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NOAA Technical Report NMFS CIRC-382

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

Fishery Publications, Calendar Year 1966: Lists and Indexes

MARY ELLEN ENGETT and LEE C. THORSON

SEATTLE, WA
JULY 1973

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 Commerecial 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, *Sebastodes 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

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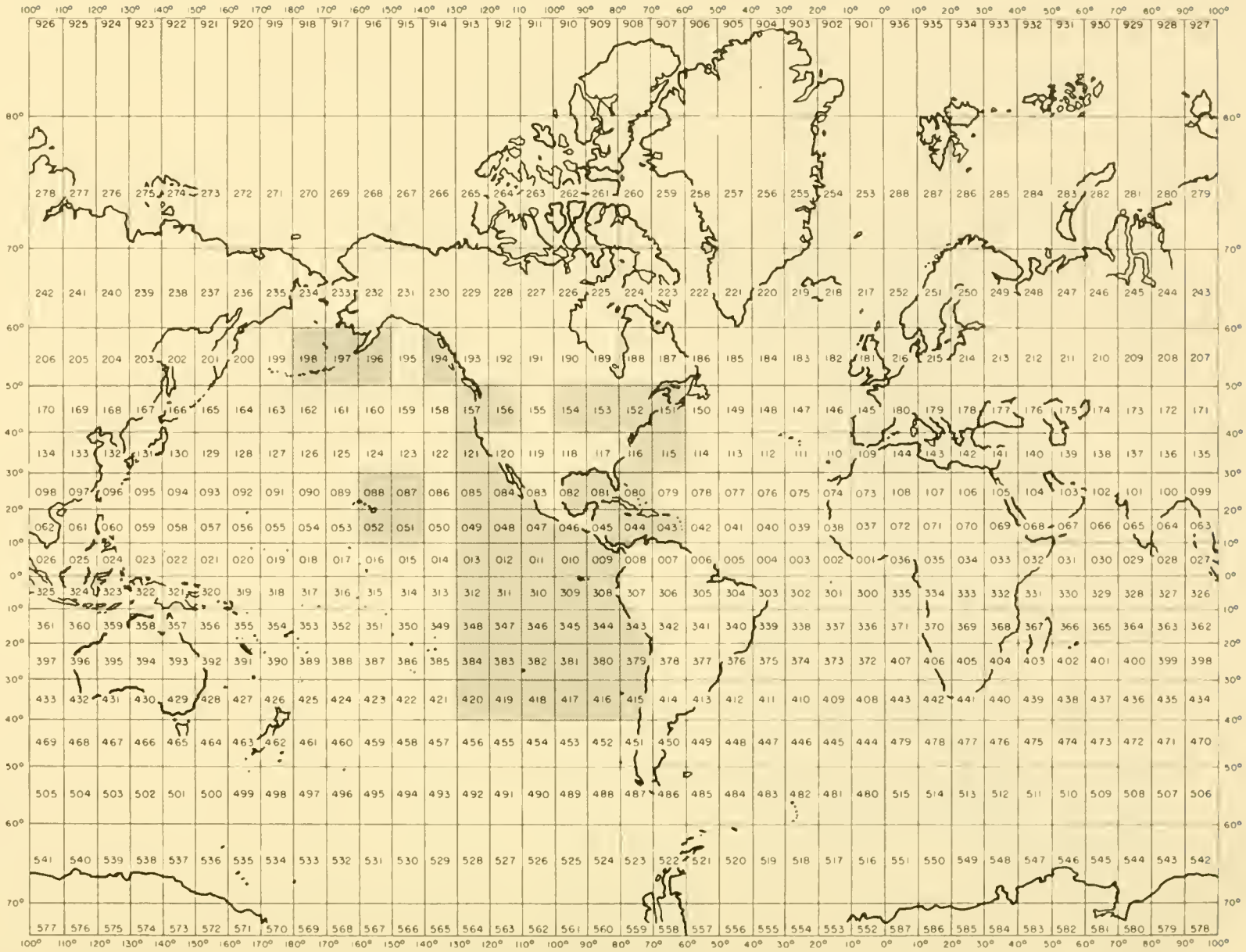

FIGURE 1.—Marsden square grid showing geographic areas (shaded) covered by fishery publications, calendar year 1966.

FISHERY PUBLICATIONS, CALENDAR YEAR 1966: LISTS AND INDEXES

By

MARY ELLEN ENGETT and LEE C. THORSON

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 1966 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 1966 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

236. Annual report exploratory fishing and gear research Bureau of Commercial Fisheries Region 2 for fiscal year 1964. By Harvey R. Bullis, Jr., and John R. Thompson. January 1966, iv + 57 pp., 35 figs., 13 tables, 1 app.
(No abstract.)

237. Commercial clams of the North American Pacific coast. By Murray H. Amos. April 1966, iii + 18 pp., 10 figs.
(No abstract.)

238. Shark fishing gear: A historical review. By Mary Hayes Wagner. January 1966, iii + 14 pp., 9 figs., 1 table.
(No abstract.)

239. Report of the Bureau of Commercial Fisheries Biological Station, St. Petersburg Beach, Florida fiscal years 1962-64. By James E. Sykes. April 1966, 26 pp., 21 figs.

