New NMFS Scientific Reports Published

NOAA Technical Report NMFS 4. Roppel, Alton Y. **"Management of northern fur seals on the Pribilof Islands, Alaska, 1786-1981."** April 1984, iii + 26 p., 3 figs., 4 tables.

ABSTRACT

This paper includes information about the Pribilof Islands since their discovery by Russia in 1786 and the population of northern fur seals, *Callorhinus ursinus,* that return there each summer to bear young and to breed. Russia exterminated the native population of sea otters, *Enhydra lutris*, here and nearly subjected the northern fur seal to the same fate before providing proper protection. The northern fur seal was twice more exposed to extinction following the purchase of Alaska and the Pribilof Islands by the United States in 1867. Excessive harvesting was stopped as a result of strict management by the United States of the animals while on land and a treaty between Japan, Russia, Great Britain (for Canada), and the United States that provided needed protection at sea. In 1941, Japan abrogated this treaty which was replaced by a provisional agreement between Canada and the United States that protected the fur seals in the eastern North Pacific Ocean. Japan, the U.S.S.R., Canada, and the United States again insured the survival of these animals with ratification in 1957 of the "Interim Convention on the Conservation of North Pacific Fur Seals," which is still in force. Under the auspices of this Convention, the United States launched an unprecedented manipulation of the resource through controlled removal during 1965-68 of over 300,000 females considered surplus. The biological rationale for the reduction was that production of fewer pups would result in a higher pregnancy rate and increased survival, which would, in turn, produce a sustained annual harvest of 55,000-60,000 males and 10,000-30,000 females.

Predicted results did not occur. The herd reduction program instead coincided with the beginning of a decline in the number of males available for harvest. Suspected but unproven causes were changes in the toll normally accounted for by predation, disease, adverse weather, and hookworms. Depletion of the animals' food supply for foreign fishing fleets and the entanglement of fur seals in trawl webbing and other debris discarded at sea became a prime suspect in altering the average annual harvest of males on the Pribilof Islands from 71,500 (1940-56) to 40,000 (1957-59) to 36,000 (1960) to 82,000 (1961) and to 27,347 (1972-81). Thus was born the concept of a research control area for fur seals, which was agreed upon by members of the Convention in 1973 and instituted by the United States on St. George Island beginning in 1974. All commercial harvesting of fur seals was stopped on St. George Island and intensive behavioral studies were begun on the now unharvested population as it responds to the moratorium and attempts to reach its natural ceiling. The results of these and other studies here and on St. Paul Island are expected to eventually permit a comparison between the dynamics of unharvested and harvested populations, which should in turn permit more precise management of fur seals as nations continue to exploit the marine resources of the North Pacific Ocean and Bering Sea.

Understanding the Vibrios

"Vibrios in the Environment," edited by Rita R. Colwell, has been published by John Wiley & Sons, Inc., 605 Third Ave., New York, NY 10158, in their Environmental Science and Technology series. Interest in the Vibrionaceae has increased in the past decade considerably. Taxonomy of this family of bacteria has improved and recognition of the pathogenic potential of vibrios other than *V. cholerae* has grown (i.e., *V. parahaemolyticus).*

The book begins with an outline of vibrios in the environment, followed by sections on epidemology and serology, pathogensis, molecular genetic aspects of vibrios, methods for isolation, enumeration, characterization, and identification, and ecology of vibrios. An important part of the book for seafood producers is the final section, "Implications for the Seafood Industry," which includes chapters on prevention of food-borne disease caused by vibrios, sanitary precautions for the seafood packer in preventing such disease, factors affecting the adherence of *V. cholerae* to blue crab shell, and the effects of storage on vibrio concentrations in shellfish.

In short, the research reported here shows the widespread distribution of pathogenic and nonpathogenic vibrios in the natural aquatic environment, and addresses the risks the vibrios pose. The authors provide recent information on identification, isolation and characterization, assessment of distribution and useful data on human exposue, toxin potency and measurement, and vibrio ecology. The volume also details the much improved taxonomy of the genera and species of the Vibrionaceae and reports on the increasing number of cases whereby *V. cholerae* is implicated in human disease in widely different geographical areas. Practical applications of research are presented in sections on prevention of vibrio transmission and analytical methods for detection and monitoring. Thus, the book is an excellent source of data on recent developments, seafood quality control, and *V. cholerae* identification and monitoring. The 634-page hardbound volume is indexed and is available from the publisher for $45.00.

