were very poor. Total catch for the Chignik area was 544,000 salmon.

The red salmon catch at South Unimak and the Shumagins was limited to a total harvest of 233,000 fish. A generally weak showing of pinks and chums along the South Peninsula resulted in few openings and poor catches. However, escapements were fairly good for both species. The total South Peninsula catch was 406,000. Aleutian returns were generally weak and no fishery occurred in the area. The last fishery there was in 1973 when 2,768 pink salmon were taken. On the north side of the Alaska Peninsula, red salmon escapement goals were achieved in the Bear and Sapsuck river systems and the sockeye catch of 232,000 was close to the average of 235,000. The chum return was poor, but coho catch and escapement were good.

Bristol Bay experienced a very weak peak year with 4.8 million sockeye harvested from a total run of 24.1 million. Escapement goals were attained or exceeded in all major Bay systems this year. With average natural survival, the total Bay escapement of 19.3 million, coupled with the 1974 escapement of 9.6 million, could produce bumper runs in 1979 or 1980. Record chum catches were made in the Norton Sound, Yukon and Kuskokwim districts and the Kotzebue chum harvest was second only to the record 1974 catch. Escapements were also some of the largest ever observed. King salmon catches were below average on both the Yukon and Kuskokwim rivers. Final chum catch for this region was 2.0 million and total catch was 2.2 million.

Publications

New NMFS Scientific Reports Published

The publications listed below may be obtained from either the Superintendent of Documents (address given at end of title paragraph on affected publications) or from D825, Technical Information Division, Environmental Science Information Center, NOAA, Washington, DC 20235. Writing to the agency prior to ordering is advisable to determine availability and price, where appropriate (prices may change and prepayment is required).

NOAA Technical Report NMFS SSRF-689. French, Robert R., Richard G. Bakkala, and Doyle F. Sutherland. "**Ocean distribution of stocks of Pacific salmon, *Oncorhynchus* spp., and steelhead trout, *Salmo gairdnerii*, as shown by tagging experiments. Charts of tag recoveries by Canada, Japan, and the United States, 1956-69.**" June 1975. 89 p. For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402

ABSTRACT

Extensive tagging experiments by member nations of the International North Pacific Fisheries Commission—Canada, Japan, and the United States—have been conducted in offshore waters of the North Pacific Ocean to investigate the ocean distribution of stocks of Pacific salmon, *Oncorhynchus* spp. This effort has resulted in the recovery of 15,215 tags including steelhead trout, *Salmo gairdnerii*, from inshore and high-seas areas. To provide a reference by which the offshore distribution of the various stocks can be readily seen as shown by tagging results through 1969, the tagging locations at sea are illustrated for each species and recovery area.

NOAA Technical Report NMFS SSRF-684. Nicholson, William R. "**Age and size composition of the Atlantic menhaden, *Brevoortia tyrannus*, purse seine catch, 1963-71, with a brief discussion of the fishery.**" June 1975. 29 p. For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402.

ABSTRACT

The catch of Atlantic menhaden, *Brevoortia tyrannus*, estimates of numbers of fish caught by age, fishing effort, age and size distribution, and changes in the fishery are summarized and briefly discussed for the five areas of the Atlantic coast of the United States for 1963-71. Appended are tables of seasonal length frequency distributions and mean lengths by age and port and tables of monthly mean lengths by sex, age, and port. The purse seine fishery declined after 1962. North of Chesapeake Bay, plants closed or reduced fishing as fish became scarce. Of eight plants that processed menhaden in 1962 only two operated in 1971. The catch and catch per unit of effort in Chesapeake Bay declined as effort increased. South of Cape Hatteras, N.C. the fishery, which had been small compared to the fishery in other areas, showed little change. The average age and size of fish in the total catch declined as the fishery north of Chesapeake Bay, which mainly caught older and larger fish, declined. Age-1 and -2 fish, which constituted most of the catch from Florida to Chesapeake Bay, increased in average length and weight.

NOAA Technical Report NMFS CIRC-391. Damkaer, David M. "**Calanoid copepods of the genera *Spinocalanus* and *Mimocalanus* from the central Arctic Ocean, with a review of the Spinocalanidae.**" June 1975. 88 p. For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402.