(No abstract.)

240. Annual report of the Bureau of Commercial Fisheries Biological Laboratory Beaufort, N.C. for the fiscal year ending June 30, 1965. By Kenneth A. Henry. March 1966, iv + 39 pp., 22 figs., 10 tables.

(No abstract.)

241. Annual report of the Bureau of Commercial Fisheries Technological Laboratory, Gloucester, Mass. for the fiscal year ending June 30, 1964. By Joseph W. Slavin. May 1966, iii + 31 pp., 16 figs., 10 tables.

(No abstract.)

242. Report of the Bureau of Commercial Fisheries Biological Station, St. Petersburg Beach, Florida fiscal year 1965. By James E. Sykes. April 1966, iv + 30 pp., 18 figs., 7 tables.

(No abstract.)

243. Progress in 1964-65 at the Bureau of Commercial Fisheries Biological Laboratory, Honolulu. By Thomas A. Manar. February 1966, 42 pp., 27 figs.

ABSTRACT

This report deals with research results achieved by the Bureau of Commercial Fisheries Biological Laboratory in Honolulu from January 1, 1964, to June 30, 1965. Described are developments in the following fields: the sensory capacities of tunas; tuna behavior; subpopulations research using genetic techniques; studies of the ecology of the skipjack tuna and the albacore tuna; biological surveys of the Indian Ocean; investigations of the oceanography of the Hawaiian Islands area and of the entire Pacific; and studies devoted to the evaluation of the use of a submarine for research in fisheries and oceanography. Publications issued or in press during the period are listed.

244. Annual report of the Bureau of Commercial Fisheries Radiobiological Laboratory Beaufort, N.C. for the fiscal year ending June 30, 1965. By T. R. Rice. July 1966, iii + 50 pp., 24 figs., 21 tables.

(No abstract.)

245. Field guide to the Synodontidae (Lizardfishes) of the western Atlantic Ocean. By William W. Anderson, Jack W. Gehringer, and Frederick H. Berry. May 1966, 12 pp., 25 figs.

ABSTRACT

Illustrated keys, designed primarily for use in the field, are presented for the 3 genera and 10 species of lizardfishes, family Synodontidae, occurring in the western Atlantic Ocean.

246. Annual report of the Bureau of Commercial Fisheries Biological Laboratory, Galveston, Texas fiscal year 1965. By Milton J. Lindner and Joseph H. Kutkuhn. June 1966, iv + 51 pp., 46 figs., 11 tables.

ABSTRACT

The program of the laboratory in Galveston involves fisheries biology and oceanography research of the commercial fishery resources in the Gulf of Mexico. Particular emphasis is on shrimp research.

247. Annual report of the Bureau of Commercial Fisheries Biological Laboratory, Gulf Breeze, Florida for the fiscal year ending June 30, 1965. By Philip A. Butler. May 1966, iii + 15 pp., 6 figs., 2 tables.

(No abstract.)

248. An economic study of the Boston large-trawler labor force. By Virgil J. Norton and Morton M. Miller. May 1966, iii + 54 pp., 6 figs., 11 tables, 49 app tables.

(No abstract.)

249. Annual report exploratory fishing and gear research Bureau of Commercial Fisheries Region 2 for fiscal year 1965. By Harvey R. Bullis, Jr., and John R. Thompson. October 1966, iii + 33 pp., 44 figs.

(No abstract.)

250. North American fishery potential. By P. A. Larkin. September 1966, pp. 1-4, 2 figs.

(No abstract.)

(250.) Are our fishery resources being properly developed and managed? By J. L. Kask. September 1966, pp. 5-7, 1 fig.

(No abstract.)

(250.) Politics and the marine fisheries. By Wilbert McLeod Chapman. September 1966, pp. 8-16, 4 figs.

(No abstract.)

(250.) Oceanography and the marine fisheries. By Milner B. Schaefer. September 1966, pp.

17-27, 19 figs.
(No abstract.)

(250.) The future of fish harvesting. By Basil A. Parkes. September 1966, pp. 28-33, 6 figs.
(No abstract.)

(250.) Processing—Tomorrow. By E. Robert Kinney. September 1966, pp. 34-36, 2 figs.
(No abstract.)

(250.) A panel considers: "Sell up to higher profits". By Arthur H. Frohman, John Mehos, Eric Turnill, and Dr. Wendell Earle. September 1966, pp. 37-44, 6 figs.
(No abstract.)

(250.) All the world's a market. By Hon. Mitchell Sharp. September 1966, pp. 45-48, 3 figs.
(No abstract.)

(250.) World demand complicates conservation. By Hon. H. J. Robichaud. September 1966, pp. 49-51, 3 figs.
(No abstract.)

(250.) Mexico's fishing industry. By Lic. Jorge Echaniz R. September 1966, pp. 52-55, 3 figs.
(No abstract.)

(250.) World markets and demands. By Stewart L. Udall. September 1966, pp. 56-58.
(No abstract.)

(250.) The role of FAO in world fisheries. By Roy I. Jackson. September 1966, pp. 59-62, 1 fig.
(No abstract.)