Sea Turtle History, Ecology, and Management

"Biology and Conservation of Sea Turtles," edited by Karen A. Bjorndal and published by the Smithsonian Institution Press, Washington, DC 20560 in cooperation with the World Wildlife Fund, Inc., constitutes the

NOAA Technical Report NMFS 5. Smith, Daniel E., and Jack W. Jossi. **"Net phytoplankton and zooplankton in the New York Bight, January 1976 to February 1978, with comments on the effects of wind, Gulf Stream eddies, and slopes water intrusions."** May 1984, iv + 41 p., 12 figs., 22 app. tables.

ABSTRACT

Results are given of monthly net phytoplankton and zooplankton sampling from a 10 m depth in shelf, slope, and Gulf Stream eddy water along a transect running southeastward from Ambrose Light, New York, in 1976, 1977, and early 1978. Plankton abundance and temperature at 10 m and sea surface salinity at each station are listed. The effects of atmospheric forcing and Gulf Stream eddies on plankton distribution and abundance are discussed. The frequency of Gulf Stream eddy passage through the NewYork Bight corresponded with the frequency of tropical-subtropical net phytoplankton in the samples. Gulf Stream eddies injected tropical-subtropical zooplankton onto the shelf and removed shelfwater and its entrained zooplankton. Wind-induced offshore Ekman transport corresponded generally with the unusual timing of two net phytoplankton maxima. Midsummer net phytoplankton maxima were recorded following the passage of Hurricane Belle (August 1976) and a cold front (July 1977). Tropical-subtropical zooplankton which had been injected onto the outer shelf by Gulf Stream eddies were moved to the inner shelf by a wind-induced current moving up the Hudson Shelf Valley.

NOAA Technical Report NMFS 7. Turner, Jefferson T. **"The feeding ecology of some zooplankters that are important prey items of larval fish."** July 1984, 28 p.

ABSTRACT

Diets of 76 species of fish larvae from most oceans of the world were inventoried on the basis of information in 40 published studies. Although certain geographic, size- and taxon-specific patterns were apparent, certain zooplankton taxa appeared in the diets of larvae of a variety of fish species in numerous localities. Included were six genera of calanoid copepods (*Acartia, Calanus, Centropages, Paracalanus, Pseudocalanus, Temora*), three genera of cyclopoid copepods (*Corycaeus, Oithona, Oncaea*), harpacticoid copepods, copepod nauplii, tintinnids, cladocerans of the genera *Evadne* and *Podon*, barnacle nauplii, gastropod larvae, pteropods of the genus *Limacina*, and appendicularians. Literature on feeding habits of these zooplankters reveals that most of the copepods are omnivorous, feeding upon both phytoplankton and other zooplankton. Some taxa, such as *Calanus, Paracalanus, Pseudocalanus,* and copepod nauplii appear to be primarily her-

Proceedings of the World Conference on Sea Turtle Conservation held in Washington, D.C., in late 1979.

The contents are divided into four parts: Sea turtle biology; status of sea turtle populations by area (historical review; Hawaii, Oceania, and Australia; East and Southeast Asia; Indian Ocean; and Atlantic Ocean); conservation theory, techniques, and law; and a sea turtle conservation strategy, action plan, and action projects. The volume provides an excellent summary of sea turtle biology, especially as applied to conservation problems and solutions. Seven papers in the first section detail research on sea turtle reproduction and nesting studies. Others report research on migration, nutrition, growth, and hibernation.

The second section on population status includes reports with data on subsistence hunting in different regions, and provides excellent summaries of data and research on sea turtle distribution and densities. Papers in part three discuss general sea turtle conservation problems, conservation theory and techniques, and laws and enforcement, as well as discussing incidental capture, habitat disruption and protection, and the questions of turtle culture and headstarting. Unindexed, the paperbound 583-page volume provides a wealth of information on sea turtles and is available from the publisher for $25.00.

Shellfish Culture and Nutrition

The **"Proceedings of the Second International Conference on Aquaculture Nutrition: Biochemical and Physiological Approaches to Shellfish Nutrition,"** edited by Gary D. Pruder, Christopher J. Langdon, and Douglas E. Conklin, has been published by the World Mariculture Society, 178 Pleasant Hall, Division of Continuing Education, Louisiana State University, Baton Rouge, LA 70803.

