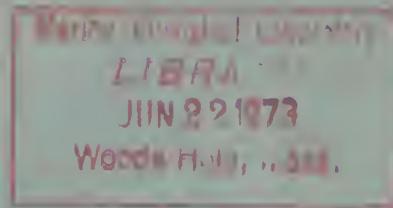


A UNITED STATES  
DEPARTMENT OF  
**COMMERCE**  
PUBLICATION

# NOAA Technical Report NMFS CIRC-380

U.S. DEPARTMENT OF COMMERCE  
National Oceanic and Atmospheric Administration  
National Marine Fisheries Service

## Fishery Publications, Calendar Year 1968: Lists and Indexes



MARY ELLEN ENGETT and LEE C. THORSON

## NOAA TECHNICAL REPORTS

### National Marine Fisheries Service, Circulars

The major responsibilities of the National Marine Fisheries Service (NMFS) are to monitor and assess the abundance and geographic distribution of fishery resources, to understand and predict fluctuations in the quantity and distribution of these resources, and to establish levels for optimum use of the resources. NMFS is also charged with the development and implementation of policies for managing national fishing grounds, development and enforcement of domestic fisheries regulations, surveillance of foreign fishing off United States coastal waters, and the development and enforcement of international fishery agreements and policies. NMFS also assists the fishing industry through marketing service and economic analysis programs, and mortgage insurance and vessel construction subsidies. It collects, analyses, and publishes statistics on various phases of the industry.

The NOAA Technical Report NMFS CIRC series continues a series that has been in existence since 1941. The Circulars are technical publications of general interest intended to aid conservation and management. Publications that review in considerable detail and at a high technical level certain broad areas of research appear in this series. Technical papers originating in economics studies and from management investigations appear in the Circular series.:

NOAA Technical Reports NMFS CIRC are available free in limited numbers to governmental agencies, both Federal and State. They are also available in exchange for other scientific and technical publications in the marine sciences. Individual copies may be obtained (unless otherwise noted) from NOAA Publications Section, Rockville, Md. 20852. Recent Circulars are:

315. Synopsis of biological data on the chum salmon, *Oncorhynchus keta* (Walbaum) 1792. By Richard G. Bakkala. March 1970, iii + 89 pp., 15 figs., 51 tables.
319. Bureau of Commercial Fisheries Great Lakes Fishery Laboratory, Ann Arbor, Michigan. By Bureau of Commercial Fisheries. March 1970, 8 pp., 7 figs.
330. EASTROPAC Atlas: Vols. 4, 2. Catalog No. I 49.4:330/(vol.) 11 vols. (\$4.75 each). Available from the Superintendent of Documents, Washington, D.C. 20402.
331. Guidelines for the processing of hot-smoked chub. By H. L. Seagran, J. T. Graikoski, and J. A. Emerson. January 1970, iv + 23 pp., 8 figs., 2 tables.
332. Pacific hake. (12 articles by 20 authors.) March 1970, iii + 152 pp., 72 figs., 47 tables.
333. Recommended practices for vessel sanitation and fish handling. By Edgar W. Bowman and Alfred Larsen. March 1970, iv + 27 pp., 6 figs.
335. Progress report of the Bureau of Commercial Fisheries Center for Estuarine and Menhaden Research, Pesticide Field Station, Gulf Breeze, Fla., fiscal year 1969. By the Laboratory staff. August 1970, iii + 33 pp., 29 figs., 12 tables.
336. The northern fur seal. By Ralph C. Baker, Ford Wilke, and C. Howard Baltzo. April 1970, iii + 19 pp., 13 figs.
337. Program of Division of Economic Research, Bureau of Commercial Fisheries, fiscal year 1969. By Division of Economic Research. April 1970, iii + 29 pp., 12 figs., 7 tables.
338. Bureau of Commercial Fisheries Biological Laboratory, Anke Bay, Alaska. By Bureau of Commercial Fisheries. June 1970, 8 pp., 6 figs.
339. Salmon research at Ice Harbor Dam. By Wesley J. Ebel. April 1970, 6 pp., 4 figs.
340. Bureau of Commercial Fisheries Technological Laboratory, Gloucester, Massachusetts. By Bureau of Commercial Fisheries. June 1970, 8 pp., 8 figs.
341. Report of the Bureau of Commercial Fisheries Biological Laboratory, Beaufort, N.C., for the fiscal year ending June 30, 1968. By the Laboratory staff. August 1970, iii + 24 pp., 11 figs., 16 tables.
342. Report of the Bureau of Commercial Fisheries Biological Laboratory, St. Petersburg Beach, Florida, fiscal year 1969. By the Laboratory staff. August 1970, iii + 22 pp., 20 figs., 8 tables.
343. Report of the Bureau of Commercial Fisheries Biological Laboratory, Galveston, Texas, fiscal year 1969. By the Laboratory staff. August 1970, iii + 39 pp., 28 figs., 9 tables.
344. Bureau of Commercial Fisheries Tropical Atlantic Biological Laboratory progress in research 1965-69, Miami, Florida. By Ann Weeks. October 1970, iv + 65 pp., 53 figs.
346. Sportsman's guide to handling, smoking, and preserving Great Lakes coho salmon. By Shearon Dudley, J. T. Graikoski, H. L. Seagran, and Paul M. Earl. September 1970, iii + 28 pp., 15 figs.
347. Synopsis of biological data on Pacific ocean perch, *Sebastes alutus*. By Richard L. Major and Herbert H. Shippen. December 1970, iii + 38 pp., 31 figs., 11 tables.

Continued on inside back cover.



U.S. DEPARTMENT OF COMMERCE

Frederick B. Dent, Secretary

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

Robert M. White, Administrator

NATIONAL MARINE FISHERIES SERVICE

NOAA Technical Report NMFS CIRC-380

**Fishery Publications,  
Calendar Year 1968:  
Lists and Indexes**

MARY ELLEN ENGETT and LEE C. THORSON

Marine Biological Laboratory  
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SEATTLE, WA

