



Recent publications of interest to the commercial fishing industry are listed below.

FISH AND WILDLIFE SERVICE PUBLICATIONS

THESE PROCESSED PUBLICATIONS ARE AVAILABLE FREE FROM THE DIVISION OF INFORMATION, U. S. FISH AND WILDLIFE SERVICE, WASHINGTON 25, D. C. TYPES OF PUBLICATIONS ARE DESIGNATED AS FOLLOWS:

- CFS - CURRENT FISHERY STATISTICS OF THE UNITED STATES AND ALASKA.
- FL - FISHERY LEAFLETS.
- SL - STATISTICAL SECTION LISTS OF DEALERS IN AND PRODUCERS OF FISHERY PRODUCTS AND BYPRODUCTS.
- SEP.- SEPARATES (REPRINTS) FROM COMMERCIAL FISHERIES REVIEW.

Number	Title
CFS-936	- Fish Meal and Oil, October 1953, 2 p.
CFS-937	- Florida Landings, September 1953, 6 p.
CFS-938	- Texas Landings, October 1953, 3 p.
CFS-940	- Frozen Fish Report, December 1953, 8 p.
CFS-941	- Mississippi Landings, October 1953, 2 p.
CFS-942	- New Jersey Landings, October 1953, 2 p.
CFS-943	- Maine Landings, October 1953, 5 p.
CFS-944	- Fish Meal and Oil, November 1953, 2 p.
CFS-945	- Florida Landings, October 1953, 6 p.
FL-359	- Manufacturers of Equipment for the Fish Processing Industries (revised), 6 p.

Wholesale Dealers in Fishery Products (Revised):
 SL-2 - New Hampshire, 1953, 1 p.
 SL-10 - Maryland, 1953, 10 p.

Number	Title
<u>Wholesale Dealers in Fishery Products (Revised) (Cont.):</u>	
SL-12	- Virginia, 1953, 12 p.
SL-14	- South Carolina, 1953, 2 p.
SL-15	- Georgia, 1953, 2 p.
Sep. No. 365	- Drum Seining--A New Development in the Puget Sound Salmon Fishery.
Sep. No. 366	- Vitamin Content of Fishery Byproducts-- Part I - Effect of Processing Methods on Riboflavin, Nicotinic Acid, and Vitamin B ₁₂ Content of Solubles and Meal.
Sep. No. 367	- Tech. Note No. 29--Effect of Salt on the Storage Life of Salmon Eggs Preserved with Sodium Bisulfite.

THE FOLLOWING SERVICE PUBLICATION IS AVAILABLE ONLY FROM THE SPECIFIC OFFICE MENTIONED:

Landings and Prices of Fishery Products, Boston Fish Pier, 1952 (Includes an Analysis of Boston Fishery Landings and Trends), by T. J. Risoli, 23 p., processed, December 1953. (Available free from the Market News Service, U. S. Fish and Wildlife Service, 10 Commonwealth Pier, Boston 10, Mass.) Fish marketing trends and conditions in Boston

for 1952 are discussed in this publication. Detailed data on landings and weighted average prices of fish and shellfish landed at the Boston Fish Pier during 1952 are presented. Statistics are given by months and species, together with comparative data for previous years.

THE FOLLOWING SERVICE PUBLICATIONS ARE FOR SALE AND ARE AVAILABLE ONLY FROM THE SUPERINTENDENT OF DOCUMENTS, WASHINGTON 25, D. C.

How to Cook Clams, by Kathryn L. Osterhaug and Rose G. Kerr, Test Kitchen Series No. 8, 14 p., illus., printed, 1953, 20 cents. Generously illustrated, this booklet is No. 8 in the Service's Test Kitchen Series of fish cookery publications released by the Service's Branch of Commercial Fisheries, and contains 27 choice recipes for cooking clams. These recipes were developed by home economists of the Service at Seattle, Wash., and College Park, Md. Some of the easy-to-prepare yet out-of-the-ordinary recipes included are stuffed clams, clam au gratin, clam poulette, deviled clam loaf, baked clam hash, sour cream clam pie, clam and spaghetti casserole, and clam and ham scramble. Instructions on how to buy and shuck clams are also found in this booklet.

The Pacific Salmon, Circular 25, 2 p., illus., printed, 5 cents, 1953. Describes very briefly the life history of the five species of salmon native to the Pacific Coast from San Francisco to northeastern Alaska. Although natural reproduction is desirable because of its economy, the hatchery is becoming increasingly necessary to maintain the resource where natural reproduction has become wholly or partly impossible. Diagrams showing the natural life cycle of salmon and the hatchery contribution and a typical salmon hatchery are presented. Interesting facts about salmon are also presented.

MISCELLANEOUS PUBLICATIONS

THESE PUBLICATIONS ARE NOT AVAILABLE FROM THE FISH AND WILDLIFE SERVICE, BUT USUALLY MAY BE OBTAINED FROM THE AGENCIES ISSUING THEM. CORRESPONDENCE REGARDING PUBLICATIONS THAT FOLLOW SHOULD BE ADDRESSED TO THE RESPECTIVE AGENCIES OR PUBLISHERS MENTIONED. DATA ON PRICES, IF READILY AVAILABLE, ARE SHOWN.