Following a brief introduction, contributors review the relevance of fish and insect nutrition to marine invertebrates. Also reviewed are biochemical aspects of penaeid nutrition, crustacean bioenergetics, feeding mechanisms and digestive physiology of decapod crustaceans, protein and amino acid nutrition of *Penaeus japonicus*, a crustacean fatty acid metabolism, *Artemia* nutrition, zooplankton as a crustacean food source, and the role of micronutrients in the biosynthesis of the crustacean exoskeleton.

In addition, the volume contains the abstracts of posters presented at the conference dealing with research into American lobster diet and growth, penaeid shrimp, American oyster, and other aspects of molluscan and crustacean nutrition. Finally, two reports summarize the conference and review future prospects in mollusk and crustacean nutrition and its research needs. The 444-page hardbound volume is available from the publisher for $35 (U.S.) and $40 (foreign).

Canada's Atlantic Fisheries Report

"The Future of the Atlantic Fisheries" by Ernie Weeks and Leigh Mazzany has been published by the Institute for Research on Public Policy (IRPP) in Montreal, Quebec, Canada, and is distributed by Brookfield Publishing Co., Old Post Road, Brookfield, VT 05036.

bivorous, while others, such as *Acartia, Centropages, Temora,* and cyclopoids exhibit broad omnivory or carnivory.The noncopepod zooplankters are primarily filter-feeders upon phytoplankton and/or bacterioplankton. Despite the importance of zooplankters in larval fish food webs, specific knowledge of the feeding ecology of many taxa is poor. Further, much present knowledge comes only from laboratory investigations that may not accurately portray feeding habits of zooplankters in nature. Lack of knowledge of the feeding ecology of many abundant zooplankters, which are also important in larval fish food webs, precludes realistic understanding of pelagic ecosystem dynamics.

NOAA Technical Report NMFS 8. Prince, Eric D. (convener and editor), and Lynn M. Poulos (editor). **"Proceedings of the international workshop on age determination of oceanic pelagic fishes: Tunas, billfishes, and sharks."** December 1983, 211 p. (27 papers, no abstract).

NOAA Technical Report NMFS 9. Chester, Alexander J. **"Sampling statistics in the Atlantic menhaden fishery."** August 1984, 16 p.

ABSTRACT

Atlantic menhaden, *Brevoortia tyrannus,* the object of a major purse-seine fishery along the U.S. east coast, are landed at plants from northern Florida to central Maine. The National Marine Fisheries Service has sampled these landings since 1955 for length, weight, and age. Together with records of landings at each plant, the samples are used to estimate numbers of fish landed at each age. This report analyzes its sampling design in terms of probability sampling theory. The design is classified as two-stage cluster sampling, the first stage consisting of purse-seine sets randomly selected from the population of all sets landed, and the second stage consisting of fish randomly selected from each sampled set. Implicit assumptions of this design are discussed with special attention to current sampling procedures. Methods are developed for estimating mean fish weight, numbers of fish landed, and age composition of the catch, with approximate 95 percent confidence intervals. Based on specific results from three ports (Port Monmouth, N.J.; Reedville, Va.; Beaufort, N.C.) for the 1979 fishing season, recommendations are made for improving sampling procedures to comply more exactly with assumptions of the sampling design. These recommendations include adopting more formal methods for randomizing set and fish selection, increasing the number of sets sampled, considering the bias introduced by unequal set sizes, and developing methods to optimize the use of funds and personnel.

Problems in the Atlantic Fisheries resulted in special investigations by the Canadian government and the IRPP by Weeks and Mazzany. This book is the result of the latter and contains a review of Canada's Atlantic fishery, an analysis of its problems, and the authors' conclusions and recommendations for government policy. The authors state categorically that "economic viability must be the overriding long-term objective for the industry (which) must become self-supporting." Among their recommendations are that: 1) Industry, labor, and capital be reduced and brought into line with expected resources and markets, 2) in the first 1-2 years reduce the number of fishermen by attrition and continuation of limited entry to the major fisheries (and "more actively" reduce fishermen and capital in the next 3-5 years), 3) provide quasi-property rights through a systems of transferable quotas (which would be divisible and saleable), introduce a self-funding scheme for vessel buy-back, and others. The volume presents, a very concise look at Canada's Atlantic fisheries, its problems, the authors' recommendations as well as those of the Canadian government's Task Force on the Atlantic Fisheries, plus a comparative analysis of both. The paperbound 112-page booklet is available from the Brookfield Publishing Company for $9.50.

