

## New NMFS Scientific Reports Published

The publications listed below may be obtained from either the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402; from the Publications Services Branch (E/A113), National Environment Satellite, Data, and Information Service, NOAA, U.S. Department of Commerce, 3300 Whitehaven St., Washington, DC 20235; or from the National Technical Information Service, U.S. Department of Commerce, Springfield, VA 22151. Writing to the agency prior to ordering is advised to determine availability and price, where appropriate (prices may change and prepayment is required).

NOAA Technical Report NMFS SSRF-773. Sedberry, George R. "Food

**habits and trophic relationships of a community of fishes on the outer continental shelf."** September 1983, iv + 56 p., 34 figs., 10 tables.

### ABSTRACT

The demersal fish community of the Outer Continental Shelf in the Middle Atlantic Bight consists of resident species (*Lophius americanus*, *Citharichthys arctifrons*, *Paralichthys oblongus*), seasonal species with boreal affinities (*Raja erinacea*, *Urophycis chuss*, *Merluccius bilinearis*, *Macrozoarces americanus*), and seasonal species with warm-temperate affinities (*Urophycis regia*, *Stenotomus chrysops*). Although most dominant demersal fishes of the Outer Continental Shelf feed primarily on dense, stable macrobenthic invertebrate communities, some feed on fishes, cephalopods, and planktonic invertebrates. In addition to seasonal changes in prey species preference, food habits

change considerably with fish size. Most predator species share many prey species. Overlap in diet among predators varies seasonally, with overlap relationships changing as species and size-class composition of the predators changes. Intraspecific diet overlap between size classes is low, but higher interspecific overlap occurs between species of similar size. Dietary overlap is lowest in the spring, when planktonic and nektonic organisms are consumed by most size classes of dominant predators. Although many important prey species are consumed by several predators, some are selectively consumed by only a few predators, so there is never complete dietary overlap between two species.

NOAA Technical Report NMFS SSRF-777. Love, Milton S., and Mike Moser. "A checklist of parasites of California, Oregon, and Washington marine and estuarine fishes." December 1983, 576 p.

### ABSTRACT

This report is a summary of the published records of parasites found from the marine and estuarine fishes of California, Oregon, and Washington. Coverage has not been limited to the western United States: It also includes parasite reports from throughout each fish's range. Included is a host-parasite list and parasite-host cross-index.

## Toward an Understanding of Salmon Smoltification

Salmon, long North America's most valuable fishery, have the potential for even greater productivity via aquaculture. Hatchery-reared fish have grown in importance, but the smolts must be fully prepared for downstream migration and saltwater survival.

Several annual workshops on salmonid smoltification culminated in 1981 in a formal symposium, the proceedings of which were published in a Special Issue, 28(1-2), of *Aquaculture*: "Salmonid Smoltification," the Proceedings of a Symposium Sponsored by the Pacific Sea Grant Advisory Program and the California Sea Grant College Program. Guest editors for the issue were H. A. Bern of the University of California, Berkeley, Department of Zoology, and Conrad V. W. Mahnken of

the NMFS Northwest and Alaska Fisheries Center's Manchester (Wash.) Laboratory.

In this Special Issue, prominent researchers present their work on topics important to salmonid development and enhancement. Included are papers on morphological indices of developmental progress in the coho parr-smolt, an ultrastructural study of changes in the endocrine organs of coho salmon during normal and abnormal smoltification, thyroid and steroid hormones for control of salmonid growth and smoltification, factors in the surge in thyroid activity in salmon during smoltification, interrenal function and smoltification, and osmoregulatory changes accompanying smoltification in the coho salmon.

Also discussed is stunting and parr-reversion during coho smoltification, photoperiod control of coho smoltifica-

tion, circannual rhythms and photoperiod regulation of growth and smoltification in Atlantic salmon, precocious sexual maturation and smoltification in male Atlantic salmon, stress and rearing of salmonids, an assessment of size/time requirements for Columbia River hatchery coho salmon releases, criteria for parr-smolt transformation in juvenile chinook salmon, criteria for adaptation of salmonids to high salinity seawater, and more.

The papers are both well written and edited and the volume is a handy reference source for those interested in gaining a better understanding of smoltification and its management in enhancing salmonid survival. Copies of the 270-page Special Issue are available for US\$62.00 (DF1.155.00) and prepaid orders should be sent to Elsevier Science Publishers, P.O. Box 330, 1000 AH, Amsterdam, The Netherlands.

NOAA Technical Report NMFS SSRF-778. Braham, Howard W., Bruce D. Krogman, and Geoffrey M. Carroll. "Bowhead and white whale migration, distribution, and abundance in the Bering, Chukchi, and Beaufort Seas, 1975-78." January 1984, 39 p.

