish are being marketed in frozen packaged form. Dressed Spanish mackerel and spotted sea trout are packaged in cellophane and cardboard containers, while red drum is cut into slices or steaks and also packaged in cellophane.



## Hawaiian Fish Production, 1948

The production of fish in 1948 for the Hawaiian Islands is estimated at 14,595,000 pounds from the sea fishery. Tuna and tuna-like fishes account for over 68 percent of the total. The most important species was skipjack with a production of about 8,000,000 pounds. The greatest landings were made during the months of June to September. Yellowfin, albacore, bluefin, and big-eyed tuna totaled 1,872,000 pounds and were taken throughout the entire year. Bonito and little tuna were taken also during the entire year, but March and April were the months of heavy catches. The total for these two species was only 131,000 pounds.



## Hoover Commission Recommendations on Federal Fisheries Functions

INTRODUCTION: In accordance with Public Law 162, Eightieth Congress, approved July 7, 1947, the Commission on Organization of the Executive Branch of the Government in March 1949 submitted its report<sup>1/</sup> on the Department of the Interior, and the related task force report<sup>2/</sup> on Natural Resources prepared in January 1949.

The functions of the Department of the Interior, including those of the Fish and Wildlife Service, were studied by the Natural Resources Task Force or Committee. The report of the Natural Resources Committee makes certain important recommendations with reference to the commercial fisheries functions of the Fish and Wildlife Service that will be of vital interest to the fishing industries.

In general, the Commission recommends the return of the commercial fisheries functions of the Service to the Department of Commerce. Four of the twelve Commissioners dissented on the Commission's recommendation, and eight members did not accept the recommendations of the Natural Resources Committee.

<sup>1/</sup>Department of the Interior, a report to the Congress, March 1949, the Commission on Organization of the Executive Branch of the Government. (For sale by Superintendent of Documents, Washington, D. C., 25 cents per copy.)

<sup>2/</sup>Task Force Report on Natural Resources (Appendix L), prepared for the Commission on Organization of the Executive Branch of the Government, January 1949. (For sale by Superintendent of Documents, Washington, D. C. 50 cents per copy.)



TASK FORCE REPORT ON NATURAL RESOURCES: In January 1949, the Task Force Report on Natural Resources (Appendix L) prepared for the Commission on Organization of the Executive Branch of the Government was issued. The part dealing with the fish and wildlife resources covers the major problems, separation of fishery functions from those concerning wildlife, relationship with other federal agencies, and a summary of recommendations. In addition, this section of the report is supported by Appendix 15, "Commercial Fisheries; Importance, Government Activities and Problems".

Fish and Wildlife Service Resources: In presenting the major problems, the Task Force in its report states that the fish and wildlife resources are important and essential parts of the Nation's basic natural resource foundation and, as such, are closely interrelated with water and land resources.

Of all the Nation's fish and wildlife resources, commercial fisheries have had the least systematic development. Many of the fishery resources of the world are unexplored and not being fully utilized. Some of these undeveloped resources are in waters within and bordering the continental United States and Alaska, others lie thousands of miles from any American port.

If these resources are to be developed by the United States, either independently or in cooperation with other nations, the Federal Government should adopt a policy of increased participation in scientific exploration and experimental fishing. Some of the older fisheries which are showing signs of being overworked should be placed on a sound management basis.

The activity of the Federal Government is not sufficiently focused on these fishing problems and this may have resulted from combining the administration of fisheries with that of terrestrial wildlife in a single federal agency, according to the Committee.

The following is a summary of the recommendation of the Committee:

1. That the Federal functions dealing with fishery resources be consolidated in a Fisheries Service.
2. That the other responsibilities of the Fish and Wildlife Service be placed under a Wildlife Service.
3. That both the Fisheries Service and the Wildlife Service be placed in a Department of Natural Resources.
4. That basic data and research activities of the Fisheries Service and the Wildlife Service be made adequate to assure the development of sound policies and effective administration.
5. That the Federal Government give adequate attention to the need for sound development of fishery and wildlife resources and the needs of an expanding fisheries industry.
6. That adequate provision be made for the coordination of the work of the two Services with each other and with other agencies of the Department of Natural Resources and other departments.

Commercial Fisheries: Appendix L, "Commercial Fisheries; Importance, Government Activities, and Problems" discusses the importance of the industry, policy of

the Federal Government regarding commercial fishing, Governmental assistance to the industry, evaluation of present services, present and future fishery problems, and the separation of fishery functions from those concerning wildlife.

In regards to the importance of the industry, the Committee states that fishing is economically as all-important to certain segments of the population living in coastal ports, as is farming or lumbering to other communities. In times of national emergency the American fishing industry, the second largest in the world, not only supplies food but also provides vessels and men for defense purposes.

Commercial fishing is of growing importance. Unused sea resources offer one promising means of increasing food supplies. This possibility is of particular importance in view of increasing population pressures in the United States and throughout the world. Planning of future Government activities must take cognizance of possible expansion of the fishing industry.

Discussing the policy of the Federal Government regarding commercial fishing, it further states that examination of existing legislation and of executive programs concerning fisheries reveals no discernible well formulated Federal policy with respect to assistance and services rendered the fishing industry. Congress has expressed itself from time to time as desirous of fostering, promoting, and developing the fisheries industry. Whereas the Federal Government, however, provides numerous services to farmers those to fishermen are less extensive in scope and less adequately supported by appropriations.

With respect to regulated use of fishery resources, the Federal policy has been more consistent and clear until recent years. In 1945, a new Federal policy concerning jurisdiction of sea fisheries was stated in a Presidential proclamation. Waters of the continental shelf and high seas in which coastal fishing is engaged in were declared subject to Federal regulation through the establishment of conservation zones. To date, there has been no implementation of this policy.