(Atlantic States Marine Fisheries Commission) Twelfth Annual Meeting, 163 p., illus., processed, Atlantic States Marine Fisheries Commission, Mt. Vernon, New York, December 1953. Presents the complete minutes of three general sessions and four section meetings of the Atlantic States Marine Fisheries Commission which took place October 8-9, 1953, at New York, N. Y. Under the North Atlantic Section of the report are included discussions of projects dealing with sea scallops; clams; shad; yellowtail flounder; lobsters; ocean perch; dragging operations; trash fishing; reconstruction of the U. S. Fish and Wildlife Service's Woods Hole Laboratory; cooperative striped bass program and racial studies; haddock mesh sizes; proposed compact between Massachusetts and Connecticut for restoration of Atlantic salmon in Connecticut River; freezing fish at sea; exploratory fishing for tuna; and catch statistics. Under the Middle Atlantic Section there is a discussion of projects dealing with sea scallops; dragging operations; statement on social legislation in marine fisheries; Delaware River Anadromous Fisheries Management Act; Pennsylvania clam sizes; cooperative striped bass program on racial studies; waste disposal off Cape May; waste disposal off New York harbor; clam investigations; New Jersey sport-fishing inventory; fluke size limits; butterfish; catch statistics; dams in the Delaware River; shad investigation; menhaden studies; New York weakfish (sea trout) study; and sport-fishing licenses. The Chesapeake Bay Section includes discussions of projects concerned with croaker; blue crab; cooperative striped bass program; shad; growth of soft clam industry; weakfish (sea trout) situation; Chesapeake Bay Institute; Potomac River oyster situation; joint legislative seafood study; catch statistics; status of Chesapeake sport fishery survey; and statement on social legislation in marine fisheries. Under the South Atlantic Section a discussion of the following programs is included: cooperative offshore research program; shad investigation; shrimp report; license fees and severance taxes; Florida fishery law revision; Oyster Laboratory at Beaufort, N. C.; catch statistics; gear development; cooperative striped bass program; bluefin tuna; conference of Georgia legislators; transportation of fresh shrimp; license fees salt-water fishermen; and social legislation in marine fisheries. The following are among the papers included in the appendices: "Status of Proposed Federal-State Striped Bass Research Program," by Edward C. Raney; "Freezing Fish at Sea," by Joseph F. Puncocar; "Exploratory Fishing for Tuna, North Atlantic," by John J. Murray; "Summary and Explanation of the Saltonstall Bill, S. 1731," by Branch of Commercial Fisheries; "Trash Fishing Operations," by Statistical Section; "Haddock Mesh Size," by Charles H. Lyles; and "Gear Development Progress in Underwater Listening Experiments and Television," by Virgil E. Harris.

The Behavior and Reproduction of Salmonid Fishes in a Small Coastal Stream, by John C. Briggs, Fish Bulletin No. 94, 66 p., illus., printed, Bureau of Marine Fisheries, Department of Fish and Game, San Francisco, Calif., 1953. Describes a study undertaken principally in order to obtain information regarding the extent of natural mortality during the egg and larval stages of certain salmonid fishes in a small California stream, to gather essential knowledge of the spawning behavior of these fishes, and to compare the results of such observations with similar evidence

from other waters. Part I describes the spawning behavior of silver salmon (*Oncorhynchus kisutch*), king salmon (*Oncorhynchus tshawytscha*), and steelhead trout (*Salmo gairdneri*). Part II describes the reproduction of the salmonid fishes, the Redd sampling program, loss in artificial propagation, aspects of losses in natural propagation, and makes a comparison of artificial and natural propagation.

(British Columbia) Provincial Department of Fisheries Report (with Appendices for the Year Ended December 31, 1952), 110 p., illus., printed, Provincial Department of Fisheries, Victoria, B.C., 1953. The first section of this report is devoted to an analysis of British Columbia's 1952 production and value of fishery products, the canned salmon pack, and a review of the salmon canning industry. Also discussed are the other canning industries (pilchard, herring, tuna, and shellfish), the production of processed fish (mild-cured salmon, dry-salt salmon, dry-salt herring, and pickled herring), the halibut fishery, fish oil and meal, net fishing in non-tidal waters, value of Canadian fisheries and the standing of the provinces for 1951, species and value of fish caught in British Columbia, condition of British Columbia's salmon-spawning grounds, and the herring investigation. The second section includes the following articles: "Contributions to the Life-History of the Sockeye Salmon (Paper No. 38)," by D. R. Foskett; "Results of Investigation of the Herring Populations on the West Coast and Lower East Coast of Vancouver Island in 1952-53, with an Analysis of Fluctuations in Population Abundance since 1946-47," by J. C. Stevenson and D. N. Outram; "Report of the International Fisheries Commission, 1952;" "Report of the Activities of the International Pacific Salmon Fisheries Commission for 1952;" and the "Salmon-spawning Report, British Columbia, 1952." Statistical data on the British Columbia fisheries are also included.

Commission on Foreign Economic Policy Report to the President and the Congress, 99 p., printed, 35 cents, Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C., January 23, 1954. This report embodies the findings of the Commission on Foreign Economic Policy, which was constituted pursuant to Public Law 215, 83d Congress, 1st. session, approved August 7, 1953. It is a composite of the thinking of the group as a whole. Concurrences or dissents which express significant differences are included as separate statements. The report discusses and makes recommendations on the post-war dollar problem, foreign aid and technical assistance, United States foreign investment, problems of agriculture and raw materials, United States dependence on imported materials, tariffs and trade policy, adjustment to increased imports, labor standards in international competition, related problems of trade adjustment, and currency convertibility. The report attempts to shape a new foreign trade policy for the Eisenhower Administration. (Also see Commercial Fisheries Review, February 1954, p. 25.)

Como Incrementar el Consumo de los Productos Pesqueros en el Uruguay (How to Increase the Consumption of Fishery Products in Uruguay), by Victor H. Bertullo, 1a. Comunicación, 15 p., printed in Spanish. (Reprint from Boletín Mensual de la Dirección de Ganadería, Año XXXIV, no. 1, 1953, pp. 35-47) Dirección de Ganadería, Ministerio de

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Ganaderia y Agricultura, Montevideo, Uruguay, 1953. Describes the method used in estimating the apparent consumption of fishery products in Uruguay; and presents statistics on and discusses ways and means to increase the consumption of fishery products.