The Tilapias and Their Culture

The tilapias are a group of freshwater cichlids of Africa and the Levant which have been introduced and farmed in many parts of the world. Some species make nests; others, the mouthbrooders, are widely used in warmwater aquaculture programs, and genetic research is expected to enhance their production.

"Tilapiine Fishes of the Genera *Sarotherodon, Oreochromis,* and *Danakilia*" by Ethelwynn Trewavas, published by the British Museum (Natural History), Cromwell Road, London, England SW7 5BD, describes 41 of the species that carry the eggs and embryos in the mouth of one or both parents. One genus, *Danakilia*, is limited in size and range and not cultured. *Sarotherodon* (9 species) and *Oreochromis* (31 species) are distinguished primarily by their breeding habits, biogeography, and structural features, and several of them are very important to fish culturists. *Tilapia*, once used for most of the well-known species, is now restricted to those which make and guard nests.

While this authoritative and extensive review is primarily taxonomic, the author also provides well-written and thorough overviews of each species' natural history and other data useful to aquaculturists, such as ecology, distribution (natural and dispersal by man), zoogeography, reproduction, and habitats. Data is also provided on the species' foods, temperatures and salinity tolerances, and breeding and hybridization, as well as on their growth, distinguishing characteristics, and, for some, general physiology, behavior, predators and parasites, etc. The volume is illustrated with many fine drawings and photographs.

The author, who retired in 1961 from the Museum as curator of fishes, has studied the cichlids (since 1928) for over 50 years, and her voluminous book will likely be of in-

terest and value to many of those involved in tilapia biology, fisheries, research, and culture. The 583-page hardbound volume is available from the publisher for £50.

"The Biology and Culture of Tilapias," edited by R. S. V. Pullin and R. H. Lowe-McConnell, published by the International Center for Living Aquatic Resources Management (ICLARM), MCC P.O. Box 1501, Makati, Metro Manila, Philippines, as ICLARM Conference Proceedings 7, constitutes the Proceedings of the International Conference on the Biology and Culture of Tilapias held 2-5 September 1980 in Bellagio, Italy.

Once limited mostly to Africa, tilapias have been widely distributed, primarily since the 1950's, to tropical and subtropical areas, and their farming systems range from Asian ricefield culture to experimental farms using heated water from power plants. This volume presents an excellent and useful series of reviews by biologists and fish culturists, as well as an outline of future research needs. It is divided into four sections: Biology, physiology, culture, and culture-related topics. Papers in the first part discuss tilapia taxonomy and speciation, ecology and distribution, tilapias in fish communities, and provide an evolutionary perspective on tilapia life histories.

Part 2 reviews environmental physiology of tilapias, their reproductive physiology and feeding, digestion, and growth (both qualitative and quantitative considerations). The session on culture presents reviews of cage culture, diseases of tilapias, and pond culture of tilapias under controlled conditions. Other papers discuss genetic markers in *Sarotherodon* and their use for sex and species identification, tilapia hybridization, control of tilapia reproduction, and problems of mass production of hybrid tilapia fry. The volume also includes a statement on research requirements, extensive references, and indexes to genera, species, and water bodies. The 432-page volume is available from ICLARM for $13 (paper, surface mail), $17.50 (cloth, surface mail), $25 (paper, airmail), or $29.50 (cloth, airmail).

"A Bibliography of Important Tilapias (Pisces: Cichlidae) for Aquaculture," by Peter Schoenen, was published in 1982 by the International Center for Living Aquatic Resources Management (ICLARM),

A Guide to World Fishes

Publication of the Second Edition of Joseph S. Nelson's **"Fishes of the World"** has been announced by John Wiley & Sons, Inc., 605 Third Ave., New York, NY 10158. This useful reference for fisheries personnel and researchers has been enlarged and considerably updated to reflect research accomplished during the last decade. An introductory chapter outlines various aspects of systematics and zoogeography, and a discussion of fish diversity and abundance includes a table showing the numbers of recognized families, genera, and total number of species and freshwater varieties in the 50 orders of the world's living fishes. The author also reviews the classification of lower chordates.