The evaluation of the present services brings out that the Federal Government's operations in relation to fisheries is, in general, adequate insofar as the scope of work is concerned, but the diverse services which are being performed are inadequately financed. These are being performed on a budget of \$450,000 (fiscal 1949). Not only have expenditures been too small to provide adequate services, but the variability of the funds appropriated has reduced the effectiveness of these services. For example, although eight field offices were once established for market news work, only six are open at present. Of these, only four have been operated continuously for the past 10 years. Similarly, port reporters stationed at landing ports vary widely in number from year to year. Consequently, the Government's market news work respecting fishery products has been an unsatisfactory half-measure.

The work of the Federal Government has also been incomplete in providing statistical surveys of the country's fisheries production. There have been only two complete statistical surveys of the fisheries of the United States since 1880.

Biological research is similarly deficient. Studies have never been undertaken for many of the major commercial species. Investigations of the condition of some important fishing resources have been initiated only to be dropped in subsequent years. A large portion of the work done has been in response to emergency situations, and therefore, lacks the depth and continuity necessary to provide sound data. For many years prior to 1948, the Fish and Wildlife Service did not

have a research vessel suitable for going more than a few miles from shore. Consequently, little is known about the current status of some of our most important species of marine fish.

According to the Committee, the major fishery considerations of the United States are the development of unused ocean fisheries, management of other sea fisheries, and maintenance of inland fisheries.

The following is the Committee's summary of Appendix L:

A fisheries industry occasions problems of development, conservation, and management; problems of a jurisdictional nature, frequently involving other nations; and problems concerning the conduct of business on a sound economic basis. These problems, viewed against a background of restricted biological and technological research, very limited economic studies, and confused jurisdiction over this basic resource, warrant the clarification of Federal policy, and increased and consistent Federal assistance in the field of fisheries. Because the fishery resources are largely beyond "territorial waters" or transcend State boundaries, and because the type of biological, technological, and economic research needed is of a long-term nature, the Federal Government must necessarily play an important role.

It is the opinion of the committee that the activity of the Federal Government should be more clearly focused on these problems and that there is need for greater efficiency and better service in the protection, development, and use of the Nation's fishery resources. The inclusion of fishery functions in an agency also concerned with terrestrial wildlife has not facilitated adequate attention to fisheries problems. The committee recommends the separation of fishery functions from those of wildlife. It recommends the establishment of both a Fisheries Service and a Wildlife Service in the proposed Department of Natural Resources.

REORGANIZATION OF THE DEPARTMENT OF THE INTERIOR: Transfer of Commercial Fisheries to Commerce: In its report to the Congress, on the reorganization of the Department of the Interior, the Commission on Organization of the Executive Branch of the Government in March 1949 (Recommendation No. 3) recommends that the Commercial Fisheries from the Fish and Wildlife Service be transferred to the Department of Commerce. Further in its report it also states that other than commercial fisheries functions of the Fish and Wildlife Service remain in Interior or the proposed Department of Natural Resources.

BUREAU OF COMMERCIAL FISHERIES IN COMMERCE: In the recommendations<sup>3/</sup> for the reorganization of the Department of Commerce, the Commission (Recommendation No. 13) recommends that all commercial fishery activities of the Department of the Interior be transferred to a Bureau of Commercial Fisheries in the Department of Commerce.

3/Letter from the Chairman on Organization of the Executive Branch of the Government Transmitting the Commission's Report on "Reorganization of the Department of Commerce," Department of Commerce, House Document No. 100, 81st Congress, 1st Session, 1949. (For sale by the Superintendent of Documents, Washington, D. C., 15 cents per copy.)



## Maine's Commercial Fisheries, 1948

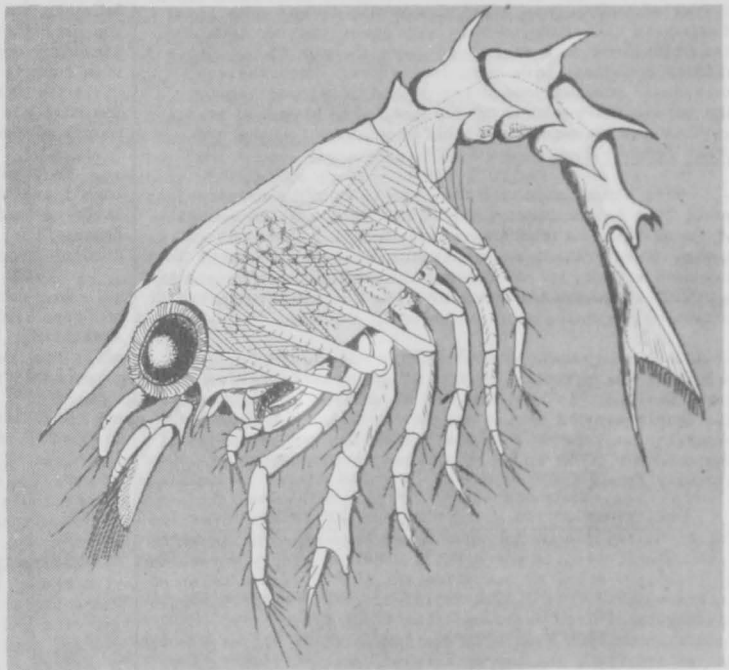
Maine's production of fishery products during 1948 increased in poundage and value. The State's production amounted to 305,037,517 pounds, about 85,000,000

pounds greater than in 1947, and the value of the catch to the fishermen was \$16,183,596, about \$4,000,000 higher than in 1947, according to statistics collected jointly by the Maine Department of Sea and Shore Fisheries and the Fish and Wildlife Service. The total poundage would have been much higher if a market existed for the menhaden that has been appearing more abundantly for the past three years in this area. Herring accounted for 60,000,000 pounds of the total production; followed by rosefish with 49,000,000 pounds; mackerel, 3,000,000 pounds; and groundfish and clams made up most of the balance.