ABSTRACT

The family Spinocalanidae includes small to medium-sized marine calanoid copepods belonging to the genera *Spinocalanus*, *Monacilla*, *Mimocalanus*, and *Teneriforma*. All species are deep-living and often comprise a large proportion, or even a majority, of the copepods in deep samples. In spite of their prevalence, definitive knowledge of the Spinocalanidae has lagged behind that of other copepod groups because adequate collections from deep water have been few, and specimens from widely separated localities have seldom been compared. Most important, however, is the fact that the fragility of the specimens makes them very difficult to study; most investigators attempting to describe or identify Spinocalanidae have indicated that their specimens were damaged and incomplete.

The present study is based on collections of zooplankton from Fletcher's Ice Island, T-3, in the Canadian Basin of the Arctic Ocean in 1967-68. The seven species of Spinocalanidae from these collections are redescribed, and their vertical distributions are discussed, based on series of samples from discrete depth intervals to 3,000 m.

The systematics of the Spinocalanidae has been reconsidered, using characters in addition to those most commonly lost in sampling. All published descriptions and records are discussed. Several critical type specimens and specimens forming the bases of widespread records have been examined and are redescribed. Keys to the genera and all of the species have been prepared, with the goal of enabling an investigator to identify even damaged specimens. Many named species or forms have been placed in synonymy, and two new species (*Spinocalanus terranovae* and *Mimocalanus heronae*) are described. The family is now considered to comprise 32 species, distributed as follows: *Spinocalanus* (19), *Monacilla* (4), *Mimocalanus* (8), and *Teneriforma* (1).

NOAA Technical Report NMFS SSRF-675. Shomura, Richard S., and Francis Williams (editors). "**Proceedings of the International Billfish Symposium, Kailua-Kona, Hawaii, 9-12 August 1972. Part 3. Species synopses.**" June 1975. 159 p. For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402.

(No abstract)

NOAA Technical Report NMFS SSRF-691. Smith, W. G., J. D. Sibunka, and A. Wells. "**Seasonal distributions of larval flatfishes (Pleuronectiformes) on the continental shelf between Cape Cod, Massachusetts, and Cape Lookout, North Carolina, 1965-66.**" June 1975. 68 p.

ABSTRACT

Larval flatfishes, representing 4 families, 17 genera, and 15 species, were identified from collections taken during a 1-yr survey designed to locate spawning grounds and trace dispersion of fish eggs and larvae on the continental shelf. Most flatfishes began spawning in the spring, a time of marked seasonal temperature change. The seasonal distribution of larvae indicated that: 1) bothids had longer spawning seasons than pleuronectids; 2) pleuronectids spawned largely in the northern half of the survey area during the spring; 3) most bothids spawned in the southern half, beginning in spring and continuing through early fall; 4) although cynoglossids spawned incidentally off North Carolina, most of their larvae were transported into the survey area from spawning grounds south of Cape Lookout; 5) the few representatives of the family Soleidae originated south of Cape Lookout; 6) spawning that began in the spring proceeded from south to north as the season progressed, but spawning that began in the fall proceeded from north to south, suggesting that the onset of spawning is triggered by spring warming and fall cooling; 7) most species spawned within a relatively narrow range of temperature; 8) salinity had no apparent influence on spawning.

NOAA Technical Report NMFS SSRF-690. Straty, Richard R. "**Migratory routes of adult sockeye salmon, *Oncorhynchus nerka*, in the eastern Bering Sea and Bristol Bay.**" April 1975. 32 p.

ABSTRACT

The stocks of sockeye salmon, *Oncorhynchus nerka*, in Bristol Bay, Alaska, are produced in the lakes and streams of 10 major river systems, which discharge into the bay over a shoreline distance of 193 km.

The establishment of fishing areas, the determination when fishing may be permitted, and the effect of exploiting simultaneously several stocks of sockeye salmon require knowledge of the migratory pattern of the individual stocks comprising the run to Bristol Bay during spawning migration. Various mark-and-recapture experiments and exploratory fishing in the eastern Bering Sea and Bristol Bay provide a picture of the migratory pattern of Bristol Bay sockeye salmon from approximately long. 170°W to the head of Bristol Bay.

The main migration route of all stocks of Bristol Bay sockeye salmon is in the offshore waters of the southern half of the entrance to the bay and in the southern half of the bay itself. All stocks remain in the offshore waters until within 32 to 80 km of their home-river systems. Segregation according to river of origin apparently began in the offshore waters as much as 200 km from the mouths of the home-river systems and appeared to progress to the head of Bristol Bay.