May 1973

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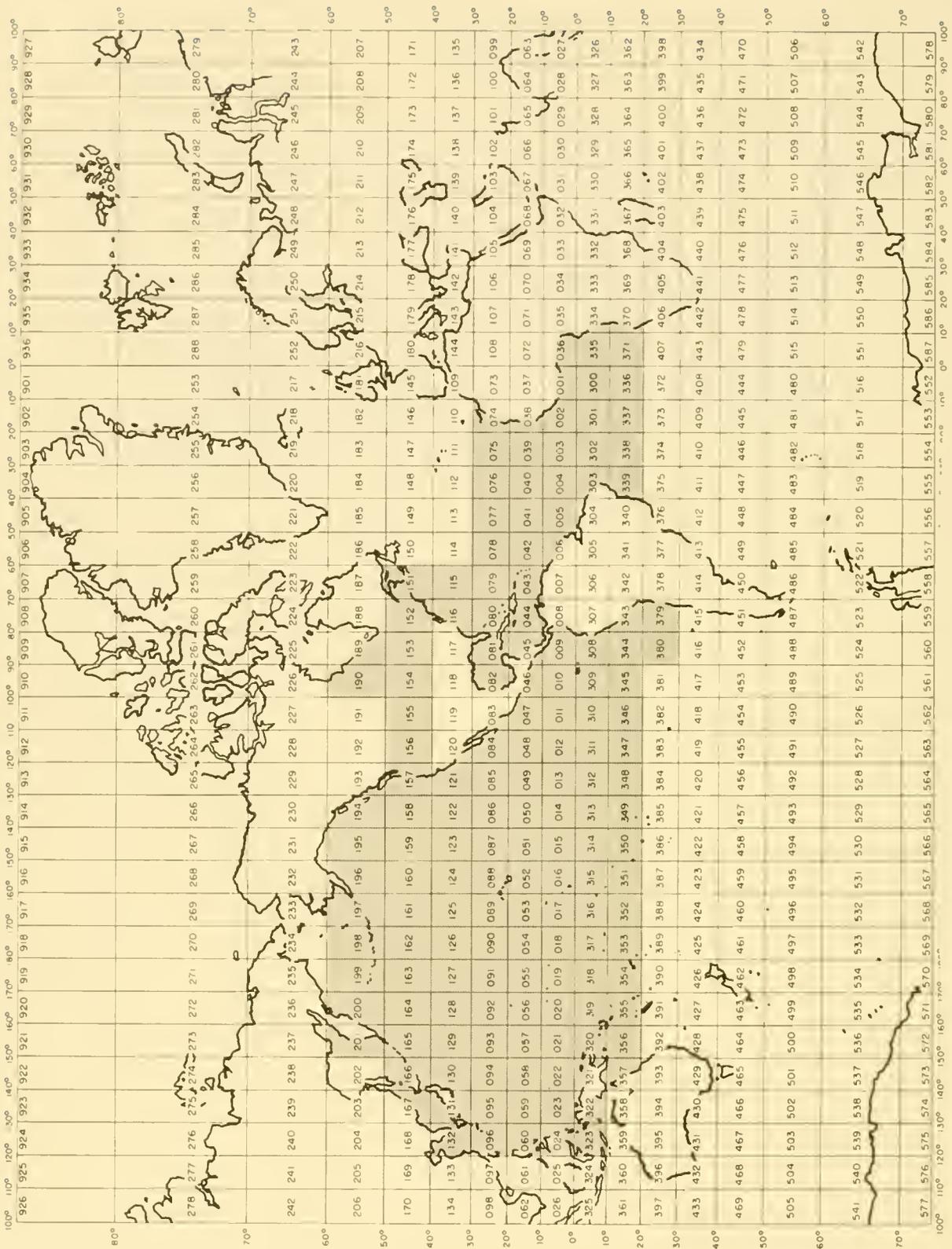


FIGURE 1.—Marsden square grid showing geographic areas (shaded) covered by fishery publications, calendar year 1968.

# FISHERY PUBLICATIONS, CALENDAR YEAR 1968: LISTS AND INDEXES

By

MARY ELLEN ENGETT and LEE C. THORSON

Scientific Publications Staff  
National Marine Fisheries Service

## ABSTRACT

The following series of fishery publications of the National Marine Fisheries Service, National Oceanic and Atmospheric Administration (until October, 1970 the Bureau of Commercial Fisheries of the U.S. Fish and Wildlife Service) in calendar year 1968 are listed numerically (with abstracts) and indexed by author, subject, and geographic area: Circular, Data Report, Fishery Industrial Research, Fishery Leaflet, and Special Scientific Report—Fisheries.

## INTRODUCTION

This document provides for calendar year 1968 numerical lists (with abstracts) and indexes by author, subject, and geographical area, the following series of publications of the National Marine Fisheries Service, National Oceanic and Atmospheric Administration, which until October 1970 was the Bureau of Commercial Fisheries of the U.S. Fish and Wildlife Service:

Circular  
Data Report  
Fishery Industrial Research  
Fishery Leaflet  
Special Scientific Report—Fisheries

The document is divided into four principal sections:

Numerical listing of series (with abstracts)  
Author index  
Subject index  
Index by Marsden squares

The last section has been included to afford easy access to the publications for those persons interested in specific geographical areas. Figure 1 shows the Marsden squares treated in the several publications.

The series abbreviations used in the indexes are:

|                                     |     |
|-------------------------------------|-----|
| Circular                            | C   |
| Data Report                         | D   |
| Fishery Industrial Research         | FIR |
| Fishery Leaflet                     | FL  |
| Special Scientific Report—Fisheries | S   |

## LISTS

### Circular

254. Fish-passage research. Review of Progress, 1961-66. By Parker S. Trefethen. October 1968, 23 pp., 37 figs.

#### ABSTRACT

Results of accelerated laboratory and field experiments to investigate problems of anadromous fish passage at high dams are summarized. Studies were made on: the passage of adult and juvenile fish through large, medium, and small impoundments; design and operation of adult fish-passage facilities at dams; mortalities of juvenile fish passing through turbines and methods of reducing losses; collection of juvenile fish from rivers, streams, and reservoirs; transportation of juvenile fish; and the effect of the changing environment on passage and survival. Publications by the staff are listed.

255. Published in 1967.

256. Design of the fishery research vessel *Oregon II*. By Francis J. Captiva. April 1968, 27 pp., 10 figs., 21 apps. figs., 2 apps. tables.

#### ABSTRACT

This paper describes the United States Fish and Wildlife Service, Bureau of Commercial Fisheries research vessel *Oregon II*. The vessel has been designed for exploratory fishing and gear development studies in the tropical and subtropical portions of the western Atlantic, Gulf of Mexico, and Caribbean Sea. It will be 170 feet long, will have a mean draft of 12½ feet, and a beam of 34 feet. Two 800-horsepower engines will propel it through a single propeller. The vessel incorporates many innovations for ease, safety, and flexibility in gear handling.

257. Published in 1967.

258. Monthly mean charts sea surface temperature north Pacific Ocean 1949-62. By L. E. Eber, J. F. T. Saur, and O. E. Sette. June 1968, vi + 168 pp. of charts.

#### ABSTRACT

This atlas contains 168 monthly sea surface temperature charts for the Pacific Ocean north of lat 20° S. The series extends from January 1949 through December 1962. Each monthly chart contains isotherms for intervals of 1° C and plotted values representing the density of observations by grid "squares" (about 86 nautical miles to a side). The data were taken from the marine weather observations stored in Punched Card Deck 116 at the National Weather Records Center, Asheville, N.C. The amount of data available per chart ranged

from about 5,000 observations at the start of the series to 15,000 at the end. The observations were distributed more abundantly along trade routes and were generally sparse in tropical regions.

Editing procedures exercised for quality control included rejection of erroneous values and the application of corrections to temperature values reported by ships which were determined to be systematically biased, relative to other ships. A numerical analysis technique, based on Carstensen's Relaxation Method, was used to obtain digital representation of the temperature fields. The isotherms were smoothed to reduce small-scale irregularities.

- 259-266. Published in 1967.

267. Progress in exploratory fishing and gear research in Region 2 Fiscal year 1967. By John R. Thompson. September 1968, 14 pp., 13 figs.

#### ABSTRACT

Accomplishments of the Bureau of Commercial Fisheries Exploratory Fishing and Gear Research Base in Pascagoula, Miss., and its Station in St. Simmons Island, Ga., are documented for fiscal year 1967 (July 1, 1966-June 30, 1967). Area covered in the explorations is the tropical and subtropical western North Atlantic, including the Gulf of Mexico and Caribbean Sea.

268. Published in 1967.

269. Organizing the technical article. By F. Bruce Sanford. March 1968, 41 pp., 36 figs., 1 app.

#### ABSTRACT

No article can be more efficient than the outline from which it is written. This manual presents a technique for devising an efficient outline by either deductive or inductive reasoning, whichever is more appropriate to the circumstances. The technique is based on strict adherence to the principles of logic.

- 270-282. Published in 1967.

