

RECENT FISHERY PUBLICATIONS

FISH AND WILDLIFE SERVICE PUBLICATIONS

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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.
SEP. - SEPARATES (REPRINTS) FROM COMMERCIAL FISHERIES REVIEW.

- | Number | Title |
|----------|---|
| CFS-2433 | - New England Fisheries, 1959 Annual Summary, 8 pp. |
| CFS-2435 | - Gulf Fisheries, 1959 Annual Summary, 7 pp. |
| CFS-2439 | - Middle Atlantic Fisheries, 1959 Annual Summary, 6 pp. |
| CFS-2444 | - Chesapeake Fisheries, 1959 Annual Summary, 7 pp. |
| CFS-2448 | - Frozen Fish Report, November 1960, 8 pp. |
| CFS-2449 | - Maryland Landings, October 1960, 3 pp. |
| CFS-2451 | - Fish Meal and Oil, October 1960, 2 pp. |
| CFS-2456 | - Alabama Landings, September 1960, 2 pp. |
| CFS-2457 | - Mississippi River Fisheries, 1959 Annual Summary, 8 pp. |
| CFS-2458 | - New York Landings, October 1960, 4 pp. |
| CFS-2459 | - Ohio Landings, October 1960, 2 pp. |
| CFS-2461 | - Virginia Landings, October 1960, 3 pp. |
| CFS-2465 | - Manufactured Fishery Products, 1959 Annual Summary, 7 pp. |
| CFS-2469 | - Maine Landings, October 1960, 3 pp. |

(Baltimore) Monthly Summary--Fishery Products, December 1960, 8 pp. (Market News Service, U. S. Fish and Wildlife Service, 400 E. Lombard St., Baltimore 2, Md.) Receipts of fresh- and salt-water fish and shellfish at Baltimore by species and by states and provinces; total receipts by species and comparisons with previous years; and wholesale prices on the Baltimore market; for the month indicated.

California Fisheries, 1959, by V. J. Samson, 41 pp. (Market News Service, U. S. Fish and Wildlife Service, Rm. 208, Post Office Bldg., San Pedro, Calif.) A review of 1959 trends and conditions in the California fisheries, including a resume of American Tuna Boat Association tuna auction sales. Among the subjects discussed is the tuna fishery--cannery receipts; albacore fishery, bait boat-clipper, and tuna purse-seine fleets; canned pack; imports; prices; canned tuna market conditions and prices; and changes in the fleets. Also discussed are the sardine fishery and case pack; the mackerel fishery, pack, and prices; the anchovy fishery; canned pet food pack; whaling industry; and fishing seasons in major fisheries. Included in the statistical tables are data on tuna and tunalike fish--canners' receipts, domestic landings, cannery receipts of frozen imported tuna, and canned pack, 1957-59; sardine landings, canned pack, and meal and oil produced, 1959 and 1958 seasons; and the canners' receipts and pack of mackerel and jack mackerel, 1957-59. Also included are data on canners' receipts of raw materials and production of anchovies, herring, squid, pet food, and meal and oil; freezings and cold-storage holdings of fish and shellfish; landings in the Eureka and San Pedro-Santa Monica areas; and imports of fishery products into Arizona and California Customs Districts, 1958-59.

California Fishery Market News Monthly Summary, Part II - Fishing Information, December 1960, 11 pp., illus. (U. S. Bureau of Commercial Fisheries, Biological Laboratory, P. O. Box 6121, Pt. Loma Station, San Diego 6, Calif.) Discusses the successful use of sonar on yellowfin tuna in the South Atlantic Ocean. Also contains sea-surface temperature charts, Eastern Pacific Ocean; and other pertinent data; for the month indicated.

(Chicago) Monthly Summary of Chicago's Fresh and Frozen Fishery Products Receipts and Wholesale Market Prices, December 1960, 19 pp. (Market News Service, U. S. Fish and Wildlife Service, 565 W.

- Sep. No. 612 - Gulf of Mexico Trawl Fishery for Industrial Species.
- Sep. No. 613 - Composition of Commercially-Important Fish from New England Waters - Part I - Proximate Analyses of Cod, Haddock, Atlantic Ocean Perch, Butterfish, and Mackerel.

Your Fishery Resources and the Fish and Wildlife Service, 8 pp., illus., processed. A folder outlining the work of the Bureau of Commercial Fisheries in assisting the fishing industry to "farm the sea," market its catch, find new uses for fishery products, and conserve the resources of inland lakes and rivers. Also mentions other duties of the Bureau such as research in nutrition, management of the Pribilof Island seal herd, and technical assistance during the negotiation of international treaties concerning fisheries.

THE FOLLOWING MARKET NEWS LEAFLETS ARE AVAILABLE FROM THE BRANCH OF MARKET NEWS, BUREAU OF COMMERCIAL FISHERIES, U. S. FISH AND WILDLIFE SERVICE, WASHINGTON 25, D. C.

- | Number | Title |
|--------|---|
| MNL-39 | - Turkey's 1959 Salt Water Fish Landings. |
| MNL-41 | - Chile's Fish Meal and Oil Plants. |

Washington St., Chicago 6, Ill.) Receipts at Chicago by species and by states and provinces for fresh- and salt-water fish and shellfish; and wholesale prices for fresh and frozen fishery products; for the month indicated.

Gulf Monthly Landings, Production, and Shipments of Fishery Products, October 1960, 8 pp. (Market News Service, U. S. Fish and Wildlife Service, 609-611 Federal Bldg., New Orleans 12, La.) Gulf States shrimp, oyster, finfish, and blue crab landings; crab meat production; LCL express shipments from New Orleans; wholesale prices of fish and shellfish on the New Orleans French Market; and sponge sales; for the month indicated.

Halibut and Troll Salmon Landings and Ex-vessel Prices for Seattle, Alaska Ports and British Columbia, 1960-1959, 34 pp. (Market News Service, U. S. Fish and Wildlife Service, Pier 42 So., Seattle 4, Wash.) Lists the landings and ex-vessel prices of halibut and troll salmon at leading United States Pacific Coast ports, and halibut landings and ex-vessel prices at leading British Columbia ports, for 1959 and 1960.

Monthly Summary of Fishery Products Production in Selected Areas of Virginia, North Carolina, and Maryland, December 1960, 4 pp. (Market News Service, U. S. Fish and Wildlife Service, 18 So. King St., Hampton, Va.) Fishery landings and production for the Virginia areas of Hampton Roads, Lower Northern Neck, and Eastern Shore; the Maryland areas of Crisfield, Cambridge, and Ocean City; and the North Carolina areas of Atlantic, Beaufort, and Morehead City; together with cumulative and comparative data; for the month indicated.