NOAA Technical Report NMFS SSRF-693. Bakun, Andrew. "**Daily and weekly upwelling indices, west coast of North America, 1967-73.**" August 1975. 114 p.

ABSTRACT

Daily and weekly indices of intensity of large-scale wind-induced coastal upwelling at selected locations along the west coast of North America are presented for the 7-yr period, 1967-73. The indices are based on 6-hourly computations of the offshore component of Ekman transport using the synoptic surface atmospheric pressure analyses produced by the Fleet Numerical Weather Central to estimate the sea surface stress. The magnitude of offshore transport is considered an indication of resultant upwelling through the bottom of the Ekman layer. A spatial distortion in absolute magnitude results in noncomparability of numerical values between different locations.

NOAA Technical Report NMFS SSRF-694. Korn, Sid. "**Semiclosed seawater system with automatic salinity, temperature, and turbidity control.**" September 1975. 5 p.

ABSTRACT

The new seawater system at the Southwest Fishery Center, Tiburon Laboratory, is described. The system delivers up to 450 l/min of filtered, ultraviolet sterilized, temperature- and salinity-controlled seawater suitable for extended holding of marine fish and invertebrates. Unique aspects of the system including provisions for open and/or closed circulation, and the pneumatic salinity control components are described in detail. The design of this facility may offer ideas to others desiring near-oceanic quality seawater from marginal sources.

NOAA Technical Report NMFS SSRF-695. Matsumoto, Walter M. "**Distribution, relative abundance, and movement of skipjack tuna, *Katsuwonus pelamis*, in the Pacific Ocean based on Japanese tuna longline catches, 1964-67.**" October 1975. 30 p.

ABSTRACT

Catch data of the Japanese tuna longline fishery from 1964 to 1967 were analyzed to determine the distribution, abundance, and movement of skipjack tuna, *Katsuwonus pelamis*, in offshore waters of the Pacific Ocean.

Large skipjack tuna, as well as larvae, were found to be concentrated mainly in the east central equatorial Pacific. Movement of skipjack tuna stocks was determined by following the shifting of high-CPUE (catch per unit effort) cells from one quarter to the next. The apparent movement of skipjack tuna stocks in the Pacific appeared to coincide with the circulation of the major ocean currents; counterclockwise in the southern hemisphere and clockwise in the

northern hemisphere, except in the eastern Pacific where the current flow is counterclockwise. The movement patterns of high CPUE suggested that skipjack tuna adults or their progeny could move from one area to the next. The movement pattern was used also to determine the probable migratory routes followed by skipjack tuna tagged in the eastern Pacific and recovered near the Hawaiian and Christmas islands.

NOAA Technical Report NMFS CIRC-392. Thorson, Lee C., and Mary Ellen Engett. "**Fishery publications, calendar year 1974: Lists and indexes.**" June 1975. 27 p.

ABSTRACT

The following series of fishery publications of the National Marine Fisheries Service, National Oceanic and Atmospheric Administration, in calendar year 1974 are listed numerically (with abstracts) and indexed by author, subject, and geographic area: NOAA Technical Report NMFS CIRC (formerly Circular); Data Report; Fishery Facts; NOAA Technical Report NMFS SSRF; and NOAA Technical Memorandum NMFS.

NMFS Lists New and Old Foreign Fisheries Leaflets

A new Foreign Fisheries Leaflet (75-1) Fisheries of Panama, 1973, is available for distribution. The 23-page leaflet contains information on artisanal fisheries, the shrimp, lobster, anchovy, herring, sardine, and scallop fisheries, industry developments, fisheries trade, vessel construction, fisheries investments, and international fisheries relations. If interested in obtaining a copy, request from: Office of International Fisheries, F41, National Marine Fisheries Service, NOAA, U.S. Department of Commerce, Washington, DC 20235. Please enclose a self-addressed label to facilitate the mailing.

The Office of International Fisheries also has a limited supply of a number of back issues of Foreign Fisheries Leaflets. Anyone interested in receiving a copy may order them from the following address: to: Division of International Fisheries Analysis (F41) Office of International Fisheries, NMFS, NOAA, Commerce, Washington, DC 20235. Requests will be honored as long as the supply lasts. Please enclose a self-addressed envelope (or a pre-addressed label) to facilitate mailing.