283. Heading-introduction technique. By F. Bruce Sanford. February 1968, 32 pp., 49 figs., 1 table.

#### ABSTRACT

Because of the vast increase in the scientific literature, technical writers must help the reader grasp ideas quickly. For this purpose, headings and introductions are two of the most useful devices.

Headings give the reader immediate insight into large blocks of information and help him digest them rapidly. Accordingly, they are an exceedingly valuable aid to speed reading.

Although headings are greatly helpful, they are not sufficient. They sometimes are ambiguous, they do not give reasons, and they look neither backward

nor forward in the article—they are concerned only with the present. They therefore need supplementation by introductions, which supply this information that headings, because of their brevity, cannot give.

Introductions, in contrast to headings, are complex devices. They have five transitional functions: therefore, a complete introduction is made up of five parts. This manual defines the functions, names the parts, and shows how to use them.

The manual thus is concerned with the heading-introduction technique, and its aim is to show how we can use this technique to help the reader grasp our idea fast.

284. Microbiological study of iced shrimp: excerpts from the 1965 iced-shrimp symposium. By B. J. Carroll, G. B. Reese, and B. Q. Ward. May 1968, 17 pp., 8 figs., 1 table.

ABSTRACT

The presentations of studies of microbiology and summarized results of the abridged histological studies are reported. How marine and land bacteria cause spoilage under refrigerated conditions is explained. Total numbers of bacteria, the changing makeup of bacterial populations, and organoleptic grades are given for pink, white, and brown shrimps through 14 days of iced storage. The effects of thorough washing are contrasted to those of average washing and the superior quality of well-washed shrimp in the second week of iced storage is shown by lower bacterial counts and the prolongation of grade. Practical recommendations, based upon experimental observations or reports in the literature, are offered. A series of photomicrographs show how the tissues of shrimps of all three species disintegrate in much the same way during 14 days of iced storage. A selection of suggested references for additional reading is provided.

285. Hypocholesterolemic effects of marine oils. By James J. Peifer. April 1968, 16 pp., tables 40 and 43.

(No abstract.)

286. Commercial fisheries federal aid to states. By H. E. Crowther. February 1968, 35 pp., 53 photographs.

(No abstract.)

287. Report of the Bureau of Commercial Fisheries Biological Laboratory, Beaufort, N.C. For the fiscal year ending June 30, 1967. By Kenneth A. Henry and Joseph H. Kutkuhn. June 1968, 22 pp., 17 figs., 9 tables.

ABSTRACT

Results of biological research in the Anadromous Fish, Blue Crab, and Menhaden Programs are discussed. Major topics include abundance, distribu-

tion, and survival of blue crab and menhaden larvae, juveniles, and adults; results of menhaden tagging studies; and details of the 1966 menhaden fishery. Other activities of the laboratory staff, and publication for Fiscal Year 1966, are listed.

288. The Atlantic coast surf clam—with a partial bibliography. By Robert M. Yancey and Walter R. Welch. June 1968, 14 pp., 7 figs., 1 table.

ABSTRACT

The surf clam, *Spisula solidissima solidissima* (Dillwyn), supports an important commercial fishery along the coasts of the Middle Atlantic States. The major portion of the catch has been taken off New Jersey since 1949. Surf clam fishing vessels, equipped with hydraulic jet dredges, take the clams from depths of 100 feet or less and land them the same day. Most of the catch is processed for use as food; a minor portion is used as bait for fish. The total catch in 1965 was 44.1 million pounds of meat.

Surf clams are found in waters of oceanic salinity and sand or gravel bottoms from the low-tide to depths of 480 feet. They range from the Gulf of Saint Lawrence to Cape Hatteras, N.C. The sexes are separate. Spawning usually occurs twice a year. Eggs, under experimental conditions, failed to develop in salinities below 23 parts per thousand. Young clams may reach a length of 1¾ inches in 1 year. Mature clams are commonly 6 to 7 inches long. Surf clams are very abundant in some areas. Populations of 1 to 2 million juvenile clams per mile of beach have been found at Wallops Island, Va., and Sandy Hook, N.J. As many as 5 million mature clams per mile of beach have been washed up on Long Island, N.Y., by a storm.

289. Annual Report of the Bureau of Commercial Fisheries Radiobiological Laboratory Beaufort, N.C. For the fiscal year ending June 30, 1967. By T. R. Rice. February 1968, 45 pp., 26 figs., 18 tables.

ABSTRACT

Research activities included studies in estuarine ecology, biogeochemistry, pollution, and radiation effects.

290. Report of the Bureau of Commercial Fisheries Biological Laboratory St. Petersburg Beach, Florida fiscal year 1967. By James E. Sykes. June 1968, 17 pp., 17 figs., 1 table.

ABSTRACT

The major goals of the Laboratory are to explore the relatively unknown scope of biological productivity in the coastal zone of the eastern Gulf of Mexico, to measure the effect of changes in that zone, and to develop methods of increasing estuarine fishery resources. The report describes cur-

rent research on projects in the Estuarine and Red-Tide Programs. The projects include studies of sediments and organisms in bay bottoms, plankton crops and fishes residing in and transferring between estuaries and the Gulf of Mexico, toxicity of the red-tide organism, and experimental rearing of pompano in an impounded lagoon. A physical, hydrological, biological, and sedimentological inventory of Florida estuaries is also in progress as part of a cooperative effort with the National Oceanographic Data Center and the States of Alabama, Mississippi, and Louisiana.

291. Sea floor topography of the central eastern Pacific Ocean. By Thomas E. Chase. June 1968, 8 pp., 19 figs., 26 app charts.

ABSTRACT

The offshore configuration of the floor of the eastern Pacific Ocean is presented on 26 topographic charts. A description of the methods and data used in their preparation is included with a general outline of the major topographic features of the region. Innovations incorporated in the series of charts include a search and evaluation of all existing data pertinent to the sea floor topography, contouring of the region in detail, and labelling of prominent undersea geological features.

292. Bureau of Commercial Fisheries Fishery-Oceanography Center, La Jolla, California. Anonymous. July 1968, 4 fan-fold.

(No abstract.)

293. Bureau of Commercial Fisheries Federal Aid Program. By Branch of Federal Aid. June 1968, 122 pp.

(No abstract.)

294. Published in 1969.

295. Report of the Bureau of Commercial Fisheries Biological Laboratory, Galveston, Texas fiscal year 1967. By Milton J. Lindner and Robert E. Stevenson. December 1968, 35 pp., 25 figs., 10 tables.

ABSTRACT

Progress of research is reported. Emphasis is on shrimp, and the research involves the fields of biology, population dynamics, ecology, and oceanography.

- 296-297. Published in 1969.

298. Research facilities of the Radiobiological Laboratory Bureau of Commercial Fisheries Beaufort, North Carolina. By T. R. Rice, T. W. Duke and Staff. December 1968, 17 pp., 14 figs.

ABSTRACT

The history, facilities, and organization are discussed. Research is performed on estuarine ecology, biogeochemistry, pollution, and effects of radiation.

299. Books and articles on marine mammals. By Ethel I. Todd. December 1968, 14 pp.

ABSTRACT

This is a guide to recent literature on pinnipeds and cetaceans.

300. Fishermen's atlas of monthly sea surface temperatures for the Gulf of Mexico. By Luis R. Rivas. November 1968, 33 pp., 2 figs.

