

UNITED STATES  
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COMMERCE  
PUBLICATION



# NOAA Technical Report NMFS CIRC-372

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

## Fishery Publications, Calendar Year 1971: Lists and Indexes

THOMAS A. MANAR

# 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, Auke 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

Peter G. Peterson, Secretary

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

Robert M. White, Administrator

NATIONAL MARINE FISHERIES SERVICE

Philip M. Roedel, Director

NOAA Technical Report NMFS CIRC-372

**Fishery Publications, Calendar Year 1971:  
Lists and Indexes**

THOMAS A. MANAR

SEATTLE, WA

October 1972

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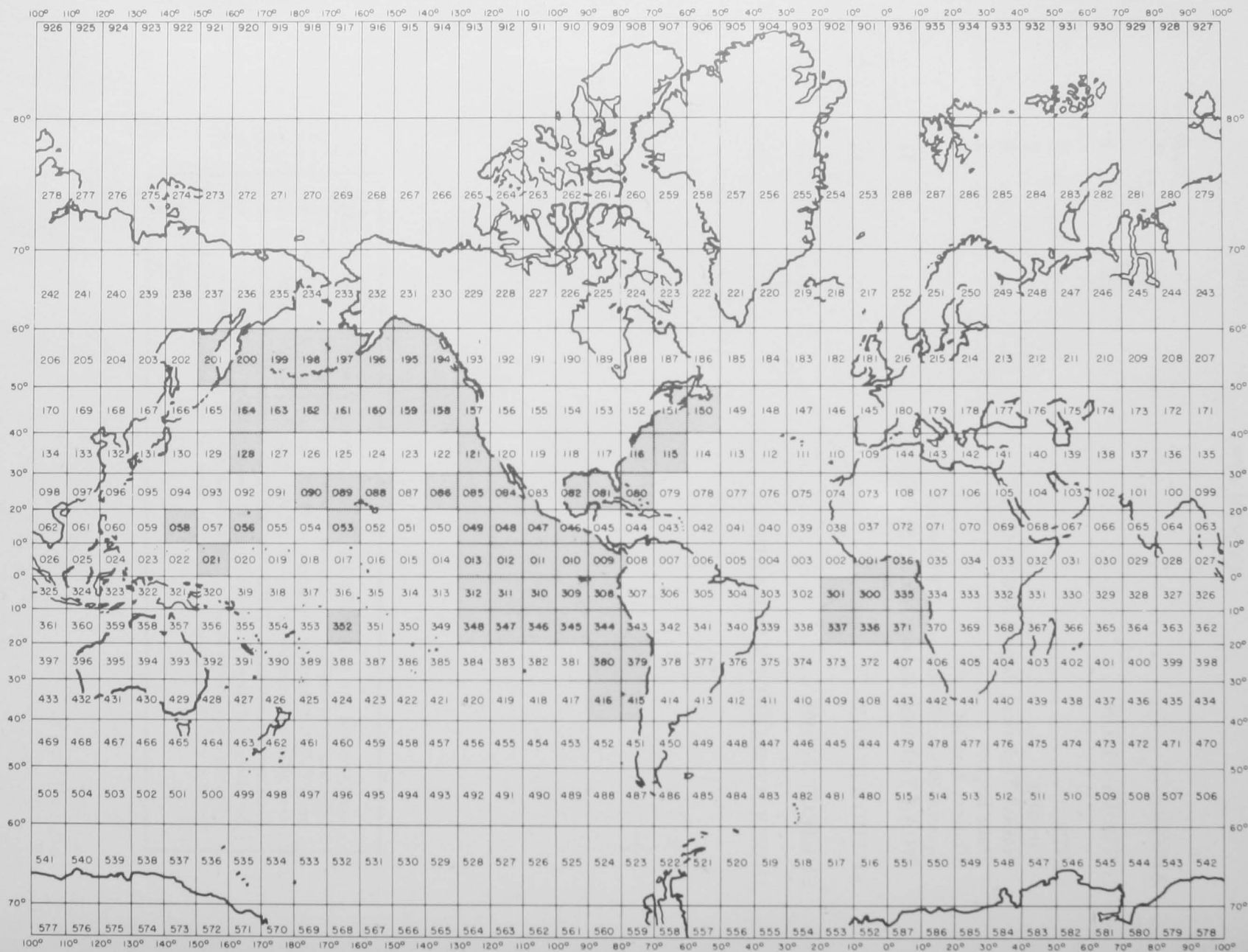


FIGURE 1. — Marsden square grid showing geographic areas (shaded) covered by fishery publications, calendar year 1971.

# FISHERY PUBLICATIONS, CALENDAR YEAR 1971: LISTS AND INDEXES

By

THOMAS A. MANAR

Chief, 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, in calendar year 1971 are listed numerically (with abstracts) and indexed by author, subject, and geographic area: NOAA Technical Report CIRC (formerly Circular); Data Report; Fishery Leaflet; and NOAA Technical Report NMFS SSRF (formerly Special Scientific Report — Fisheries).

## INTRODUCTION

This document provides for calendar year 1971 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:<sup>1</sup>

Circular  
Data Report  
Fishery Leaflet  
Special Scientific Report — Fisheries

During 1971, the Circular series was incorporated in the NOAA Technical Report series as NOAA Technical Report NMFS CIRC, and the Special Scientific Report series was incorporated in the NOAA Technical Report series as NOAA Technical Report NMFS SSRF. The numbering systems were unchanged. The year

<sup>1</sup> An index to the Fishery Bulletin, Vol. 69, Nos. 1-4, 1971, appears in No. 4, p. 883-896.

also saw the termination of the Fishery Leaflet series, number 640 being the last.

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
NOAA Technical Report NMFS CIRC	C
Data Report	D
Fishery Leaflet	FL
Special Scientific Report—Fisheries	S
NOAA Technical Report NMFS SSRF	S

## LISTS

### Circular

330, Vol. 2. EASTROPAC Atlas: Biological and Nutrient Chemistry Data from Principal Participating Ships First Survey Cruise, February-March 1967. By Cuthbert M. Love (editor). April 1971, vii + 87 pp., 196 charts. For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402 — Price \$4.75 per volume.

#### ABSTRACT

This atlas contains charts depicting the distribution of physical, chemical, and biological oceanographic properties and associated meteorological properties observed during EASTROPAC. EASTROPAC was an international cooperative investigation of the eastern tropical Pacific Ocean (20° N. to 20° S., and from the west coasts of the American continents to 119° W.) which was intended to provide data necessary for a more effective use of the marine resources of the area, especially tropical tunas, and also to increase knowledge of the ocean circulation, air-sea interaction, and ecology. The Bureau of Commercial Fisheries (now National Marine Fisheries Service) was the coordinating agency. The field work, from February 1967 through March 1968, was divided into seven 2-month cruise periods. During each cruise period one or more ships were operating in the study area.

On completion of the field work the data seemed too numerous for a classical data report. Instead, it was decided to produce an 11-volume atlas of the results, with 5 volumes containing physical oceanographic and meteorological data from the principal participating ships, 5 volumes containing biological and nutrient chemistry data from the same ships, and 1 volume containing all data from Latin American cooperating ships and ships of opportunity. Extensive use was made of a computer and automatic plotter in preparation of the atlas charts. Methods used to collect and process the data upon which the atlas is based are described in detail by the contributors of the following categories of charts: temperature, salinity, and derived quantities; thickness of the upper mixed layer; dissolved oxygen; meteorology; nutrient chemistry; phytoplankton standing stocks and production; zooplankton and fish larvae; micronekton; birds, fish schools and marine mammals.

330, Vol. 3. EASTROPAC Atlas: Physical Oceanographic and Meteorological Data from Principal Participating Ships First and Second Monitor Cruises, April-July 1967. By Cuthbert M. Love (editor). September 1971,

vii + 107 pp., 130 charts. For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402 — Price \$4.75 per volume.

#### ABSTRACT

This atlas contains charts depicting the distribution of physical, chemical, and biological oceanographic properties and associated meteorological properties observed during EASTROPAC. EASTROPAC was an international cooperative investigation of the eastern tropical Pacific Ocean (20° N. to 20° S., and from the west coasts of the American continents to 119° W.) which was intended to provide data necessary for a more effective use of the marine resources of the area, especially tropical tunas, and also to increase knowledge of the ocean circulation, air-sea interaction, and ecology. The Bureau of Commercial Fisheries (now National Marine Fisheries Service) was the coordinating agency. The field work, from February 1967 through March 1968, was divided into seven 2-month cruise periods. During each cruise period one or more ships were operating in the study area.