#### ABSTRACT

From September 1975 to September 1977 we conducted field research on bowhead, *Balaena mysticetus*, and white, *Delphinapterus leucas*, whales in the U.S. Bering, Chukchi, and Beaufort Seas. The objectives were to determine the general distribution and migration of these whales in spring and autumn and to estimate abundance. We also surveyed the literature beginning in June 1975 through March 1978 to augment our empirical results.

Bowhead and white whales spend the winter months among the pack ice and open water of the central and western Bering Sea. They migrate into the eastern Chukchi Sea and across the southern and central Beaufort Sea from April through June. Their route takes them along the west side of the northern Bering Sea through Bering Strait, along the northwest coast of Alaska between Point Hope and Point Barrow, generally within 50 km of shore (closer to Point Barrow than off

Point Hope and Cape Lisburne), and offshore in the Beaufort Sea generally to within 60 km of the coast (exceptions are pointed out in the text).

Virtually all bowhead migration appears to follow this pattern; however, white whales may be divided into groups (or stocks) of varying sizes, some occurring in Bristol Bay, Norton Sound, Kotzebue Sound, and along the northwest coast of

Alaska during summer. The largest component of the white whale population migrates into the Canadian Beaufort Sea in spring at roughly the same time as the bowheads. Autumn migration results were not obtained, generally, for either species.

The 1978 minimum estimate of the bowhead whale population was 1,800-2,900 individuals; for white whales in Alaskan waters it was 9,000-16,000 individuals.

## South, Central American Fishery Reports Available

### Chilean Fisheries

Chile has become the preeminent Latin American fishing country. The country's 1982 fisheries catch surpassed 4.0 million metric tons (t), a 20 percent increase over the 3.3 million t taken in 1981. The increased catch, however, has not been reflected in increased profits for Chilean companies.

Most of the catch is reduced to fish

meal, but low prices for that product affected company earnings in 1981 and early 1982. The Government's exchange rate policy has also affected company earnings. Chilean officials believe that, even with the recent growth of the fisheries catch, there are still extensive unutilized resources that will enable the industry to continue expanding for several years.

The U.S. Embassy in Santiago, Chile, has prepared a 26-page report reviewing Chile's fishing industry. It includes information on the catch, processing, exports, fleet, vessel con-

## Chemistry, Biochemistry, and Fish Utilization

"Chemistry & Biochemistry of Marine Food Products," edited by Roy E. Martin, George J. Flick, Chieko E. Hebard, and Donn R. Ward, is a new reference published by Avi Publishing Company, 250 Post Road East, P.O. Box 831, Westport, CT 06881. Martin is Director of Science and Technology, National Fisheries Institute, Washington, D.C.; Flick and Hebard are with the Virginia Polytechnic Institute and State University (VPI&SU), Blacksburg, Va.; and Ward is with the VPI&SU at Hampton, Va.

Broad in scope, the volume contains much information useful to those concerned with the utilization of our marine fisheries. It provides excellent reviews of important aspects of seafood technology and by-product utilization, along with recent advances in marine product preservation.

In bringing together currently known data on the chemistry and biochemistry of marine food products, the book is an expansion of a symposium held in 1979 during the American Chemical Society's meeting in Washington, D.C. It is structured to emphasize the importance of those sciences to the complexities of fisheries technology and to provide a deeper understanding of those changes occurring in this resource. The editors also present material and references translated from foreign sources that had not appeared elsewhere in the U.S. scientific literature.

The volume begins with a review of lipid oxidation in fish muscle microsomes. Chapter 2, by John Spinelli and John Dassow, is on the modification and potential uses of fish proteins in the food industry. Also reviewed are recent advances in the chemistry of iced fish spoilage, histamine formation in fish, identification of fish species by isoelectric focusing, properties of fish oils by

Maurice E. Stansby, and steroids in mollusks and crustacea of the Pacific Northwest.

Also reviewed are carotenoid pigments in seafood, TMAO in fish and shellfish, heavy metals in fishery products, seafood irradiation by Joseph J. Licciardello and Louis J. Ronsivalli, enzymatic ammonia production in iced penaeid shrimp, effects of processing on clam flavor volatiles, biochemical evaluation of seafood, flavor components in fish and shellfish, effect of heat processing on color characteristics in crustacean blood, utilization of shellfish waste for chitin and chitosan production, blueing discoloration of Dungeness crabmeat by Jerry K. Babbitt, vitamins and minerals in Pacific Northwest seafoods, enzyme modifications of fishery by-products, and preservation of seafood with modified atmospheres.

With growing opportunities to catch, culture, and utilize U.S. seafoods, the

struction, market for U.S. exporters and investors, and Chilean development programs. A copy can be purchased for \$5.00 by ordering report number ITA-83-02-002 from the National Technical Information Service (NTIS), Springfield, VA 22161.