There have been several large draggers, herring carriers, and a large number of 25- to 35-foot boats added to the fleet during 1948.

A new freezer is being built at Vinalhaven which will buy fresh fish and fillet as well as freeze and store.

**LOBSTERS:** Lobster production dropped off 2,354,040 pounds and the value to the fishermen was \$376,722 lower than in 1947. The average price to the fishermen in 1948 was 40.4 cents per pound, 3.7 cents higher than in 1947. This was much higher than the 15.6 cents average for 1939. There were 950 less lobster fishermen in 1948 than in 1947, which would partially account for the drop in catch. In addition, the individual fishermen did not catch as many pounds of lobster per trap as in 1947. It is estimated that there were 2,000,000 pounds of lobsters being held in the pounds along the Maine coast as of January 1949. The catch of lobsters would have been much less had it not been for the excellent weather that prevailed throughout the summer and fall along the Maine coast.



A YOUNG LOBSTER IN THE FIRST STAGE OF DEVELOPMENT (8 MM.). CUTICLE IS WHOLLY TRANSPARENT WITH INTERNAL ORGANS VISIBLE.

**CANNERIES:** Six new sardine canneries started operations during 1948, and one cat and dog food plant, which accounted for some of the increased fishing for herring. Two canneries, late in 1948, put up experimental packs of tuna with good results. In addition, some smoked tuna was packed by another plant.

**ROSEFISH:** Landings of rosefish hit an all-time high for Maine. The production of 49,041,410 pounds is about 9,000,000 pounds more than in 1947.

**SMELT:** Due to the lack of very cold weather in Maine the latter part of 1948 and the lack of ice in the bays and rivers, smelt production was low.

**CLAMS:** The clam fishery showed an increase over 1947 of about 1,000,000 pounds. This was due to the clam canneries resuming packing operations in 1948 and an increase in demand for the fresh clam trade.



## Markets for Airborne Seafood

Markets for Airborne Seafoods, by S. A. Larsen, W. Reitz, and K. K. Burgum, is a study under the Air Cargo Research conducted by the School of Business Administration, Wayne University, under express authority of the Detroit Board of Education and sponsored by five corporations.

This study seeks to point the way to a larger market for seafoods and to blueprint a plan for the achievement of this objective. The study should be of special interest to fish producers and distributors, transportation agencies, packaging concerns, home economists, and government officials—all of whom have a part to play in bringing about an improvement in the quality, and thereby strengthening the demand and increasing the consumption of fresh fish.

Excerpts from a synopsis of the study follow:

**INTRODUCTION:** The fishery industry has endeavored in many ways to improve the market for its products. Advertising campaigns have urged the public to eat more fish. Housewives and students have been given instructions and demonstrations on a variety of ways to cook fish. These efforts doubtless have been productive. Nevertheless, this study suggests one other method of strengthening the market for products of the sea. Its approach to the problem can be summed up in a few words—give the consumer fresher fish.

This study indicates that people in this country would like to consume an additional half billion pounds of fresh fish. A goodly portion of this 62 percent increase above present consumption could be achieved if improved methods of producing, cooling, transporting and merchandising were employed to bring to market in prime condition the delectable products of the sea.

This study defines new markets for fresh fish and estimates the potential volume of air traffic in strictly fresh seafood. In addition, it is offered as a guide to the development of a vast market for a product which of necessity must be kept at low temperatures and speeded to the consumer if it is to be offered to the public as strictly fresh.

**PRESENT MARKETING AND CONSUMPTION OF FRESH FISH:** The United States cannot be regarded at present as a nation of fish eaters, despite the great sources of supply suggested by its 8,300 miles of coastline and 45,000 square miles of inland waters. Per capita consumption of fresh fish—as distinguished from processed fish—amounts to only 6.89 pounds annually. Even with the inclusion of canned, smoked and salted fish, and the sportsman's catch thrown in for good measure, the annual per capita consumption figure of 14.8 pounds is not impressive.

In a comparison with fish consumption in other countries, the United States is found to rank 14th among the nations, although in production of fish it is exceeded only by Japan.

Furthermore, this low national average of fresh fish consumption is by no means evenly distributed. Fish is enjoyed most nearest its sources of supply, with the result that residents of tidewater states are found to consume well above the national average of fresh fish. The states of Massachusetts and New York, for example, show a per capita average of 12.8 and 12.4 pounds, respectively.

As the distance between the consumer and the source of supply increases, consumption drops off, until we find seven West North Central states averaging only 3.3 pounds per capita and Oklahoma and Idaho down to 2.2 and 2.3 pounds, respectively.

A high association also was found between population density and fresh fish consumption, illustrated by the 17.9 pounds per capita consumption in Maine cities against

a 7.6 pounds figure for Maine's rural population, or by the contrast between urban consumption of 5.7 pounds in Nebraska and that state's rural use of only 1.4 pounds. The overall tabulation shows roughly 62 million urbanites consuming an average of 11.35 pounds of fish while 69 million ruralists eat only 2.82 pounds per head each year. It is further estimated that the 38 million residents of the nation's first 92 cities in size consume 555 million pounds of fresh fish annually, or 61 percent of the total.

To obtain a close-up of urban fish consumption, the localities which will benefit most by the development of airborne seafood, direct consumers' surveys were made in Kansas City, Chicago and Detroit, both of home and restaurant consumers.

In general, it may be stated that the poor showing of fresh fish on the American menu is due to poor merchandising, lack of consumer education and the adverse effect on quality of existing methods of packing, shipping, handling and temperature control.

Doubtless the quality factor should be placed at the top of the list, for no amount of smart merchandising or of consumer education as to selection and preparation of fish can improve the quality and materially boost the market demand for these delicacies which so quickly deteriorate once taken from their native waters.

