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/AI13), National Environmental Satellite, Data, and Information Service, NOAA, U.S. Department of Commerce, 3300 Whitehaven St., Washington, DC 20235; or from the National Technical Information Service, Springfield, VA 22151. 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-769. Kaylor, John D., and Robert J. Learson. **"Krill and its utilization: A review."** July 1983, 10 p.

ABSTRACT

This article is based on a review of the literature on 1) the Antarctic krill resource, 2) multinational efforts to use krill as food, and 3) technological, economic, and marketing aspects of krill. The decimation of baleen whales, significant krill predators, has brought about an apparent overabundance of this protein-rich crustacean. Since the krill biomass exceeds the world's annual tonnage of fishery products, a close examination of the potential of krill stocks is justified.

Krill is an extremely rich source of protein and fat, and there is the potential of valuable byproducts such as chitin and chitosan. However, the harvesting operation may prove to be one of somewhat low economic return. The technology of using krill to form various food products acceptable to western preferences is not yet well developed. Utilization technology seriously lags behind harvesting technology.

Finding the potential value of krill requires an appraisal of 1) feasibility of producing krill products with a reasonable degree of marketing acceptability, 2) the value of our lending technical assistance to some nation to achieve the above, and 3) the economic and international pressures that are likely to favor those nations that are already completely subsidized and have vertical integration of their fisheries.

It is widely believed that abundant, protein-rich krill could contribute substantially to the world protein food supplies. Owing to the lack of development of a krill product possessing wide appeal and the unknown economic return of this potential fishery, eventual success seems dependent on government-subsidized operations.

NOAA Technical Report NMFS SSRF-770. Keser, Milan, Donald F. Landers, Jr., and Jeffrey D. Morris. **"Population characteristics of the American lobster, *Homarus ameri-***

The Fishes of the Gulf of Mexico

Number one in the W. L. Moody, Jr., Natural History Series of the Texas A&M University Press is **"Fishes of the Gulf of Mexico,"** subtitled "Texas, Louisiana, and Adjacent Waters," by H. Dickson Hoese and Richard H. Moore. The authors are, respectively, professor of biology at the University of Southwestern Louisiana and assistant professor of biology at Coastal Carolina College.

With over 600 photographs and drawings, more than half in full color, the volume pictures nearly 500 species of fish found in Gulf waters along the Texas-Louisiana coast. Complementing them is a detailed description of each fish, with common and scientific names, identifying characteristics, abundance, importance, habitat, geographic range, and approximate maximum size. Also included are temperate, subtropical, and tropical species which the authors believe are most likely to also be found in this region.

Introductory chapters review the ecology and zoogeography of the Gulf and outline conservation work, with a short history of ichthyological research in the area. An illustrated glossary defines technical terms and appendices list several offshore and deep-water species which may stray onto the continental shelf, freshwater fishes that may be washed into the Gulf, French (Cajun) and Spanish (Mexican) common names of some species, and more. An extensive bibliography lists both general and specific references. The volume also includes many excellent underwater fish photographs by Farley Sonnier and drawings by Dinah Bowman.

Drawing on previous works, the authors have devised easy-to-use keys to the families and species and attempted to verify each species which had been reported for the area. Well written, illustrated, and produced, this thorough volume should be of interest and value to commercial and sport fishermen, biologists, and others interested in the marine life of the northwestern Gulf. The 327-page volume is available from the Texas A&M University Press, Drawer C, College Station, TX 77843 for $9.95 (paper) and $14.95 (cloth) plus $1.00 postage.

A Guide to North American Sharks

Number five in the W. L. Moody, Jr., Natural History Series, **"The Sharks of North American Waters"** by Jose I. Castro, has been published by the Texas A&M University Press, Drawer C, College Station, TX 77843. The author, currently studying shark reproduction and fetal-maternal relationships, has written 108 species accounts for all sharks reported within 500 n.mi. of the United States and Canada from the Atlantic Ocean to lat. 20°N. Data is also given for a few deep-water species from adjacent areas which might possibly stray into North American waters.

The first part of the book provides brief, general accounts of the sharks: Their evolution, anatomy, reproduction,

***canus*, in eastern Long Island Sound, Connecticut."** October 1983, 7 p.

ABSTRACT

Population characteristics of the American lobster have been studied extensively in the vicinity of Millstone Point, Conn. Since 1975, 22,150 lobsters have been tagged, and pertinent biological data recorded. Catch per unit effort was similar among years, but was significantly higher for wire than wood pots. Legal-sized individuals ranged from 4.5 to 18.1 percent of the total catch. The percentage of culled lobsters ranged from 9.7 to 17.4 percent, and was greater for wood than wire pots. The sampled population was comprised of 51 percent males and 49 percent females. Berried females accounted for 3.1-6.7 percent of the total catch, and over half of these were of sublegal size. Growth per molt averaged 13.0 percent and was not significantly different between sexes. A major period of molting occurred in the late spring and early summer.