New England Fisheries--Monthly Summary, December 1960, 22 pp. (Market News Service, U. S. Fish and Wildlife Service, 10 Commonwealth Pier, Boston 10, Mass.) Reviews the principal New England fishery ports, and presents food fish landings by ports and species; industrial fish landings and ex-vessel prices; imports; cold-storage stocks of fishery products in New England warehouses; fishery landings and ex-vessel prices for ports in Massachusetts (Boston, Gloucester, New Bedford, Provincetown, and Woods Hole); Maine (Portland and Rockland), Rhode Island (Point Judith), and Connecticut (Stonington); frozen fishery products prices to primary wholesalers at Boston, Gloucester, and New Bedford; and landings and ex-vessel prices for fares landed at the Boston Fish Pier and sold through the New England Fish Exchange; for the month indicated.

New England Importers and Brokers of Imported Fishery Products, 1961, 8 pp. (Market News Service, U. S. Fish and Wildlife Service, 10 Commonwealth Pier, Boston 10, Mass.) A revised list of the importers and brokers of foreign fishery products in the Boston and New England area. The list includes the name, address, types of products, and shipping countries.

(Seattle) Washington, Oregon, and Alaska Receipts and Landings of Fishery Products for Selected Areas and Fisheries, Monthly Summary, December 1960, 10 pp. (Market News Service, U. S. Fish and Wildlife Service, Pier 42 South, Seattle 4, Wash.) Includes landings and local receipts, with ex-vessel and wholesale prices in some instances, as reported by Seattle and Astoria (Oreg.) wholesale

dealers; also Northwest Pacific halibut landings; and Washington shrimp landings; for the month indicated.

Marketing Feasibility Study of Radiation Processed Fishery Products, WASH-1030, 35 pp., illus., processed. (Bureau of Commercial Fisheries, U. S. Fish and Wildlife Service, Washington 25, D. C.) This report has been prepared as a result of a study conducted by the Bureau of Commercial Fisheries for the Atomic Energy Commission. The purpose of the study was to determine, from various segments of the fishing and allied industries, the acceptability and the marketing feasibility of radiation-processed fishery products. Findings showed that expansion of markets for fishery products ranked first among the advantages resulting from irradiation; improved quality control ranked second. Results of the study also indicated that many individuals expect the radiation process to revolutionize completely the fresh fish industry, leading to the development of new markets and the expansion of old ones.

THE FOLLOWING ENGLISH TRANSLATIONS OF FOREIGN LANGUAGE ARTICLES ARE NOT FOR GENERAL DISTRIBUTION BUT ARE AVAILABLE FOR REFERENCE ONLY FROM THE OFFICE INDICATED:

FROM THE U. S. FISH AND WILDLIFE SERVICE,
BUREAU OF COMMERCIAL FISHERIES,
P. O. BOX 3830, HONOLULU, HAWAII, THE FOLLOWING:

An Investigation of the Waters Adjacent to Ponape, 10 pp., Translation No. 12, illus., processed, August 9, 1949. (Translated from Fisheries Experiment Station Progress Report No. 1, 1923-35, December 1937.)

On the Gonads of Skipjack from Palao Waters, by Kizo Matsui, Translation No. 19, 7 pp., illus., processed, August 30, 1949. (Translated from South Sea Science, vol. 5, no. 1, September 1942, pp. 117-122.)

The Larval and Juvenile Stages of the Plecostei, by Kamakichi Kishinouye, Translation No. 20, 4 pp., processed, September 1, 1949. (Translated from Suisan Gakkai Ho, vol. 3, no. 2, December 1919.)

List of Translations Reproduced for Distribution to Sept. 1, 1949, by W. G. VanCampen and B. M. Shimada, Translation No. 22, 4 pp., processed, September 1, 1949.

Observations on the Skipjack Fishing Grounds, by Kamakichi Kishinouye, Translation No. 21, 4 pp., processed, September 1, 1949. (Translated from Suisan Gakkai Ho, vol. 4, no. 2, December 1924, pp. 87-92.)

On the Search for Southern Tuna Fishing Grounds, by Yoshinori Ban, Translation No. 13, 12 pp., illus., processed, August 1949. (Translated from South Sea Fisheries, vol. 7, no. 9, September 25, 1941, pp. 10-21.)

A Survey of Tuna Grounds in Equatorial Waters, by Tokuzo Uehara, Translation No. 14, 5 pp., illus., processed, August 12, 1949. (Translated from South Sea Fishery News, vol. 5, no. 3, June 25, 1941, pp. 13-17.)

A Survey of Tuna Fishing Grounds in the Marshall and Caroline Islands, by Kenzo Ikebe, Translation No. 15, 5 pp., illus., processed, August 1949. (Translated from South Sea Fishery News, vol. 5, no. 1, 1941, pp. 6-9.)

A Symposium on the Investigation of Tuna and Skipjack Spawning Grounds, Translation No. 16, 12 pp., processed, August 23, 1949. (Translated from South Sea Science, vol. 4, no. 1, July 1941, pp. 64-75.)

A Tuna Survey in Palau Waters (Late 1940), Translation No. 24, 5 pp., processed, September 8, 1949. (Translated from South Sea Fishery News, vol. 5, no. 4, September 2, 1941, pp. 2-4.)

FROM THE ICHTHOLOGICAL LABORATORY,
BUREAU OF COMMERCIAL FISHERIES,
RM. 71, U. S. NATIONAL MUSEUM,
WASHINGTON 25, D. C., THE FOLLOWING:

Materials on the Structure of the Fish Brain. 1--Structure of the Brain of Codfishes, by A. N. Svetovidov, 33 pp., processed. (Translated from Trudy Zoologicheskogo Instituta Akademii Nauk SSSR, vol. 13, 1953, pp. 390-419.)

The Morphology and Classification of the Northern Blennoid Fishes (Stichaeoidea, Blennioidei, Pisces), by V. M. Makushok, 25 pp., illus., processed. (Translated from Trudy Zoologicheskogo Instituta Akademii Nauk SSSR, vol. 25, 1958, pp. 3-129.)

Note on Phycis borealis Saemundsson (Pisces, Gadidae), 3 pp., processed. (Translated from Trudy Zoologicheskogo Instituta Akademii Nauk SSSR, vol. 17, 1955, pp. 346-348.)