(250.) The future of North American fisheries. By Donald L. McKernan. September 1966, pp. 63-72, 5 figs.
(No abstract.)

251. Annual report, Bureau of Commercial Fisheries Technological Laboratory, Pascagoula, Mississippi fiscal year 1965. By Travis D. Love and Mary H. Thompson. November 1966, iv + 25 pp., 21 figs., 7 tables.
(No abstract.)

252. Published in 1967.

253. Ornamental use of starfishes. By Haskell S. Tubiash. December 1966, 3 pp., 2 figs.
(No abstract.)

Data Report

10. Oceanographic observations, 1963, east coast of the United States. By Joseph Chase. March 1966, 173 pp. on 3 microfiche.

ABSTRACT

Daily water temperature and salinity observations for 1963 from 15 locations along the Atlantic seaboard are tabulated, plotted, and discussed.

11. Releases and recoveries of marked pink shrimp, *Penaeus duorarum* Burkenroad, in south Florida waters. 1958-64. By Donald M. Allen and T. J. Costello. March 1966, 77 pp. on 2 microfiche.

ABSTRACT

In 17 experiments in south Florida waters, pink shrimp were captured, stain-marked, released, and recaptured during the period 1958-64. This report contains data concerning place and date of release and recapture of shrimp, number, size, and sex of shrimp, and the stains used.

12. Oceanographic observations south of Adak Island, summer 1963. By Craig Van Dyke. May 1966, 56 pp. on 1 microfiche.

ABSTRACT

Temperature and salinity data to a depth of 1,050 m. were obtained at 44 stations between Adak Island and lat. 50° N., from July to September 11, 1963, aboard the RV *George B. Kelez*. Tabulations of observed and interpolated data, as well as values of sigma-T and dynamic height anomaly, are presented.

13. Oceanographic observations of Tampa Bay, Charlotte Harbor, Pine Island Sound, Florida, and adjacent waters of the Gulf of Mexico, February 1964 through February 1965. By A. Dragovich, J. A. Kelly, Jr., and J. H. Finucane. August 1966, 73 pp. on 2 microfiche.

ABSTRACT

Oceanographic data are presented, and the methods of collection and analysis of samples are described. Determinations of water temperature, salinity, inorganic phosphate-phosphorus, dissolved oxygen, pH, iron, chlorophyll A, light transmission, ultraviolet absorption, cloud cover, cloud type, wind velocity, sea state, and sea direction are recorded. These data were collected as a part of continuing studies on the ecology of estuaries and the Florida red-tide organism (*Gymnodinium breve*).

14. Hydrographic observations in Tampa Bay, Florida, and the adjacent Gulf of Mexico—1963. By John H. Finucane and Alexander Dragovich. September 1966, 83 pp. on 2 microfiche.

ABSTRACT

Hydrographic and primary-productivity data are presented for Tampa Bay, Fla., and the adjacent Gulf of Mexico for 1963. Observations include tide stage, water temperature, salinity, total and inorganic phosphate-phosphorus, total soluble nitrogen, dissolved oxygen, pH, light transmission, water color, cloud cover, cloud type, visibility, wind velocity, wind direction, and sea state. Values for chlorophyll, ultraviolet absorption, and primary production also are given. These data were collected during field operations in estuarine studies of the eastern Gulf of Mexico.

Fishery Industrial Research

Vol. 3, No. 2. Proximate composition of Lake Michigan alewife (*Alosa pseudoharengus*). By Donald R. Travis. July 1966, pp. 1-4, 4 figs., 3 tables.

ABSTRACT

The concentration of nitrogen, oil, ash, and moisture in alewives caught in Lake Michigan was determined on 6 bimonthly samples. The proximate composition and physical measurements are reported for the whole fish.

Vol. 3, No. 2. Accumulation of organic acids during cold storage of shucked soft clams, *Mya arenaria* (L.), in relation to quality. By Baruch Rosen. July 1966, pp. 5-11, 7 figs.

ABSTRACT

During the cold storage of soft clams in plug-top metal cans, the content of glycogen decreased; that of glucose at first increased and then stabilized; that of lactic acid increased continuously; and that of acetic, propionic, and pyruvic acids increased at diminishing rates. The bacterial count increased at an exponential rate. Except in the cases of extreme freshness and extreme spoilage, organoleptic quality was related neither to the chemical changes nor to the bacterial count.

Vol. 3, No. 2. Value of menhaden fish meal as a protein supplement to cottonseed meal-corn diets fed to rats. By Robert R. Kifer, Edgar P. Young, and Kam C. Leong. July 1966, pp. 13-15, 3 tables.

ABSTRACT

Menhaden fish meal was evaluated as a protein supplement to cottonseed meal-corn diets by means of a rat-feeding study. Rats were randomly allotted to 9 treatment groups and fed diets containing cottonseed meal-corn with 0-, 2-, or 4-percent levels of fish-meal protein, at 16-, 15-, or 14-percent levels of total protein. A significant improvement in rates of gain and utilization of feed resulted from supplementation by the menhaden fish meal. These differences in growth response and utilization of feed were not significantly related to the 16-, 15-, or 14-percent dietary levels of protein.