NOAA Technical Report NMFS SSRF-771. Smolowitz, Ronald Joel. **"Mesh size and the New England groundfishery — applications and implications."** July 1983, 60 p.

ABSTRACT

Mesh size control has been advocated from the earliest days of the otter trawl fishery in the United States. Researchers determined that larger meshes in the cod end of a trawl reduce discarding by allowing small fish to escape; a process known as size-selection. This selectivity is measured by the selection factor — the relationship between the 50 percent retention length and the stretched length of the mesh. Selection factors vary by species, net material, duration of tow, speed of tow, size of catch, and with variations in mesh size.

Cod-end mesh size experiments were conducted aboard eight New England otter trawlers from December 1977 to October 1978 to examine the possible effects of increasing the mesh size in that fishery. Selection factors were determined for Atlantic cod, *Gadus morhua* (3.33-3.80), haddock, *Melanogrammus aeglefinus* (3.04-3.47), yellowtail flounder, *Limanda ferruginea* (2.16-2.29), pollock, *Pollachius virens* (3.26-3.33), winter flounder, *Pseudopleuronectes americanus* (2.04-2.27), and American plaice, *Hippoglossoides platessoides* (2.25-2.41). For Atlantic cod, haddock, and winter flounder, there was a reduction of discards, up to 93 percent, and an increase in landings, by as much as 44 percent, with the larger mesh (133-138 mm). For yellowtail flounder, there was a reduction of discards and of landings.

Mesh size regulation as a management tool first requires the determination of the objectives in order to choose the size mesh. Enforcement difficulty, especially in the New England mixed fishery, is the greatest obstacle to overcome. The implications of mesh management reach beyond the fishery into the processing and financial sectors of the industry.

NOAA Technical Report NMFS SSRF-772. Squire, James L., Jr., and Daphne V. Nielsen. **"Results of a tagging program to determine migration rates and patterns for black marlin, *Makaira indica*, in the southwest Pacific Ocean."** July 1983, 19 p.

ABSTRACT

Marine game fish anglers reported tagging a total of 2,576 black marlin, *Makaira indica*, from 1968 through 1978 near the Great Barrier Reef, north Queensland, Australia, as part of the National Marine Fisheries Service Cooperative Marine Game Fish Tagging Program — Pacific Area. Sixty tagged black marlin were recaptured during an 11-year period for a recapture rate

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migration, distribution, fishing techniques, utilization, and attacks on humans. A key to the shark families then leads into the second part: Family and species descriptions. This includes descriptions of each family, identification keys for each species, species accounts, and illustrations of each species. The keys employ such readily observable external features as shape, proportion, color, shape of teeth, and geographic range.

Though a few species accounts are necessarily brief because little about them is known, most others supply essential details on the description, range, biology, reproduction, relationship to man (commercial uses, economic losses, danger, and recreational or scientific values), how caught, and selected references. Each shark covered is illustrated in profile plus a snout outline and upper and lower teeth outlines. Besides the many line drawings, the book is illustrated with 17 excellent underwater photographs of live specimens. A short appendix includes data on the goblin shark, a primitive deep-water species, and the megamouth shark taken in 1976 off Oahu, Hawaii.

Interest in sharks has grown in recent years and many scientists, anglers, commercial fishermen and others will no doubt find this well written and illustrated book a handy and useful field guide and reference. Indexed and with a good bibliography, the 180-page volume is available from the publisher for $19.50 (cloth) and $9.95 (paper) plus $1.00 postage.

Fisheries Ecology and Management

A new fisheries reference and textbook, **"Fisheries Ecology,"** by Tony J. Pitcher and Paul J. B. Hart, has been published by Avi Publishing Company, 250 Post Road East, P.O. Box 831, Westport, CT 06881. The authors are, respectively, Lecturer in Zoology at the University College of North Wales and Lecturer in Zoology at the University of Leicester.

Concerned with the ecology of exploited fish populations, the volume provides a broad view of the subject, dealing in large part with marine fisheries, but including applicable aspects of freshwater fisheries. Aimed at advanced students of fisheries, aquaculture, and marine ecology, the book's eleven chapters give a thorough overview of fishes, fisheries, fisheries managment, economics, and fish nutrition, growth, production, and recruitment.

Chapter 1 provides basics on the structure and senses of fishes, their biology, and adaptations to a variety of aquatic communities. Chapter 2 discusses the growth of the world fisheries since 1945, future fish supplies, fishing methods and fleets, and the storage and handling properties of fish. The biological basis of the fisheries is explored in chapter 3 — stock concepts, fish abundance and its estimation, and population age structure, mortality schedules, and fecundity. Chapter 4 examines fish nutrition,

of 2.3 percent. Average weight of black marlin tagged was estimated to be 175 kg (385 pounds). Anglers tend to overestimate weight at time of tagging and short-term recaptures (0-60 days) indicate an average angler overestimate of 16 kg (35 pounds) per marlin.