FROM THE U. S. FISH AND WILDLIFE SERVICE, BUREAU OF COMMERCIAL FISHERIES, BIOLOGICAL LAB., SEATTLE, WASH., THE FOLLOWING:

Chemical Studies on the Body Tissues of the Salmon, ONCORHYNCHUS KETA, after Spawning, by T. Uno, T. Tokunaga, and M. Nakamura, Translation Series No. 29, 11 pp., processed, April 8, 1960. (Translated from Bulletin of the Hokkaido Regional Fisheries Research Laboratory, no. 14, September 1956, pp. 89-95.)

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

Apparent Abundance of the Pilchard (SARDINOPS CAERULEA) Off Oregon and Washington, 1935-43, as Measured by the Catch per Boat, by John C. Marr, Fishery Bulletin 52 (From Fishery Bulletin of the Fish and Wildlife Service, vol. 51), 17 pp., illus., printed, 15 cents, 1950.

MISCELLANEOUS PUBLICATIONS

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

AGAR:

Agar from DIGENEA SIMPLEX, by Harold J. Humm, 6 pp., illus., printed. (Reprinted from Florida State University Studies, Contributions to Science.) Florida State University, Tallahassee, Fla.

ALGAE:

Estudios sobre Algas Industriales Espanolas. 1--Influencia del Tratamiento Previo sobre el Rendimiento

y Calidad del Agar Obtenido del Gelidium (Studies on Spanish Industrial Algae. 1--Influence of Processing Conditions on the Yield and Quality of the Agar Obtained from Gelidium), by Jesus Aravio-Torre y Javier Villegas, 13 pp., illus., printed in Spanish. (Reprinted from Boletin del Instituto Espanol de Oceanografia, no. 97, May 1959.) Instituto Espanol de Oceanografia, Ministerio de Marina, Madrid, Spain, 1959.

ANTIBIOTICS:

"Studies on the Influence of Treatment Immediately after Catching upon the Quality of Fish Flesh. IV--Use of Chlortetracycline Ice for the Preservation of Saury, Cololabis saira Brevoort," by Y. Tsuchiya, T. Nonura, and M. Murase, article, Bulletin of the Japanese Society of Scientific Fisheries, vol. 25, November 1959, pp. 569-572, illus., printed in Japanese with English abstract. Japanese Society of Scientific Fisheries, c/o Tokyo University of Fisheries, Shiba-kaigandori 6-chome, Tokyo, Japan.

"Thermal and Nonthermal Degradation of Acronize Chlortetracycline in Fish and Some Shellfish," by E. F. Kline and others, Food Technology, vol. 14, June 1960, pp. 305-508, printed. Food Technology, The Garrard Press, 510 No. Hickory St., Champaign, Ill.

BIOCHEMISTRY:

"Adsorption of the Ferric Ion by Weakly Acidic Resins. Preferential Uptake of the Ferric Ion by Alginic Acid," by M. Seno and T. Yamabe, article, Bulletin of the Chemical Society of Japan, vol. 33, May 1960, pp. 590-596, printed. Chemical Society of Japan, No. 5, 1-chome, Surugadai, Kanda Chiyoda-ku, Tokyo, Japan.

"Studies on the Browning of Fish Flesh. I--Browning of White Flesh by Heat," by Toyoki Ono and Fumio Nagayama, article, Bulletin of the Japanese Society of Scientific Fisheries, vol. 24, no. 10, 1959, pp. 833-836, printed in Japanese with English abstract. Japanese Society of Scientific Fisheries, c/o Tokyo University of Fisheries, Shiba-kaigandori 6-chome, Tokyo, Japan.

CALIFORNIA:

Inshore Fishes of California, by John L. Baxter, 80 pp., illus., printed, 35 cents. California Department of Fish and Game, Sacramento, Calif., 1960. Presents information on California's inshore fish and discusses environmental factors, adaptations of inshore fish, management, classification, tide pool fish, coastal access, and pier fishing. Also contains detailed descriptions of California's principal inshore species of fish. Slanted primarily toward the sports fisherman, but also of considerable interest to people in the fishing industry and related fields.

CANADA:

Journal of the Fisheries Research Board of Canada, vol. 17, no. 6, December 1960. Queen's Printer and Controller of Stationery, Ottawa, Canada. Includes, among others, these articles: "Age, Growth and Sexual Maturity of Cod (Gadus morhua L.) in the Newfoundland Area, 1947-1950," by A. M. Fleming; "Keeping Quality of Pacific Coast Dogfish. II," by B. A. Southcott and others; "Economic Study of the Herring Fishery of Charlotte County, New Brunswick, 1956-1957," by W. F. Doucet; "The Effect of Marine Products on the Blood Cholesterol Levels in Man and in Animals. A Review," by J.D. Wood; "Seasonal

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Variation in the Collagen Content of Pacific Herring Tissues," by J. R. McBride, R. A. MacLeod, and D. R. Idler; and "Further Study of Larval Herring (*Clupea harengus* L.) in the Bay of Fundy and Gulf of Maine," by S. N. Tibbo and J. E. HenriLegare.

CANNING:

"Preparation of Fish for Canning," by W. A. Empey, article, Food Preservation Quarterly, vol. 20, March 1960, pp. 8-12, printed. Food Preservation Quarterly, Commonwealth Scientific & Industrial Research Organization, Division of Food Preservation and Transport, Sydney, Australia.

CARIBBEAN:

"Los Problemas de la Pesca en el Caribe" (Caribbean Fishery Problems), by Federico Gomez de la Maza, article, Puntal (Revista Maritima y Pesquera), vol. 7, no. 80, November 1960, pp. 20-21, illus., printed in Spanish. Puntal, Apartado de Correos 316, Alicante, Spain.

CLAM SHELLS:

"Clam Shells Kill Waste Acid," by C. S. Cronan, article, Chemical Engineering, vol. 67, June 13, 1960, p. 78, printed. Chemical Engineering, McGraw-Hill Publishing Co., 330 W. 42nd St., New York 36, N. Y.

COD:

"The Acid-Soluble Collagen of Cod Skin," by E. Gordon Young and J. W. Lorimer, article, Archives of Biochemistry and Biophysics, vol. 88, June 1960, pp. 373-381, printed. Archives of Biochemistry and Biophysics, c/o Academic Press, 111 Fifth Ave., New York 3, N. Y.

"Kinetics of Phosphate-Buffered, Ribose-Amino Reactions at 40° and 70% Relative Humidity: Systems Related to the 'Browning' of Dehydrated and Salt Cod," by N. R. Jones, article, Journal of the Science of Food and Agriculture, vol. 10, November 1959, pp. 615-624, printed. Journal of the Science of Food and Agriculture, The Society of Chemical Industry, 14 Belgrave Square, London SW1, England.