Vol. 3, No. 2. Value of menhaden fish meal as a protein supplement to meat-and-bone meal-corn diets fed to rats. By Robert R. Kifer, Edgar P. Young, and Kam C. Leong. July 1966, pp. 17-24, 9 figs., 6 tables.

ABSTRACT

To evaluate menhaden fish meal as a protein supplement to meat-and-bone meal-corn diets, we allotted rats randomly to 9 treatment groups and fed them diets containing meat-and-bone meal-corn, with 0, 2, and 4 percent fish meal protein, at 16-, 15-, and 14-percent levels of total protein. Rates of gain and utilization of feed were significantly improved by adding fish meal. The rates of gain and utilization of feed decreased, however, as the dietary levels of protein were lowered, whether fish meal was used as a supplement or not.

Vol. 3, No. 2. Value of menhaden fish meal as a protein supplement in soybean meal-corn diets fed to rats. By Robert R. Kifer, Edgar P. Young, and Kam C. Leong. July 1966, pp. 25-28, 8 tables.

ABSTRACT

2 consecutive rat-feeding studies were conducted so that menhaden fish meal could be evaluated as a protein supplement in soybean meal-corn diets. Animals weighing 50 $\pm$ 5 grams were randomly allotted to 5 treatment groups in Experiment I and to 9 treatment groups in Experiment II and fed diets containing soybean meal-corn, with and without fish meal, at various levels of total protein (16 and 14 percent in Experiment I and 16, 15, and 14 percent in Experiment II).

In both experiments, response to fish-meal supplementation varied somewhat, as indicated by rates of gain and utilization of feed. It was indicated, however, that fish-meal supplementations in general did not improve the amino acid balance of the soybean meal-corn diets.

Vol. 3, No. 2. Proximate composition of Gulf of Mexico industrial fish. By Mary H. Thompson. July 1966, pp. 29-67, 5 figs., 7 tables, 17 app figs., 21 app tables, 2 illus.

ABSTRACT

Variations in physical measurements and proximate composition of 17 Gulf of Mexico industrial fish over several years are delineated on a monthly

basis. Scattered data for several other species are also presented. Analysis of variation in proximate composition and the influence of (1) geographic location of catch, (2) yearly variation, (3) reproductive cycle, (4) sex, (5) food, (6) size, (7) activity, and (8) species are discussed. The fishery is described, and data are given on fluctuations in bottom temperature and types of bottom encountered. Changes in moisture and oil content are shown, and an equation for estimating the oil content of a lot, composed of mixed species, from its known moisture content is presented. The equation ($Y = 65.3 - 0.8X$) can be used to predict the oil content with a statistically estimated error of ± 0.6 percent oil. A series of actual samples showed the average deviation to be -0.1 percent.

Vol. 3, No. 3. Proximate composition of the Pacific Coast Dungeness crab (*Cancer magister*). By Robert N. Farragut and Mary H. Thompson December 1966, pp. 1-4, 4 figs., 3 tables.

ABSTRACT

The proximate composition of Pacific Coast Dungeness crab is given. Data from 4 samples each of frozen body meat, claw meat, and offal of the Dungeness crab are reported, as is the composition of 2 types of cooked packs from the same lots. Changes in proximate composition resulting from processing are noted.

Vol. 3, No. 3. Microbial analyses of frozen raw breaded shrimp. By Bobby J. Carroll, Travis D. Love, Benjamin Q. Ward, and Melvin E. Waters. December 1966, pp. 5-11, 2 tables.

ABSTRACT

164 commercially packed samples of frozen raw breaded shrimp from 14 processing plants were tested for total plate counts, coliforms, *Escherichia coli*, fecal streptococci, and coagulase-positive staphylococci. The aim of the study was to supply background data on which realistic future bacteriological standards can be based.

Vol. 3, No. 3. Recent technological studies of Dungeness crab processing. Part 4—Preliminary report on salt uptake and heat penetration in whole-cooked crab. By Harold Barnett and Richard W. Nelson. December 1966, pp. 13-16, 3 figs., 1 table.

ABSTRACT

A study undertaken to show the effect on whole Dungeness crab of varying the concentration of brine in the cook water indicated that salt is absorbed at a faster rate in leg meat than in body meat and that cooking crab in brine causes a slight weight loss.

An evaluation of the rate of penetration of heat in whole crab during brine cooking showed that whole crabs may sometimes be undercooked at the end of 23 minutes, which is the time normally used in commercial cooking.

Vol. 3, No. 3. Commercial fisheries of the Columbia River and adjacent ocean waters. By A. T. Pruter. December 1966, pp. 17-68, 42 figs., 22 tables.

ABSTRACT

Fisheries in the Columbia River and the adjacent ocean waters constitute a large and valuable industry with important economic and recreational benefits to people of the Pacific Northwest. Rapidly developing agricultural and manufacturing industries in the Columbia River Basin, however, are placing increasing demands upon the fresh-water environment of resident and anadromous species. The advent of the nuclear age raises the possibility that man may adversely affect the ocean environment also.