Strictly speaking, there is hardly such a thing today as a really fresh fish outside of the immediate vicinity where it is caught. Under present conditions of harvesting, shipping and marketing, it cannot be otherwise. This is, of course, more true of some species of fish and operations than of others. As a rule the "freshest" salt water fish served in a Midwestern home is 8-12 days old. Unlike meat, which requires a period of ageing and therefore gains in flavor and texture with the passage of the days following the kill, a fish begins to deteriorate immediately upon leaving the water.

Fishing boats commonly remain at sea several days to a week or more. When the boats return to port, fish for the markets are packed in boxes with flaked ice and sent on their way via truck or rail to ultimate destinations, some of which are well over 1,000 miles distant, at an average speed of 25 to 35 miles an hour. After one to four days in transit, plus another day or two at terminals, wholesale houses and retail outlets, they are available to the consumer for the skillet or the oven.

Then, too, throughout the entire period of storage, shipping and marketing in the conventional manner, melting ice leaches out valuable minerals, proteins and flavor. In fact, few species retain their high sea flavor beyond 6 or 7 days.

That consumers have been aware of this deterioration in quality is evidenced by surveys made in Kansas City, Chicago and Detroit.

**POTENTIAL CONSUMPTION OF AIRBORNE FISH:** Consumers in the 3 cities surveyed expressed virtually a unanimous desire for strictly fresh seafood of an infinite variety and voted an overwhelming willingness to pay premium prices, if need be, in order to obtain it.

Employing a formula, in which proper weight was given to the factors of distance from seafood production centers and population characteristics, an optimum fresh fish consumption by urban and rural population groups in the 43 states was computed. This shows that the greatest potential increase may be experienced in the urban centers of the Central and West North Central states, running to 170 percent, as contrasted with the 28 percent gain for the city dwellers of the Middle Atlantic states. Average increase estimated for all urban population: 61 percent.

For the United States as a whole, the estimated increase in fresh fish consumption in terms of per capita is from 6.89 pounds to 11.12 pounds, with total annual poundage increasing 557,956,000 over an estimated 1940 consumption of 906,500,000.

If only the distance factor were considered in computing potential consumption--and the longest airborne operation could be considered the equivalent of an overnight truck haul--then the country's per capita consumption increase would be in the neighborhood of 200 percent, to about 21 pounds per person. However, the distance factor in the formula amounts to only 30 percent while other factors account for 70 percent.

**GUIDE TO PACKAGING AND MARKET DEVELOPMENT:** Indications are that these predicted increases in fresh seafood consumption can be achieved by prompt unloading of the catch, coupled with new methods of packaging, speedy transportation, temperature control and alert merchandising. The consumer has indicated a willingness to support such a program.

In the tri-city survey consumers expressed their preference for the species of fin and shellfish most desired for air shipment, some of which they are at present unable to procure. Top 10 on the list are pompano, red snapper, shrimp, salmon, lobsters, swordfish, oysters, sturgeon, crabs and scallops.

Other factors weigh with force in any determination of the species of fish most amenable to air shipment. Price per pound is given considerable weight, as previous experience in predicting air cargo potential have indicated that relatively high priced perishables benefit doubly from highspeed transportation. Rate of perishability also weighs importantly as does the effect of seasonal variation in supply. Volume of catch is weighed inversely.

Using the formula, nearly 100 species of fish were given an air propensity index and grouped into 3 classifications: excellent, good and fair. The salt water fish judged most likely to lead the air cargo list was sturgeon, with an index of 96. Leader in the fresh water fish league is brook trout, with an index of 100, although annual catch of only a few thousand pounds over a wide area may prove unattractive to air freighters. Whitefish, on the other hand, rated at 75, totals 4,431,000 pounds of annual production and should be attractive air cargo.

It may be significant to the air carrier that almost all (95.5 percent) of the total annual catch of about 400,000,000 pounds of shellfish rates excellent on the propensity index, and the remaining 4.5 percent rates good. In this field lies a vast potential of airfreight. The prospective air transporter of seafoods will be interested at the outset in those species which show the highest propensity to air carriage and that at the same time are caught in sufficient quantities to provide worthwhile loading on a regular basis.

In the salt water category of fin fish, the 7 species rated excellent gross 30,957,000 pounds annually. In the fresh water division, the 8 species earning top ratings gross 25,513,000 pounds annually, while the top-rate shellfish are produced at the rate of 376,586,000 pounds per

year. Total annual production of seafood judged excellent or highly amenable to air shipment is 433,060,000 pounds. This volume represents about 25 percent of the estimated total of fresh fish which annually goes to market.

There is considerable seasonal variation in the catch of some species, a factor which must be weighed in the planning of any air transport operation.

Exports and imports of fresh fish, which in 1941 amounted to 215 and 305 million pounds, respectively, suggest further possibilities for air cargo activity, as most of the external commerce in fresh fish is with the neighboring countries and possessions.

**EXPERIMENTAL SHIPMENTS OF AIRBORNE FRESH FISH:** A research program such as this in the field of transportation is more convincing if experimental shipments are made in order to test the validity of the predictions propounded. As a result 65 air shipments were made from the 8 major fish producing areas to Detroit. The results were enlightening and encouraging.

These shipments revealed clearly the need not only of speed in the marketing of seafood but also emphasized the critical importance of constant temperature control and the elimination of useless weight--a factor to contend with in the successful operation of aircraft. A combination of temperature control, reduced weight and high speed was achieved through the development of a new type of packaging for airborne seafood.

Under prevailing methods of shipping fish by rail or truck, fish are packed with chipped ice in wooden boxes. As the ice melts, water laden with protein matter and other food values seeps away. This seepage not only adversely affects the quality of the fish but is highly corrosive to the vehicles in which it takes place. Since the container developed and used in the experimental shipments is externally dry this waste is overcome. A moisture proof insulated container unit makes possible a 40 percent saving in gross weight as compared to the conventional shipments made in wooden boxes with cracked ice as a refrigerant.