"A Comparison of Objective Tests for Quality of Gulf Shrimp," by E. A. Fieger and J. J. Friloux, article, Food Technology, January 1954, vol. 8, no. 1, pp. 35-8, illus., printed, single copies of periodical: domestic US\$1, foreign US\$1.15. The Garrard Press, 119 West Park Avenue, Champaign, Ill. (Published by the Institute of Food Technologists.) Freshly-caught Gulf shrimp stored in crushed ice were sampled daily for chemical, bacteriological, and organoleptic tests. The correlation of the results of the chemical and bacteriological data to quality and spoilage is discussed. Chemical, bacteriological, and organoleptic studies were made daily on samples taken from ice-stored fresh headless shrimp. Of the four chemical tests used to determine quality, the tyrosine reaction was shown to be of little or no value. Determinations of trimethylamine nitrogen and volatile acids were of value in indicating whether spoilage had occurred, but did not give information of prespoilage changes. Significant increases in bacterial plate counts preceded by 2 or 3 days similar increases in volatile acids and trimethylamine nitrogen values. Amino nitrogen values decreased with increasing storage time and correlated quite well with taste-panel tests of flavor and quality. The results of taste-panel testing is of particular value to the shrimp industry. During the first seven days of ice storage, the shrimp gradually lost their characteristic sweet flavor. This was followed by a period of seven days during which they were tasteless. Beyond 14 days' storage, spoilage occurred with the development of off-flavors. It is postulated that loss of quality during the early period of storage is mainly caused by autolysis and with longer storage spoilage occurs mainly through bacterial action.

"The Determination of Volatile Reducing Substances (V.R.S.) as an Aid in Quality Control of Fish Products," by Lionel Farber and Anne Cederquist, article, Food Technology, December 1953, vol. 7, no. 12, pp. 478-80, printed, single copies of periodical: domestic US\$1, foreign US\$1.15. The Garrard Press, 119 West Park Avenue, Champaign, Ill. (Published by the Institute of Food Technologists.) The concept of quality is discussed from two points of view; namely, the distinction between an acceptable or wholesome product and one that is not, and the extent to which a given commodity meets some ideal condition or standard. Illustrative data have been presented showing the possible application of the determination of the content of volatile-reducing substances as an aid in evaluating the aforementioned aspects of quality. Data for the content of volatile nitrogen compounds have also been included. Experimentally-obtained data for volatile-reducing and nitrogen compounds in commercial samples of raw and canned fish have been presented. The results show that the Volatile Reducing Substances method offers a means of accurately and practically assessing the quality of a fish product, both in the sense of its wholesomeness and fitness for use and of attempting to establish grades, classes, or ratings as an approach to some condition considered ideal or most desirable for the particular commodity. To accomplish the above purposes, ranges of V.R.S. values for each product will have to be determined, as well as the distribution of the V.R.S. values within each grade or class.

illus., printed, DM26 (about US\$6.50). E. Schweiserbart'sche Verlagsbuchhandlung (Erwin Naegele), Johannes Street 3/1, Stuttgart, West Germany. This work presents a detailed and excellent description of the fisheries on the west coast of Sweden. An introductory section describes the areas covered (mainly the Skagerak, Kattegat, and Sund) as well as the ocean currents prevailing in these areas, the depths which influence greatly the fishing there, and the salt content of the waters, temperatures, light absorption, and the nutritive values of aquatic production. The second section contains a most valuable history of Sweden's fisheries, reaching back to the 11th century. The author has found evidence of large herring catches as early as the year 1000 A. D. During the later centuries herring remained economically the most important species caught on the west coast of Sweden. With the abundance of herring, wealth came to Sweden. If there was a failure of the herring catch, there followed a period of impoverishment. Some of the author's statements on the periodical changes of the herring catch and the resulting changes in the welfare of the fishing industry easily may be applied to some United States fisheries. The second section closes with a description of historical fishing methods and gear formerly utilized in the fisheries of Sweden. The third section contains the description of present-day fishing. The most important fisheries--cod, herring, eel, sprat, haddock, sea pike, flounder, and mackerel--are described in many details, as well as the gear and vessels used, mesh sizes preferred, areas fished, average tonnage of fish caught, and the number of fishermen employed and active in full-time commercial fishing. Photographs of gear and of actual fishing add to the excellent presentation of the facts and figures. Section four contains statistical data on the catches from 1936 through 1950 by areas and by species. The 1950 data also contain values of the catches by areas and by species. A special appendix shows the number of fishermen, gear, vessels, and catches (quantities and values) by species for the governmental districts of Goteborg, Bohus, and Halland. In section five the distribution of the catch is described. "Public Auctions" and "Cooperative Selling" are the two main methods of distribution at the fisherman's level. Since 1934, fish prices are protected in one way or in another by government regulation. Minimum prices have been in effect since 1946. Imports are subject to license. They are also subject to a fee of 5 percent of the invoice value. Also, exports are licensed within the restrictions necessitated by the precarious food situation prevailing generally in Sweden. The per-capita fish consumption in Sweden in 1950 was 17 kg (37.4 pounds). Section six contains data on manufactured and processed fishery products. Salt cod and canned herring are the two main products manufactured. The following section (seven) describes number and location of fishermen, fishermen's villages, number and value of boats, vessels, and gear used. (On the average, the Swedish fishermen turns over his invested capital twice per annum, while the United States fisherman turns it over only once.) The blueprints of boats and vessels in this section are of great help to the reader interested in the construction of fishing boats or vessels. Section eight deals with the organization of the fishing industry, the distribution of the profits (by shares) and the size of the crews on the different vessels. It further describes some fishermen's cooperatives and other industrial associations of fishermen, wholesalers, and retailers of fish. The two final sections (nine and ten) contain valuable material on Sweden's fishery administration and fishery legislation. The fishery administration unit maintains research vessels and laboratories; a fishery loan fund for gear, motors, and vessels; a fishermen's accident insurance; a fishermen's school; and a statistical and an economic service. The legislation mostly refers to the determina-

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tion of "domestic waters;" regulates mesh sizes and types of gear to be used; and for certain species establishes a legal minimum size. The United States reader will find in Dr. Rosén's book a well-prepared presentation of Sweden's most important fisheries, which will enrich his general knowledge of the fisheries and at the same time stimulate thinking on the many unsolved problems facing the United States fisheries.