"Studies on the Proteins of Fish Skeletal Muscle. 7--Denaturation and Aggregation of Cod Myosin," by J. J. Connell, article, The Biochemical Journal, vol. 75, June 1960, pp. 530-538, printed. The Biochemical Journal, Cambridge University Press, Bentley House, 200 Euston Rd., London NW1, England.

CRUSTACEA:

The Physiology of Crustacea. Vol. 1: Metabolism and Growth, edited by Talbot H. Waterman, 687 pp., printed, \$22. Academic Press, Inc., 125 E. 23rd St., New York 10, N. Y., 1960.

CUBA:

"Fauna Acompañante en la Pesquería de Camarones" (Incidental Fauna of the Shrimp Fishery), by Captain Fritz, article, Mar y Pesca, vol. 4, nos. 1 and 2, November-December 1960, pp. 32-33, illus., printed in Spanish. Departamento de Pesca, Edificio I.N.R.A., Onceno Piso, Plaza Civica, Havana, Cuba.

Statistics of Fishery Products, Year 1959 (Estadísticas de Productos Pesqueros, Año 1959), 38 pp., processed in Spanish. Departamento de Pesca, I.N.R.A.,

Havana, Cuba, 1960. Contains details of the quantity and value of Cuba's production, export, and import of fishery products in 1959.

DOLPHIN:

Auditory Scanning in the Dolphin, by W. N. Kellogg, Contribution No. 110, 3 pp., illus., printed. (Reprinted from The Psychological Record, vol. 10, no. 1, January 1960, pp. 25-27.) Oceanographic Institute, Florida State University, Tallahassee, Fla., 1960.

ENZYMES:

"Digestive Enzymes of Fish and Seasonal Changes in Their Activity," by A. V. Ananichev, article, Biochemistry (U.S.S.R.), vol. 24, November-December 1959, pp. 952-958, printed in Russian. Biochemistry (U.S.S.R.), Consultants Bureau, Inc., 227 W. 17 St., New York 11, N. Y.

FACTORY TRAWLER:

"Trawling Operations on Fairtry II," by Geoffrey Trout, article, World Fishing, vol. 9, no. 12, December 1960, pp. 35-38, illus., printed. World Fishing, John Trundell (Publishers) Ltd., St. Richard's House, Eversholt St., London NW1, England. Consists mainly of photos showing operations on board the factory trawler Fairtry II during a trip to the Northwest Atlantic. A number of "shots" depict the functioning of the deck gear. The text describes the processing of the fish from landing to unloading of the blocks of frozen fillets at dockside.

FACTORYSHIP:

"La Era de los Navios-Factoria" (The Era of the Factoryships), by F. Boixiere, article, Puntal (Revista Maritima y Pesquera), vol. 7, no. 80, November 1960, pp. 2-4, illus., printed in Spanish. Puntal, Apartado de Correos 316, Alicante, Spain.

FILLET SLICING MACHINE:

A Machine to Slice Cod Fillets, by H. E. Power and H. Fougere, New Series Circular No. 6, 7 pp., illus., processed. Fisheries Research Board of Canada, Technological Station, Halifax, N. S., Canada, October 1960. Experiments have shown that a substantial increase in the efficiency of candling cod fillets for parasites can be expected if the fillets are sliced longitudinally into slices 1/2-inch thick before candling. A cod-filleting machine has been designed and developed at the Halifax, Nova Scotia, Technological Station. The machine and its operation are described in this booklet.

FISH COOKERY:

Maine Sardine Recipes, 12 pp., illus., printed. Maine Sardine Council, 15 Grove St., Augusta, Me., 1961. A miniature booklet of 20 recipes using sardines in sandwiches, salads, pizza, and other dishes. Includes a chart which compares the nutritive and health values of Maine sardines with other snack and convenience foods. Attractively illustrated in full color.

FISH MEAL:

"Nutrition Symposium of National Fisheries Institute: Fish Meal Quality," by Steele Culbertson, article, Feedstuffs, vol. 32, May 14, 1960, pp. 56, 65-66, printed. Feedstuffs, Miller Publishing Co., 118 So. 6th St., Minneapolis 2, Minn.

THESE PUBLICATIONS ARE NOT AVAILABLE FROM THE FISH AND WILDLIFE SERVICE, BUT USUALLY MAY BE OBTAINED FROM THE ORGANIZATION ISSUING THEM.

"Preparation of 'Galongong' (*Decapterus macrosoma*) Fish Meal and Its Nutritive Value," by O. N. Gonzalez, S. V. Bersamin, and J. I. Sulit, article, Indo-Pacific Fisheries Council, Proceedings of 6th Session, pp. 283-286, printed. Indo-Pacific Fisheries Council Secretariat, Food and Agriculture Organization of the United Nations, Regional Office for Asia and the Far East, Bangkok, Thailand, 1956.

FOOD AND AGRICULTURE ORGANIZATION:

Current Bibliography for Aquatic Sciences and Fisheries, Annual Indexes, 1959, 181 pp., processed. Food and Agriculture Organization of the United Nations, Viale delle Terme di Caracalla, Rome, Italy.

List of Films and Filmstrips on Fisheries and Related Subjects, by E. Heen, 163 pp., processed. Food and Agriculture Organization of the United Nations, Viale delle Terme di Caracalla, Rome, Italy, 1960. Contains descriptions of films on fishing gear and methods, vessels, fish processing, and fisheries science in general. This revised and augmented edition was compiled from film catalogues, and fisheries trade, government, and other publications. Most of the films listed are obtainable from member governments. The FAO itself, however, owns a limited number which are primarily for use in fisheries schools and training centers and at international meetings.

Yearbook of Fishery Statistics, 1959 (Production), vol. XI, 386 pp., illus., processed in English, French, and Spanish, \$4. Food and Agriculture Organization of the United Nations, Rome, Italy, 1960. (For sale by the Columbia University Press, International Documents Service, 2960 Broadway, New York 27, N. Y.) This edition contains all sections that appeared in the 1958 edition except for that pertaining to fishing craft. This is the first Production Yearbook in which it has been possible to make modifications in accordance with the recommendations of the Expert Meeting on Fishery Statistics in the North Atlantic Area, held in Edinburgh in September 1959. Improvements and refinements were made in the maps and graphs section, with the aim of standardizing as far as possible their presentation. The total world catch of fishery products for 1959 is estimated at 35 million metric tons as compared to 33.7 million tons for 1958.

FRANCE:

"La Flotte de Peche Francaise" (The French Fishing Fleet), article, France Peche, vol. 5, no. 45, November 1960, pp. 33, 35-36, illus., printed in French. France Peche, Tour Sud-Est, Rue de Guemene, Lorient, France.