#### **Venezuelan Fisheries**

Venezuelan fishermen caught about 193,000 t of fish and shellfish in 1981, a 2 percent increase over the 190,000 t taken in 1980. The tuna industry expanded but there was a sharp decline in the sardine fishery. Shrimp fishermen near Lake Maracaibo reported continuing problems with industrial pollution and sewage.

Venezuela, in recent years, has become one of the major Latin American markets for U.S. fishery products. However, Venezuela's deepening economic difficulties and increased competition from Andean Pact partners Ecuador and Peru have forced the government to implement restrictive new trade practices which will affect imports from the United States.

The U.S. Embassy in Caracas has prepared a 15-page report reviewing 1981-82 fishery developments. The report describes the tuna, sardine, and shrimp fisheries, the role of the fishing industry in the national economy, government policy, international relations, import restrictions, and opportunities for U.S. businessmen. A copy can be purchased for \$5.00 by ordering ITA-83-03-006 from NTIS.

#### **Mexican Fisheries**

The U.S. Fisheries Attache for Latin America stationed at the U.S. Embassy in Mexico City has prepared a 9-page review of the Mexican fishing industry. The report includes information on Mexican fishery policies, catch, tuna, shrimp, fish meal, sport fishing, joint ventures, fleet, consumption, credit, budget, and processing. U.S. companies can order a copy for \$5.00 by requesting ITA-83-02-008 from NTIS.

#### **Brazilian Fisheries**

Brazil has one of the world's largest coastlines and river systems, but has

only begun to exploit its fishery potential.

The U.S. Embassy in Brazilia has prepared a 33-page report on the nation's fishing industry. The report includes 21 statistical tables and information on trade, tuna, sardines, lobster, whales, leasing foreign vessels, and fisheries development. U.S. companies can obtain a copy by ordering ITA-83-02-007 for \$5.00 from NTIS.

#### **Ecuadorean Fisheries**

Ecuadorean fishery exports increased in 1981, making fishery products the country's most important nonpetroleum export commodity. Almost all of the increase was due to the continued growth of the country's pond shrimp industry.

The U.S. Embassy in Quito has prepared a 19-page report on the Ecuadorean fishing industry. It includes 16 statistical tables and information on shrimp, shrimp culture, tuna, canned products, fish meal, economic development, and research. U.S. companies can obtain a copy by ordering ITA-83-01-003 for \$5.00 from NTIS.

volume should be a very useful reference for those dealing with fisheries technology and utilization. The indexed 474-page hardbound volume has 23 chapters, each with many references, and is available from the publisher for \$45.00 in the United States and \$49.50 elsewhere.

## **Progress in Fish Culture Is Reported**

**"Recent Advances in Aquaculture,"** edited by James F. Muir and Ronald J. Roberts and published by Westview Press, 5500 Central Avenue, Boulder, CO 80301 (and Croom Helm) presents six long reviews on topics of considerable interest to aquaculturists. Muir is a Lecturer in the Institute of Aquaculture at the University of Stirling, and Roberts is Director of the Institute.

In Chapter 1, Donald J. Macintosh, who has extensively studied mangrove ecology at the University of Malaysia, explains the significance of mangroves to both fisheries and aquaculture and describes the distribution and ecology of mangrove swamps, their productivity and energy flow, and mangrove pond culture practices for finfish, prawns, crabs, mollusks, and seaweeds.

Another lengthy chapter by J. F. Wickins relates opportunities for farming crustaceans in western temperate regions, beginning with a brief review of the demand for crustaceans and their biology. Culture options (i.e., prawns, lobsters, crayfish, etc.) are discussed, as is the reuse of water in controlled environment cultures.

The biology and culture of snakeheads, a species popular in the orient, is presented by Kok Leong Wee while Kim Jauncey reviews carp nutrition. The snakehead has higher protein and lower fat content than carp or

tilapia, and Wee reviews their systematics, nutritional attributes, economics of their culture, their ecological requirements and air breathing characteristics, life history, fecundity, growth rate, etc. He then discusses snakehead culture and diseases and suggests several areas for future research in disease control, breeding, genetic selection and hybridization, and culture technology.

Another long chapter by John D. Balarin and Rene D. Haller is devoted to the intensive culture of tilapia in tanks, raceways, and cages. Discussed is the suitability of tilapia for intensive culture and intensive fry production, along with nutrition and feeding in intensive culture. Then, the authors give an economic evaluation and future prospects of tilapia culture.

Finally, James F. Muir provides a thorough review of recirculated water systems in aquaculture, discussing operating conditions, overall system design, oxygen supply, nitrogen re-

moval, solids removal, sterilization, chemical oxidation processes, pH control, energy use in recycled systems, system operation and control, husbandry and production management, and economics of recycling systems.