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331—348. (Issued before 1971.)

349. Use of Abstracts and Summaries as Communication Devices in Technical Articles. By F. Bruce Sanford. February 1971, iii + 11 pp., 1 fig.

#### ABSTRACT

Abstracts and summaries, if appropriately written, help the author communicate his ideas. This circular gives the rationale for using these communication devices and tells how to design them. With this knowledge, the author of a technical article can use them to best advantage in getting his ideas across to the reader.



50—352. (Issued before 1971.)

53—355. (See NOAA Technical Report NMFS CIRC.)

56. Floating Laboratory for Study of Aquatic Organisms and Their Environment. By George R. Snyder, Theodore H. Blahm, and Robert J. McConnell. May 1971, iii + 16 pp., 11 figs.

ABSTRACT

The National Marine Fisheries Service has built a floating laboratory to study environmental problems in the Columbia River. The barge that supports the laboratory was obtained from the U.S. Navy. Installation of a complex electrical and water supply system plus biological research equipment aboard the barge have made it possible to conduct research near sites where problems are expected to occur.

57—360. (Not issued.)

61. Regional and Other Related Aspects of Shellfish Consumption — Some Preliminary Findings From the 1969 Consumer Panel Survey. By Morton M. Miller and Darrel A. Nash. June 1971, iv + 18 pp., 21 figs., 3 tables, 10 apps.

ABSTRACT

A consumer survey panel, consisting of representative households throughout the United States, recorded their fishery product purchases for a 12-month period, beginning in February 1969. They were participants in a study conducted under the aegis of the National Marine Fisheries Service, Division of Economic Research. This paper deals mainly with study findings respecting the consumption of major species of shellfish, at home and away from home.

Findings of the study indicate marked regional preferences for individual shellfish items. For example, oysters are consumed in South Atlantic States at nearly double the national per capita rate. Similarly, clams enjoy a high rate of consumption in Middle Atlantic and New England areas. All of which suggests an important correlation between consumption and tradition as well as a persistent tendency for seafood varieties, particularly those consumed in a "fresh" form, to be consumed in the area of catch.

The study also indicated an association between high income households and shellfish consumption, with oysters a single notable exception. Age of consumer, too, has an apparent bearing on shellfish consumption as it was found that older consumers are the more disposed toward consumption of these products.

With respect to consumption away from home, it appears that half or more of the crabs and lobsters are consumed in meals outside the home, but the majority consumed of other products was at home.

## NOAA Technical Report NMFS CIRC

353. Truk Live-Bait Survey. By Peter T. Wilson. August 1971, iii + 10 pp. For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402 — Price 25 cents Stock Number 0320-0012.

ABSTRACT

A survey of the bait resources of Truk lagoon was made in June-August 1970. Directed by an Okinawan with extensive pre-World War II fishing experience in Truk, the survey showed the presence of six bait species, some of which live around the coral heads and must be taken with a specially designed net. Baitfish from Truk lagoon supported a Japanese skipjack tuna fishing fleet of about 40 vessels during prewar years.

354. Sanitation Guidelines for the Control of *Salmonella* in the Production of Fish Meal. By E. Spencer Garrett and Richard Hamilton. October 1971, iii + 7 pp., 9 figs. For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402 — Price 25 cents Stock number 0320-0023.

ABSTRACT

A detailed description of the scope and magnitude of the *Salmonella* problem as it relates to the manufacture of fish meal is discussed. Specific control steps and procedures are outlined which, if followed, should keep *Salmonella* contamination to a minimum in fish reduction plants.

355. Saltwater Recirculation System and Laboratory at the Exploratory Fishing and Gear Research Base, Pascagoula, Miss. By Donald A. Wickham. July 1971, 7 pp., 7 figs.

ABSTRACT

An approximately 10,000-gal. capacity saltwater recirculation system and laboratory were built to conduct controlled behavioral studies of the responses of fish to harvesting gear. This facility consists of an 18-ft diameter by 4½-ft deep pool, a 4-ft deep by 15-ft long rectangular tank, and several water tables. Design compromises resulting from space limitations and construction of the laboratory in an existing one-story structure are discussed. Techniques using a commercial swimming pool diatomaceous-earth filter for removing iron precipi-

tate from the subsurface salt water and particulate matter from the high salinity wedge river water used to supply the system are described. The system's components and operation are also briefly described.

362. Research Vessels of the National Marine Fisheries Service. By Robert S. Wolf. August 1971, iii + 46 pp., 3 tables. For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402 — Price 50 cents Stock number 0320-0011.

ABSTRACT

The research fleet of the National Marine Fisheries Service (formerly the Bureau of Commercial Fisheries) of the National Oceanic and Atmospheric Administration, U.S. Department of Commerce, is described in detail by individual ship. The descriptions are accompanied by photographs. A brief text covering fleet activities and modernization precedes the vessel descriptions.

363. (Not issued.)

364. History and Development of Surf Clam Harvesting Gear. By Phillip S. Parker. October 1971, iv + 15 pp., 15 figs.

ABSTRACT

The development of harvesting gear for surf clams, *Spisula solidissima*, along the eastern coast of the United States is reviewed from early times up to the present.

Early clamming was done by hand using rakes or tongs, while today the industry depends upon large, efficient dredges operating from stable vessels. Little gear development took place prior to World War II; however, since that time, the industry has made rapid strides in the development of harvesting gear. Today this trend is still very much in evidence, with gear constantly being modified for adaptation to newer vessel types.

Most gear development work has been the result of the surf clam industry itself. However, the Federal Government, in cooperation with industry, has developed several pieces of equipment for adaptation to clamming gear.

## Data Report

(Hard copies of Data Reports Nos. 50 thru 64 and 66 thru 70 are for sale at \$3.00 and microfiche copies for 95 cents each. No. 65 is for sale at \$6.00 and microfiche copies for 95 cents each by the U.S. Department of Commerce, National Technical Information Service, 5285 Port Royal Road, Springfield, VA 22151.)

50. Primary Productivity and Related Oceanographic Data, Subarctic Pacific Region, 1966-68. By Jerry D. Larrance. February 1971, 113 pp. on 2 microfiche.

ABSTRACT

Data are reported in tabular form from 10 cruises in the Subarctic Pacific Region in 1966-68 made by research vessels of the Bureau of Commercial Fisheries (now National Marine Fisheries Service) Biological Laboratory, Seattle, Wash. The methods used for sampling and analysis are presented.

51. Physical Oceanographic Data from the North Pacific Ocean, October 2 to November 8, 1965. By W. James Ingraham, Jr. February 1971, 43 pp. on 1 microfiche.

ABSTRACT

Temperature and salinity data to about 1,000-m depth were obtained from Nansen bottle casts at 36 stations south of Attu Island while the RV *George B. Kelez* was conducting experimental salmon fishing. Presented here are the observed and interpolated values (at various depths, from the surface to 1,000-m) of temperature and salinity and computed values of SIGMA-T, specific volume anomaly, and dynamic height.

These are the first winter data from the study area.

52. Physical Oceanographic Data from the North Pacific Ocean, 1969. By W. James Ingraham, Jr., Donald M. Fisk, Gerald A. Sanger, Andrew Bakun, and Stephen E. Truner. April 1971, 180 pp. on 3 microfiche.

ABSTRACT

Temperature and salinity data collected during three cruises of the RV *George B. Kelez* and one cruise of the RV *Miller Freeman* in the central and northeastern Pacific Ocean are presented. These data were compiled from Nansen bottle casts at 6 stations and STD casts at 327 stations.

53. Subsurface Water Temperatures of the Columbia River at Prescott, Oregon (River Mile 72), 1968-69. By George R. Snyder and Robert J. McConnell. February 1971, 9 pp. on 1 microfiche.

ABSTRACT

Water temperature data from January 1968 through December 1969 are presented to aid in the evaluating of the effects of impending industrial encroachment on the existing fisheries of the lower Columbia River.

54. Limnological Data from Lake St. Clair, 1963 and 1965. By Jarl K. Hiltunen. February 1971, 45 pp. on 1 microfiche.

ABSTRACT

Limnological data, primarily benthological, are presented for collections made at 14 stations.