ABSTRACT

This atlas was prepared in response to interest expressed by the Gulf fishing industry for surface temperature information. It shows that sea surface temperatures fluctuate greatly seasonally and latitudinally with a yearly average of 77° F. This temperature fluctuation causes a seasonal fluctuation in the composition of the shallow-water fauna in the northern Gulf. The atlas also shows that surface temperatures extend deeper in winter than in summer and that upwelling occurs along the north coast of Yucatan during summer. In addition to monthly maps for mean surface isotherms, monthly maps for maximum, minimum, and average surface temperatures are also given.

- 301-302. Published in 1969.

303. Bureau of Commercial Fisheries Fishery-Oceanography Center La Jolla, California fiscal year 1968. By Alan R. Longhurst. September 1968, 32 pp.

ABSTRACT

This report describes the facilities now available for research and gives an account of research done from July 1967 through June 1968.

The main accomplishments of the Center during this period have been completion of the EASTROPAC surveys of seasonal changes in the biology and oceanography in the eastern Pacific, and design of computer methods of analysis and presentation of survey data; design and construction of an experimental deep-sinking tuna purse seine net; partial elucidation of the genetically distinct racial structure of the northern anchovy; and completion of studies of the feeding budget of the California sardine population during the rise and fall of the fishery.

304. Fish and Wildlife Act of 1956, as amended (An excerpt from Title 16 of the United States Code). Anonymous. December 1968, 11 pp.

ABSTRACT

Contains provisions for the establishment of the

U.S. Fish and Wildlife Service and its constituent agencies, the Bureau of Commercial Fisheries and the Bureau of Sport Fisheries and Wildlife. Outlines conditions for making loans for construction or purchase of fishing vessels and granting of fishing vessel insurance. Also covers cooperation with the Department of State, representation at international meetings, investigation and research in fisheries, consultations with other organizations on fish and wildlife problems, reports to Congress and the President, and appropriation of funds.

305. Tropical Atlantic Biological Laboratory, Miami, Florida. Anonymous. October 1968, 4 fan-fold.

(No abstract.)

306. Bureau of Commercial Fisheries Biological Laboratory, Honolulu, Hawaii. Anonymous. December 1968, 4 fan-fold.

(No abstract.)

307. Bureau of Commercial Fisheries Biological Laboratory, Galveston, Texas. Anonymous. November 1968, 4 fan-fold.

(No abstract.)

308. Sanitation guidelines for the breaded-shrimp industry. By Joe P. Clem and E. Spencer Garrett. November 1968, 14 pp., 7 figs.

#### ABSTRACT

Physical plant requirements, cleaning procedures, operating procedures, and need for personal hygiene are discussed.

### Data Reports

Hard copies of Data Reports Nos. 23 through 30 are for sale at \$3.00 and microfiche copies for 65 cents each by the U.S. Department of Commerce, National Technical Information Service, 5285 Port Royal Road, Springfield, VA 22151.

23. Physical, chemical, and biological observations on the Continental Shelf, Nova Scotia to Long Island, 1964-66. By John B. Colton, Jr., Robert R. Marak, Samuel R. Nickerson, and Ruth R. Stoddard. 1968, 195 pp. on 3 microfiche.

#### ABSTRACT

This report lists and illustrates results obtained during eight quarterly environmental surveys: December 1964 and 1965, March 1965 and 1966, May-June 1965 and 1966, and September 1965 and 1966. The purpose of these surveys was to determine the seasonal distribution of temperature, salinity, dis-

solved oxygen, and chlorophyll in an area supporting an intensive commercial fishery.

24. Hydrographic observations in Tampa Bay, Florida, and the adjacent Gulf of Mexico—1965-66. By Carl H. Saloman and John L. Taylor. 1968, 393 pp. on 6 microfiche.

#### ABSTRACT

The hydrographic data include water temperature, salinity, total phosphorus, total nitrogen, oxygen, pH, turbidity, chlorophyll A, B, and C, astacin and nonastacin carotenoids, primary productivity based on chlorophyll A extraction, primary productivity by the oxygen light- and dark-bottle method, and ultraviolet absorption. Methods of collecting and analyzing samples are described. Tables summarize the data by mean, range, number of observations by month and year, and by area. All observations were made as part of continuing estuarine research in Tampa Bay and vicinity.

25. Oceanic conditions in the northwestern Gulf of Guinea, *Geronimo* Cruise 3, 10 February to 21 April 1964. By Julien R. Goulet, Jr., and Merton C. Ingham. 1968, 48 pp. on 1 microfiche.

#### ABSTRACT

This atlas comprises a series of horizontal and isopycnic sections. The distributions of temperature, salinity, and dissolved oxygen are shown on the 0-, 20-, 50-, 100-, 200-, and 400-m. horizontal surfaces, and on the 25- and 26-g/l isopycnic surfaces. Topographies of the thermocline and the 25- and 26-g/l isopycnic surfaces are shown also.

26. Oceanic conditions in the northwestern Gulf of Guinea, *Geronimo* Cruise 4, 5 August to 13 October 1964. By Merton C. Ingham, Julien R. Goulet, Jr., and John T. Brucks. 1968, 50 pp. on 1 microfiche.

#### ABSTRACT

This atlas comprises a series of horizontal and isopycnic sections. The distributions of temperature, salinity, dissolved oxygen, and dissolved phosphate-phosphorus are shown on the 0-, 20-, 50-, 100-, 200-, and 400-m. horizontal surfaces, and on the 25- and 26-g/l isopycnic surfaces. Topographies of the thermocline and the 25- and 26-g/l isopycnic surfaces are shown also.

27. Oceanic conditions in the northwestern Gulf of Guinea, 14 to 30 March 1965 (part of *Geronimo* Cruise 5). By John T. Brucks, Merton C. Ingham, and Thomas D. Leming. 1968, 48 pp. on 1 microfiche.

#### ABSTRACT

This atlas comprises a series of horizontal and

isopycnic sections. The distributions of temperature, salinity, dissolved oxygen, and dissolved phosphate-phosphorus are shown on the 0-, 20-, 50-, 100-, 200-, and 400-m horizontal surfaces and on the 25- and 26-g/l isopycnic surfaces. Topographies of the thermocline and the 25- and 26-g/l isopycnic surfaces are shown also.

28. Oceanic conditions off Sierra Leone, 10 February to 2 March 1965 (part of *Geronimo* Cruise 5). By John T. Brucks, Merton C. Ingham, and Thomas D. Leming. 1968, 45 pp. on 1 microfiche.

ABSTRACT

This atlas comprises a series of horizontal and isopycnic sections. The distributions of temperature, salinity, dissolved oxygen, and dissolved phosphate-phosphorus are shown on the 0-, 20-, 50-, 100-, 200-m horizontal surfaces, and on the 25- and 26-g/l isopycnic surfaces. Topographies of the thermocline and the 25- and 26-g/l isopycnic surfaces are shown also.

29. Data on the feeding habits of the green crab, *Carcinus maenas* (L.). By John W. Ropes. 1968, 39 pp. on 1 microfiche.

ABSTRACT

Information on the stomach contents of green crabs caught in Plum Island Sound, Mass., and Hampton Harbor, N.H., is tabulated in this report.

30. Biological conditions in the northwestern Gulf of Guinea, *Geronimo* cruises 3, 4, and 5, February 1964 to March 1965. By Conrad V. W. Mahnken, Jack W. Jossi, and Mead McCabe. 1968, 51 pp. on 1 microfiche.

ABSTRACT

This atlas comprises a series of measurements of carbon fixation and distributions of zooplankton displacement volumes and copepod species.

### Fishery Industrial Research

- Vol. 4, No. 2. Proximate composition and sodium potassium contents of four species of tuna. By Neva L. Karrick and Claude E. Thurston. April 1968, pp. 73-81, 10 tables.