The method of packaging the seafood for these experimental shipments (and now used in commercial operations) was to precool the contents of the container to just above the freezing point before shipping. It was found that the average temperature rise in transit was at the rate of .6 degree per hour. Even on the longest flights from Alaska, Seattle and the Gulf, fish arrived in excellent condition. Fish shipped by air thus packaged were served to a critical consumer panel and to the public in dining places and invariably adjudged of the highest quality.

The shipments ranged from shrimp, oysters and lobsters to rainbow trout and Alaskan salmon. This insulated container was found suited to the shipment of whole fish, fillets and shucked shellfish.

**COMPARATIVE TRANSPORTATION COSTS:** Costs of shipping fresh seafood by air are by no means discouraging, particularly when it is borne in mind that airborne fish, if fresh at shipping point, will be of top quality upon arrival at their destination and will therefore bring top market prices.

Airborne costs per net pound of seafood from Norfolk to Detroit including packaging is 6.4 cents--predicated on the air cargo rate now being offered by air transport operators. Via railway express, a mode of transportation commonly employed for the shipment of fresh fish, the cost per net pound is 6.9 cents--or .5 of a cent less by airfreight. From other representative origins studied, shipping costs are slightly lower for rail express. From Boston costs of shipping seafood are 1.6 cents less per net pound; from Jacksonville 4.5 cents less; from New Orleans 1.9 cents less; from San Francisco 4.2 cents less; and from Seattle to Detroit 3.7 cents less per pound by rail express.

The shipping costs given here include the expenses of packaging, which for the conventional wooden-box-and-ice method runs to 1.25 cents per net pound of fish and for the iceless insulated pack comes to 1.5 cents per pound,

or an additional packaging cost for the airborne product of only  $\frac{1}{4}$  of a cent per pound.

Fourteen of the 65 experimental shipments were studied in detail to obtain a cross-section of actual shipping data. An average of 37 hours is found to have elapsed between the time of catching and the time of shipping, while an additional 19 hours on the average was spent in transit to Detroit, including truck pick-up and delivery. Thus it is seen that the fish, on the average, were only 56 hours out of the water at the time they reached Detroit distributors.

It is believed that even this encouraging time factor can be improved upon as shipments of airborne fish become a regular practice and air-ground transport becomes more closely integrated and as the speed of transport aircraft increases with the introduction of more advanced models.

Consumer acceptance of sample airborne shipments was enthusiastic, and bodes well for expanding operations of this nature, both from the viewpoint of a satisfied consumer and from that of the profit-minded producer and shipper.

If whole consumer areas of the interior can be brought within fresh-fish range of the major salt water fish producing centers via the air transport bridgeway, then it may be assumed that many species now unfamiliar to consumers will come into popular demand.

**POTENTIAL TRAFFIC ESTIMATES:** As part of its guide to the market development of airborne fish, this report contains an estimate of the potential ton-miles of seafood cargo which reasonably may be expected to materialize.

Few figures are available relating to existing gross traffic in fresh fish. But using the information at hand

and applying to it a formula carefully evolved an estimate of 517 million actual ton-miles annually for the United States as a whole is arrived at, broken down into 402 million ton-miles for the urban and 115 million for the rural trade.

Obviously, not all of the gross traffic in fresh fish will become available to air transport. Short distances are best suited to truck haulage, and for this reason air distances of less than 200 miles are not regarded as within the province of aircraft utilization.

Using the excellent, good, and fair air cargo propensity indices as a yardstick, it appears that more than 173 million ton-miles of top propensity fish in due time may be expected to go by air, of which 137 million ton-miles or 80 percent will go to urban areas--now most expeditiously served by air transport.

It is further estimated that some of the 231 million ton-miles of good propensity fish may become available for air transportation, as well as some of the 443 million ton-miles of fair propensity seafood. For the initial period of air traffic development it may be that only upwards of 173 million ton-miles of peak propensity product will enter the picture. This constitutes 20 percent of the optimum gross traffic and sets up a modest goal at which to aim.

A rough translation of the 173 million ton-miles of traffic into actual flight operations has been worked out, using 1,140 miles as the average haul of airborne fish and 8 tons as the cargo load for a DC-4--a standard commercial aircraft in use today. It is estimated that top propensity potential fish traffic would amount to 18,985 plane loads annually, or an average of 52 flights daily.



## New Florida Shark Fishing Vessel Ready

For several months, a Florida shark oil firm has been refitting a large shark fishing vessel, according to a Stuart, Florida, trade periodical dated February 21. This boat, the Sachem, has been revamped so that she will be able to fish far from the home port of Stuart, Fla. The vessel is well equipped for shark fishing with the latest type depth recorder, a very powerful radio-telephone, and all the equipment necessary to let the boat navigate in waters far from home. Many shark fishing boats going out on long trips depend on finding their bait in the area where they fish. The Sachem, however, will carry more than 32,000 pounds of frozen bait.

The crew consists of only four men with each person responsible for a particular job in the operation of the vessel plus acting as a shark fisherman.

It is believed that the Sachem will open up some entirely new production areas for shark.



## New Jersey Fisheries Notes

**EEL GRASS RETURNS:** Reports indicate that eel grass, once abundant in New Jersey's bays and rivers, is beginning to reappear after an absence of many years. The return of the eel grass, which provides food for waterfowl and refuge for



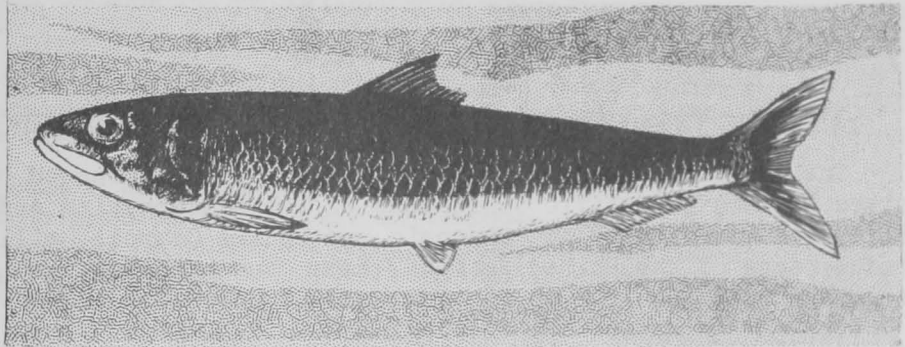
shrimp and bay scallops, has increased the catches of bait shrimp in the Barnegat Bay, according to a mid-February report from the Service's Marketing Specialist conducting a survey of New Jersey fisheries.