--R. A. Kahn

"Experiments with the Harbour Seal, *Phoca vitulina*, a Definitive Host of a Marine Nematode, *Porrocaecum decipiens*," by D. M. Scott, article, Journal of the Fisheries Research Board of Canada, vol. 10, no. 8, pp. 539-47, printed, C\$3.25 per volume, Fisheries Research Board of Canada, Ottawa, Canada, November 1953. The Atlantic cod, *Gadus callarias*, and several other marine fishes in inshore Canadian waters are commonly infested with a parasitic nematode. Infestation experiments carried out in 1947 and 1948, as described in this paper, showed that the harbour seal, *Phoca vitulina*, was a definitive host of a larval nematode found in the flesh of the Atlantic cod, *Gadus callarias*; smelt, *Osmerus mordax*; Canadian plaice, *Hippoglossoides platessoides*; and eelpout, *Macrozoarces americanus*. Adult worms recovered from experimentally infested seals were identified as *Porrocaecum decipiens*. Some larval *Porrocaecum* in the four species of fishes studied were *P. decipiens*. The worms lost their larval characteristics by moulting between the third and sixth day following introduction into the seal. Sexual maturation proceeded rapidly after the eleventh day and some males and females matured before the twentieth day. Maturation was accompanied by a distinct increase in size.

"Fisheries Rehabilitation in North Idaho," by Paul Jeppson, article, Idaho Wildlife Review, vol. VI, no. 3, November-December 1953, pp. 10-11, illus., printed, The Idaho Fish and Game Commission, Boise, Idaho. The control of undesirable species of fish is important as a fisheries management method in north Idaho where these species make up the greater portion of the fish found in many lakes and larger rivers. When an area has been productive of game fish but a natural increase of trash fish is evident, it is usually sound management to attempt to control the undesirable species. In Idaho, seining, trapping, gill-netting, poisoning, shocking, dynamiting, or draining for the purpose of taking undesirable fish are limited to operations conducted or closely supervised by the Fish and Game Department. Hoop nets, gill nets, drag seines, dynamite, and rotenone are used in lakes, and hoop nets, dynamite, and rotenone in rivers as the principal methods of removal or eradication. Comparatively few fish are taken from the rivers; however, experiments conducted on the St. Joe River indicate that large numbers of squawfish and suckers can be eliminated in dewatered channels of the river during the late summer low-water period by using rotenone. From 20 to 60 tons of trash fish, principally tench and suckers, have been taken annually from the waters of north Idaho by State-supervised fishermen using hoop nets.

Fisheries Year-Book and Directory, 1952-53 (Incorporating the World Fisheries Year-Book, North Atlantic Fisheries Year-Book, and the Herring Exporters Manual), edited by Harry F. Tysser, 404 p., illus., printed, British-Continental Trade Press Ltd., 222 Strand, London, England. An international reference book and directory of the fishing and fish-processing industries. The articles which make up the first part of the book cover the following subjects: The British Fishing Industry; Denmark's Fishing Industry; The

Icelandic Fisheries; Federal Germany's Seafisheries and Fish Imports; Around the World (covers the fisheries of the more important countries); Refrigeration Progress; Smoked Salmon Trade Expansion; Smoke-Curing of Fish; World Distribution of Food Fish; International Council for the Exploration of the Sea; English Fishery Research; Progress Report from the Torry Research Station; Fishing Nets--A World Index; Fish Oils; The Use of Measuring and Controlling Instruments; Developments in Fishing Vessel Construction; and Developments in Canning Technique. The first part of the book also contains a fish supply calendar (tabulated by kind of fish, area of catch, and months of supply); a list of trade journals of interest to the fishery industry; a list of organizations and trade associations; and a dictionary of fish names. The second half of the book is a directory which lists names, addresses, and other particulars on firms in various branches of the fishery industries, grouped by countries. The lists included are: (1) exporters and curers, quick freezers, trawler owners; (2) importers and wholesalers; (3) fish canners and preservers; (4) machinery and equipment for fish processing, refrigeration, etc.; (5) packing machinery, materials, etc.; (6) supplies for fisheries (ship builders and repairers, ship chandlers, nets and cordage, instruments, and other equipment); (7) fish byproducts (meal, oil, vitamins, etc.); and (8) cold storage and transport. Also included is a list of trade marks and names and a buyers' guide and classified list of advertisers.

"Fishing in the Whirlpool of Charybdis," by Paul A. Zahl, article, The National Geographic Magazine, November 1953, vol. CIV, no. 5, pp. 579-618, illus., printed, 65 U. S. cents per issue. National Geographic Society, Washington 6, D. C. Myriad strange creatures inhabiting sunless ocean depths generate brilliant patterns of cold light like that of fireflies. To study these deep-sea fishes, the author spent several months at the Strait of Messina, between Sicily and the Italian mainland, where a rich variety of marine life is periodically swept up by whirling currents and strong winds. This article describes in detail the search for deep-sea fishes in the Messina whirlpools, and presents the author's unique series of color photographs of deep-sea fauna.