"Le Marche Francais du Poisson" (The French Market for Fish) article, France Peche, vol. 5, no. 45, November 1960, pp. 111-114, illus., printed in French. France Peche, Tour Sud-Est, Rue de Guemene, Lorient, France.

"Un Nouveau Systeme de Peche par l'Arriere Mis au Point a Cherbourg" (A New Method of Stern Fishing Being Tried at Cherbourg), article La Peche Maritime, vol. 39, no. 992, November 1960, pp. 703-705-707, illus., printed in French. La Peche Maritime, 190, Boulevard Haussmann, Paris, France.

GEAR:

"Experimental Use of Multiple Mechanization Aboard SRT-1044," by V. P. Trofimov, article, Rybnoe Khoziaistvo, vol. 35, no. 9, 1959, pp. 39-46, illus., printed in Russian. Rybnoe Khoziaistvo, VNIRO Glavniproekta, pri Gosplanie S.S.S.R., Moscow, U.S.S.R.

"New Equipment for Mechanization of Drift-Net Fishing Aboard Medium Trawlers," by A. A. Karasik, article, Rybnoe Khoziaistvo, vol. 34, no. 7, 1958, pp. 28-31, illus., printed in Russian. Rybnoe Khoziaistvo, VNIRO, Glavniproekta, pri Gosplanie S.S.S.R., Moscow, U.S.S.R.

"Net-Shaking Machine, VSM-2," by A. A. Shabanov and V. P. Ivashev, article, Rybnoe Khoziaistvo, vol. 34, no. 7, 1958, pp. 32-34 illus., printed in Russian. Rybnoe Khoziaistvo, VNIRO Glavniproekta, pri Gosplanie S.S.S.R., Moscow, U.S.S.R.

GENERAL:

"On the Problem of New Fishing Prospects on the Continental Shelf and in the High Seas," by U. Schmidt, H. J. Aurich, and E. H. Rogalla, article, Information fur die Fischwirtschaft, vol. 6, 2/Annex I, 1959, pp. 33-53, illus., printed in German. Bundesforschungsanstalt fur Fischerei, Neuer Wall 72, Hamburg 36, Germany.

GREENLAND:

"East Greenland Fishing Possibilities," article, World Fishing, vol. 9, no. 12, December 1960, p. 55, illus., printed, World Fishing, John Trundell (Publishers) Ltd., St. Richards House, Eversholt St., London NW1, England. With the scarcity of cod on other, more familiar grounds, interest in fishing grounds off East Greenland has grown recently. This article is an account of a cruise made to the area early in 1960 by the British research vessel Ernest Holt. The report of the voyage indicates that fishing in waters of over 130 fathoms during late autumn and spring would probably be worthwhile.

HERRING:

"Amino-Acid Composition of Herring (*Clupea harengus*) and Herring Meal. Destruction of Amino-Acids during Processing," by Gjermund Boge, article, Journal of the Science of Food and Agriculture, vol. 11, July 1960, pp. 362-365, printed. Journal of the Science of Food and Agriculture, The Society of Chemical Industry, 14 Belgrave Square, London SW1, England.

"On Atlantic-Scandinavian Herring Resources and Their Utilization," by Iu. Marti and S. S. Fedorov, article, Rybnoe Khoziaistvo, vol. 35, no. 5, 1959, pp. 17-26, illus., printed in Russian. Rybnoe Khoziaistvo, VNIRO Glavniproekta, pri Gosplanie S.S.S.R., Moscow, U.S.S.R.

On the Causes of the Great Fluctuations in the Herring Fishery on the West Coast of Sweden, by K. A. Andersson, Series Biology, Report No. 12, 52 pp., illus., printed. Fishery Board of Sweden, Institute of Marine Research, Lysekil, Sweden, 1960.

INDUSTRIAL MANAGEMENT:

A Handbook of Small Business Finance, by Ralph B. Tower, Small Business Management Series No. 15,

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85 pp., illus., printed, 30 cents. Small Business Administration, Washington, D. C., 1960. (For sale by the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C.) The fourth edition of a handbook on finance for small businesses. The purpose of this booklet is to furnish new owners and inexperienced managers with basic information to help them understand better the financial operations of their businesses. As such, it should aid them in making better use of the financial assistance available to them, particularly from local banks, and guide them in measuring the progress of their operations. Some of the subjects covered are term loans, accounts receivable, and inventory financing; current sources of financial assistance for small manufacturers; and the Small Business Administration's lending and investment programs.

INTERNATIONAL COMMISSIONS:

(International North Pacific Fisheries Commission) Annual Report for the Year 1959, 120 pp., illus., printed. International North Pacific Fisheries Commission, 6640 N. W. Marine Drive, Vancouver 8, B. C., Canada. This is the sixth consecutive annual report of the International North Pacific Fisheries Commission, established by a Convention between Canada, Japan, and the United States on June 12, 1953. It consists of three parts: report of accomplishments of the Commission's annual meeting held in Seattle from November 2 through 7, 1959; summary of administrative activities during the year; and progress reports on research conducted by the member governments under the Commission's program. In 1959 the Commission for the second year studied the salmon, halibut, and herring stocks in the eastern North Pacific to determine whether these stocks continued to meet the abstention qualifications of the Convention, or if changes should be made. No recommendations for changes in abstention for salmon or halibut stocks were made. Herring stocks, however, were recommended for removal from abstention. The Commission took a number of steps toward expediting the collation and publication of the results of its research program. Studies of the king crab population of the eastern Bering Sea were continued by Japanese and United States scientists, acting in accordance with a request made in 1954 by the latter country.

(North Pacific Fur Seal Commission) Proceedings of the Third Annual Meeting, January 25-27, 1960, Moscow, U.S.S.R., 40 pp., processed. Secretary, North Pacific Fur Seal Commission, Department of the Interior, Washington 25, D. C., March 1960. The North Pacific Fur Seal Commission was established in January 1958, during a meeting held in Washington, D. C. The Commission was organized in accordance with the Interim Convention on Conservation of North Pacific Fur Seals, signed in Washington on February 9, 1957, by the Governments of Canada, Japan, the U.S.S.R., and the United States. The Convention came into force on October 14, 1957. This report contains sections on the proceedings of the Third Annual Meeting, summaries of fur-seal investigations during 1959, plans for 1960, and administrative report of the Secretary to the Third Meeting. The second and third sections discuss the fur-seal investigations and management programs of the member countries.

JAPAN:

Progress Report of the Cooperative Coastal Important Resources Investigations, 1955, 193 pp., illus., printed in Japanese and English. Fisheries Agency, Hokkaido Regional Fisheries Research Laboratory, Yoichi, Japan, August 1959.