**OYSTER INDUSTRY:** The State's oyster industry in the Atlantic Coast area has suffered the past few years due to the high price of Connecticut seed oysters. Heavy mortality of seed oysters from drills makes the higher seed price prohibitive.



## Pacific Coast Two-year Sardine Fishery Survey

A small fleet of ships, nearly 100 investigators, and three governmental agencies are fishing for the facts on the decline of sardine populations in waters of two States and Mexico, according to the March 9 issue of Outdoor California of the California Division of Fish and Game.



CALIFORNIA SARDINE (SARDINA CAERULEA)

Leading off in the 2-year survey is the Bureau of Marine Fisheries, California Division of Fish and Game.

Their 100-foot research vessel, the N. B. Scofield, has put out to sea on the first of a series of offshore investigations.

The Scofield has been joined by the 120-foot Crest of the Scripps Institute of Oceanography and will be followed by the 132-foot Black Douglas of the U. S. Fish and Wildlife Service, operated by the other two parties to the three-way research program. Eventually, other specially-equipped craft will ship out from California ports for coordinated ocean operations.

With \$800,000 appropriated by the State Legislature to the Scripps Institute, and \$200,000 from a special tax on California sardine processors, the staff of investigators will attempt to find out: (1) is there a chance for sardine fishing to recover? (2) is there a way to predict seasons and long-range trends?

Cruising as far as 500 miles offshore, the floating laboratories will range Pacific waters from the Columbia River in Oregon to Cedros Island, Mexico. The extent of sardine spawning waters, relationships between survival of eggs, young, and oceanographic conditions, and causes of fluctuation, will be studied.

At sea, the Black Douglas will occupy a regular series of about 40 stations distributed along four lines running offshore from the Oregon coast for about 500 miles. Work at each station will include plankton collection by fine-meshed nets hauled in the upper layers of the sea; temperature observations and collection of water samples, taken at various depths down to 1,000 meters, to provide information on the currents and the biological and chemical characteristics of the water. Enough of these observations, properly distributed in space and time, should provide information of the causes of fluctuations in the abundance of young pilchards and allied problems.



## Research on Artificial Propagation of Clams



ing and setting or ecological conditions required by the larvae in nature.



## Scientific Conference on Conservation and Utilization of Resources

The Secretary-General of the United Nations announced on March 25 that the United Nations Scientific Conference on the Conservation and Utilization of Resources, authorized by the Economic and Social Council, will be held at Interim Headquarters of the United Nations, Lake Success, New York, from August 17 to September 6, 1949.

The Conference is to be devoted to an exchange of ideas and experience on the techniques of resource conservation and utilization, their economic costs and benefits and their inter-relations. The Conference will have no policy-making responsibilities; it will not bind governments nor will it formulate recommendations to them.

Individuals who have been invited to contribute papers to the Conference include scientists, engineers, resource technicians, economists, and other experts. They have been selected on as wide a geographic basis as possible with the advice of the Preparatory Committee and Member Governments. (Several Service experts are preparing papers.)

Section meetings on Wildlife, Fish, and Marine Resources will be held on the following topics and dates:

### 1. Changes in Abundance of Fish Populations--August 22.

- (a) The effects of natural conditions. (Natural fluctuations in the abundance of marine fishes and their probable causes such as poor survival of young, unfavorable hydrological conditions, food supply, population pressures, excessive natural mortalities.)
- (b) The effects of fishing. (Reaction of fish stocks to fishing; evidences of overfishing; species most susceptible to overfishing; the optimum catch.)

### 2. Management and Cultivation of Fresh Water Fish--August 24.

- (a) Pond culture of warm water fishes. (Role of pond culture in food production, pond management; selection of species, pond

fertilization, stocking, cropping; potential possibilities of pond culture as an additional source of food.)

- (b) Management of cold water fish resources. (Principles and practices of hatching, stocking and management in streams, lakes, and artificial impoundments; carrying capacity of waters; population balance; introduction of exotic species; effects of various rates of cropping on production; regulation of fishing.)

3. Fisheries Statistics--August 25.

- (a) Statistics on economic features. (Craft and gear used; catches; price; cost of production; marketing; development of Fisheries; organization of industry; domestic and foreign trade.)
- (b) Biological statistics. (Resource evaluation; catch per unit of effort; measurements of fish at markets; statistical treatment of biological data.)

4. Research in the Conservation and Utilization of Marine Resources--September 1.

- (a) Research in fishery conservation. (Techniques used in studying fisheries; the integration of hydrological, biological, and other studies in a well-rounded marine fisheries research program.)
- (b) Utilization of algae. (Location and composition of algae of actual or potential value; quantitative survey methods and findings; growing, harvesting and processing techniques and equipment; food, industrial and agricultural utilization of algae and algal chemicals; seaweed conservation.)

5. Technological Development in Fisheries--September 2.

Recent advances in methods of handling, distribution, preservation, and processing of fish; new products and byproducts. Also notes on the factory ship, echo ranging and echo sounding and aerial detection of fish, navigation aids, etc.