Each chapter discusses practical advances made by the authors and includes many fairly recent (up to about 1981) references. The book will likely be of interest to practicing fish culturists as well as students and scientists. Indexed, the 453-page hardbound volume costs \$49.75 or £27.50.

## Bacterial and Viral Diseases of Fishes

Expanding interest in fish disease studies culminated in a 1981 symposium of the Society for General Microbiology in Edinburgh, Scotland, and the result of that is "**Microbial Diseases of Fish**," edited by R. J. Roberts and published as the Society's Special Publication No. 9 by Academic Press Inc. (London) Ltd., 24-28 Oval Road, London, England NW1 7DX.

The volume contains 12 well-written reviews: A. E. Ellis explains the difference between the immune mechanisms of fish and higher vertebrates, M. J. Manning et al. review developmental aspects of immunity and tolerance in fish, and P. D. Ward discusses the development of bacterial vaccines for fish. Ken Wolf then reviews newly discovered viruses and viral diseases of fishes between 1977 and 1981 and B. J. Hill reports on infectious pancreatic necrosis virus and its virulence.

Additionally, C. Agius reviews virus diseases of warm water fish, A. L. Munro details the pathogenesis of bacterial diseases of fishes, and C. Michel reports on progress toward furunculosis vaccination. Finally, the pathogenicity of *Vibrio anguillarum* is examined by M. T. Horne while D. J. Alderman discusses fungal diseases of aquatic animals, A. H. McVicar presents an extensive review of *Ichthyophonus* infections of fish, and A. D. Pickering and L. G. Willoughby review *Saprolegnia* infections of salmonids.

In sum, the volume represents a use-

ful and fairly recent synthesis of information on microbial fish pathogens. The 305-page hardbound book is indexed, and each chapter is well documented with references. It is available from the publisher for £21.80 or \$40.50.

"**Bacterial and Viral Diseases of Fish: Molecular Studies**," edited by Jorge H. Crosa of the School of Medicine, Oregon Health Sciences University, Portland, has been published as WSG-WO 83-1 by the Washington Sea Grant Program, 3716 Brooklyn Avenue, N.E., Seattle, WA 98105.

The six chapters in this small paperback volume present recent research on important bacterial and viral diseases of salmonids, and work which might lead to eventual development of successful fish vaccines. The first paper provides a detailed account of the major diseases causing mortality among cultured salmonids and also deals with the methods for preventing and halting the spread of those diseases.

The next three chapters analyze the causative agents of vibriosis and furunculosis. Finally, the molecular study of two viral systems, infectious hematopoietic necrosis (IHN) and infectious pancreatic necrosis (IPN) viruses, are discussed in the last two papers. The small 86-page volume, unindexed, is available from the publisher for \$5.00.

## A Look at the New England Fisheries

"**Industry in Trouble**," subtitled "The Federal Government and the New England Fisheries," by Margaret E. Dewar, has been published by the Temple University Press, Broad and Oxford Streets, Philadelphia, PA 19122. In it, the author, an Assistant Professor at the Hubert H. Humphrey Institute of Public Affairs, University of Minnesota, reviews the New England fishing industry since World War II, its problems, and the efforts to solve them. She then compares her analysis with Government efforts to aid other U.S. industries (i.e., steel, shoes, merchant marine, shipbuilding, etc.).

Chapter by chapter the author explores the structure and problems of the New England fisheries, efforts at

aiding them, shortcomings of intervention, foreign fleets and questions of fisheries control, fishery management implementation, and examines shortcomings in public efforts to revitalize the fisheries.

The author gives her views of the fishing industry problems, how the fishing industry perceived them, the Federal aid or programs to alleviate the problems, and the effects of those programs. Often, she says, the root causes of problems were not fully identified by either the public or private sectors, and thus there were many problems in finding good solutions, and in implementing the programs. She predicts that the fishing industry will continue to face problems, seek government help, and that the effectiveness of that aid will again depend on how well industry, Congress, and administrators learn from the past.

The author has provided an in-depth and relatively unbiased look at the New England groundfish fishery and her primary recommendations are for better analysis of all aspects of the perceived problems of that fishery, along with analysis of the effects of any proposed solutions or programs. The author also suggests some ways that government aid could be more effective and addresses the question about when the government should step in to help an ailing industry. While some may not agree with all of the author's beliefs or suggestions, the book does present a thoughtful analysis which may be useful even beyond the fishing industry. The 252-page hardbound volume is indexed, provides extensive notes and references, and is available from the publisher for \$29.95.

## Pay Lake, Fish Hauler Directory Published

A directory of pay lakes and live fish haulers in selected states is now available according to the National Marine Fisheries Service. For a free copy, U.S. firms should write Jim Ayers, National Marine Fisheries Service, NOAA, Suite 200, 11215 Hermitage Road, Little Rock, AR 72211, or telephone 501-378-5888.