KENYA:

Report on Kenya Fisheries, 1959, 26 pp., illus., printed, 2 s. 5 d. (about 34 U. S. cents). Ministry of Forest Development, Game and Fisheries, Fisheries Division, Nairobi, Kenya, 1960. Reviews the work done during 1959 on inland fisheries development, a fish culture farm, a trout hatchery, and the trout rivers. The sea fisheries section includes information on landings, marketing, and foreign trade in fresh, chilled, and frozen fish; the production of dried fish and shark; and the marine shell, oyster, shrimp, spiny lobster, and crab fisheries. Fishing investigations and gear development are discussed and several tables on catch statistics and imports are included. A diagram of a native fish trap is shown.

LAW OF THE SEA CONFERENCE:

De Tweede Conferentie van de Verenigde Naties over het Zeerecht, Geneve, 17 Maart-27 April 1960, Proceedings of the Second Conference on the Law of the Sea (March 17-April 27, 1960), 65 pp., printed in Dutch and English, fl. 1.40 (about 37 U. S. cents). Ministerie van Buitenlandse Zaken, The Hague, Netherlands, 1960. Includes discussions of the Law of the Sea Conference of 1958, the opening of the Second Conference and its organization, the Committee of the Whole, and the plenary sessions. The appendix contains the text of the resolution convening the Conference; a note by the Secretary-General outlining the synoptical table of breadth and juridical status of territorial sea and adjacent zones; the proposals of the U.S.S.R., Mexico, the United States, and Canada; and the United States-Canadian proposal. Also contains the statement of the Chairman of the Netherlands Delegation, a table showing how each country voted on the major proposals, and the final act of the Conference.

LINGCOD:

"Lingcod Muscle Phosphomonoesterases. I--Acid Phosphatases that Hydrolyze P-Nitrophenyl Phosphate," by Neil Tomlinson and R. A. J. Warren, article, Canadian Journal of Biochemistry and Physiology, vol. 38, June 1960, pp. 605-612, printed. Canadian Journal of Biochemistry and Physiology, Division of Administration and Awards, National Research Council, Ottawa 2, Canada.

MARINE ALGAE:

"Marine Red Algae. Chemical Properties and Practical Importance. I--Communication: Chemical Composition," by O. J. vonSchmid, article, Botanica Marina, vol. 1, nos. 1/2, 1959, pp. 54-64, illus., printed in German. Botanica Marina, Gram, de Gruyter und Co., Hamburg 1, Germany.

Notes on the Marine Algae of Florida. I--The Intertidal Rocks of Marineland, by Harold J. Humm, 7 pp., illus., printed. (Reprinted from Florida State University Studies, no. 7, October 15, 1952.) Oceanographic Institute, Florida State University, Tallahassee, Fla.

THESE PUBLICATIONS ARE NOT AVAILABLE FROM THE FISH AND WILDLIFE SERVICE, BUT USUALLY MAY BE OBTAINED FROM THE ORGANIZATION ISSUING THEM.

MARINE FISHERIES:

L'Essor de la Pêche Maritime dans les Mers Tropicales (The Scope of the Marine Fishery in Tropical Seas), by Francois Doumenge, 67 pp., illus., printed in French. (Reprinted from Les Cahiers d'Outre-Mer, vol. 13, 1960, pp. 133-199.) Les Cahiers d'Outre-Mer, Palais de la Bourse, Place Gabriel, Bordeaux, France.

MISCELLANEOUS:

"Fish Gathering Effects and Submarine Illumination of the Incandescent and Fluorescent Mercury-Vapour Lamps," by Takaya Kusaka, article, Bulletin of the Japanese Society of Scientific Fisheries, vol. 25, no. 1, 1959, pp. 17-21, illus., printed in Japanese with English abstract. Japanese Society of Scientific Fisheries, c/o Tokyo University of Fisheries, Shiba-kai-gandori 6-chome, Tokyo, Japan.

MULLET:

The Demand for Florida Mullet, by William S. Engelson and Marshall R. Colberg, Contribution No. 69, 12 pp., illus., printed. (Reprinted from Florida State University Studies, no. 22, 1956, pp. 77-88.) Oceanographic Institute, Florida State University, Tallahassee, Fla. Discusses the economists' concept of "demand," consumption of mullet in Florida and elsewhere, methods of collecting data for the economic study of mullet, and analysis of the findings of this study. Data available for 1951 indicated that, "the ease with which new producers can enter the field probably means, however, that the primary effect of an increasing demand will be to increase the number of mullet fishermen rather than their per-capita earnings."

NETS:

"Experimental Fishing Test on the Efficiency of Double Gill Net," by Masatsune Nomura, article, Bulletin of the Japanese Society of Scientific Fisheries, vol. 26, February 1960, p. 103, printed. Japanese Society of Scientific Fisheries, c/o Tokyo University of Fisheries, Shiba-kaigandori 6-chome, Tokyo, Japan.

NORTH VIETNAM:

Local Industry and Fishing in North Vietnam, by Nguyen Van Dau and Tran Dinh Pho, JPRS 5541, 7 pp., processed. (Translated from Nhan Dan, no. 2264, May 31, 1960, p. 3.) U. S. Joint Publications Research Service, 205 E. 42nd St., Suite 300, New York 17, N. Y., September 19, 1960. Photocopies of this report are for sale by Photoduplication Service, Library of Congress, Washington 25, D. C.)

NORWAY:

"Stortralernes Lonnsomhet 1959" (The Value of Large Trawlers, 1959), by A. Holm, article, Fiskets Gang, vol. 46, no. 48, December 1, 1960, pp. 673-680, illus., printed in Norwegian. Fiskets Gang, Postgiro nr. 691 81, Bergen, Norway.

NUTRITION:

Nutritive Value of Foods, Home and Garden Bulletin No. 72, 30 pp., illus., printed, 20 cents. U. S. Department of Agriculture, Washington, D. C., September 1960. (For sale by the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C.) A table of nutritive values of 10 classes of

food makes up the greater part of this bulletin. Data are included on the water, caloric, protein, fat, fatty acid, carbohydrate, mineral, and vitamin content of several types and species of fish and shellfish.

OCEANOGRAPHY:

Annual Report of the Oceanographic Institute of the Florida State University, Fiscal Year 1959-1960, 27 pp., processed. The Oceanographic Institute, Florida State University, Tallahassee, Fla., November 1, 1960. Describes the functions and activities of the Oceanographic Institute during the fiscal year July 1, 1959, through June 30, 1960. Emphasis is placed on research projects completed or currently under way.