55. Hydrographic Observations in Tampa Bay and the Adjacent Gulf of Mexico—1967. By Carl H. Saloman and John L. Taylor. April 1971, 64 pp. on 2 microfiche.

ABSTRACT

Hydrographic data include water temperature, salinity, total phosphorus, total Kjeldahl nitrogen, pH, dissolved oxygen, turbidity, water transparency, ultraviolet absorption, chlorophyll *a*, *b*, and *c*, astacin and nonastacin carotenoids, and primary productivity based on the chlorophyll *a* and light-and dark-bottle methods. Methods of collecting and analyzing samples are described. Tables summarize data collected from 30 permanent stations by mean, range, and number of observations by month, year, and area. Other tables summarize the mean, range, and number of observations of samples taken daily at the laboratory dock, weekly from a small embayment in Boca Ciega Bay where pompano culture was studied, and monthly at stations where oyster raft experiments were made in Old Tampa Bay and Boca Ciega Bay.

56. Dissolved Nitrogen, Dissolved Oxygen, and Related Water Temperatures in the Columbia and Lower Snake Rivers, 1965-69. By Kirk T. Beiningen and Wesley J. Ebel. April 1971, 60 pp. on 1 microfiche.

ABSTRACT

Data on the dissolved nitrogen, dissolved oxygen, and water temperatures in the Columbia and lower Snake Rivers from 1965 through 1969 are presented. The data were compiled from field observations and from laboratory analysis of water samples collected at 40 stations.

57. Data on Samples for Surf Clams and Ocean Quahogs. By John W. Ropes and Arthur S. Merrill. February 1971, 43 pp. on 1 microfiche.

ABSTRACT

Data on the catch of surf clams and ocean quahogs by several reserach vessels operating in the continental shelf of the Gulf of Maine to Cape Hatteras, N.C., are given.

58. A Survey of Fish Purchases by Socio-Economic Characteristics, First Quarterly Report, February, March, and April 1969. By Darrel A. Nash. April 1971, 148 pp. on 3 microfiche.

ABSTRACT

This report presents data collected during February, March, and April 1969 of fish purchases by 1,500 U.S. households. The Division of Economic

Research of the National Marine Fisheries Service, through Market Facts, Inc., made a year-long statistical survey of such purchases. The socio-economic characteristics of the household purchasing patterns are presented.

59. A Survey of Fish Purchases by Socio-Economic Characteristics, Second Quarterly Report, May, June, and July 1969. By Darrel A. Nash. April 1971, 148 pp. on 3 microfiche.

ABSTRACT

This report presents data collected during May, June, and July 1969 of fish purchases by 1,500 U.S. households. The Division of Economics Research of the National Marine Fisheries Service, through Market Facts, Inc., made a year-long statistical survey of such purchases. The socio-economic characteristics of the household purchasing patterns are presented.

60. A Survey of Fish Purchases by Socio-Economic Characteristics, Third Quarterly Report, August, September, and October 1969. By Darrel A. Nash. April 1971, 148 pp. on 3 microfiche.

ABSTRACT

This report presents data collected during August, September, and October 1969 of fish purchases by 1,500 U.S. households. The Division of Economics Research of the National Marine Fisheries Service, through Market Facts, Inc., made a year-long statistical survey of such purchases. The socio-economic characteristics of the household purchasing patterns are presented.

61. A Survey of Fish Purchases by Socio-Economic Characteristics, Fourth Quarterly Report, November and December 1969 and January 1970. By Darrel A. Nash. April 1971, 148 pp. on 3 microfiche.

ABSTRACT

This report presents data collected during November and December 1969 and January 1970 of fish purchases by 1,500 U.S. households. The Division of Economics Research of the National Marine Fisheries Service, through Market Facts, Inc., made a year-long statistical survey of such purchases. The socio-economic characteristics of the household purchasing patterns are presented.

62. A Survey of Fish Purchases of Socio-Economic Characteristics, Annual Report, February 1969-January 1970. By Darrel A. Nash. April 1971, 162 pp. on 3 microfiche.

ABSTRACT

This report presents data collected during February 1969-January 1970 of fish purchases by 1,500 U.S. households. The Division of Economic

Research of the National Marine Fisheries Service, through Market Facts, Inc., made a year-long statistical survey of such purchases. The socio-economic characteristics of the household purchasing patterns are presented.

63. Hydrographic Observations in Tampa Bay and the Adjacent Gulf of Mexico—1968. By Carl H. Saloman and John L. Taylor. May 1971, 204 pp. on 4 microfiche.

ABSTRACT

Hydrographic data include water temperature, salinity, total phosphorus, total Kjeldahl nitrogen, pH, dissolved oxygen, turbidity, water transparency, ultraviolet absorption, chlorophyll *a*, *b*, and *c*, astacin and nonastacin carotenoids, and primary productivity based on the chlorophyll *a* and light- and dark-bottle methods. Methods of collecting and analyzing samples are described. Tables summarize data collected from 30 permanent stations by mean, range, and number of observations according to month, year, and area. Other tables summarize the mean, range, and number of observations of samples taken daily at the laboratory dock, weekly from a small embayment in Boca Ciega Bay where pompano culture was studied, and monthly at stations where ultraviolet and primary productivity monitoring continues.

64. Catches of Postlarval White Shrimp *Penaeus setiferus* (Linn.), and Brown Shrimp, *P. aztecus*, Ives, and Temperature and Salinity Observations in Vermilion Bay, Louisiana, March 1963 to April 1967. By C. W. Caillouet, Jr., B. J. Fontenot, Jr., W. S. Perret, R. J. Dugas, and H. F. Hebert. July 1971, 39 pp. on 1 microfiche.

ABSTRACT

A small trawl towed in a semicircle of 30.5-m (100 ft) radius in the shallow water near the shoreline was used to collect postlarval white shrimp and brown shrimp. Dates and hour of sampling, catches of post-larvae, species composition of subsamples of the catches, and water temperature and salinity data are presented.

65. Physical-Chemical Oceanographic Data from the North Pacific Ocean and Bering Sea, 1970. By W. James Ingraham Jr., Donald M. Fisk, and Stephen E. Turner. August 1971, 311 pp. on 5 microfiche.

ABSTRACT

Temperature and salinity data were obtained at 305 stations in 1970 during winter, spring, and summer cruises of the RV *George B. Kelez* south of the Alaska Peninsula and Aleutian Islands and in the Bering Sea. Values were measured at

standard depths down to 1,500-m from STD traces; sigma-t, sound velocity, anomaly of specific volume, and dynamic height are also presented.

66. Summary of Tags Released and Recovered for Atlantic Menhaden, 1966-69. By L. C. Coston. August 1971, 117 pp. on 2 microfiche.

ABSTRACT

A summary by month is presented of all tagged adult Atlantic menhaden, *Brevoortia tyrannus*, released and all tags recovered along the Atlantic coast of the United States from New York to Florida, 1966 through 1969. The menhaden were tagged internally with numbered ferromagnet metal tags that were recovered on magnets in reduction plants during the production of meal and oil.

67. Drift Bottle Experiments in the North Pacific Ocean and Bering Sea—1957-60, 1962, 1966, and 1970. By Felix Favorite and Donald M. Fisk. August 1971, 20 pp. on 1 microfiche.

ABSTRACT

Tabulation and summary of results of nine drift bottle experiments conducted in central Aleutian Island area. A total of 283 bottles was recovered at various locations along the island arc and along the northern coasts of the Pacific Ocean (and Bering Sea) from Hokkaido eastward to San Francisco.

68. Sardine Eggs and Larvae and Other Fish Larvae of the Pacific Coast, 1958 and 1959. By David Kramer. October 1971, 132 pp. on 3 microfiche.

ABSTRACT

Data are presented on eggs and larvae collected in 1958 and 1959 by the California Cooperative Oceanic Fisheries Investigations off the coast of California and Baja California. Included are the standardized haul factors for all stations on all surveys and records of positive occurrences of a particular species as follows: Pacific sardine eggs by age in days, fish larvae by size classes including Pacific sardine, northern anchovy, jack mackerel, and Pacific mackerel and fish larvae, unsized, including Pacific hake and rockfish spp.

69. Sea-Surface Temperatures and Salinities Collected Between 1957 and 1969 at Nine Pacific Monitoring Stations. By Marian Y. Y. Yong. December 1971, 35 pp. on 1 microfiche.