(FAO) Present Status and Prospectives of the Fishery Industry in Latin America, by Jorge d'Alarcao, 64 p., processed. Food and Agriculture Organization of the United Nations, Rome, Italy, April 1953. (United Nations Economic and Social Council, General Report E/CN 12/325.) The original report was presented at the Fifth Session of the Economic Commission for Latin America, Rio de Janeiro, Brazil, April 9, 1953.) This paper contains an interpretation and compilation of facts and data which have been made available to FAO through the work of experts in the field or by information supplied by the countries involved in the postwar study of the problems of economic development of the fisheries in Latin America. Latin America as a whole has shown steady progress in the development of its fisheries since the end of World War II, and in certain restricted areas in Chile, Brazil, Peru, Venezuela, and Mexico there are already the nuclei of large fisheries industries, including the processing industries such as freezing and canning. The industry in general is, however, still at an elementary stage of economic development where primitive techniques and small-scale production prevail. The main economic causes of the low level of fish production in the region are low productivity per fisherman, defective techniques in marketing and transportation, consumer discrimination in favor of other foodstuffs, the availability of other sources of food supplies competitive in

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price and nutritional value, and, principally, the inadequate purchasing power of the lower income groups. Food shortages during the war provided incentives for the capital investment which led to large and successful exploitation of fisheries resources in a few areas of Latin America. There is still an incentive to much greater capital investment either by the governments, private sections of the economy, or by foreign investment in all Latin American countries. That incentive is the large potential domestic market which, with provision of steady supplies of fish at stable prices and, above all, with improvements in processing, transport, and sanitary distribution, will become an active consumer's market. Statistical data on landings of fish and shellfish, imports, and exports for the various Latin American countries are contained in an appendix. The first part of the report discusses labor productivity in fishing; equipment; labor; production; freezing, curing, canning, and byproducts industries; demand and prices; foreign trade; investments; and industrial organization and government intervention. Projects and prospectives of fisheries development in Latin America are presented.

NOTE: Also see Commercial Fisheries Review, July 1953, pp. 42-44.

"The Growth Rate of the American Lobster (*Homarus americanus*)," by D. G. Wilder, article, Journal of the Fisheries Research Board of Canada, vol. X, no. 7, pp. 371-412, illus., printed, C\$3.00 per volume in Canada and the United States, and C\$3.25 in other countries. Fisheries Research Board of Canada, Ottawa, Canada, September 1953. Data are presented on the natural growth of larvae, and on the growth of marked 15- to 25-cm. lobsters, recaptured 4 to 12 months after release. An attempt was made to estimate the ages of the smaller commercial-sized lobsters in the Northumberland Strait area. Towing with a plankton net especially designed for the capture of lobster larvae was conducted in the western part of Northumberland Strait between Richibucto, N.B., and Miminegash, P.E.I., from mid-June to late September each year from 1948 to 1952. Carapace measurements of lobster larvae caught in the western part of Northumberland Strait showed that in this area the natural growth in length per molt is 34.4 percent from stage 1 to stage 2, 31.8 percent from stage 2 to 3, and 30.3 percent from stage 3 to 4. The seasonal distribution of the first four larval stages was determined from plankton tows made continuously from mid-June to late September each year from 1948 to 1952. To determine natural annual growth, lobsters of 15 to 25 cm., total length, were sorted into five or six size groups and were distinctively marked by means of holes punched through the tail fan. These were liberated on six widely separated fishing grounds in the Maritime Provinces. Recoveries of these marked lobsters 4 to 12 months after release showed that in the southern Gulf of St. Lawrence, 15- to 20-cm. lobsters grew 8 to 9 mm. (13 to 15 percent) in carapace length, 22 to 25 mm. (13 to 14 percent) in total length, and 80 to 95 grams (45 to 53 percent) in weight. In southern Nova Scotia and Grand Manan 20- to 25-cm. lobsters grew 10 to 12 mm. (13 to 15 percent) in carapace length, 27 to 34 mm. (12 to 15 percent) in total length, and 170 to 220 grams (43 to 54 percent) in weight. From the carapace length of 4th-stage larvae and straight-line equations relating carapace length before molting and carapace length after molting, the average carapace lengths of lobsters in stages 5 to 20 were calculated. From observations and calculations on the growth per molt and molting frequency, it is estimated that in the Northumberland Strait area lobsters reach a length of 14 cm. (5-1/2 in.) at the end of the fifth growing season

(4-1/4 years old) and 24 cm. (9-1/2 in.) at the end of the ninth growing season (8-1/4 years).

Gulf States Marine Fisheries Commission Fourth Annual Report 1952-53 (to the Congress of the United States and to the Governors and Legislators of Alabama, Florida, Louisiana, Mississippi, and Texas), 27 p., printed, Gulf States Marine Fisheries Commission, 312 Audubon Bldg., New Orleans 16, La. Contains the Commission's activities for the period October 1952-October 1953. Summarizes the principal activities of the marine fisheries administration of each of the Gulf States in the interest of bringing about the proper utilization of the fishery resources. Plans for future investigations are presented. Included are short discussions of the U. S. Fish and Wildlife Service activities in biological research and exploratory fishing in the Gulf area. Describes an oceanographic survey of the Gulf of Mexico and oyster investigations. A financial report of the Commission is included.

(International Commission for the Northwest Atlantic Fisheries) Annual Proceedings for the Year 1952-53, vol. 3, 88 p., illus., printed, International Commission for the Northwest Atlantic Fisheries, Halifax, N.S., Canada, 1953. At the third annual meeting, the Commission decided to establish its publications in two annual series, a "Statistical Bulletin" and an "Annual Proceedings." The Statistical Bulletin will deal with the fisheries statistics of the convention area, mainly those for the year in question, but also with statistics for former years collected and compiled by the Commission. The Annual Proceedings will contain the Commission's reports for the year in question: the administrative report, the report of the annual meeting, summaries of research by participating countries, certain scientific papers especially prepared for the annual meeting, and an annotated list of papers of special interest to the Commission's work. The present Annual Proceedings includes an administrative report and financial statements for the fiscal year ending June 30, 1953; report of the Third Annual Meeting; and summaries of research during 1952 by countries and subareas. Presents the following scientific papers specially prepared for the annual meeting: "Identification of Major Groundfish Stocks in Subarea 4 of the Northwest Atlantic Convention Area," by W. R. Martin; and "Knowledge of Divisions of Stocks of Cod, Haddock, Redfish, and American Plaice of Subareas 3 and 2 of the Northwest Atlantic Convention Area," by W. Templeman. Also includes the following contributions to a special meeting on long-term hydrographic changes and their effects on fish stocks in the Northwest Atlantic area; "Introductory Remarks," by J. L. Kask; "Changes in the Distribution of Marine Animals in New England and Middle Atlantic Waters in Relation to Changes in Temperature," by Clyde C. Taylor and Herbert W. Graham (authors' abstract); "Long-Term Changes in Hydrography and Fluctuations in Fish Stocks," by A. Vedel Taning; and "Long-Term Changes in Hydrographic Conditions and Corresponding Changes in the Abundance of Marine Animals," by Wilfred Templeman and A. M. Fleming.