This report examines the commercial fisheries in the river and ocean, stressing their importance in the overall development plans for the Columbia River Basin. The fisheries are classified into 3 groups: those for species resident in the Columbia, those for anadromous species, and those for marine species. The fisheries then are described on the basis of individual fish species within each of these groups. The descriptions include information on areas of capture, references to types of harvesting gear, and historical reviews of landings.

Fishery Leaflet

581. List of fishermen's and fish shore workers' unions in the United States. By Economic Service Section Branch of Foreign Trade and Economic Services. June 1966, 4 pp.

(No abstract.)

582. The bait shrimp industry of the Gulf of Mexico. By Anthony Inglis and Edward Chin. May 1966, iii + 10 pp., 6 figs.

(No abstract.)

583. Plankton. By Louella E. Cable. July 1966, iii + 13 pp., 4 figs.

(No abstract.)

584. Marine protein concentrate. By Bureau of Commercial Fisheries Technological Laboratory, College Park, Maryland. April 1966, v + 27 pp., 3 figs., 12 tables.

ABSTRACT

General information is given on a method to convert red hake into a high-quality marine protein concentrate for human consumption. Plans, as well

as estimates of processing and product costs, are shown for a proposed commercial process. Data are presented on the physical, chemical, nutritional, bacteriological, and toxicological studies on marine protein concentrate, produced by a method closely approximating the proposed commercial process.

585. Published in 1967.

586. Commercial flounder gigging. By Hilton M. Floyd. February 1966, iii + 5 pp., 6 figs.

ABSTRACT

The leaflet describes a commercial method of spearing southern flounder (*Paralichthys lethostigma*), and the gear used. The essential equipment is a spear and a light.

587-588. Published in 1965.

589. The shrimp and the shrimp fishery of the southern United States. By William W. Anderson. Revised January 1966, 8 pp., 9 figs.

(No abstract.)

590. List of fishery associations in the United States. By Leslie D. McMullin. Revised May 1966, iv + 6 pp.

(No abstract.)

591. Fishery motion pictures.

(No author, no abstract, no date.)

592. The striped bass. By Paul R. Nichols. October 1966, iii + 6 pp., 5 figs.

(No abstract.)

593. Graduate educational grants, academic year 1967-1968. Anonymous. 5 pp., 5 figs.

(No abstract.)

594. Published in 1967.

595. List of Fishery Leaflets of the U.S. Fish and Wildlife Service. Anonymous. December 1966, 29 pp.

(No abstract.)

596. List of Circulars of the U.S. Fish and Wildlife Service. Anonymous. December 1966, 13 pp.

(No abstract.)

597. List of Fishery Bulletins of the U.S. Fish and Wildlife Service. Anonymous. December 1966, 15 pp.

(No abstract.)

598. List of fishery associations in the United States. By Leslie D. McMullin. Revised December 1966, iii + 4 pp.

(No abstract.)

599. List of fishery cooperatives in the United States, 1966-67. By Leslie D. McMullin. Revised October 1966, v + 14 pp.

(No abstract.)

Special Scientific Report—Fisheries

525. Comparative study of juvenile American shad populations by fin ray and scute counts. By Paul R. Nichols. February 1966, iii + 10 pp., 14 tables.

ABSTRACT

Forty-five juvenile American shad, *Alosa sapidissima* (Wilson), collections, from 10 major shad producing rivers along the Atlantic coast of North America, were examined to see if differences in meristic counts suggested evidence of discrete river populations. Four meristic characters—pectoral, dorsal, and anal fin rays and scutes—were used. The difference in the counts between locations and between years within rivers was small compared to that between rivers. The differences in counts between rivers indicated that discrete populations of juvenile shad occurred in rivers.

526. Synopsis on the biology of the jack mackerel (*Trachurus symmetricus*) By John S. MacGregor. April 1966, iii + 16 pp., 6 figs., 2 tables.

ABSTRACT

This synopsis brings together all extant knowledge of the jack mackerel. This knowledge covers nomenclature, taxonomy, morphology, distribution, ecology and life history, population, exploitation, and protection and management.

527. Age and size composition of the menhaden catch along the Atlantic coast of the United States, 1962 with a brief review of the commercial fishery. By William R. Nicholson and Joseph R. Higham, Jr. February 1966, iv + 24 pp., 6 figs., 8 tables, 15 app. tables.

ABSTRACT

The 1962 purse seine catch of Atlantic menhaden, *Brevoortia tyrannus*, was 600,000 tons in the summer fishery and 29,000 tons in the North Carolina fall fishery. The mean catch per purse seine set, based on an estimated number of 26,176 sets, was 24 tons. The 1958 year class (age 4) dominated the fishery in the Middle and North Atlantic Areas

for the fourth consecutive year and provided 5 percent of the catch in the Chesapeake Bay Area and 36 percent of the catch in the North Carolina fall fishery. On the basis of its contribution to the fishery in the Chesapeake Bay and Middle Atlantic Areas, the incoming year class (1961) appeared to be less than average in abundance. Except for age-0 fish, the mean lengths and weights in the South Atlantic Area in 1962 were less than the means for the previous 7-year period. The means for age-4 fish were less than the 7-year means in the Middle and North Atlantic Areas, but slightly greater in the Chesapeake Bay Area. With few exceptions, the mean lengths and weights of other age groups in the Chesapeake Bay, Middle Atlantic, and North Atlantic Areas were greater than the 7-year means.