ABSTRACT

The following species of tuna were studied; albacore (*Germo alalunga*), bluefin (*Thunnus thynnus*), skipjack (*Katsuwonus pelamis*), and yellowfin (*Neothunnus macropterus*). Data are reported for the light and dark meat of the nape, center, and tail sections of the fish.

- Vol. 4, No. 2. Use of sodium acid pyrophosphate to retain natural moisture and reduce struvite

in canned king crab. By Robert Jones. April 1968, pp. 83-89, 1 fig., 3 tables.

ABSTRACT

Sodium acid pyrophosphate in varying concentrations was added at two levels of pH to king crab during canning. Salt also was added.

Adding 0.25 and 0.35 percent of sodium acid pyrophosphate increased the retention of moisture by almost 2 percent. Struvite either did not develop or developed very little during storage of the product for 1 year.

Addition of pyrophosphate in concentrations greater than 0.35 percent adversely affected the taste of the product. Addition of pyrophosphate in concentrations less than 0.25 percent did not improve the product.

- Vol. 4, No. 2. Mechanized haul seine for use in farm ponds. By Kenneth L. Coon, Alfred Larsen, and James E. Ellis. April 1968, pp. 91-108, 14 figs., 2 tables.

ABSTRACT

Present methods of harvesting fish from farm ponds are time consuming, laborious, and wasteful of water. This paper supplies information on a mechanized system in which a haul seine and associated equipment are used to capture fish in farm ponds and a conveyor and associated equipment are used to load and weigh the fish into trucks for shipment to market. The mechanized seine works well both in ponds of small or large size and water as deep as 8 feet.

- Vol. 4, No. 3. Effect of special handling of haddock on the postirradiation shelf life of haddock fillets. By Vincent G. Ampola and Louis J. Ronsivalli. June 1968, pp. 109-111, 1 table.

ABSTRACT

Improved techniques for handling eviscerated haddock after capture resulted in superior quality of the fish prior to irradiation and a significant extension in the post-irradiation shelf life of fillets cut from them.

- Vol. 4, No. 3. Sonic system for determining distances between selected points of an otter trawl. By Leon E. French, Jr. June 1968, pp. 113-125, 9 figs.

ABSTRACT

Trawl gear is rigged with several sonic transducers connected to a shipboard recording-type echo sounder by means of a special cable. Trawl dimensions are recorded continuously and simultaneously under a specially calibrated scale.

- Vol. 4, No. 3. Echo reflector for sonic measuring system on an otter trawl. By Leon E. French, Jr. June 1968, pp. 127-131, 3 figs.

#### ABSTRACT

Sonically measuring distances between points in an otter trawl during operation by use of transducers and an echograph recorder presents problems. For example, when the headrope height of an otter trawl is about one-half the wing-end spread, the head-rope and wing-end measurement traces appear at the same location upon the recording paper. The simultaneous overlay of signals can be corrected by use of a sonic echo reflector to replace one of the wing-positioned transducers in the measuring system and by use of the echo-signal method instead of the direct-signal method. The echo signals, however, are weaker than the direct signals.

This paper reports on a test of three reflectors: plain wood, aluminum sheet, checkered aluminum. All three reflectors gave usable strong echo signals. The best quality signal was given, however, by the aluminum reflector.

Vol. 4, No. 4. Effect of gamma radiation on thiaminase activity in freshwater fish. By Richard A. Krzeczowski. July 1968, pp. 133-138, 2 figs., 5 tables.

#### ABSTRACT

Sensitivity to gamma radiation of the antimegaloblastic thiaminase in whole fish was studied so that the potential usefulness of this radiation for controlling the activity of thiaminase in fishery products could be estimated. Although gamma radiation will partially inactivate thiaminase in the species studied, its use for complete inactivation does not appear to be economically feasible.

Vol. 4, No. 4. Relation of temperature, time, and moisture to the production of aflatoxin in fish meal. By Travis D. Love. July 1968, pp. 139-142.

#### ABSTRACT

Numerous instances have been reported in which moldy vegetable meals, when incorporated into feeds, have produced symptoms of acute toxicity in animals. The several toxin principles (aflatoxins) produced by the mold *Aspergillus flavus* have been isolated in crystalline form and chemically identified as lactones, epoxides, or hydroperoxides.

Commercial fish meal has never been reported to contain aflatoxins. In this study fish meal was heavily inoculated with *Aspergillus flavus*, and the concentration of moisture was artificially increased to 18 percent. The meal developed aflatoxins after being held at 28°C for 35 days. The control meals, which had a normal moisture concentration of 10 percent, did not produce aflatoxins at any temperature studied, though they were heavily inoculated with *Aspergillus flavus* and held for 35 days.

Vol. 4, No. 4. Variation in the fatty acid composition of Pacific herring (*Clupea harengus pallasi*) oil in Alaska during 1964 and 1965.

By Paul A. Robisch and Edward H. Gruger, Jr. July 1968, pp. 143-150, 9 tables.

#### ABSTRACT

Industrial users need knowledge about the variability in the fatty acid composition of Alaska herring oil. Accordingly, oil from the 1964 and 1965 catch seasons was analyzed for certain of its chemical properties — individual fatty acid composition, total concentration of the saturated, monoenoic, and polyenoic fatty acids, iodine value, saponification value, free fatty acid value, and peroxide value.

The individual fatty acid components varied to some extent. Ranges in the concentration of the monoenoic fatty acids for the 2 years did not overlap; the average differed by 4.8 percent. Differences in the averages for the saturated and polyenoic fatty acids were only 1.7 percent. Data on iodine value indicated that the total unsaturation of the oil was somewhat greater in 1964 than in 1965; data on the other chemical properties indicated that the oil had not undergone appreciable alteration prior to being analyzed.

The reasons for the above variations could not be determined, since several variables were operating simultaneously.

Vol. 4, No. 4. Author index of publications and addresses — 1966. Bureau of Commercial Fisheries Branch of Technology and Branch of Reports (Seattle). By Helen E. Plastino and Mary S. Fukuyama. July 1968, pp. 151-164.

(No abstract.)

Vol. 4, No. 5. Shrimp-behavior studies underlying the development of the electric shrimp-trawl system. By Edward F. Klima. December 1968, pp. 165-181, 16 figs., 9 tables.

#### ABSTRACT

Observation of how shrimp react to different amounts of electrical energy and repetition rates of pulsating direct current in the laboratory and the field provided information on the electric characteristics needed for an effective electric shrimp trawl.

The laboratory studies showed the electric threshold voltage of shrimp oriented at different positions to the electrodes and the effect of different voltages on the shrimp's responses. Threshold voltages were affected by the animal's position relative to the electric field, and the shrimp's reaction increased with an increase in voltage.

The field studies provided information on the electrical output needed to force burrowed shrimp out of the substrate. Capacitor-discharge pulses of 4 per second with a potential of 3.0 volts or more across 100 millimeters parallel to the electric field were best for forcing shrimp out of the types of bottom on some of the commercial shrimping grounds in the Eastern Gulf of Mexico.

Vol. 4, No. 5. Designing an improved California tuna purse seine. By M'nakhem Ben-Yami and Roger E. Green. December 1968, pp. 183-207, 16 figs., 5 tables.