ABSTRACT

Sea-surface temperature and salinity data from seven island stations and two ocean weather stations in the Pacific Ocean for the period 1957-69 are presented. Spectral analysis of the data was performed, and the resulting harmonic curves together with observed data are presented in graphical form. Coefficients that define the harmonic functions are presented in tabular form.

70. Conversion Tables for Commercially Important Penaeid Shrimp of the Gulf of Mexico. By Clark T. Fontaine. December 1971, 9 pp. on 1 microfiche.

ABSTRACT

Tables are divided by classifications commonly used by the industry to designate landings of whole or headless brown (*Penaeus aztecus*), white (*P. setiferus*), and pink (*P. duorarum*) shrimp. Data presented by sex and sexes combined for each species include shrimp that range from 70 to 235 mm total length.

Fishery Leaflet

634. List of Fishery Associations in the United States, 1969-70. By Division of Current Economic Analysis. February 1971, v + 11 pp.

ABSTRACT

Sixteen national, 2 international, and 100 local fishery associations in 27 States and the District of Columbia are listed. Each association generally includes the name of one of the officers.

635. Overboard with Chest Waders, Hip Boots, or Rain Gear. By R. O. Parker, Jr. February 1971, 6 pp., 6 figs. For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402 — Price 10 cents.

ABSTRACT

Neither chest waders, hip boots, nor rain gear will cause you to drown if you don't panic. Waders, the most dreaded of the three, can actually be the safest. If you are wearing bulky clothing in addition to your boots and do nothing after you enter the water, you will float.

636. Alaska's Fishery Resources The Sockeye Salmon. By Wilbur L. Hartman. March 1971, iii + 8 pp., 8 figs., 2 tables.

ABSTRACT

Sockeye salmon, *Oncorhynchus nerka*, are produced in river-lake systems in Canada, Alaska, and the Soviet Union. Alaska production has averaged \$32 million to the wholesaler annually since 1945; the value was \$72 million in 1965. Female sockeye salmon carry about 3,500 eggs and spawn in late fall in lake inlets and outlets and even the lakes themselves. The following spring, inch-long fry emerge and migrate at night to the lakes. After spending 1 to 4 years growing in the nursery lakes, the fish migrate in schools to the feeding grounds far out in the Pacific Ocean. After 1, 2, or 3 years at sea, the maturing sockeye salmon return through the coastal waters to the freshwater spawning grounds. Sockeye salmon when grown weigh 6 to

9 lb and average 24 inches long. They are captured by a Japanese high seas gill net fishery, an American inshore gill net fishery, and the Alaska native subsistence fishery in the rivers and lakes. The State of Alaska manages the inshore fishery. The National Marine Fisheries Service provides the basis for research needed for rational management and international protection of this valuable natural resource.

637. Age Determination of Fishes (Revised). By Fred E. Lux. June 1971, 7 pp., 7 figs.

ABSTRACT (None)

638. A Lift Net for Catching Bait Fish Attracted to Light. By Hilton M. Floyd. April 1971, 3 pp., 6 figs.

ABSTRACT

Construction and operation of the gear are described. The chief attributes of the gear are its light construction and single-handed operation.

639. (Not issued.)

640. National Marine Fisheries Service Biological Laboratory, Boothbay Harbor, Maine. By John E. Watson. September 1971, ii + 11 pp.

ABSTRACT

This report describes the activities of the National Marine Fisheries Service Biological Laboratory at Boothbay Harbor, Maine, the northernmost research facility maintained by the U.S. Government on the Atlantic Coast.

Special Scientific Report — Fisheries

619. Macrozooplankton and Small Nekton in the Coastal Waters Off Vancouver Island (Canada) and Washington, Spring and Fall of 1963. By Donald S. Day. January 1971, iii + 94 pp., 19 figs., 10 tables, 3 apps.

ABSTRACT

Eight species of euphausiids, 5 species of mysids, and 14 species of fish were identified. Euphausiids composed about 90 percent by number of the organisms caught, and fluctuations in their abundance were concomitant with changes in the biomass of the samples. The bulk of the organisms collected at night were in the upper 30 m. All species were taken by a 0.9-m. Isaacs-Kidd mid-water trawl.

The concentration of organisms was lowest near shore, reached a maximum at or near the outer edge of the continental shelf, and decreased again farther offshore. The concentration of organisms was greater in the southern part of the region than in the northern part. This distribution was

apparently related to the general surface circulation. Seasonal fluctuations were indicated by a decrease in biomass from spring to fall.

20. (Issued before 1971.)

21. Predation by Sculpins on Fall Chinook Salmon, *Oncorhynchus tshawytscha*, Fry of Hatchery Origin. By Benjamin G. Patten. February 1971, iii + 14 pp., 6 figs, 9 tables.

ABSTRACT

Predation was studied during migration of the fry towards the Columbia River from two hatcheries — the Elokomin River Hatchery (13 km. upstream from the Columbia) and the Oxbow Hatchery on Herman Creek (0.2 km. upstream). In the Elokomin River the estimated loss of hatchery salmon to sculpins, *Cottus* spp., was 3.9 percent of 1.5 million fry released in 1962 and 1.3 and 3.6 percent of 2.2 and 0.1 million fry, respectively, released in 1963. Loss was negligible among 2.3 million fry released in Herman Creek in 1962.

Sculpins that preyed on hatchery salmon were coastrange sculpin, *C. aleuticus*; prickly sculpin, *C. asper*; reticulate sculpin, *C. perplexus*, and torrent sculpin, *C. rhotheus*; in the Elokomin River and prickly and reticulate sculpins in Herman Creek. Predation was greatest by prickly sculpin (the largest species) and least by coastrange sculpin (a species with a comparatively small mouth).

Losses of salmon to sculpins may have been related to diet and to the size of the releases. In the Elokomin River, predation was greater on salmon fed a wet diet than on those fed moist pellets. The larger of the two releases in 1963 had the smaller percentage loss. Improvement of hatchery procedures is probably the best way to reduce losses of hatchery-reared salmon to sculpins.

22. Numbers and Lengths, by Season, of Fishes Caught with an Otter Trawl near Woods Hole, Massachusetts, September 1961 to December 1962. By F. E. Lux and F. E. Nichy. February 1971, iii + 15 pp., 3 figs., 19 tables.

ABSTRACT

Forty-one species of fish were caught in hauls made about four times per month at water depths of 2 to 15 feet (0.6 to 4.6 m.) in Woods Hole harbor. Seasonal occurrence is discussed and compared with water temperature. Data on growth during the first year are given for a number of species.

23. (Issued before 1971.)

24. Influence of Mechanical Processing on the Quality and Yield of Bay Scallop Meats. By

N. B. Webb and F. B. Thomas. April 1971, iii + 11 pp., 9 figs., 3 tables.

ABSTRACT

The present commercial method of shucking bay scallops by hand is costly. A mechanical method has accordingly been developed in an effort to reduce costs while maintaining or improving the quality of the processed meats. Therefore, the mechanical method must produce meats of a quality and yield equal to or better than that presently obtained by hand processing.

The purpose of this study therefore was to compare the quality and yield of bay scallops processed by mechanical means with the corresponding values of those processed by the typical hand method. The mechanical method included heat-shocking of the shell-stock, roller-vibration removal of the meats and viscera and the subsequent separation of the viscera from the meats.

The quality of the scallops was measured objectively by the determination of drip, volatile base, pH, and bacterial count was measured subjectively by means of a qualified taste panel's rating the samples for odor, texture, appearance, and flavor. The yield of the scallops was evaluated by (1) proximate analysis for moisture, crude protein, ash, and fat, (2) amount of water absorbed, (3) amount of cooked meats obtained, and (4) loss of drip from frozen meats.

The results indicate that the quality and yield of meats from bay scallops processed mechanically as described above is equivalent to the quality and yield of those processed commercially by hand.

625. Distribution of Salmon and Related Oceanographic Features in the North Pacific Ocean, Spring 1968. By Robert R. French, Richard G. Bakkala, Masanao Osako, and Jun Ito. March 1971, iii + 22 pp., 19 figs., 3 tables.

ABSTRACT

Japanese and United States research vessels made a cooperative research cruise. Differences in distribution of salmon were examined by species, by maturity, and by age group. Sockeye salmon, *Oncorhynchus nerka*, were in the more northerly waters and pink salmon, *O. gorbuscha*, in the more southerly waters, whereas chum salmon, *O. keta*, were more widely distributed and in all waters occupied by other species. The proportion of older ages decreased from north to south; immature sockeye and chum salmon were generally restricted to the more southern waters and maturing fish to the more northern waters.