Oceanographic Survey of the Continental Shelf Area of Southern California, Publication No. 20, 568 pp., illus., processed. State Water Pollution Control Board, Rm. 316, 1227 O St., Sacramento 14, Calif., 1959.

"Oceanography and Fisheries," by J. L. Kask, article, Canadian Fisheries Annual, 1960, pp. 49-54, printed. Canadian Fisheries Annual, National Business Publications, Ltd., Gardenvale, Quebec, Canada.

OYSTERS:

The Glorious Oyster, edited by Hector Bolitho, 191 pp., illus., printed, 25 s. (about US\$3.50). Sidgwick and Jackson, Ltd., 1 Tavistock Chambers, Bloomsbury Way, London WC1, England, 1960.

Oysters, by C. M. Yonge, 226 pp., illus., printed, 21 s. (about US\$2.95). William Collins, Sons and Co., Ltd., 14 St. James' Place, London SW, England, 1960.

Some Additional Differences Between CRASSOSTREA VIRGINICA and OSTREA EQUESTRIS in the Gulf of Mexico Area, by R. Winston Menzel, 6 pp., processed. (Reprinted from Proceedings of the National Shellfisheries Association, vol. 46, pp. 76-81.) Oceanographic Institute, Florida State University, Tallahassee, Fla.

POLLUTION:

First Report of Pollution-Caused Fish Kills Through September 30, 1960, 6 pp., processed. Division of Water Supply and Pollution Control, Public Health Service, U. S. Department of Health, Education, and Welfare, Washington 25, D. C., 1960. This is the first quarterly report of fish killed by pollution in the United States. It marks the beginning of a long-term cooperative effort by the 50 states, the U. S. Public Health Service, and the U. S. Fish and Wildlife Service. This project will be an effective means of obtaining additional basic information needed to determine effects of pollution on the Nation's water resources. This report is cumulative, including reports of "fish kills" caused by pollution during 1960 until September 30. Future reports also will be cumulative.

PORPOISE:

Size Discrimination by Reflected Sound in a Bottle-Nose Porpoise, by W. N. Kellogg, Contribution No. 117, 6 pp., illus., printed. (Reprinted from the Journal of Comparative and Physiological Psychology, vol. 52, no. 5, October 1959, pp. 509-514.) Oceanographic Institute, Florida State University, Tallahassee, Fla.

THESE PUBLICATIONS ARE NOT AVAILABLE FROM THE FISH AND WILDLIFE SERVICE, BUT USUALLY MAY BE OBTAINED FROM THE ORGANIZATION ISSUING THEM.

from publication of Vsesoiuznovo Nauchno-Issledovatel'skovo Instituta Morskovo Rybnovo Khoziaistva i Okeanografii, 15 pp., 1934.)

The Question of the Migratory Impulse in Connection with the Analysis of Intraspecific Biological Groups, by N. L. Gerbilsky, Translation Series No. 260, 10 pp., processed, 1960. (Translated from Akademiia Nauk SSSR, Ikhtologicheskaiia Komissiiia, Trudy Soveshchaniia, no. 8, 1958, pp. 142-152.)

Some Results of Mass Marking of "Non-Standard" Sturgeon Fingerlings by Means of Radioactive Phosphorus, by G. S. Karzinkin, E. V. Soldatova, and I. A. Shekhanova, Translation Series No. 279, 15 pp., illus., processed, 1960. (Translated from Migratsii Zhi-votnikh, no. 1, 1959, pp. 27-40.)

FROM THE FISHERIES RESEARCH BOARD OF CANADA, BIOLOGICAL STATION, ST. ANDREWS, N.B., CANADA, THE FOLLOWING:

The Effect of Some Aspects of the Biology of Euphausiacea upon the Summer Feeding Conditions for Cod in the Barents Sea, by S. S. Drobysheva, Translation Series No. 224, 18 pp., processed, 1959. (Translated from Trudy Poliarnovo N. -I. Institut Morskovo Rybnovo Khoziaistva i Okeanografii (PINRO), no. 10, 1957, pp. 106-124.)

Fish Farming--An Important Source for Increasing Food Resources, USSR, by S. Alekseyev, JPRS 3850, 6 pp., processed. (Translated from Sovetskaya Torgovlya, no. 8, August 1958, pp. 12-15.) U. S. Joint Publications Research Service, 205 E. 42nd St., Suite 300, New York 17, N. Y. (Photocopies of this report are for sale by Photoduplication Service, Library of Congress, Washington 25, D. C.)

WASHINGTON:

Washington State Department of Fisheries, 1959 Annual Report, 243 pp., illus., printed. Washington State Department of Fisheries, 4015 20th Ave., W., Seattle 99, Wash., 1960. This report includes information on the activities of the Department of Fisheries during 1959 in the fields of fish farming, marine farming and stream improvement, and fisheries law enforcement. Sections are also included on otter trawling, salmon trolling, the herring fishery, coastal inves-

tigations, Columbia River fisheries, sports fishery, and salmon escapement. Specialized problems are dealt with in chapters on the Japanese seed oyster export program, the coastal pink shrimp fishery, Olympia oyster reproduction, hatchery operations, and shellfish predator control. A considerable portion of the report is devoted to the 1959 fisheries statistical report containing data on commercial landings and fishway counts.

WATER POLLUTION:

Biological Problems in Water Pollution, compiled by C. M. Tarzwell, 296 pp., illus., printed. U. S. Public Health Service, Department of Health, Education, and Welfare, Washington 25, D. C., 1960. The transactions of a seminar held at The Taft Sanitary Engineering Center, Cincinnati, Ohio, in April 1959. General topics include effects of radioactive wastes, pesticides, and oil refinery wastes on aquatic life; marine and estuarine pollution; and application of biological findings in pollution abatement. Many leading pollution specialists in the United States attended the seminar, and their combined papers encompass the progress and research needs of today in the field of biological pollution studies.

WHALES:

Nutrient from the Brains of Whales, by H. Kondo and Z. Narita, Japanese Patent 4794, printed in Japanese. Tokkyocho (Patent Office), No. 1 Sannencho, Kojimachiku, Tokyo, Japan.