Typical family descriptions consist of a common name and spelling of the taxonomic group, distribution data, a line drawing illustrating morphological characteristics, a brief description of the group, biological, ecological, and systematic notes, subfamilies, estimated number of genera and species, plus recent references to major systematic studies. Included are 452 illustrations, 45 updated distribution maps, a checklist of extant classes, orders, suborders, and families, and an extensive bibliography. The 523-page hardbound volume is a good up-to-date introduction to the world's major fish groups, and is available from the publisher for $44.95.

Technology of Tropical and Subtropical Fishes

Publication of the **"Proceedings of the Eighth Annual Tropical and Subtropical Fisheries Conference of the Americas,"** compiled by Ranzell Nickelson II, has been published by the Sea Grant College Program, Texas A&M University, College Station, TX 77843. It consists of 25 papers, edited by their respective authors, on a wide variety of topics of interest to the fisheries industry and fishery technologists.

Terrance Leary describes the activities of the Gulf of Mexico Fishery Management Council while Fred Prochaska et al. review the world production trends and U.S. imports of shrimp and spiny lobsters. Hector Lupin addresses communication problems between fisheries institutes and the fisheries industry in Latin America. Two articles outline experimental gear for and on-board handling of deep-sea red crabs (*Geryon* sp.) in the Gulf of Mexico, while Charles Roithmayr reports on purse-seine fishing for coastal pelagic fishes (thread herring, Spanish sardine, round scad, scaled sardine, and round herring) in the northern Gulf.

Other articles discuss salmonellae in oysters, clams, crabs, and mullet; TDT of *Vibrio cholerae* in shrimp; problems with adductor muscle parasites, *Sulcascaris sulcata*, in calico scallops in the southeastern U.S.; closed system shedding of blue crabs; measuring texture to evaluate fish freshness; texture variation in cooked fish fillets, pasteurization methods for flaked fish by Melvin Waters; electronic candling to detect bones in white fish fillets; menhaden use for surimi production; texture analysis of *Macrobrachium* tails; using osmoregulation in Penaeid shrimps to

MCC P.O. Box 1501, Makati, Metro Manila, Philippines, as ICLARM Bibliographies 3. While several other bibliographies have been published on the tilapias, this is the first to deal comprehensively with cultured tilapias, and the author has sought to make available all references on these fishes for libraries, researchers, and biologists. Species included in this bibliography include: *Oreochromis macrochir, O. aureus, O. hornorum, O. mossambicus, O. niloticus, Sarotherodon galilaeus, Tilapia rendalli*, and *T. zilli*. Each species is introduced with a "List of Synonyms," followed by its bibliography, arranged alphabetically by author, and ending with a subject index and a geographic index for the species. The 336-page paperbound volume is available for $18.00 (airmail $32.50).

"ICLARM Bibliographies 3, Supplement 1" by Peter Schoenen includes additional references discovered since publication of the original work, and covers *Oreochromis macrochir, O. aureus, O. hornorum, O. mossambicus, O. niloticus, Sarotherodon galilaeus, Tilapia rendalli*, and *T. zilli*. The references are all those published on those species as of the end of 1983. Reference numbers are consecutive from the first volume, and as before, subject and geographic indexes are included. The 191-page paperbound volume is available from ICLARM and ISBS (price not listed).

"**Applied Genetics of Tilapias**" by Giora W. Wohlfarth and Gideon Hulata has also been published by ICLARM as Studies and Reviews 6. The review was commissioned by ICLARM to collate existing information on the applied genetics of tilapias to assess the usefulness of previous work and to suggest future research directions. The review also summarizes much of the information on the biology and distribution of tilapias which is useful in approaching genetic manipulation. Discussed are variations between species, interspecific hybridization, sex determination, variation within species, population control, use of electrophoretic markers, and future breeding research needs. The 26-page paperbound volume is available from ICLARM for $3.00 (surface) and $5.28 (airmail). U.S. orders should be sent to the ICLARM Distributor, International Scholarly Book Services, Inc., P.O. Box 1632, Beaverton, OR 97075, using the airmail price.

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enhance flavors; and others. The volume is available from the publisher for $10.