528. U.S. Federal research on fisheries and limnology in the Great Lakes through 1964: An annotated bibliography. By Ralph Hile. March 1966, iii + 53 pp., 2 tables.

ABSTRACT

The annotated bibliography is preceded by a brief account of the Federal research program in fisheries and limnology in the Great Lakes in 1957-64. The bibliography covers 314 papers by staff members of the Bureau of Commercial Fisheries Biological Laboratory in Ann Arbor, Mich., and 35 by associated scientists with whom the Laboratory had contractual or other cooperative arrangements; included also are patents issued to Laboratory personnel. A roster of Laboratory scientists as of December 31, 1964, is appended.

529. The Bureau of Commercial Fisheries Type IV electrofishing shocker—Its characteristics and operation. By Benjamin G. Patten and Charles C. Gillaspie. April 1966, iii + 15 pp., 10 figs.

ABSTRACT

A fish shocker which is effective, dependable, light weight, and economical to purchase and operate is described. The output energy of this shocker is 450 volts direct current at 150 milliamperes, pulsed into square waves at frequencies controllable from 20 to 100 per second with a fixed duration of 6 milliseconds.

This output energy produces a good galvanotaxis reaction in fish in the field. Our experimentation and information from the literature indicates the output energy of the described shocker to be of a favorable range.

Methods of operation of electric shockers are given. The recommended sizes of the electrodes are about 40 cm. square for the anode and 2.3 m. square for the cathode. The electrodes should be operated close together, especially in resistive waters. In suitable waters a wading technique is used, but a floating electrofishing operation is necessary if waters are deep or swift.

The effectiveness of a shocker is often reduced by environmental factors, but in most situations little can be done to compensate for this. The effects of water resistivity, variations in fish size or species, temperature, and fish mortality factors are discussed in relation to the success of electrofishing operations.

530. Seasonal and areal distribution of zooplankton in coastal waters of the Gulf of Maine, 1964. By Kenneth Sherman. May 1966, 11 pp., 10 figs., 4 tables.

ABSTRACT

A description is given of the composition and seasonal variations of zooplankton in coastal waters of the Gulf of Maine during 1964, and comparisons are made between 1963 and 1964. Twelve zooplankton groups (major taxa) were represented in the samples. Five occurred as holoplanktonic forms and seven were meroplanktonic. Copepods were the dominant zooplankters during all seasons. Zooplankton volumes for both years followed similar areal trends. Mean annual volumes were highest in the western area (Cape Ann, Mass., to Cape Elizabeth, Maine); moderate in the central area (Cape Elizabeth to Mt. Desert Island, Maine); and low in the eastern sector (Mt. Desert Island to Machias Bay, Maine). Zooplankton volumes were generally lower in 1964 than in 1963. Seasonal and annual variations in abundance of zooplankters are discussed in relation to hydrography. Local hydrography appears to influence the abundance and distribution of coastal zooplankters more directly than does the cyclonic-eddy system of the Gulf proper.

531. Length-weight relation of the summer flounder *Paralichthys dentatus* (Linnaeus). By Fred E. Lux and L. R. Porter, Jr. June 1966, iii + 5 pp., 1 fig., 3 tables, 1 app. table.

ABSTRACT

Length-weight equations of the form $W = c\ L^b$ in which W is weight, L is length, and c and b are constants are given for summer flounder for each calendar quarter. Weight for a given length varied seasonally. Males were slightly heavier than females of the same length.

532. Growth and survival of sockeye salmon introduced into Ruth Lake after removal of resident fish populations. By William R. Meehan. July 1966, iii + 18 pp., 12 figs., 14 tables.

ABSTRACT

Sockeye salmon (*Oncorhynchus nerka*) in three lakes on Afognak Island, Alaska, were studied. Ruth Lake was treated with rotenone to remove resident fish. Midarm Lake, which had no salmon, and Little Kitoi Lake, which has a small run of sockeye, were used as controls to compare survival and growth of introduced fry and natural fry with survival and

growth of introduced fry in Ruth Lake. Other factors that might influence sockeye production, such as plankton and bottom fauna, were also considered.

In general, growth and survival of fry and biological productivity were greater in the treated lake. Growth and survival decreased as fry densities increased.

533. Annual fish passage report — Rock Island Dam Columbia River, Washington, 1965. By Paul D. Zimmer and John H. Broughton. October 1966, iii + 24 pp., 3 figs., 21 tables.

ABSTRACT

Fish were again counted through the fishways at Rock Island Dam, thus providing counts at this location of the 33d consecutive year. Chinook and sockeye counts were down, and coho and steelhead counts were up from 1964. The counts of chinook, coho, and steelhead were larger, and the count of sockeye smaller than their respective averages for 1933-64. The count of salmon and steelhead was exceeded by the count of other species.

Four and one-half percent of the salmon and steelhead passing through the counting gates had injuries.