The distribution of larval fish, which at times serve as food for salmon, varied by group; Hexagrammidae were in all waters occupied by salmon whereas larvae of *Hemilepidotus* and *Bathymaster* were taken only in the northern areas and Myctophidae larvae only in the southern areas occupied by salmon.

626. Commercial Fishery and Biology of the Fresh-Water Shrimp, *Macrobrachium*, in the Lower St. Paul River, Liberia, 1952-53. By George C. Miller. February 1971, iii + 13 pp., 8 figs, 7 tables.

ABSTRACT

A small fishery was conducted for the large commercial fresh-water shrimp, *Macrobrachium vollenhovenii*, using traps. A second smaller species, *M. macrobrachion*, was culled from the trap catch for the fishermen's use. The estuarine fishery was seasonal (May to January), during the period of low salinity. Cost of raw tail meats to the consumer was over \$1.00 (U.S.) per pound. The fishermen derived more than \$7,500 from the fishery.

Commercial shrimp, *M. vollenhovenii*, spawned in the estuary from May to January. Fecundity was estimated at 12,000 to 45,000 eggs per female. As the embryo developed the color of the egg changed from red to brown. Embryonic and larval development to time of setting of *M. vollenhovenii* was believed similar to that of *M. rosenbergii*, 50 to 65 days. An intensive push-net fishery was conducted by women on the zero age group soon after the juveniles had set. Juvenile shrimp were not caught by traps. Monthly length distributions indicated that the fishery was supported by age group one, which was replaced at the end of the season by age group zero. Age group zero grew rapidly and reached a modal length of 75 to 80 mm. in 9 months in January; and adults grew slowly and increased in length to 85 to 90 mm. in May, and 100 to 105 mm. in November. The weight-length relation of *M. vollenhovenii* ovigerous females was expressed by the equation  $\text{Log } W = -4.656603 + 3.011392 \text{ Log } L$ , and males and nonovigerous females by  $\text{Log } W = -4.829560 + 3.092213 \text{ Log } L$ .

The characters used to distinguish *M. macrobrachion* from the commercial shrimp are given. The smaller species (modal length 50 to 54 mm.), constituted 88 percent of the shrimp discarded from the commercial catch. The trap fishery harvested the adults of the two species, which differed considerably in length, without harm to either species.

627. Calico Scallops of the Southeastern United States, 1959-69. By Robert Cummins, Jr. June 1971, iii + 22 pp., 23 figs, 3 tables.

ABSTRACT

The report summarizes developments concerning the calico scallop resource of the southeastern United States. A brief background is provided followed by a description of the fishery in North Carolina and subsequent expansion to the Florida grounds. Included are sections dealing with developments in the fishery, quality of the scallop and its parasites. A chronological review is made of the development of processing machinery; recent industry activity is summarized; and cooperative

technical Bureau of Commercial Fisheries (now National Marine Fisheries Service) assistance is described.

628. Fur Seal Investigations, 1969. By NMFS, Marine Mammal Biological Laboratory. August 1971, viii + 90 pp., 20 figs., 44 tables, 23 appendix A tables, 18 appendix B tables.

ABSTRACT

Field investigations of the fur seal, *Callorhinus ursinus*, in 1969 were conducted on the Pribilof Islands from June to October and in the eastern North Pacific Ocean, off the State of Washington, in February and March.

The kill included 38,678 males and 230 females.

We counted 10,276 living adult males in June and 10,597 in July.

Dead fur seals counted included 14,810 pups and 286 animals older than pups.

The main causes of death among 208 pups were malnutrition, hookworm disease, and microbial infections.

The average weights of pups in late August were 9.8 kg. for males and 8.6 kg. for females.

We marked 25,775 pups of both sexes and 3,419 male seals presumed to be ages 1 and 2, and recovered 3,558 marked male seals.

Tag loss varies with tag series. Data on the relative effectiveness of two kinds of marks used on fur seals are inconclusive.

Estimates of the number of pups born in 1966 were 461,000 from tagging and 390,000 from shearing and sampling. According to sheared to un-sheared ratios, an estimated 303,500 pups were born in 1969.

The forecasted kill of males in ages 2 to 5 in 1970 is 53,700. The predicted kill of males in ages 2 to 5 in 1969 was 56,500; the actual kill was 38,440.

About 68 percent of 334 young males tagged on St. Paul Island in 1968 and 69 percent of 555 tagged there in 1969 have since been recovered on the Pribilof Islands. Four of eleven transmitters attached to young males were unaccounted for at the end of the season in 1969.

Weights of the bacula of young males ranged from 3 to 11 dg. at age 2 to 13 to 45 dg. at age 5, and weights of the testes ranged from 9 to 18 g. at age 2 to 23 to 99 g. at age 5.

The number of females collected at sea in 1968 were too few to permit a comparison of body lengths and reproductive conditions between animals on St. Paul Island and at sea during comparable periods.

Organochlorine pesticides were found in the tissues of fur seals, sea lions, and marine birds.

Of 1,136 fur seals sighted off Washington, 334 were collected, 41 were wounded and lost, and 42 were killed and lost.

Solitary seals were more prevalent than paired or large groups of animals.

Fifty-four percent of 299 females killed were from 1 to 7 years old, and 48 yearling seals from the 1968 year class were taken.

Twenty-six marked seals were collected.

Pregnancy rates have ranged from 38 to 90 percent for females age 5 and older collected off Washington in February and March since 1958.

Fifty-five percent of 140 fetuses collected in 1969 were males.

Forty-eight percent of the nonpregnant seals 4 to 19 years of age had ovulated.

Anchovy was the leading species in 190 stomachs that contained food.

Rockfish, capelin, and salmonids followed in importance. Salmon were the most valuable of the commercial fishes eaten by fur seals off Washington in 1969.

differed significantly among those schools with and without catches. Among schools yielding catches, the vessels found most associated with 50 or more birds; among those unsuccessfully fished, the vessels found most associated with 11-50 birds.

Data on support activities showed that it usually took nine men one-half hour to unload about 3.4 metric tons of skipjack tuna. The rate of unloading depended largely on the size of the fish. Loading ice required 6.6 minutes.

Comparison of data from high- and low-producing vessels showed that a high-producing vessel chummed the schools longer, used more bait in fishing, tended to remain with the school longer, and was successful in fishing a higher percentage of the schools it sighted.

629. Analysis of the Operations of Seven Hawaiian Skipjack Tuna Fishing Vessels, June-August 1967. By Richard N. Uchida and Ray F. Sumida. March 1971, v + 25 pp., 14 figs., 21 tables. For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402 — Price 35 cents.

#### ABSTRACT

Analysis of operational data collected from seven Hawaiian skipjack tuna fishing vessels in the summer of 1967 showed that the vessels expended 38 percent of their day-baiting effort at Kaneohe Bay, which yielded 14.7 buckets of bait per set. Keehi Lagoon was, by far, the most productive night-baiting ground; it received 84 percent of the night effort and yielded 10.4 buckets per set.

On fishing trips which averaged 15.5 hours, 31 percent of the time was devoted to traveling to and from the fishing grounds, 62 percent was occupied by scouting, and only 7 percent was actually spent fishing. The vessels chummed 83 percent of the schools sighted, successfully fished 57 percent of the schools chummed, and used an average of 12.8 buckets of bait per trip. Most often seven men fished per school. Fishing duration among the vessels ranged from 1 to 155 minutes, but most schools were fished only for short periods.

Schools of large skipjack tuna (7 kg. or more), which dominate the summer catch, were usually fished further offshore.

About half of the schools sighted were in waters to the west of Oahu. Sightings increased from daybreak to a peak at 0801-0900, dipped at 1001-1100, then rose to a second peak at 1301-1400. The vessels caught 62 percent of their day's catch after 1200. Cloud cover and wave height at the time of fishing had no effect on the success or failure in fishing the school. Although the predominant species of bird associated with the school was not a good indicator of fishing success, size of the bird flock

630. Blue Crab Meat I. Preservation by Freezing. By Jurgen H. Strasser, Jean S. Lennon, and Frederick J. King. July 1971, iii + 13 pp., 5 figs., 2 tables.