A Review of Fish Aggregating Devices

"**Review of Experiences With and Present Knowledge About Fish Aggregating Devices,**" by M. Bergstrom has been published as BOBP/WP/23 by the FAO's Bay of Bengal Programme, Post Bag No. 1054, Madras 600 018 India. To prepare it the author contacted many experts and has thus provided a selective yet excellent review of a wide range of FAD's, their construction, placement, and how they are fished.

The author presents many examples of artificial reef types and materials from auto tires to concrete, FRP, wood bundles, vessel hulls, and much more, as well as FAD's anchored or drifting at the surface. A more extensive section reviews traditional, modern, and experimental mid-water FAD's. Other sections review site selection for anchoring modern FAD's and harvesting methods for the various devices. Finally, the author discusses such considerations as FAD maintenance, ownership and access rights, legal aspects, anchor design and size, corrosion, chafing, etc. The large format, paperbound 57-page report is available from the BOBP (price not listed).

Basic Marine Ecology

"**An Introduction to Marine Ecology**," by R. S. K. Barnes and R. N. Hughes, has been published by Blackwell Scientific Publications, Inc., The Downing House, 706 Cowper Street, Palo Alto, CA 94301. Barnes is a Lecturer in Aquatic Ecology, University of Cambridge, and Hughes is Lecturer in Ecology, University College of North Wales, U.K.

The first 10 chapters review such subjects as the nature and global distribution of marine organisms, marine habitats and productivity, planktonic systems of surface ($<1{,}000$ m) waters, benthos of continental shelves and littoral sediments, salt marshes and mangrove swamps, rocky shores and kelp forests, coral reefs, pelagic and benthic systems of the deep sea; fish and other nekton, life history patterns and natural selection, and speciation and biogeography. Chapter 11 reviews the overall marine ecosystem and Chapter 12 discusses human uses of the sea for food, waste disposal, and development.

Thus, the volume presents a broad look at marine ecology and the function of marine ecosystems, for students who already possess some basic knowledge of general ecology. Well illustrated and indexed, the 339-page paperbound volume is available from the publisher for $23.50.

Studies of a Large Marine Wetland Ecosystem

The Wadden Sea, the shallow coastal area from the Netherlands to Denmark, is Europe's largest estuarine area ($\sim 8{,}000$ km^2) and most important nursery for North Sea fish and shrimp and hosts several

million migratory water birds. Its more than 30 barrier islands shelter wide tidal flats and salt marshes. The area also faces many conflicting human interests and demands. The fishing fleet was halved between 1960 and 1980, and the number of fishermen was reduced even more. Shrimp, *Crangon crangon*, now dominates the landings (~75 percent).

An International Wadden Sea Working Group was set up in 1965, with studies coordinated by the Nature Management Department of the Agricultural University at Wageningen, to collect baseline data upon which to base conservation and management decisions for the area. Included were studies of 1) Geomorphology (Dijkema et al., 1980), 2) Hydrography (Postma, 1982), 3) Marine Botany (Wolff, 1979), 4) Marine Zoology (Dankers et al., 1981), 5) Fishes and Fisheries (Dankers et al., 1979), 6) Wadden Sea Birds (Smit and Wolff, 1980), 7) Marine Mammals (Reijnders and Wolff, 1982), 8) Pollution (Essink and Wolff, 1978), 9) Flora and Vegetation (Dijkema and Wolff, 1983), 10) Terrestrial and Freshwater Fauna (Smit et al., 1981), and 11) Physical Planning and Nature Management (Bruyns and Wolff, 1983).

The invertebrates volume (No. 4) presents reviews of the species of zooplankton, zoobenthos, and nekton of the Wadden Sea and its river estuaries, and their relationships with their environment. Life histories of such other important invertebrates as copepods, jellyfish, lugworms, blue mussel, cockle, shore crab, shrimp, etc., are also reviewed.

Of the 102 Wadden Sea fishes, 22 are common, 26 are fairly common, 16 are scarce, 12 are rare, and 22 are extremely rare. The fish and fisheries volume (No. 5) reviews the species present, data on their abundance and long- and short-term population changes, and the region's fisheries. It explains the Sea's importance for juvenile fishes and recommends studies of the effect of shrimping on fish recruitment, and on the role of shellfish culture in the Sea's ecosystem.