ABSTRACT

In the Eastern Tropical Pacific Ocean, about 50 percent of the purse seine sets for tuna are unsuccessful, owing mostly to the fish's escaping the net during setting and pursing operations. Described here is the design of a proposed purse seine that will largely retain the desirable features of the presently used seine but that will sink faster and use the webbing with greater economy. In comparative tests with scale models (1:25), the model built according to the proposed design sank nearly three times as fast as did the model of the presently used seine.

Fishery Leaflet

606. Great Lakes gill net. By William G. Gordon. June 1968, iii + 8 pp., 14 figs., 1 table.

ABSTRACT

This report on present methods of setting and retrieving gill nets in the Great Lakes has illustrations of equipment, techniques, and materials commonly used throughout the industry.

607. Published in 1967.

608. The bait minnow industry of the Great Lakes. By William G. Gordon. February 1968, 6 pp., 10 figs.

ABSTRACT

The bait minnow industry is described, and methods for increasing the harvest are demonstrated by the results of exploratory bait fishing activities completed by the Bureau of Commercial Fisheries.

609. How to throw a castnet. By Hilton M. Floyd. March 1968, 12 pp., 11 figs.

ABSTRACT

The pictorially described procedure in this leaflet will help anyone to master this art of fishing.

610. Published in 1967.

611. Construction and operation of a floating Alaska Salmon trap. By Fred W. Hipkins. April 1968, iii + 12 pp., 8 figs., 1 table.

ABSTRACT

Salmon traps, now nearly extinct, are the most efficient fishing gear ever developed for the capture and impoundment of salmon. The first salmon trap was built in Cook Inlet about 1885, but floating traps were not introduced until after 1890. The

number of traps varied annually until the State Legislature abolished them in 1959. In 1967, only three traps were operated in Alaska in a Federal Fishing Reserve set aside by President Woodrow Wilson for the Metlakatla Indians on Annette Island. A floating salmon trap consists of a lead, outer and inner hearts, pot, and two spillers. Methods of hanging, setting, and brailing a trap are given.

612. Published in 1967.

613. Available leaflets on fisheries. Anonymous. June 1968, 5 pp.  
(No abstract.)

614. The American shad. By Randall P. Cheek. August 1968, iii + 13 pp., 18 figs.

ABSTRACT

The life history of the American shad (*Alosa sapidissima*) is described. The economic importance of the commercial and sport fisheries are reviewed, and the status of research and management of this species are summarized.

615. List of fishery leaflets of the U.S. Fish and Wildlife Service. Anonymous. June 1968, 30 pp.

(No abstract.)

616. A trotline for blue crabs. By Hilton M. Floyd. December 1968, 5 pp., 5 figs.

ABSTRACT

A method of using many kinds of bait on a trotline is presented. The gear is easy to make and use.

617. List of fishery associations in the United States, 1967-68. By Gale H. Lyon. January 1968 (revised), v + 14 pp.

ABSTRACT

Ten national and 112 local fishery associations in 29 States and the District of Columbia are listed. Also included is the name of one of the officers of each association.

618. Partial list of fishing boat builders. Prepared by Branch of Exploratory Fishing. November 1968, iii + 12 pp.

ABSTRACT

The following list of builders includes data on 238 shipyards in 26 coastal and inland States. The list also provides information (if known) on the construction material used.

619. Published in 1969.

620. List of fishermen's and fish shore workers' unions in the United States, 1968. By Branch

of Foreign Trade and Economic Services, Bureau of Commercial Fisheries. April 1968 (revised), v + 12 pp.

ABSTRACT

One hundred and eight fishermen's and fish shore workers' unions in 19 States are listed.

**Special Scientific Report--Fisheries**

559. Water quality of streams tributary to Lakes Superior and Michigan, by Jerome W. Zimmerman. January 1968, iii + 41 pp., 2 figs., 11 tables, 1 app.

ABSTRACT

Water quality of streams tributary to Lakes Superior and Michigan was analyzed for 142 stations on 99 streams tributary to Lake Superior and 83 stations on 56 streams tributary to Lake Michigan during 1962-65.

Concentrations of aluminum, copper, and iron were not affected greatly by flow or season. Magnesium, calcium, chlorides, total alkalinity, total hardness, and conductivity varied with the flow, temperature, and season; the lowest values were during the spring runoff and heavy rains, and the highest were during low water in late summer and the colder periods of winter. Concentrations of nitrate, silica, and sulfates were lowest in the spring and summer. Concentrations of tanninlike and ligninlike compounds were highest during the spring runoff and other high-water periods, and were lowest during freezeup when surface runoff was minimal. The pH values were highest from June to September and lowest during the spring runoff. Phenolphthalein alkalinity was detected primarily in the summer and coincided occasionally with low flows just before the spring thaw. Total hardness usually was lower in streams tributary to Lake Superior than in streams tributary to Lake Michigan. The total hardness was higher in the streams in Wisconsin than in the streams in Michigan along the west shore of Lake Michigan. It was lowest in the northernmost streams.

The water quality of the streams in an area was related to the geological characteristics of the land.

560. Published in 1967.

561. Diel and seasonal occurrence of pink shrimp, *Penaeus duorarum* Burkenroad, in two divergent habitats of Tampa Bay, Florida, by Carl H. Saloman. January 1968, iii + 6pp., 4 figs., 6 tables.

ABSTRACT

Pink shrimp, *Penaeus duorarum*, were sampled for 17 months in two divergent habitats in Tampa Bay, Fla. Information was obtained on size and sex of the shrimp, water temperature, salinity, light transmission, and activity in relation to moon phase.

Catches were larger during darkness and rose as temperature decreased from about 30° C to 14° C. Larger shrimp were caught in darkness than in daylight throughout the period. Larger shrimp were also caught at the station having lowest salinity and incidence of transmitted light. In dark phases of the moon greater numbers of shrimp were caught than during light phases. The size of shrimp reached a peak in April and May after an average increase in length of about 1 mm carapace length per month. Female shrimp were larger than males in all samples except two.

562. Seasonal and areal distribution of zooplankton in coastal waters of the Gulf of Maine, 1965 and 1966, by Kenneth Sherman. March 1968, iii + 11 pp., 6 figs., 6 tables.

ABSTRACT

A description is given of the abundance, composition, and seasonal variations in distribution of zooplankton. Eleven major taxa were represented in the samples. Six were holoplanktonic, and five were meroplanktonic. Copepods were the dominant zooplankters during all seasons in both years. Zooplankton volumes in both years followed similar areal trends. Mean annual volumes were highest in the western area (Cape Ann to Cape Elizabeth), moderate in the central area (Cape Elizabeth to Mt. Desert Island), and low in the eastern sector (Mt. Desert Island to Machias Bay). Zooplankton volumes were generally lower in 1966 than in 1965. Areal and annual variations in the abundance of zooplankters are discussed in relation to hydrography.

563. Bibliography of oyster parasites and diseases, by Carl J. Sindermann. April 1968, 13 pp.

ABSTRACT

The bibliography is oriented toward the diseases that affect oysters and is not concerned with human diseases that may be transmitted by raw shellfish. References to parasites and diseases of pearl oysters (Pteriidae) have been included, even though such bivalves are not true oysters (Ostreidae). References to mortalities of oysters have been included only if a pathogen was associated or suspected. Particular emphasis has been placed on disease states resulting from an infectious agent or parasite invasion.

564. Description and evaluation of methods for determining incident solar radiation, submarine daylight, chlorophyll *a*, and primary production — Used by Scripps Tuna Oceanography Research Program in the eastern tropical Pacific, by Robert W. Holmes. December 1968, iii + 31 pp., 5 figs., 15 tables.