"Ionizing Radiations for the Control of Fish Spoilage," by J. T. R. Nickerson, E. E. Lockhart, B. E. Proctor, and J. J. Licciardello, article, Food Technology, January 1954, vol. 8, no. 1, pp. 32-4, illus., printed, single copies of periodical: domestic US\$1, foreign US\$1.15. The Garrard Press, 119 West Park Avenue, Champaign, Ill. (Published by the Institute of Food Technologists.) A study was made of the effect of cathode rays on control of fish

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spoilage caused by bacteria. Haddock fillets were irradiated with supervoltage cathode rays and then stored at 36°-40° F. The dose levels used were 4×10^5 , 5×10^5 , and 6×10^5 rep at 2 m.e.v. and 6×10^5 and 7×10^5 rep at 3 m. e.v. Standard plate counts, trimethylamine nitrogen analyses, and organoleptic examinations were made on the irradiated and control samples at the start and after 2 to 6 weeks of storage at refrigerator temperatures above freezing. The results showed that high-voltage cathode rays may be used to destroy bacteria on haddock fillets, thereby extending the storage life of such products when held at refrigerator temperatures above freezing. Much lower doses of ionizing radiations were used for this purpose than would be required to destroy all microorganisms that might be present on fish fillets. From the standpoint of destruction of bacteria and the extension of storage life at temperatures of 36°-40° F. (2.2°-4.4° C.), energies of 3 m.e.v. gave better results than energies of 2 m.e.v. at the same dose level. This indicates that some penetration into the flesh of the fish fillet is necessary to bring about an effective destruction of microorganisms. Statistical analysis of the results of organoleptic tests made on irradiated samples held as long as six weeks at 36°-40° F. and on controls preserved by freezing indicated that the irradiated samples might be considered acceptable.

"Israel's Fish Problem," by H. W. Richardson, article, Foreign Trade, vol. 14, no. 365 (December 26, 1953), pp. 23-4, printed, single copy 10 Canadian cents. Department of Trade and Commerce, Ottawa, Canada. (Available from The Queen's Printer, Government Printing Bureau, Ottawa, Canada. Describes Israel's young fishing industry which provides only one-third of the fish consumed in that country. Consumption has dropped from 45 to 32 pounds per capita a year because of several factors. Import restrictions are severe and as long as Israel's payment problems remain acute, there is little likelihood of a more liberal policy. At present Israel buys her fish from soft-currency countries. Then there is the matter of price; imported fish sell at higher prices because of changes in exchange rates. Additional problems involving the fish supply are the smaller local fish production because of poor deep-sea catches, food rationing, and a population swelled by continuing immigration. A short description of Israel's fishing industry is included.

(Japan) "Marking Experiment of the Young Herring (*Clupea pallasii*) in the Pacific Coast of Hokkaido, 1949-52," by Heihachi Kondo and Hitoshi Kitahama, article, Bulletin of Hokkaido Regional Fisheries Research Laboratory, No. 9, pp. 17-56, illus., printed, in Japanese and summary in English. Hokkaido Regional Fisheries Research Laboratory, Yoichi, Hokkaido, Japan, November 1953. Describes the results of marking experiments conducted on the Pacific coast of Hokkaido since 1949. These experiments were made to clarify the relation between the spring herring of the Japan Sea coast and the young herring of the Pacific coast of Hokkaido and to determine the migration route of the young herring. A general outline of the seasonal movement of the young herring was made from the results of the tagging experiment, and it was confirmed that the herring in various districts on the Pacific coast are of the common group. Recovery of one fish on the Japan Sea coast suggests a relationship between the Pacific coast's young herring and the Japan Sea's spring herring.

The Life History of the Cabezon, *SCORPAENICHTHYS MARMORATUS* (Ayres), by Charles P. O'Connell, Fish Bulletin No. 93, 80 p., illus., printed. Bureau of Marine

Fisheries, Department of Fish and Game, San Francisco, Calif., 1953. Describes the cabezon (*Scorpaenichthys marmoratus*), a species of minor economic importance which has gained considerable popularity during the past 15 years in the California sport fishery. In view of the sixfold increase in sport landings of the cabezon since the end of the war, the drain on the population may conceivably reach proportions capable of diminishing the stock in the foreseeable future. Should increasing demand for the cabezon eventually elevate it to a position of greater economic importance in the California catch, a knowledge of its biology would be desirable. To this end, the information here presented will facilitate further study of the species and ultimately contribute to its management. Statistical data and discussions are included on the commercial and sport catches, range and habitat, food and feeding, reproduction, larval development, length-weight relationship, age and growth, and color variations of the cabezon.