6. Developing Fishery Resources--September 5.

- (a) Latent fishery resources and means for their development. (Location of undeveloped fisheries, methods of exploration and development; evidence of the existence of oceanic stocks; potential contribution to world food supply; international cooperation in exploitation.)
- (b) Propagation and transplantation of marine fish. (Possibilities of hatching, stocking and transplanting; methods employed.)

Section meetings on Water, of interest to the fisheries, will be held on the following topics and dates:

1. Water Supply and Pollution Problems--August 22.

- (a) Utilization of surface, underground and sea water. (Latest developments in water supply methods, including control of chemical and biological equality of water; co-ordination of domestic and industrial use of waters; use of sea water.)
- (b) Control and utilization of polluted waters. (Effects of stream pollution on domestic and industrial water supply and on fish and wildlife; developments in pollution control and use of polluted waters.)

2. Comprehensive River Basin Development--August 23.

A symposium on the co-ordination of plans for flood control, navigation, domestic and industrial water supply, irrigation, power,

fish and wildlife protection, and watershed management in the preparation of multi-purpose plans for river basins. (Data required for comprehensive planning; methods of correlating engineering studies; review of selected reports of experience in multi-purpose water development programs.)

3. Hydro Power and Other Water Uses--September 1.

- (a) Protection of fish and wildlife. (Costs and benefits of constructing fishways and other protective devices for fish; utilization of water control projects for wildlife protection; administration of fish and wildlife benefits of water projects.)



## Sockeye Salmon Fishing Regulations for 1949

The Chairman of the International Pacific Salmon Fisheries Commission, on February 9, announced the 1949 sockeye salmon fishing regulations as promulgated by the Commission at their meeting on January 23, 1949, in Vancouver, B. C.

The Commission's regulations this year are designed to meet the views of the fishing industry, allow greater escapement to the spawning grounds, and provide for an equal take by both American and Canadian fishermen, according to the Chairman of the Commission.

No restrictions were placed on waters of the Pacific Ocean outside of a line projected from Tatoosh Island to Bonilla Point, on Vancouver Island.

### Regulations pertaining to U. S. Convention Waters:

1. Opening date for sockeye fishing: July 19, 6:00 a. m.
2. Closing date for sockeye fishing: To be recommended by Commission on the basis of the U. S. catch equalizing the Canadian catch.
3. Period of weekly closed season:
  - July 19th to August 21st - 48 hours, for gill nets;
  - 60 hours, for all other gear.
  - After August 21st - 36 hours for all gear.
 (Subject to modification on the advice of the Commission through its Chairman.)
4. Gill nets: Size of mesh permissible:
  - (a) Not less than 8 inches prior to July 19th;
  - (b) Not less than 8 inches during any period prior to August 21st when U. S. Convention Waters may be declared closed for fishing for sockeye in accordance with regulation 2, above.
5. Sale, purchase, or possession is prohibited of sockeye taken in U. S. Convention waters--
  - (a) Prior to July 19th, 6:00 a. m.;
  - (b) At any time prior to August 21st when U. S. Convention Waters may be declared closed to sockeye fishing.

### Regulations pertaining to Canadian Convention Waters:

1. Opening date for sockeye fishing:
  - (a) That portion of the Canadian waters of Juan de Fuca Strait lying

- within Areas 19, 20, and 21, as defined in the British Columbia Fishery Regulations - July 19th, 6:00 a. m.;
- (b) Fisheries District No. 1 (Fraser River) and including Areas 17 and 18 - July 25th, 6:00 a. m.
2. Closing date for sockeye fishing:  
To be recommended by Commission on the basis of the Canadian catch equalizing U. S. catch, including estimated fall catch.
  3. Period of weekly closed time: 72 hours.  
(Subject to modification on the advice of the Commission through its Chairman.)
  4. Gill nets - Size of mesh permissible:
    - (a) Not less than 8 inches prior to July 25th, 6:00 a. m.;
    - (b) Not less than 8 inches at any time prior to August 29th, 6:00 a. m. when Canadian Convention Waters may be declared closed for fishing for sockeye in accordance with regulation 2, above.
  5. Sale, purchase, or possession is prohibited of sockeye taken in Canadian Convention Waters--
    - (a) In that portion of the Canadian waters of Juan de Fuca Strait lying within Areas 19, 20, and 21, as defined in the British Columbia Fishery Regulations, prior to July 19th, 6:00 a. m.;
    - (b) Fisheries District No. 1 (Fraser River) and including Areas 17 and 18 prior to July 25th, 6:00 a. m.;
    - (c) All Canadian Convention Waters from time of closure of sockeye fishing until August 29th, 6:00 a. m.
  6. Minimum time notice in applying closures, additional closed times etc.:  
24 hours.

The Commission recognizes that, under ordinary conditions, the 1949 cycle of the sockeye runs has been one of the smallest of the Fraser River runs, and for this reason, it is necessary to continue for this season regulations that will allow greater escapement to the spawning grounds in order to build up this run. The Commission feels these regulations will greatly aid the 1953 cycle.



### Surf-clam Fishery

The surf-clam industry of Long Island is showing signs of increased activity, according to a March 19 report from the Service's Marketing Specialist stationed in Long Island. One plant is again canning minced surf clams. A former surf clam canner has, according to reports, interested the State of Massachusetts in investigating the possibility of dredging surf clams for canning. He has introduced the New York clam dredge to the Massachusetts fishermen. It is expected that the increased production possible with the dredge will result in a lowering of the price of \$3.00 per bushel for the first part of 1949 in Massachusetts while the Long Island vessels, during the same period, were getting about \$1.00 per bushel for their surf clams.





## U. S. Imports of Fish Nets

The imports of all kinds of fish nets and netting into the United States during 1948 were nearly six times greater than the preceding year. Manila trawl net imports are approaching the prewar amount, according to import data of the Bureau of the Census.