Foreign Fisheries Leaflets (by number and title) still available, include the following: 4A, Marine Fisheries of West Pakistan; 5, Denmark's Fishing Industry (1970); 26, Industrial Outlook Report of the Taiwan Fishing Industry, 1969; 35, Greece: Production of Processed Fishery Products, 1970; 52, North Portugal's Sardine Industry, 1969; 56A, Norway: Fishery Landings, 1967-1970; 79, Marine Fisheries of Nigeria, 1970; 91, Trends in Malaysian Fishing, 1968-1969; 120, Fisheries of the Democratic Republic of the Congo; 130, The Fisheries of Belem, Brazil, 1971; 149A, British Honduras Fish Exports, 1969; 150, The Fisheries of Equatorial Guinea, 1970; 156, World Fish Meal and Oil Review, 1969, and the Outlook for 1970; 161, Man-in-the-Sea Program in Japan, 1971; 165, The Marine Fisheries of Gabon, 1970; 172, The Shrimp and Spiny Lobster Industry, Bay Islands, Honduras, 1968; 181, Market Potential for Frozen Herring in West Germany, 1970; 182-A, Newfoundland Fisheries, 1970; 189, Canada's Fisheries Closing Lines, 1971; 72-3, The Developing Common Fisheries Policy of the EEC, 1972; 72-6, The Commercial Fisheries of Portugal, 1970; 72-11, Thailand Fishery Trends, 1972; 72-13, Fisheries of Sierra Leone, 1970-1971; 72-17, Fisheries of Taiwan, 1971; 73-1, Shrimp Industry of Central America, Caribbean Sea, and Northern South America; 73-2, Fisheries of Iceland, 1971; 73-3, Fisheries of the Republic of Korea, 1971; 73-8, Fisheries of Panama, 1971-72; 73-9, Fisheries of New Zealand, 1971; 73-10, Shrimp and Lobster Industry of Honduras; 73-12, Marine Fisheries of the Federal Republic of Germany, 1970-1971; 73-13, Fisheries of Venezuela, 1970-71; 73-14, North East Atlantic Fisheries, 1970; 73-15, Marine Fisheries of Norway, 1972; 73-16, Review of the Indonesian Shrimp Fishery, and its Present Developments; 73-17, Fishing Industry of Iceland, 1972; 73-18, Fishing Industry of Ireland, 1972; 73-19, Fisheries of the Ivory Coast, 1972; 73-20, Fishing Industry of Denmark, 1972; 74-3, Fisheries of the Gambia, 1973; 74-7, Japan's Frozen Shrimp Imports, 1964-73; 74-8, Fisheries of Denmark, 1973; 74-9, Fisheries of Tanzania, 1972; 74-10, Fisheries Statistics of Japan, 1972; 74-12, Fisheries of the Cameroons, 1973.

Third Baltic Symposium Proceedings Are Printed

Proceedings of the Third Baltic Symposium on Marine Biology, Helsinki/Helsingfors June 11th-17th, 1973, Merentutkimuslaitoksen Julkaisu, Havsforskningsinstitutets Skrift N:o 239, edited by Ake Niemi. Institute of Marine Research, Box 14166, Helsinki 14, Finland, 1975; 355 pp., illus.

The Third Baltic Symposium focused on two topics: 1) Production, food webs, and ecological models of the Baltic and 2) Indicator organisms/communities of different environments in the Baltic. The papers on these two topics covered many aspects from pure science to applied investigations. One day of the meeting was devoted to reports of the Baltic Marine Biologists working groups. About 48-50 papers were presented. Included were the following: "Interaction between the coastal zone and the open sea," by Artur Svansson; "Some factors limiting primary production in the coastal waters of the southern Baltic," by Barbara Malewicz; "Eutrophication and mass production of blue-green algae in the Baltic," by Ulrich Horstmann; "Seasonal changes in the level of detergents in the brackish water of the Dead Vistula and the Bay of Gdansk," by Gerard Drewa, Zbigniew Zbytniewski, and Fryderyk Pautsch; "Efects of zooplankton abundance and temperature on time and place of reproduction of Baltic herring groups," by E. Ojaveer and M. Simm; "Fish production in the Helsinki sea area," by R. Anttila, H. Lehtonen, and Y. Valtia; "A production model of the Baltic salmon population," by Per-Olov Larsson.

These proceedings would be of interest to anyone studying the effects of pollution. Participants were from Denmark, Federal Republic of Germany, Finland, German Democratic Republic, Poland, Sweden, United Kingdom, and the United States.

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