#### ABSTRACT

Freezing was studied as a method of preserving blue crab meat for up to 8 months. The results indicate that a rapid freezing rate, storage below 0° F, and vacuum packaging are preferable to minimize losses in the desirable qualities of freshly picked meat.

630. Blue Crab Meat II. Effect of Chemical Treatments on Acceptability. By Jurgen H. Strasser, Jean S. Lennon, and Frederick J. King. July 1971, iii + 12 pp., 1 fig., 9 tables.

#### ABSTRACT

Several chemical treatments were tested as adjuncts to preservation of blue crab meat. Most of these samples were preserved by freezing but some were heat-preserved or freeze-dried. In general, the dip treatments studied did not improve the quality of the preserved samples. However, glazing treatments with some of these chemical solutions appeared to improve the quality of frozen-stored samples.

631. Occurrence of Thiaminase in Some Common Aquatic Animals of the United States and Canada. By R. A. Greig and R. H. Gnaedinger. July 1971, iii + 7 pp., 2 tables.

#### ABSTRACT

Two tables are presented that survey the presence or absence of thiaminase in freshwater and marine fish and shellfish.

632. (See NOAA Technical Report NMFS SSRF.)



633. Blueing of Processed Crab Meat. II. Identification of Some Factors Involved in the Blue Discoloration of Canned Crab Meat (*Callinectes sapidus*). By Melvin E. Waters. May 1971, iii + 7 pp., 1 fig., 3 tables.

ABSTRACT

An outbreak of blue discoloration in canned crab meat occurred during 1969. This paper reports the result of a study we made to pinpoint the cause of blueing and suggest a remedy. Factors found not to affect the color of canned crab meat are (1) method of obtaining a vacuum, (2) the use of a parchment liner, (3) plant water used in processing, (4) the use of dead and/or partially dead crabs, and (5) several metal ions reported as the cause of blueing in other products.

Results showed that iron was involved in the discoloration. It was further shown that a buffered solution of citric acid (pH 6.5-6.8) prevented formation of the blue-colored complex.

634. Age Composition, Weight, Length, and Sex of Herring, *Clupea pallasii*, Used for Reduction in Alaska, 1929-66. By Gerald M. Reid. July 1971, iii + 25 pp., 4 figs., 18 tables.

ABSTRACT

Sampling data from the reduction fisheries for herring, *Clupea pallasii*, in southeastern Alaska (1929-66), Prince William Sound (1937-58), and Kodiak (1936-59) are summarized. The data include the weight of the catches, the weight allowed by quota, and age composition, average weight, average length, and sex ratios.

635. (See NOAA Technical Report NMFS SSRF.)

636. Oil Pollution on Wake Island from the Tanker *R. C. Stoner*. By Reginald M. Gooding. May 1971, iii + 12 pp., 8 figs., 2 tables. For sale by the Superintendent of Documents, U.S. Government Printing Office Washington, D.C. 20402 — Price 25 cents Stock Number 0320-0008.

ABSTRACT

On September 6, 1967, the tanker *R. C. Stoner* foundered on the reef off the harbor entrance at Wake Island. During the following 10 days the vessel's cargo of over 22,000 kliters (6 million gal) of high octane aviation gasoline, aviation jet fuel, aviation turbine fuel, diesel oil, and bunker C black oil was spilled along the southern coast of the island.

A shore and underwater survey of the contaminated coastline showed that an estimated 2,500 kg of inshore reef fishes were killed and stranded on the shore. Numerous other fish and invertebrates were probably killed. Evidence is cited which

indicates that most of the kill occurred on the shallow reef flat and the author speculates on the lethal effect of the various fuels.

NOAA Technical Report NMFS SSRF

632. An Annotated Bibliography of Attempts to Rear the Larvae of Marine Fishes in the Laboratory. By Robert C. May. August 1971, iii + 24 pp., 1 appendix I table, 1 appendix II table. For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402 — 35 cents.

ABSTRACT

A bibliography has been compiled of papers which describe attempts to rear the larvae of marine fishes in the laboratory, covering the period 1878 to 1969. Annotations summarize each paper, and appendixes list the species of fishes studied and the types of food used in the attempts to rear them.

635. A Bibliography of the Blackfin Tuna, *Thunnus atlanticus* (Lesson). By Grant L. Beardley and David C. Simmons. August 1971, 10 pp. For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402 — Price 25 cents Stock Number 0320-0014.

ABSTRACT

One hundred eighty-four references on the blackfin tuna, *Thunnus atlanticus* (Lesson), are listed. A subject index is included.

637. Occurrence of Larval, Juvenile, and Mature Crabs in the Vicinity of Beaufort Inlet, North Carolina. By Donnie L. Dudley and Mayo H. Judy. August 1971, iii + 10 pp., 1 fig., 5 tables. For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402 — Price 25 cents.

ABSTRACT

Monthly samples from 13 ocean stations near Beaufort Inlet, N.C., were examined for the occurrence of crab larvae in 1962. Larval collections were supplemented by sampling with a bottom trawl for juveniles and adults in 1962 and 1963. Trawling was restricted to a small area near the sea buoy at the Inlet. Larvae of 27 species of crabs were taken during the study and were most abundant during the summer and fall. Adults of 13 species of crabs occurred in the collections, with *Callinectes sapidus*, *C. similis*, *Portunus gibbesii*, *Ovalipes ocellatus*, and *Hepatus epheliticus* being the more prevalent.

638. Length-Weight Relations of Haddock from Commercial Landings in New England, 1931-55. By Bradford E. Brown and Richard C. Hennemuth. August 1971, v + 13 pp., 1 fig., 6 tables, 10 appendix A tables. For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402 — Price 25 cents. Stock Number 0320-0018.

ABSTRACT

Length-weight relations (including the conversion of dressed to live weight) are needed to study the population dynamics of haddock on Georges and Browns Banks. Analyses of covariance were used to compare these relations among market categories, years, fishing areas, and months. There was considerable variation among samples taken on different trips and among subsamples taken on a single trip. Separate regression lines are recommended for market categories (large and scrod) and for Georges and Browns Banks. No yearly or seasonal trends were evident. Estimating equations are presented.

639. A Hydrographic Survey of the Galveston Bay System, Texas, 1963-66. By E. J. Pullen, W. L. Trent, and G. B. Adams. October 1971, v + 13 pp., 15 figs., 12 tables. For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402 — Price 30 cents Stock Number 0320-0024.

ABSTRACT

Water temperature and salinity data, taken during 1963-66, and dissolved organic nitrogen, total phosphorus, and dissolved oxygen data taken during 1964-66 Galveston Bay, Texas were analyzed by area and habitat (depth strata).

Temperatures ranged from 0.4° C to 36.0° C during the study and averaged slightly higher in the peripheral than the open-water or channel habitat. Between years, water temperature averages varied as much as 7° C between coldest months, and 3° C between warmest months.

Salinities ranged from 0.1 to 36.6‰ and increased from the peripheral to the channel habitats. Gradients of increasing salinities occurred from east to west and north to south in the system. Salinities decreased from 1963 to 1966 with the smallest difference between years occurring in March and April and the greatest difference between years in May and June. Minimum salinities always occurred during periods of high stream discharge in the winter and spring and maximum salinities during periods of low stream discharge in the late summer and fall.

Dissolved organic nitrogen concentrations ranged from 1 to 300 µg at /liter. Nitrogen concentrations decreased from the upper to the lower bays. Nitrogen values were similar seasonally and

between years. High river flow was correlated with an increase of nitrogen in the lower bay areas.

Total phosphorus concentrations ranged from 0.1 to 47.5 µg at /liter. Phosphorus concentrations diminished from upper to lower bays, and from west to east in the system. Seasonal concentrations of phosphorus were similar from 1964 through the spring of 1966. In June 1966, concentrations increased, reaching an all years' maximum in the fall. River discharge was not correlated to phosphorus concentrations, although nitrogen and phosphorus values were positively correlated.

Dissolved oxygen concentrations ranged from 0.2 to 13.6 ml/liter. Lowest oxygen concentrations were in the channels and highest and similar concentrations were in the peripheral and open-water habitats. Oxygen values were inversely correlated with water temperatures.

640. Annotated Bibliography on the Fishing Industry and Biology of the Blue Crab, *Callinectes sapidus*. By Marlin E. Tagatz and Ann Bowman Hall. August 1971, 94 pp. For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402 — Price \$1.00 Stock Number 0318-0009.