Of the 25 marine mammals recorded in the Wadden Sea, only the harbor seal, gray seal, common or harbor porpoise, and bottlenose dolphin have been regular inhabitants, though the last two have virtually disappeared. Authors of this report (No. 7) consider pollution, particularly PCB's to be the main threat to seals and recommend studies on juvenile survival, the role of disturbance in reduced recruitment, and why the harbor porpoise and bottlenose dolphin have virtually disappeared. Also presented is data on the status and life histories of those four marine mammals.

Second largest of the reports, "Birds of the Wadden Sea," No. 6 presents extensive ecological data on the area's waterfowl, their habitat selection and competition, invertebrate consumption, and threats to them; almost 3.5 million birds may be present in late summer congregations.

Finally, Report No. 11, sums up the political and administrative organizations in the region, the status of planning and management systems, reviews conservation in the area as well as exploitation and use of the area, international conventions pertinent to the area, and the major areas of conflict between conservation and utilization interests. It further presents a model for the region's protection and management, and recommends a formalized Wadden Sea Convention and establishment of a professional management organization in the three nations to coordinate protection and management of the region.

The eleven initial reports, bound into four volumes, are available at $85.00 from A. A. Balkema, 99 Main Street, Salem NH 03079. The separate paperbound reports are available at prices ranging from $4.75 (No. 8, Pollution) to $28.00 (No. 9, Flora and Vegetation).

This statement is required by The Act of August 12, 1970, Section 3685, Title 39, U.S. Code, showing ownership, management, and circulation of the Marine Fisheries Review, publication number 366-630, and was filed on 1 October 1984. The Review is published quarterly (four issues annually) with an annual subscription price of $8.75 (sold by the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402). The complete mailing address of the office of publication is: Scientific Publications Office, F/NWR1, NMFS, NOAA, 7600 Sand Point Way N.E., Bin C15700, Seattle, WA 98115. The complete mailing address of the headquarters of the publishing agency is: National Marine Fisheries Service, NOAA, Department of Commerce, 2001 Wisconsin Ave., N.W., Washington, DC 20235. The name of the publisher is Jack McCormick and the editor and managing editor is Willis Hobart; their mailing address is: NMFS Scientific Publications Office, 7600 Sand Point Way N.E., Bin C15700, Seattle, WA 98115. The owner is the U.S. Department of Commerce, 14th St., N.W., Washington, DC 20230; there are no bondholders, mortgagees, or other security holders. The purpose, function, and nonprofit status of the organization (agency) and the exempt status for Federal income tax purposes has not changed during the preceding 12 months. The extent and nature of circulation is as follows: Total number of copies (A) (average number of copies of each issue during the preceding 12 months) was 2501 and the actual number of copies of the single issue published nearest to the filing date was 2501. Paid circulation (B) is handled by the U.S. Government Printing Office, Washington, DC 20402, and (C) the total number printed for their sales (mail subscriptions and individual sales) was 750 for both the average number of copies each issue during the preceding 12 months and the actual number of copies of the single issue published nearest to the filing date. Free distribution (D) by mail, carrier, or other means; samples, complimentary, and other free copies (average number of copies each issue during the preceding 12 months) was 1751 and the actual number of copies of the single issue published nearest to the filing date was 1751. The total distribution (E: sum of C and D) (average number of copies each issue during the preceding 12 months) was 2501 and the actual number of copies of the single issue published nearest to the filing date was 2501. There were no copies not distributed or returned from new agents (F). The total (G: sum of E and F) is equal to the net press run figures shown in item A: 2501 copies. I certify that the statements made by me above are correct and complete: (Signed) Jack McCormick, Publisher.

A Basic Guide to the Study of Algae

"Algal Biology: A Physiological Approach," by W. Marshall Darley, has been published by Blackwell Scientific Publications, Inc., The Downing House, 706 Cowper Street, Palo Alto, CA 94301, as volume 9 in their Basic Microbiology Series. The author is with the University of Georgia's Department of Botany, and his book is intended as a supplemental text for courses in phycology, aquatic ecology, limnology, and marine biology.

The volume provides a handy introduction to the field of algal physiological ecology and emphasizes the individual organism and how it functions in its environment. The author gives an overview of the various classes of algae, relates concepts in algal physiological ecology, and reviews environmental factors affecting phytoplankton growth and population dynamics. Also discussed are seaweeds; benthic algae; algae in snow, soil, and hot springs; human and algal interactions; and symbiotic associations of algae. Indexed, the 168-page paperbound book is available from the publisher for $15.60.