Table 1 - U. S. Imports of Otter Trawl and Cotton Netting, 1947-1948

Country of Origin	Otter Trawl Nets, (manila only)				Cotton Fish Nets (does not include under 50¢ a lb.)				Cotton Fish Nets and Netting, all others			
	1948		1947		1948		1947		1948		1947	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Canada	-	-	-	-	10,742	12,445	3,863	4,741	3,070	6,415	3,881	2,440
Mexico	19,799	17,420	7,055	5,818	-	-	45	67	-	-	-	-
United Kingdom	462,568	261,947	108,043	60,357	3,293	14,451	576	1,515	-	-	185	1,459
Portugal	805	443	-	-	-	-	-	-	-	-	-	-
France	-	-	-	-	208	869	387	944	-	-	-	-
Belgium	11,775	6,953	-	-	-	-	-	-	-	-	-	-
Netherlands	68,512	44,949	-	-	33,445	63,237	7,654	11,818	944	3,262	-	-
Germany	4,184	2,522	-	-	-	268	1,535	-	-	-	-	-
Italy	-	-	-	-	-	-	-	-	-	-	295	89
Japan	72,906	31,710	-	-	29,108	46,214	2,432	4,050	1,023	1,153	-	-
India	-	-	-	-	5,957	15,036	6,271	15,681	-	-	-	-
Total	640,552	365,944	115,098	66,175	83,021	153,787	21,168	38,816	5,037	10,930	4,361	3,988

again entered the picture for the first time since the war, and the Netherlands. Cotton nets, including cotton trawl nets, are still far below the prewar average of 500,000 pounds. The Netherlands was the leading shipper in 1948 with Japan a close second.

Table 2 - U. S. Imports of Gill Nets, 1947-1948

Country of Origin	Gill Netting, Flax (more than \$1.00 a lb.)				Gill Netting, Hemp (more than 60¢ lb.)				Gill Netting, (all others)			
	1948		1947		1948		1947		1948		1947	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Canada	1,918	4,524	450	1,300	140	261	-	-	500	400	680	130
Mexico	-	-	-	-	-	-	-	-	10	5	-	-
United Kingdom	1,016	2,144	723	2,459	-	-	-	-	-	-	-	-
Netherlands	2,344	8,840	218	850	-	-	-	-	-	-	-	-
Italy	-	-	-	-	595	659	100	105	999	268	-	-
Japan	5,794	12,090	-	-	667	600	-	-	-	-	-	-
China	-	-	-	-	-	-	-	-	-	-	-	-
India	-	-	-	-	-	-	420	660	-	-	-	-
Total	11,072	27,598	1,391	4,609	1,402	1,520	520	765	1,509	673	680	130

The total of all kinds of fish gill nets is about one-fourth of the imports for the prewar year of 1939, when nearly 50,000 pounds were entered. (See table in the November 1948 Commercial Fisheries Review, page 35). Japan started to ship linen (flax) gill nets for the first time in several years. Before the war, Japan accounted for only 4 percent of the total imports of this type of netting, but in 1948, she contributed 55 percent of the total.



## Wholesale and Retail Prices

The wholesale index for all commodities as of February 15, 1949, continued to drop and was 1.3 percent lower than January 11, 1949, and 0.9 percent less than the comparable period in 1948, according to the Bureau of Labor Statistics of the Department of Labor. The rate of decline in foods was greater than the previous month. The wholesale food index was 3.3 percent below the previous month and 6.5 percent lower than on February 17, 1948.

During February 1949, there were no changes in the wholesale prices of canned pink and red salmon compared with January 1949; however, compared with February 1948, pink canned salmon prices were 13.1 percent higher and red canned salmon, 2.9 percent higher. Wholesale prices of cured cod during February 1949 increased 0.8 percent and were 6.9 percent higher than February 1948.

## Wholesale and Retail Prices

Item	Unit	Percentage change from--		
		Feb. 15, 1949	Jan. 11, 1949	Feb. 17, 1948
<b>Wholesale: (1926 = 100)</b>				
All commodities	Index No.	158.5	-1.3	-0.9
Foods	do	159.0	-3.3	-6.5
<b>Fish:</b>				
Canned salmon, Seattle:		Feb. 1949	Jan. 1949	Feb. 1948
Pink, No. 1, Tall	\$ per doz. cans	5.848	0	+13.1
Red, No. 1, Tall	do	6.587	0	+ 2.9
Cod, cured, large shore, Gloucester, Mass.	\$ per 100 lbs.	15.500	+0.8	+ 6.9
<b>Retail: (1935-39 = 100)</b>				
All foods	Index No.	Feb. 15, 1949	Jan. 15, 1949	Feb. 15, 1948
Fish:		199.7	-2.5	- 2.4
Fresh, frozen, and canned	do	327.2	-1.4	+ 3.9
Fresh and frozen	do	267.2	-1.9	- 3.3
Canned salmon:				
Pink	¢ per lb. can	61.2	-0.4	+18.4

The continued drop in retail food prices, much more than the usual seasonal decline, marked the seventh consecutive monthly decrease. The retail food index on February 15 was 8 percent below the July 1948 peak. Following the general food trend, the mid-February index of 327.2 for fresh, frozen, and canned fish was 1.4 percent lower than mid-January 1949, but 3.9 percent higher than mid-February 1948. However, the fresh and frozen fish prices on February 15, 1949, showed a more marked decline and were 1.9 percent lower than mid-January 1949 and 3.3 percent less than mid-February 1948. Canned pink salmon prices also declined slightly compared to the previous month, but were still 18.4 percent higher than the corresponding period in 1948.



## PACKAGING FROZEN FISHERY PRODUCTS

The quality of frozen fish and shellfish is determined to a large degree by the quality of the product at the time of freezing and the manner in which it is stored. The function of the package is to help maintain that quality from the time the product is prepared for freezing until it is opened by the consumer. Care in selection, processing, and storing may be entirely wasted unless the product is adequately protected until it is consumed.

--Fishery Leaflet 324