ABSTRACT

References are given on 742 publications, published before 1970, on classification, distribution, abundance, life history, morphology, physiology, ecology, fishery, and industry. Annotations and a subject index also are provided.

641. Use of Threadfin Shad, *Dorosoma petenense*, as Live Bait During Experimental Pole-and-Line Fishing for Skipjack Tuna, *Katsuwonus pelamis*, in Hawaii. By Robert T. B. Iversen. August 1971, iii + 10 pp., 3 figs., 7 tables. For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402 — Price 25 cents Stock Number 0320-0013.

ABSTRACT

The effectiveness of threadfin shad as a live bait for skipjack tuna fishing in Hawaii was compared with the normal anchovy bait (nehu) during experimental fishing on 37 schools of skipjack tuna during 1967 and 1968 aboard the research vessel *Charles H. Gilbert*. Threadfin shad proved about as effective as nehu in (1) luring skipjack tuna to the stern of the vessel, (2) concentrating the skipjack tuna at the fishing station, and (3) catch rate of skipjack tuna. Underwater observations of threadfin shad and nehu indicate a general similarity in behavior during fishing. Bait-sized threadfin shad occur in freshwater impoundments in Hawaii during the peak months of skipjack tuna fishing.

They are hardy, easily acclimated to salt water, and readily handled in large numbers.

an information resource for studies of air-sea interaction and related seasonal variation of the near-surface oceanic environment. It can also be used to outline potential areas and seasons of fishing operations.

642. Atlantic Menhaden (*Brevoortia tyrannus*) Resource and Fishery — Analysis of Decline. By Kenneth A. Henry. August 1971, v + 32 pp., 40 figs., 5 appendix figs., 3 tables, 2 appendix tables. For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402 — Price 45 cents Stock Number 0320-0019.

ABSTRACT

After record catches in 1961 and 1962 of about 2.3 billion pounds (1.043 million metric tons) of menhaden (*Brevoortia* spp.), the U.S. catch declined to about 1.2 billion pounds (0.544 million metric tons) in 1967. Most of the decrease was in the North Atlantic and Middle Atlantic. Since about 1940, catches had increased, in general, with increased fishing effort. In recent years, however, the catch per unit of effort (a standard vessel day) has declined markedly. It fell from about 148,000 pounds (67.1 metric tons) in 1962 to about 38,000 pounds (17.2 metric tons) in 1967 in the North Atlantic and from 140,000 pounds (63.5 metric tons) in 1962 to 51,000 pounds (23.1 metric tons) in 1967 in the Middle Atlantic. The catch per unit of effort in these two areas improved in 1968, but fishing effort was at such a low level that the increase is of doubtful significance.

Other possible units of effort such as catch per vessel week and catch per landing day are examined. In 1964, the catch in Chesapeake Bay exceeded the catch in the Middle Atlantic for the first time; in 1968, the Chesapeake Bay catch amounted to 63% of the total summer catch of Atlantic menhaden (*B. tyrannus*). In recent years, over 90% of the fish in the total catch were immature. A relation is established between the estimated abundance of juvenile Atlantic menhaden, based on trawling, and the total catch from the year class. A stock-recruitment relation, based on catch per unit of effort in the Middle Atlantic and total catch from the year class, indicates that the spawning stock is below optimum size.

643. Surface Winds of the Southeastern Tropical Atlantic Ocean. By John M. Steigener and Merton C. Ingham. October 1971, iii + 20 pp., 17 figs. For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402 — Price 35 cents.

ABSTRACT

This publication presents mean monthly surface wind velocities by 5° rectangles (Marsden square quadrants) for the eastern tropical Atlantic Ocean from the African coastline at approximately lat 5° N to lat 20° S, and from long 15° E to long 20° W. The publication is intended to serve principally as

644. (In press, 31 December 1971.)

645. Traveling Screen for Removal of Debris from Rivers. By Daniel W. Bates, Ernest W. Murphey, and Martin G. Beam. October 1971, iii + 6 pp., 6 figs., 1 table. For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402 — Price 25 cents Stock Number 0320-0016.

ABSTRACT

This report describes the features and operation of a traveling debris screen, installed within a 12.2-m wide test flume in the Grande Ronde River near Troy, Oreg. The National Marine Fisheries Service developed the screen to improve removal of debris from canals and rivers of the Pacific Northwest and to reduce costs of removal. Trash racks are now used to remove debris, but they have been considered impractical because of maintenance difficulties during floods and because of their large size.

646. Dissolved Nitrogen Concentrations in the Columbia and Snake Rivers in 1970 and their Effect on Chinook Salmon and Steelhead Trout. By Wesley J. Ebel. August 1971, iii + 7 pp., 2 figs, 6 tables. For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402 — Price 20 cents Stock Number 0320-0020.

ABSTRACT

Concentrations of dissolved nitrogen gas varied widely in 1970 but were generally lower in the Columbia River than in 1968-69. Concentrations were high, however, in some areas of the Snake River in the spring and early summer, mainly because of spilling of water at Little Goose Dam. Symptoms of gas bubble disease were widespread in Snake River juvenile and adult chinook salmon (*Oncorhynchus tshawytscha*) and steelhead trout (*Salmo gairdneri*). There were substantial losses of fish, particularly juveniles, during periods of high concentration of dissolved nitrogen gas.

647. (In press, 31 December 1971.)

648. Weight Loss of Pond-Raised Channel Catfish (*Ictalurus punctatus*) During Holding in Processing Plant Vats. By Donald C. Greenland and Robert L. Gill. December 1971,

638. Length-Weight Relations of Haddock from Commercial Landings in New England, 1931-55. By Bradford E. Brown and Richard C. Hennemuth. August 1971, v + 13 pp., 1 fig., 6 tables, 10 appendix A tables. For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402 — Price 25 cents. Stock Number 0320-0018.

ABSTRACT

Length-weight relations (including the conversion of dressed to live weight) are needed to study the population dynamics of haddock on Georges and Browns Banks. Analyses of covariance were used to compare these relations among market categories, years, fishing areas, and months. There was considerable variation among samples taken on different trips and among subsamples taken on a single trip. Separate regression lines are recommended for market categories (large and scrod) and for Georges and Browns Banks. No yearly or seasonal trends were evident. Estimating equations are presented.

639. A Hydrographic Survey of the Galveston Bay System, Texas, 1963-66. By E. J. Pullen, W. L. Trent, and G. B. Adams. October 1971, v + 13 pp., 15 figs., 12 tables. For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402 — Price 30 cents Stock Number 0320-0024.

ABSTRACT

Water temperature and salinity data, taken during 1963-66, and dissolved organic nitrogen, total phosphorus, and dissolved oxygen data taken during 1964-66 Galveston Bay, Texas were analyzed by area and habitat (depth strata).

Temperatures ranged from 0.4° C to 36.0° C during the study and averaged slightly higher in the peripheral than the open-water or channel habitat. Between years, water temperature averages varied as much as 7° C between coldest months, and 3° C between warmest months.

Salinities ranged from 0.1 to 36.6‰ and increased from the peripheral to the channel habitats. Gradients of increasing salinities occurred from east to west and north to south in the system. Salinities decreased from 1963 to 1966 with the smallest difference between years occurring in March and April and the greatest difference between years in May and June. Minimum salinities always occurred during periods of high stream discharge in the winter and spring and maximum salinities during periods of low stream discharge in the late summer and fall.

Dissolved organic nitrogen concentrations ranged from 1 to 300 ug at /liter. Nitrogen concentrations decreased from the upper to the lower bays. Nitrogen values were similar seasonally and

between years. High river flow was correlated with an increase of nitrogen in the lower bay areas.

Total phosphorus concentrations ranged from 0.1 to 47.5 ug at /liter. Phosphorus concentrations diminished from upper to lower bays, and from west to east in the system. Seasonal concentrations of phosphorus were similar from 1964 through the spring of 1966. In June 1966, concentrations increased, reaching an all years' maximum in the fall. River discharge was not correlated to phosphorus concentrations, although nitrogen and phosphorus values were positively correlated.

Dissolved oxygen concentrations ranged from 0.2 to 13.6 ml/liter. Lowest oxygen concentrations were in the channels and highest and similar concentrations were in the peripheral and open-water habitats. Oxygen values were inversely correlated with water temperatures.