## ABSTRACT

A detailed account and evaluation are presented for certain methods used by the STOR (Scripps Tuna Oceanography Research) Program. This description should assist readers and users of the STOR data and be of general interest to workers in the field.

An Eppley 10-junction 180° pyranometer was used in conjunction with a Speedomax recorder for the measurement of incident solar radiation. Daily incident radiation was obtained by integration of the daily record with a polar planimeter. Errors due to integration and failure of the gimbals to stabilize the pyranometer completely are estimated to be  $\pm 1$  percent and  $\pm 5$  percent, respectively. A comparison between observed daily radiation and computed radiation from four standard climatological equations revealed the inaccuracy of using indirect methods for daily totals.

The deck and submarine irradiance meters were equipped with cosine collectors; their construction, calibration, and operation are described. A blue-green Wratten filter (No. 45) was routinely used with both detectors. The relative spectral sensitivity in air and Jerlov ocean water type I was calculated. In air, the maximum transmittance was at 490  $m\mu$  and the half-band width was roughly 63  $m\mu$ . At 100-m depth in type I water, this value shifted to 475  $m\mu$  with a 50  $m\mu$  band width. By assuming the universal validity of the Jerlov seawater transmission curves, it was possible to obtain estimates of total visible downwelling irradiance at depth from a single attenuation coefficient measurement. Under ideal conditions and with no depth measurement error, a coefficient of variation of  $\pm 10.5$  percent was obtained for the attenuation coefficient. This error increased appreciably when vessel motion and errors of depth measurement occurred.

Chlorophyll *a* measurements were obtained by spectrophotometric method with acetone extracts of membrane-filtered water samples. Corrections for blank values at 750  $m\mu$  were applied, and concentrations computed with the equations of Richards with Thompson. The coefficient of variation for surface samples varied between 14 and 27 percent and increased with depth.

Primary production was measured with  $C^{14}$ ; the details of the methodology and standardization are given. Because a number of different incubation techniques were used (i.e., in situ, deck incubator, trailing bottle, and laboratory incubator), an attempt was made to compare these procedures with the in situ method. All of the methods yielded results which were correlated with those obtained by the in situ method. Thus unbiased estimates of in situ production may be obtained from the different incubation techniques.

565. Passage conditions and counts of fish at the Snake Island fishway, Little Falls Dam,

Potomac River, Md., 1960-63, by Paul R. Nichols. February 1968, iii + 14 pp., 7 figs., 5 tables.

## ABSTRACT

Resident fish such as sucker, carp, channel catfish, bluegill, and black crappie travelled through the fishway, but apparently no anadromous fish ascended the river far enough to reach the fishway. It is possible that: (1) the runs of anadromous fish are now at such a low level that the spawning area above Little Falls is not needed as in former years; (2) the stocks with the instinct to move above Little Falls which were blocked from their natural spawning ground when the Little Falls Dam was rebuilt in 1949 have since disappeared; and (3) the rapids between Chain Bridge and the fishway may deter the upstream progress of migrating fish.

Success in reestablishing runs of anadromous fish above Little Falls may require the planting of fertilized eggs and adult fish in the upper river and the construction of fish-passage facilities at the rapids above Chain Bridge. Successful hatching of shad eggs and the collection of young shad above Little Falls indicate that the river is suitable for the restoration of this species.

566. Horizontal and vertical distribution of juvenile salmonids in upper Mayfield Reservoir, Washington, by Jim Ross Smith, John R. Pugh, and Gerald E. Monan. April 1968, iii + 11 pp., 6 figs., 6 tables.

## ABSTRACT

The proposed installation of a fish collecting device in the upper end of Mossyrock Reservoir, soon to be created on the Cowlitz River in southwestern Washington, prompted this study to determine the horizontal and vertical distribution of juvenile salmonids in such an environment. A section of the upper end of Mayfield Reservoir, an existing body of water on the Cowlitz River, was systematically sampled with gill nets and a trawl from April 1964 to June 1965. Eighty-seven percent of the 11,467 salmonids captured were taken in the upper 7.3 m of water, which constituted 52.8 percent of the total sampling area.

If the distribution of fish in upper Mossyrock Reservoir is similar to the distribution in Mayfield Reservoir, a collecting device running from shore to shore, extending to a depth of 7.3 m, and designed to collect fish approaching from both the upstream and the downstream sides should collect over 80 percent of all migrating salmonids.

567. Setting and first season survival of the American oyster, *Crassostrea virginica*, near Oxford, Maryland, 1961-62, by J. R. Webster and W. N. Shaw. July 1968, iii + 6 pp., 2 figs., 4 tables.

#### ABSTRACT

The setting of oysters in Broad Creek and Tred Avon River, on the eastern shore of Chesapeake Bay, was monitored during 1961 and 1962. Setting was substantially greater both years in Broad Creek, and the highest number of spat were found on shells suspended from 0.3 to 9 meters below the surface. Three times more spat were caught on shells in bags than on shells broadcast on the bottom.

In Tred Avon River setting was very light in 1961 and light in 1962, except during the week of 30 July to 6 August. In Broad Creek setting was heaviest during the week of 17 to 24 July 1961 and during each week from 25 June to 13 August 1962.

First-season survival rates were 1 to 27 percent. There was some indication, especially in Broad Creek during 1962, that the greater the setting rates the lower the first-season survival rates.

568. The Japanese Atlantic longline fishery, 1964, and the status of the yellowfin tuna stocks, by John P. Wise. August 1968, 5 pp., 1 fig., 5 tables.

#### ABSTRACT

The Japanese Atlantic longline fishery increased in 1964 to nearly 85 million hooks. Catches of yellowfin tuna decreased slightly, while catches of albacore increased markedly. Even though fishing has decreased since 1964, the effort is still greater than necessary for optimum yield in numbers of yellowfin tuna.

569. Oyster mortalities, with particular reference to Chesapeake Bay and the Atlantic coast, of North America, by Carl J. Sindermann. July 1968, iii + 10 pp., 7 figs.

#### ABSTRACT

A number of recent mass mortalities of oysters of the Middle Atlantic States and elsewhere in the world have been attributed to the effects of disease. Oyster production in Delaware Bay and lower Chesapeake Bay has been seriously reduced during the past decade by an epizootic of a protozoan pathogen, *Minchinia nelsoni*. Other recent disease-associated mortalities of oysters have occurred in the Gulf of Saint Lawrence and the Gulf of Mexico. Man may have aided spread of diseases by transfers and overcrowding of beds. Reduction of this threat to oyster production could be effected by quarantines, development of disease-resistant strains of oysters, and use of environmental barriers (such as low salinity) to the pathogens involved.

570. Fishes taken during shrimp trawling along the south Atlantic coast of the United States, 1931-35, by William W. Anderson. July 1968, iv + 60 pp., 9 figs., 13 tables.

#### ABSTRACT

Fish of numerous families and species are taken

with shrimp on the shrimping grounds. Records of the fish taken during a study of the white shrimp by the U.S. Bureau of Fisheries, are provided. These records cover the coast from Cape Romain, S.C., to Cape Kennedy, Fla., and are organized under four basic areas: South Carolina Outside, Georgia Outside, Georgia Inside, and Florida Outside. The entire region is treated also as a unit. Yearly and monthly average numbers of fish taken per hour of trawling and percentages of the catch are provided for all species for the region and for the several basic areas.

Seasonal variation in the numbers of fish on the shrimp fishing grounds is large; numbers are lowest during the late winter and spring, build up rapidly in the summer and early fall, and are highest in the late fall and early winter.