"Pilchard Shoals in South-West Australia," by A. M. Rapson, article, Australian Journal of Marine and Freshwater Research, vol. 4, no. 2, November 1953, pp. 234-250 and Plates 1, 2, & 3, illus., printed. Australian Journal of Marine and Freshwater Research, Commonwealth Scientific and Industrial Research Organization, 314 Albert Street, East Melbourne C.2, Victoria, Australia. The distribution of pilchard shoals from echo-sounder records, obtained on the fisheries research vessel Warren between Albany and Esperance, is described. Data from echograms and ring-net catches are used to estimate the density of fish in shoals. A method of estimating the number of shoals of pilchards per acre has been developed, using the sounder as a surveying instrument. The quantity of shoal pilchards on two parts of the coast has been calculated. Dispersal of shoals when feeding conditions are good is deduced after examination of pilchard stomachs and N70 tow-net hauls. Movements along the coast are inferred from the distance shoals must travel to obtain a full feed. The selection and avoidance of certain classes of food are discussed. The manner in which shoals come to the surface is described, and observations are made on behavior of fish in surface shoals.

"A Possible Initial Condition for Red Tides on the Coast of Florida," by L. Basil Slobodkin, article, Journal of Marine Research, vol. 12, no. 1, pp. 148-55, illus., printed, \$1.50 per number. Sears Foundation for Marine Research, Bingham Oceanographic Laboratory, Yale University, New Haven, Conn., 1953. Describes a study of the conditions which exist when red tides occur on the coast of Florida. According to the author, "It is considered likely that red tide outbreaks are initiated by the occurrence of discrete masses of water which differ in salinity and chemical characteristics from the normal water of the Florida coast. The abnormal nutrient concentrations found in 1947 can be explained on the basis of vertical stratification of the organisms. Upwelling or other purely marine phenomena are superfluous assumptions. Once the nutritional requirements of the dinoflagellates are satisfied, the limiting condition for a bloom is the rate of diffusion of the physiologically suitable water mass. Prediction of red tides will depend on intimate knowledge of coastal drainage and hydrography. Prevention of most red tides may be possible by altering the drainage pattern of the Charlotte Harbor-Calloosahatchee estuary region."

"Preliminary Experiments Using Lights and Bubbles to Deflect Migrating Young Spring Salmon," by J. R. Brett and D. MacKinnon, article, Journal of the Fisheries Research Board of Canada, vol. 10, no. 8, pp. 548-59, illus., printed,

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C\$3.00 per volume in Canada and the United States, and C\$3.25 in other countries. Fisheries Research Board of Canada, Ottawa, Canada, November 1953. The problem of altering the downstream migratory path of young salmon, with a view to their safe passage around destructive barriers, is one of prime importance in fisheries conservation. Experiments to deflect young spring salmon (*Oncorhynchus tshawytscha*) during their nighttime migration by means of a beam of light and/or a "wall" of bubbles were conducted in a canal near Courtenay, B.C. By use of hoop nets it was discovered that under natural conditions no significant difference existed in the respective catches of the spring salmon under yearlings moving downstream on either side of the canal. A significant difference was obtained, however, when a narrow beam of light was directed into the water at a downstream angle in front of one net. A reduction to about one-third the expected catch resulted with either continuous or flashing light. The "wall" of bubbles, in a similar position, did not reduce the catch. Cutthroat trout fry and hatchery-reared Kamloops trout fingerlings were not deflected under these conditions.

"The Problem of Sea Water Pollution," by John W. Mann, article, The Department of State Bulletin, December 7, 1953, vol. XXIX, no. 754, Publication 5301, pp. 775-80, printed, 20 cents per issue. (For sale by Superintendent of Documents, Washington 25, D. C.) For well over half a century governments have legislated separately against the preventable release into their navigable waters of polluting refuse matter. The discharge of oil and oily water, with consequent fouling of beaches and harbors, fire hazard, and injury to fish and wildlife, has been particularly objectionable. In some countries shipowners and petroleum associations have conducted studies and voluntarily taken preventive measures. The subject has also been considered internationally and is presently being studied under the auspices of the United Nations. This paper discusses oil pollution as an international problem, and describes the presentation of the problem to the League of Nations, and action by the United Nations.

"Responses of Coho and Chum Salmon Fry to Current," by Dixon MacKinnon and William S. Hoar, article, Journal of the Fisheries Research Board of Canada, vol. 10, no. 8, pp. 523-38, illus., printed, C\$3.00 per volume in Canada and the United States, and C\$3.25 in other countries. Fisheries Research Board of Canada, Ottawa, Canada, November 1953. Pacific salmon, dwelling in the turbulent streams on the mountainous west coast of North America, must react to currents which change drastically from day to day and from place to place. A difference has been observed in the character of response which coho fry (*Oncorhynchus kisutch*) and chum fry (*O. keta*) make to currents. This difference seems to explain, in part, why the former species remains in the rivers while the latter moves into the sea. This paper describes the current-preference experiments which were conducted at Nile Creek, B.C., during the spring and summer of 1950, and at Port John, B.C., in 1951 and 1952. Chum and coho salmon fry respond positively to changes in water flow by swimming against the current. The magnitude of the response varies with the intensity of the current. Currents eliciting optimum response differ for the two species. Both species respond to the stronger of two parallel laminar currents but, after a time, coho fail to discriminate between small differences while the chums move continuously into the greater flow. No evidence of adaptation is apparent in a two-hour period with rapid complex turbulences. In turbulent water coho fry make a sharper initial response than chum fry but do

not seem to maintain the peak response over as wide a range of turbulences.

"Sea Life in the Arctic," article, Trade News, November 1953, vol. 6, no. 5, pp. 3-5, illus., processed. Department of Fisheries, Ottawa, Canada. For seven successive years the Fisheries Research Board of Canada has sent a trained team of scientists northward wresting more and more secrets about sea mammals, fish, and other related subjects from comparatively little known waters. Even the waters themselves are being measured for temperatures, salinity, density, and oxygen. The reason for these yearly trips is primarily to expand Canada's knowledge of marine resources, which could serve to raise the living standards of the natives. The *Calanus*, a combination experimental fishing vessel and floating laboratory, has been used to carry out the progressive research program into the physical and biological oceanography of Canada's Eastern Arctic waters, and the results so far are presented in this paper.