640. Annotated Bibliography on the Fishing Industry and Biology of the Blue Crab, *Callinectes sapidus*. By Marlin E. Tagatz and Ann Bowman Hall. August 1971, 94 pp. For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402 — Price \$1.00 Stock Number 0318-0009.

ABSTRACT

References are given on 742 publications, published before 1970, on classification, distribution, abundance, life history, morphology, physiology, ecology, fishery, and industry. Annotations and a subject index also are provided.

641. Use of Threadfin Shad, *Dorosoma petenense*, as Live Bait During Experimental Pole-and-Line Fishing for Skipjack Tuna, *Katsuwonus pelamis*, in Hawaii. By Robert T. B. Iversen. August 1971, iii + 10 pp., 3 figs., 7 tables. For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402 — Price 25 cents Stock Number 0320-0013.

ABSTRACT

The effectiveness of threadfin shad as a live bait for skipjack tuna fishing in Hawaii was compared with the normal anchovy bait (nehu) during experimental fishing on 37 schools of skipjack tuna during 1967 and 1968 aboard the research vessel *Charles H. Gilbert*. Threadfin shad proved about as effective as nehu in (1) luring skipjack tuna to the stern of the vessel, (2) concentrating the skipjack tuna at the fishing station, and (3) catch rate of skipjack tuna. Underwater observations of threadfin shad and nehu indicate a general similarity in behavior during fishing. Bait-sized threadfin shad occur in freshwater impoundments in Hawaii during the peak months of skipjack tuna fishing.

They are hardy, easily acclimated to salt water, and readily handled in large numbers.

642. Atlantic Menhaden (*Brevoortia tyrannus*) Resource and Fishery — Analysis of Decline. By Kenneth A. Henry. August 1971, v + 32 pp., 40 figs., 5 appendix figs., 3 tables, 2 appendix tables. For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402 — Price 45 cents Stock Number 0320-0019.

ABSTRACT

After record catches in 1961 and 1962 of about 2.3 billion pounds (1.043 million metric tons) of menhaden (*Brevoortia* spp.), the U.S. catch declined to about 1.2 billion pounds (0.544 million metric tons) in 1967. Most of the decrease was in the North Atlantic and Middle Atlantic. Since about 1940, catches had increased, in general, with increased fishing effort. In recent years, however, the catch per unit of effort (a standard vessel day) has declined markedly. It fell from about 148,000 pounds (67.1 metric tons) in 1962 to about 38,000 pounds (17.2 metric tons) in 1967 in the North Atlantic and from 140,000 pounds (63.5 metric tons) in 1962 to 51,000 pounds (23.1 metric tons) in 1967 in the Middle Atlantic. The catch per unit of effort in these two areas improved in 1968, but fishing effort was at such a low level that the increase is of doubtful significance.

Other possible units of effort such as catch per vessel week and catch per landing day are examined. In 1964, the catch in Chesapeake Bay exceeded the catch in the Middle Atlantic for the first time; in 1968, the Chesapeake Bay catch amounted to 63% of the total summer catch of Atlantic menhaden (*B. tyrannus*). In recent years, over 90% of the fish in the total catch were immature. A relation is established between the estimated abundance of juvenile Atlantic menhaden, based on trawling, and the total catch from the year class. A stock-recruitment relation, based on catch per unit of effort in the Middle Atlantic and total catch from the year class, indicates that the spawning stock is below optimum size.

643. Surface Winds of the Southeastern Tropical Atlantic Ocean. By John M. Steigner and Merton C. Ingham. October 1971, iii + 20 pp., 17 figs. For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402 — Price 35 cents.

ABSTRACT

This publication presents mean monthly surface wind velocities by 5° rectangles (Marsden square quadrants) for the eastern tropical Atlantic Ocean from the African coastline at approximately lat 5° N to lat 20° S, and from long 15° E to long 20° W. The publication is intended to serve principally as

an information resource for studies of air-sea interaction and related seasonal variation of the near-surface oceanic environment. It can also be used to outline potential areas and seasons of fishing operations.

644. (In press, 31 December 1971.)

645. Traveling Screen for Removal of Debris from Rivers. By Daniel W. Bates, Ernest W. Murphey, and Martin G. Beam. October 1971, iii + 6 pp., 6 figs., 1 table. For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402 — Price 25 cents Stock Number 0320-0016.

ABSTRACT

This report describes the features and operation of a traveling debris screen, installed within a 12.2-m wide test flume in the Grande Ronde River near Troy, Oreg. The National Marine Fisheries Service developed the screen to improve removal of debris from canals and rivers of the Pacific Northwest and to reduce costs of removal. Trash racks are now used to remove debris, but they have been considered impractical because of maintenance difficulties during floods and because of their large size.

646. Dissolved Nitrogen Concentrations in the Columbia and Snake Rivers in 1970 and their Effect on Chinook Salmon and Steelhead Trout. By Wesley J. Ebel. August 1971, iii + 7 pp., 2 figs, 6 tables. For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402 — Price 20 cents Stock Number 0320-0020.

ABSTRACT

Concentrations of dissolved nitrogen gas varied widely in 1970 but were generally lower in the Columbia River than in 1968-69. Concentrations were high, however, in some areas of the Snake River in the spring and early summer, mainly because of spilling of water at Little Goose Dam. Symptoms of gas bubble disease were widespread in Snake River juvenile and adult chinook salmon (*Oncorhynchus tshawytscha*) and steelhead trout (*Salmo gairdneri*). There were substantial losses of fish, particularly juveniles, during periods of high concentration of dissolved nitrogen gas.

647. (In press, 31 December 1971.)

648. Weight Loss of Pond-Raised Channel Catfish (*Ictalurus punctatus*) During Holding in Processing Plant Vats. By Donald C. Greenland and Robert L. Gill. December 1971,

iii + 7 pp., 3 figs., 2 tables. For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402 — Price 25 cents.

#### ABSTRACT

Information on weight loss and mortality was obtained for samples of channel catfish (*Ictalurus punctatus*) held for processing at a catfish processing plant located at Dumas, Ark. Weight losses were determined for several different holding situations by daily weighings of samples held in wire containers. Mortality was recorded at 24-hr intervals. Test results showed peak weight loss during the test period for all holding situations averaged 55 kg per metric ton (5.5 lb. per cwt), 82.0% of which occurred during the first 48 hr of holding. There was no difference in weight loss of fish held at densities of 320.3 kg per cubic meter (20.0 lb. per cu ft) and 640.6 kg per cubic meter (40.0 lb. per cu ft) of water ranging from 21.1° to 22.2° C (70.0° to 72.0° F). However, at the heavier loading there was twice the mortality, 8.0% compared to 4.5%. Fish held in a pond with temperatures from 8.9° to 15.0° C (48.0° to 59.0° F) fared the best of any of the test groups. These fish had a peak weight loss of 2.0% and suffered no mortality. Similar groups of fish held in vats at 21.1° C (71.0° F) aerated with agitators and compressed air had peak weight losses of 4.2% and 6.9% and suffered mortalities of 34.0% and 15.0% respectively.

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349. Use of abstracts and summaries as communication devices in technical articles. By F. Bruce Sanford. February 1971, iii + 11 pp., 1 fig.
350. Research in fiscal year 1969 at the Bureau of Commercial Fisheries Biological Laboratory, Beaufort, N.C. By the Laboratory staff. November 1970, ii + 49 pp., 21 figs., 17 tables.
351. Bureau of Commercial Fisheries Exploratory Fishing and Gear Research Base, Pascagoula, Mississippi, July 1, 1967 to June 30, 1969. By Harvey R. Bullis, Jr., and John R. Thompson. November 1970, iv + 29 pp., 29 figs., 1 table.
352. Upstream passage of anadromous fish through navigation locks and use of the stream for spawning and nursery habitat, Cape Fear River, N.C., 1962-66. By Paul R. Nichols and Darrell E. Louder. October 1970, iv + 12 pp., 9 figs., 4 tables.
356. Floating laboratory for study of aquatic organisms and their environment. By George R. Snyder, Theodore H. Blahm, and Robert J. McConnell. May 1971, iii + 16 pp., 11 figs.
361. Regional and other related aspects of shellfish consumption — some preliminary findings from the 1969 Consumer Panel Survey. By Morton M. Miller and Darrel A. Nash. June 1971, iv + 18 pp., 19 figs., 3 tables, 10 apps.