The croaker family (Sciaenidae) was the most abundant and important found on the shrimp fishing grounds. Croakers were captured in greater numbers than all other families of fish combined in every month of the year.

Four families of fish—The Sciaenidae (croakers), Carangidae (jacks), Ariidae (sea catfish), and Bothidae (flounders)—were taken in greatest numbers per hour of trawling and together contributed almost 87 percent of the yearly average catch in the region.

Seven species of fish—*Stellifer lanceolatus* (star drum), *Micropogon undulatus* (Atlantic croaker), *Leiostomus xanthurus* (spot), *Menticirrhus* spp. (king whiting), *Chloroscombrus chrysurus* (bumper), *Cynoscion regalis* (gray seatrout), and *Etropus crossotus* (fringed flounder)—each contributed 3 percent or more of the yearly average catch for the region, and together represented over 76 percent of the yearly average catch in the region.

571. Spawning areas and abundance of chinook salmon (*Oncorhynchus tshawytscha*) in the Columbia River Basin—past and present, by Leonard A. Fulton. October 1968, iii + 26 pp., 5 figs., 8 tables.

#### ABSTRACT

Chinook salmon, the most abundant species of salmon in the Columbia Basin, formerly spawned in nearly all tributaries of the Columbia River and in many areas of the main river. Over the past 60 years, the construction of dams has inundated, impeded, or blocked access to spawning areas.

Despite these heavy losses, large areas of spawning grounds in the middle and lower portions of the drainage are still available to chinook salmon. Stream improvements by State and Federal fishery agencies have rehabilitated some areas and have brought others into production for the first time.

Important spawning areas are listed and charted in this report according to their past use (before 1965) and present use (1966). Estimates of recent spawning populations in major tributaries and in segments of the main stem are also given. Former

and present levels of abundance are listed according to three major runs—spring, summer, and fall.

572. Effects of lamprey larvicides on invertebrates in streams, by Richard L. Torblaa. August 1968, iii + 13 pp., 2 figs., 11 tables.

ABSTRACT

The study was conducted on five streams tributary to Lake Superior and four tributary to Lake Michigan. Samples of the bottom fauna before and after chemical treatment revealed that most groups of aquatic organisms were not adversely affected by exposure to larvicides. The total number of invertebrates was smaller 1 week after treatment than before treatment, increased somewhat by 6 weeks after treatment, and had returned to pretreatment levels 1 year after treatment. Aquatic insects were affected less than other organisms, and invertebrates were more severely affected and recovered more slowly in areas of sand and detritus than in riffle areas.

573. Physical, chemical, and biological oceanography of the entrance to the Gulf of California, spring of 1960, by Raymond C. Griffiths. December 1968, iii + 47 pp., 40 figs., 1 table.

ABSTRACT

The whole area at the entrance to the Gulf of California and off southwestern Lower California in the spring of 1960 was underlain by Intermediate Water (marked by a salinity minimum of about 34.5 ppt at about 800 m) and, above that, by Subtropical Subsurface Water (marked by a salinity maximum of 34.80 ppt at about 200 m). Above these waters were: to the northwest, California Current Surface Water (marked by a shallow salinity minimum of about 34.10 ppt at about 100 m); to the northeast, Gulf Surface Water (marked by high surface salinities that obscure the maximum of the Subtropical Subsurface Water); and, to the south, Subtropical Surface Water (marked by intermediate salinities and high temperatures).

The most important oceanographic feature of the area was a strong front between California Current and Gulf Surface Waters. At Cape San Lucas this front was roughly vertical, but to the south and west it became more sinuous and much weaker and was formed more and more by California and Subtropical Surface Waters. At the Cape the stronger flow of the California Current Water seemed to hold back the Gulf outflow at the surface, and to the south of the Cape it penetrated Gulf Surface Water at depths between 50 and 100 m, spreading horizontally or affecting in some way the entire Gulf entrance, often in a complicated manner. The vertical front at Cape San Lucas thus became a horizontal one offshore at depth. The frontal sys-

tem was very clearly shown in the distributions of temperature and salinity in the upper 100 m, but only between 50 and 100 m in the oxygen distribution.

The Subtropical Subsurface Water was in the extensive oxygen minimum of the eastern Pacific, and the oxygen content of the surface waters was affected by upwelling and probably by phytoplankton activity.

The second important feature of the area was upwelling. Distributions of temperature, salinity, and oxygen showed it to be strong off western Lower California and weaker off Cape Corrientes and other parts of the eastern side of the Gulf entrance. The water upwelled off Lower California was initially low in oxygen content, but this content increased as the water moved south. The distributions of temperature and, particularly, salinity showed this transport. The standing crop of zooplankton was generally highest in the areas in which upwelled water occurred.

574. Some operational aspects of the Hawaiian live-bait fishery for skipjack tuna (*Katsuwonus pelamis*), by Vernon E. Brock and Richard N. Uchida. September 1968, iii + 9 pp., 1 fig., 5 tables.

ABSTRACT

An analysis of detailed operating records of two Hawaiian skipjack tuna vessels during 1952 and 1953 indicated consistent patterns of time utilization and activities that probably were representative for the Hawaiian skipjack tuna fleet during these 2 years. Availability of skipjack tuna appears to be lowest during the winter; hence, the vessels are drydocked and repaired then. The pattern of fishing was marked by a period of bait collection lasting a day or more, followed by a period of fishing that lasted from 1 to 5 days, but generally was 3 days or less. Baitfish mortality rates were so high that it was difficult to maintain a large quantity of live bait, or to fish successfully for more than 3 days. The design of the skipjack tuna vessels and their operating procedure reflected these constraints in the use of bait. Long-range vessels with refrigeration, possibly able to fish more efficiently during the winter, would be impractical without the development of methods to reduce baitfish mortalities. A fishery for live bait, independent of the tuna fishing vessels, would require the same techniques to be successful.

Much of the time at sea was spent in searching for fish rather than in fishing. A reduction in time spent searching would reduce the loss of baitfishes in the baitwells and increase the catch of skipjack tuna for baitfish used. Hence, knowledge of areas where skipjack tuna are concentrated would be of substantial value to the fishery.

575. Length relations of some marine fishes

from coastal Georgia, by Sherrell C. Jorgenson and Grant L. Miller. November 1968, iii + 16 pp., 3 tables.

#### ABSTRACT

Information is given for converting standard length into fork and total lengths, fork length into standard and total lengths, and total length into standard and fork lengths of 82 species of marine fishes collected in coastal Georgia during 1953-61.

576. Oceanographic surveys of Traitors Cove Revillagigedo Island, Alaska, by Douglas R. McLain. December 1968, iii + 15 pp., 15 figs., 2 tables.

#### ABSTRACT

Traitors Cove is a small fiordlike estuary in southeastern Alaska. It is divided into two basins by a narrow constriction, where a reversing tidal falls forms. Four oceanographic surveys of the estuary between 1963 and 1965 showed that this tidal falls creates a region of strong turbulence and destroys the stratification of the water near it. Surface currents in the estuary are predominantly seaward on ebb tide and toward the head of the estuary on flood tide.

577-578. Published in 1969.

579. A list of the marine mammals of the world, by Dale W. Rice and Victor B. Scheffer. December 1968, iii + 16 pp.

#### ABSTRACT

Listed are 117 species of Recent marine mammals, including fresh-water species of the predominantly marine groups. The numbers of species are: Order Carnivora (1), Order Pinnipedia (33), Order Sirenia (5), Order Mysticeti (10), and Order Odontoceti (68). The geographical distribution of each species is shown. The systematic status of little-known species is discussed.

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