Daily maximum and minimum water temperatures and daily average rate of stream flow were recorded.

534. Distribution and abundance of sardine and anchovy larvae in the California current region off California and Baja California, 1951-64: A summary. By Elbert H. Ahlstrom. August 1966, iii + 71 pp., 6 figs., 66 tables.

ABSTRACT

Data summarized in this report document the nine-fold increase in the anchovy population (based on numbers of larvae) between 1951 and 1964, as well as the marked decline in the distribution and abundance of sardine larvae. Data for the years 1958-64 are treated in more detail than those for earlier years. Information was obtained on cooperative hydrographic-biological cruises of the California Cooperative Oceanic Fisheries Investigations.

535. Red-tide research summarized to 1964 including an annotated bibliography. By George A. Rounsefell and Walter R. Nelson. December 1966, iii + 85 pp., 8 figs., 4 tables, 1 app table.

ABSTRACT

This paper summarizes from published and unpublished data and reports the status of research on the Florida red tide up to 1964. It contains 292 references, mostly annotated, on red tide and closely related subjects. The relation of oceanographic conditions to red-tide blooms, the seasonal and coastwise distribution of the Florida red tide, and progress in various aspects of research are discussed.

536. Fur seal investigations, Pribilof Islands, Alaska, 1965. By Alton Y. Roppel, Ancel M. Johnson, Raymond E. Anas, and Douglas G. Chapman. v + 45 pp., 14 figs., 21 tables, 23 app tables.

ABSTRACT

The age classification of 40,367 male fur seals (*Callorhinus ursinus*) killed on the Pribilof Islands in 1965 was: age 2, 4 percent; age 3, 56 percent; age 4, 36 percent; and age 5, 4 percent. The ages of 901 male seals were not determined. The peak of the kill occurred 27-31 July. Predicted kills of 3- and 4-year-old males on St. Paul Island were 33,000 and 16,000; actual kills to 9 August were 19,009 and 12,046. All 2-year-old males available 22-26 July on St. Paul Island were killed to determine if abundance on land at age 2 is related to return of the year class at age 3. To test the commercial value of their skins, 854 males larger and older in appearance than those normally taken were killed. Harem and idle bulls counted on the Pribilof Islands were 10,470 and 6,729. Of 10,432 females killed, St. Paul Island contributed 7,530, and St. George Island, 2,902. Selective killing for young females on St. Paul Island 23-27 August produced 88 percent in ages 2-5; nonselective killing on St. George Island 16-27 August produced 64 percent in ages 2-5. Sixty-five 3-year-old females examined were nulliparous; 1 of 51 4-year-old females was primiparous and recently post partum. Recoveries of marked seals included 4,947 with tags or checkmarks applied in the year of birth, 238 selected and tagged as yearlings in previous years, and 36 seals tagged by the U.S.S.R. Ten thousand pups were single-tagged and checkmarked, and 20,087 were checkmarked only; 922 seals were double-tagged as yearlings. Pup mortality on land was 46,308. On the basis of tag recoveries from males and counts of dead pups, about 560,000 pups were born on the Pribilof Islands in 1961 and 500,000 in 1962. On the basis of tag recoveries from females, 344,107 pups were born in 1960, 527,482 in 1961, and 337,012 in 1962. Marked-to-unmarked ratios yielded an estimate of 347,000 pups born on the Pribilof Islands in 1965. From tags recovered in 1965 from seals tagged as yearlings in previous years, we estimated that there were 78,000 yearling males in 1961 and 85,000 in 1962. The average weight of untagged and unmarked seal pups exceeded that of tagged and marked seal pups by 1.14 kg. (males) and 1.04 kg. (females). The predicted kill of male seals on St. Paul Island in 1966 includes 3,000 of ages 2 and 5, 26,000 of age 3, and 14,000 of age 4. Female seals will not be purposely killed in 1966.

537. Published in 1967.

538. Distribution of spawning pink salmon in Sashin Creek, southeastern Alaska, and sur-

vival of their progeny. By William J. McNeil. September 1966, iii + 12 pp., 1 fig., 13 tables.

ABSTRACT

The escapement of pink salmon (*Oncorhynchus gorbuscha*) to Sashin Creek, southeastern Alaska, in 1963 was 16,757 fish, and fresh-water survival calculated from potential egg deposition and number of outmigrant fry was 20 percent. The spawning ground was divided into three areas—upper, middle, and lower—for the study of density of spawners and survival of progeny. The density of spawners was highest in the middle area. Survival during spawning was low in each area; survival between the end of spawning and the beginning of fry emergence was variable among the three areas; and survival during fry emergence was high in each area. From egg deposition to fry emergence, survival was estimated to be 31 percent in the upper area, 16 percent in the middle area, and 15 percent in the lower area.

Although the upper area was highly productive of pink salmon fry, it has had intensive spawning only in years when the density of spawners was high. When the density was low, spawners tended to concentrate in the lower area. The validity of the supposition that only highly productive spawning beds are used when escapements are small is questioned. The observations at Sashin Creek indicate that relatively large escapements help ensure complete use of productive spawning beds.