The State of Maine's Best Seafood Recipes, 30, p., illus., printed, Maine Department of Sea and Shore Fisheries, Augusta, Maine. The Maine Development Commission and Maine Department of Sea and Shore Fisheries have gathered together in this booklet many fine recipes, developed by Maine housewives, for cooking the fish and shellfish taken from the waters just off the coast of Maine. These recipes have been passed down from mothers to daughters for generations. Recipes for baked, boiled, fried, and broiled fish and shellfish are presented. Recipes for stews, chowders, casserole dishes, canapes, spreads, and salads are also included, as well as a guide for buying fish. The booklet has some fine color illustrations.

"The Use of Catch-Effort and Tagging Data in Estimating a Flatfish Population," by K. S. Ketchen, article, Journal of the Fisheries Research Board of Canada, vol. 10, no. 8, pp. 459-85, illus., printed, C\$3.00 per volume in Canada and the United States, and C\$3.25 in other countries. Fisheries Research Board of Canada, Ottawa, Canada, November 1953. The purpose of this paper is (1) to compare the estimates of a population of flatfish as obtained through the use of information on catch-effort and tag recoveries, (2) to demonstrate how the DeLury method may be extended with the aid of tagging data to account effectively for immigration and emigration, and (3) to use the results of this extension in company with data on catch and rate of exploitation to compute the total stock of fish. By a modification of the DeLury method an estimate is made of the stock of lemon sole (*Parophrys vetulus*) on the fishing grounds in Hecate Strait, British Columbia. The method is based on (1) the trend in catch of tagged fish per unit of effort in relation to accumulated catch of tagged fish, and (2) the trend in catch of untagged fish per unit of effort in relation to accumulated catch of untagged fish. At the start of the experiment 4.72 million pounds are estimated to have been present, while during the experiment 3.74 million pounds entered the area of fishing, 3.26 million pounds emigrated from it, and 2.54 million pounds were caught. A Petersen-type estimate based on the ratio of tagged to untagged fish was 4.70 million pounds present at the start of the experiment—practically identical with the one derived from catch-effort information. Total population for the year 1950 is estimated at 9.8-12.2 million pounds, including catch and possible emigration prior to the experiment, the stock on the fishing grounds at the start of the experiment, and the immigration subsequently. The average annual survival rate of age VII-age IX lemon soles in Hecate Strait

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has decreased from 0.770 to 0.614 during the period of growth of the fishery, 1944-1951. From this difference the average rate of exploitation is estimated as 16 to 20 percent and the average population as 8.9 to 11.5 million pounds. Since this range is nearly the same as the range described above, it is concluded that almost the whole of the Hecate Strait stock was accessible to fishing in 1950, which was a year of unusually high production.

World Population and Production by W. S. Woytinsky and E. S. Woytinsky, 1268 p., printed, illus., US\$12. The Twentieth Century Fund, New York, N. Y., 1953. This massive volume is the sole work of the authors and was prepared without the aid of research workers or collaborators. Included in its almost 1,300 pages are 497 tables, 338 figures, 37 pages of source references, an alphabetical list of authors, and a subject index. Chapter 20, "Fisheries," covers 32 pages, including 12 tables and 6 figures. It represents a review of broad fishery fields, largely from the 53 fishery reference works listed in the source of references. The major topics discussed in the chapter include Life in the Water, Major Fishing Areas, Products of the Sea, Fishery in the Past, Fishery Today, Whaling and Sealing, Conservation of Marine Resources, and Outlook. Under Outlook the authors report that fish do not supply an important part of the diet in many countries, only 3 percent of the food and 2 percent of the protein coming from this food source. But the fisheries do have advantages. They replenish themselves, and, while not inexhaustible, the resources are very large. And probably "fish supply proteins and fats at a much lower cost at the point of production than livestock." The more important obstacles to fuller development of marine resources are listed as "insufficient knowledge of marine

life, insufficient recognition of the food value of fish, conservatism in eating habits, and lack of international cooperation in the management of marine resources."

The Chapter on Fisheries comes under Part III, which is devoted to Agriculture. The other four parts of the book deal with Man and His Environment, World Needs and Resources, Energy and Mining, and Manufactures.

--A. W. Anderson

TRADE LISTS

The Commercial Intelligence Branch, Office of International Trade, U. S. Department of Commerce, has published the following mimeographed trade lists. Copies of these lists may be obtained by firms in the United States from that Office or from Department of Commerce field offices at \$1.00 per list:

Canneries - Norway, 15 p. (August 1950). Includes canneries of fishery products. Lists the names and addresses, size of firm, and type of products packed of all canneries in Norway.

Canneries - Denmark, 9 p. (November 1953). Includes canneries of fishery products. Lists the names and addresses, size of firm, and type of products packed. Only the more important plants have been included in this list. "The main factor in the Danish canning industry is the meat processing industry, but canned fish products have also assumed importance in recent years," the report states.



FOSSILIZED FISH FOUND IN NORWAY

A school of some 40 fossilized fish were recently discovered embedded in rock in the district of Ringerike, Norway, about 30 miles north of Oslo. Of a previously unknown type, the fish are estimated to be 350 million years old.

Completely intact with heads, eyes, tails, and fins clearly outlined, the fossilized specimens were identified as belonging to a group known as cephalaspids, one of the earliest vertebrate types. The find was made by Dr. Robert Denisen of the Chicago Museum of Natural History, and professors Leif Stormer and Anatol Heintz of the Paleontological Museum in Oslo.

The Paleontological Museum in Oslo has a rare collection of primitive fishes, sea scorpions, and crustaceans, discovered in the same district back in 1911 by professor Johan Kiaer of Oslo University. One of the sea scorpions, now on display at the museum, is over 31 inches long.