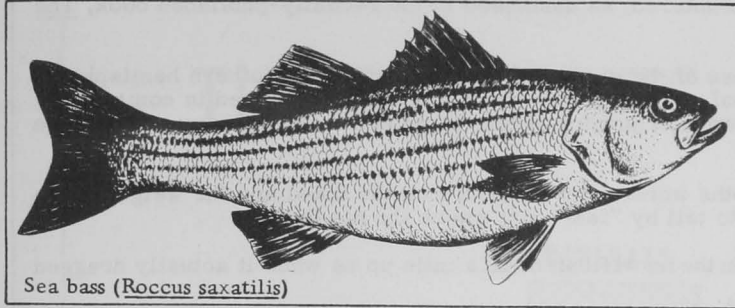
WHALING:

"International Whaling Commission," by R. G. R. Wall, article, Norsk Hvalfangst-Tidende (The Norwegian Whaling Gazette), vol. 49, no. 11, November 1960, pp. 505-517, printed in Norwegian and English. Norsk Hvalfangst-Tidende, Sandefjord, Norway. Report of the twelfth meeting of the International Whaling Commission, held in London, June 20-24, 1960. Covers the order of business and the individual reports of the scientific, technical, and other committees. Discusses in detail the condition of the stocks of various species, pursuance of the conservation aims of the International Whaling Convention, Antarctic catch limitation, the Netherlands and Norway and the Convention, the humane killing of whales, and other topics.



STRIPED BASS AIR-TRANSPORTED TO KENTUCKY LAKE

The Virginia Fisheries Laboratory, Gloucester Point, played host to scientists from the Kentucky Fish and Wildlife Department and Tennessee Commission of Game and Fishes aboard the Laboratory's research vessel Pathfinder the latter part of August 1960, using it as living quarters and a laboratory while young Chesapeake Bay



Sea bass (*Morone saxatilis*)

striped bass or rockfish were captured for transplanting in Kentucky Lake. Kentucky Lake is partly in the state of Kentucky and partly in Tennessee and is about 150 miles long.

Some striped bass have been introduced into the lake and there were some signs of egg laying in spring 1960, but

there is no evidence of successful growth of young. The Commissioners from Kentucky and Tennessee are anxious to increase the stock of striped bass for sport fishing in their area. "We anticipate that sport fishermen will pay between \$3 and \$4 million annually for fishing in Kentucky Lake, if it becomes well stocked, the Kentucky Fish and Wildlife Department stated. "We also hope that the rockfish will feed on gizzard shad and threadfin shad which are scrap fish in Kentucky Lake."

Striped bass impounded or introduced in Kerr Reservoir (Buggs Island) on the Virginia-Carolina border have reproduced themselves and are offering excellent fishing for sportsmen in that area. They have also been bred successfully in the Sante Cooper Reservoir in South Carolina.

A number of young striped bass, fingerling length, were collected and placed in plastic bags. The water in the bags was treated with a germicidal and the bags were inflated with oxygen. Under these conditions the fish can survive successfully for at least 72 hours.

In order to insure rapid transportation, an Army helicopter from Fort Eustis picked up the fish and transported them to Langley Field, where they were transferred to a Tennessee National Guard Plane and flown to Kentucky Lake. All of the fish were less than a year old, but an additional number of year-old fish were taken by truck to the lake.

This is not the first transplant of striped bass to new waters. In 1879 and again in 1881, striped bass from Navesink River, N. J., were shipped by train to San Francisco Bay. A total of 435 fish were successfully transported and within ten years over a million pounds of fish were being caught commercially. California has excellent sport fishing for striped bass, and the California Game and Fish Commission estimates that over \$10 million is spent by sportsmen for striped bass fishing alone.

The Virginia Fisheries Laboratory reported that there was an unusually good survival of young striped bass two years ago which was expected to supply excellent fishing the fall of 1960 in Virginia. The outlook for good striped bass fishing for sportsmen and commercial fishermen is good for the next few years.

HOW SCIENTISTS TRAWLED DOWN TO 30,000 FEET

The voyage of the Danish research vessel Galathea, in 1950-52, made a fine contribution to the study of the seven seas. Of particular interest to trawlermen, however, was the technique employed when she was trawling depths of three miles and more. Here is a summary of the methods used and some of the difficulties encountered, as described in the recently-published book, The Galathea Deep Sea Expedition.

When trawling depths such as those of the great ocean trenches of the Southern hemisphere, the scientists of the Galathea had to deal with problems which are not encountered in commercial fishing. Perhaps the most important was the judging of the length of wire necessary to trawl the bottom.

It must be realized that, at the depths worked, the pressure on the trawl and the weight of the wire was such that it was impossible to tell by "feel" just where the net lay.

Resistance was much the same when the trawl floated half a mile up as when it actually dragged the bottom.

In order to judge the minimum length of wire needed at any given depth, the scientists used a system of theoretical analysis involving the law of resistance to a cylinder. A cylinder moving horizontally through water on a vertical axis encounters a ratio of resistance in direct proportion to its length. Moving horizontally while its axis is also horizontal, however, resistance is only slightly increased for every additional unit of length.

A trawl wire, which passes through water at an acute angle, encounters both transverse and longitudinal resistance. A free wire dragged behind a ship will always be straight; the greater the speed, the nearer horizontal it will be, but the greater its weight, the nearer it approaches the vertical.

A wire dragging a weight, however, forms a slight curve.

Taking these factors into account, and also the known resistance of the trawl, it was possible to calculate from the angle of the upper end of the wire, and from its diameter, speed, and the depth of the bottom, exactly how much wire must be paid out before the trawl grounded.

The diameter of the wire seems, at first sight, to have a surprisingly disproportionate effect on the calculations. For example, at a depth of 16,000 feet at two knots, 31,200 feet of 9 mm. wire is needed, while only 25,675 feet of 12 mm. wire reached bottom at the same depth and speed. The weight of the thicker wire keeps it that much nearer to the vertical.

The huge winch drum of the Galathea held 39,000 feet of trawl wire, and to obtain adequate strength it was made with an increasing diameter from the lower to the upper end. Starting with 3,000 feet of 9.3 mm. wire, it ended with 2,470 feet of 21.8 mm. diameter. The breaking strain of the last length was nearly five times that of the first, but it had, of course, to carry the whole weight of the 39,000 feet besides the weight of the trawl and its contents.

Once the trawl was over the side and the calculated length of wire paid out, it was assumed that it reached bottom when the wire formed a correct angle with the surface of the water.

If the angle was too small, speed was reduced very carefully, because of the danger of the trawl dragging beneath the ship. If the angle was too large, speed was increased. The angle was checked on a special gauge.

Tension was checked, too, by means of a dynamometer, as at the depths being worked an obstruction might not otherwise be noticed before the wire parted.

Tension, however, varies with all sorts of factors on long lengths of line, so the scientists often found it difficult to decide whether to continue trawling. They were fortunate, as it turned out, in that they did not once break the wire. Their system proved successful in every one of the deep-sea trawls they made. (The Fishing News, September 6, 1957.)