539. Tagging summary of American shad, *Alosa sapidissima* (Wilson) and striped bass, *Roccus saxatilis* (Walbaum), Bureau of Commercial Fisheries Biological Laboratory, Beaufort, N.C., 1950-65. By Paul R. Nichols and Randall P. Cheek. July 1966, 8 pp., 1 fig., 6 tables.

ABSTRACT

Number and type of tags applied on American shad, *Alosa sapidissima* (Wilson), and striped bass, *Roccus saxatilis* (Walbaum), in 1950-65, are summarized in tables. A detailed description is given of each type of tag and how it was affixed to the fish. The report also gives the purpose of each tagging study and the status of reports on the findings.

540. Biological oceanography of the eastern tropical Pacific: Summary of existing information. By Maurice Blackburn. November 1966, iii + 18 pp., 6 figs., 2 tables.

ABSTRACT

Investigations of the biological oceanography of the eastern tropical Pacific are reviewed. Published papers, papers in press, and completed manuscripts, are briefly summarized. On most of the 29 biological-oceanographic expeditions made since 1952, similar properties were measured by similar methods. Numbers of available comparable measurements are: standing crop of surface chlorophyll *a*, 1,153; surface primary productivity, 603; standing crop of small zooplankton in the upper 300 m., 875; standing crops of chlorophyll *a* and micronekton in the upper 100 m., about 100 each; other types of measurements, small numbers.

The measurements of surface chlorophyll *a*, surface productivity, and zooplankton are analyzed by 14 areas which are distinguished on the basis of the physical structure of the upper 200 m. and by half-yearly periods irrespective of year. The analysis by areas shows that all three measurements are highest in upwelling areas (coastal and equatorial) and areas with thin mixed layers, lowest in areas with thick mixed layers (in the subtropical anticyclonic current gyrals), and intermediate elsewhere. The analysis by periods is partly inconclusive because of the uneven distribution of observations through the year. The most interesting result is the unexpected lack of statistically significant differences between property means for the 2 half-years in some of the areas which are believed (on physical-oceanographic grounds) to be seasonally eutrophic.

The paper also summarizes findings reported elsewhere on changes in biological properties with depth and time of day and on successive days. Past studies on statistical relationships between different properties measured at the same times and places and on the ecology of special groups of organisms (especially chaetognaths, considered as possible "indicators" of water masses or property-distributions) are also summarized briefly. Numerous deficiencies of knowledge are evident; increased research could contribute fundamentally to the much neglected study of biological oceanography in the tropical oceans of the world.

541. Distribution and occurrence of *Gymnodinium breve* on the west coast of Florida, 1964-65. By Alexander Dragovich and John A. Kelly, Jr. December 1966, iii + 15 pp., 7 figs., 4 tables.

ABSTRACT

The distribution and monthly occurrence of *Gymnodinium breve*, the Florida red-tide organism, were determined over a period of 13 months (in 1964-65) in the coastal waters of west Florida. Counts of *G. breve* varied from 0 to 53,800 cells per liter of water; no fish kills were observed. The organism was present at all stations from 9.3 km. (5 miles) to 37.1 km. (20 miles) offshore. It was not present in samples from Tampa Bay, and it was found only twice in samples from Charlotte Harbor. The highest occurrence of *G. breve* was in samples taken 27.8 km. (15 miles) offshore. Vertical distribution of the species was greatest at the surface and at 5 m. and lowest at 20 m. The largest concentrations of *G. breve* occurred in September during a period of reduced salinity and temperature. Because these two factors are important to the ecology of the organism, their relation to the presence or absence

of *G. breve* is discussed. *G. breve* were found within the temperature range 13.8° to 30.6° C. It was absent or rare at both the low and high temperatures; cell densities greater than 1,000 per liter were observed from 26.0° to 27.9° C. The organism occurred at salinities ranging from 33.68 to 37.07 p.p.t. The highest concentration of cells and incidence was noted within the salinity range 35.00 to 36.90 p.p.t.

542. Some effects of DDT on the ecology of salmon streams in southeastern Alaska. By Roger J. Reed. November 1966, iii + 15 pp., 7 figs., 9 tables.

ABSTRACT

The effects on stream-dwelling fish and insects of an aerial application of DDT (0.28 kg. (kilogram) per hectare or one-fourth pound per acre) to control blackheaded budworm were studied in four streams in southeastern Alaska.

Prespray and postspray sampling was done to determine the food eaten by rainbow and cutthroat trout, the coefficient of condition of trout, the abundance of insects on stones in the stream, the numbers of drifting insects, and the concentrations of DDT in the water, fish, clams, and plankton.

The effects of the DDT were an immediate marked increase in the number of aquatic insects drifting in the stream the day of spraying and the annihilation of aquatic insects within 3 days . No fish were observed to be harmed, although the concentrations of DDT and DDE (biological derivative of DDT) in their bodies increased. The concentrations of DDT also increased in stream waters, plankton, and clams. The one known long-term effect of the DDT on trout was a decline in their condition factor, apparently due to the reduction in their food supply.

The stream insects slowly began to reappear a few weeks after the spraying but did not approach normal numbers until the following summer.

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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.

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