Sex was determined for 28 recaptures; 25 (89 percent) were reported as males and 3 (11 percent) reported as females. Average weight of males at recapture was 91 kg (195 pounds), for females, 221 kg (488 pounds).

Vector analysis of time, distance, and direction data for tag recovery locations indicated migration direction (vector mean bearing) and distance (vector mean distance from point of tagging) by periods of release time: 0-60 days, 121°/72 n.mi., 61-120 days, 134°/446 n.mi., 121-240 days, 097°/1,256 n.mi.

The greatest distance (2,100 n.mi.) recorded from the point of tagging was for a black marlin recaptured northeast of New Zealand, 235 days after tagging. Black marlin tagged early in the north Queensland fishing season (September) tended to migrate away from the area of tagging at a lower rate for the first 0-60 day period than black marlin tagged in October, November, or later in the fishing season.

Tag recoveries were made near the tagging location 1, 2, and 4 years after tagging. Locations of recapture for these black marlin were calculated to be a vector mean distance of 58.3 n.mi. from the point of tagging. Longline high catch rate areas for black marlin indicate a monthly movement for the first 240 days of release time not unlike that observed by tagging. In the summer the centers of high catch rate show a south to southeast movement off the east coast of Australia from the tagging area, then a northward movement in the winter and spring to the New Guinea-Bismark Archipelago-Solomon Islands area. The amount of interchange with the Indo-Pacific and areas to the north is unclear, although emigration from the tagging area to north of New Guinea was recorded.

NOAA Technical Report NMFS SSRF-774. Judy, Mayo H., and Robert M. Lewis. **"Distribution of eggs and larvae of Atlantic menhaden, *Brevoortia tyrannus*, along the Atlantic coast of the United States."** October 1983, 23 p.

ABSTRACT

Atlantic menhaden, *Brevoortia tyrannus*, eggs and/or larvae were collected during 52 of 77 ocean cruises by 12 vessels from 1953 to 1975. The combined cruises extended from the Antilles Current southeast of Florida to Cape Cod, Mass. Eggs and/or larvae were present in samples from Cape Canaveral, Fla., to Martha's Vineyard, Mass. Eggs were found at several locations off the coast from October to February and they occurred in the upper water column (10 m or less in depth). The largest batch of eggs were caught in December off North Carolina. Larvae were found at numerous locations off the coast and catch by gear indicated that they appear to be most concentrated in the upper portion of the water column. Larvae were caught each month except September. They were more concentrated in the South Atlantic Bight than north of Cape Hatteras, N.C. Most larvae were taken between 20 and 75 km from shore and the two largest catches occurred in December and March off North Carolina. The cruise data show that the seasonal distribution and abundance of eggs and larvae coincide with the seasonal distribution of adults.

NOAA Technical Report NMFS SSRF-775. Fogarty, Michael J. (editor). **"Distribution and relative abundance of American lobster, *Homarus americanus*, larvae: New England investigations during 1974-79."** September 1983, 64 p. (11 papers.)

growth, and the dynamics of a fish population, and chapter 5 briefly outlines the evolutionary effects of mortality on fish populations.

Chapters 6 and 7 discuss recruitment and prediction of fishery yields (surplus yield models), and chapter 8 presents dynamic pool models and fishery management. Chapter 9 discusses how economic factors influence fishery management while chapter 10 reviews general principles of fish farming (salmon, milkfish, carp, etc.) and its improvement. The final chapter reviews some of the problems and progress in managing various fisheries and discusses contemporary fishery problems. Cohort analysis is described in an appendix.

Broader than some other texts, the volume considers fish as part of the total ecosystem and is enhanced by use of examples from a wide variety of marine fisheries worldwide. It outlines the processes to be identified, described, measured, analyzed and predicted to manage fisheries, and, in sum, is a good synthesis of fisheries biology, ecology, harvesting, economics, and fisheries management.

The volume provides a list of references plus an index of fish names and a general index. The 414-page hardbound volume is available from the publisher for $32.50 in the United States and $36 elsewhere in North and South America.

Fisheries and Fish Technology

"Fish Handling & Processing," edited by A. Aitken, I. M. Mackie, J. H. Merritt, and M. L. Windsor, is the second edition of the 1965 volume of the same title produced by the Torry Research Station in Aberdeen, Scotland. The new edition is considerably updated and revised and, receiving special attention is chilled-water storage of fish and freezing fish at sea, both scarcely mentioned in the first volume. Also, making frozen fillet blocks is dealt with in some detail.

This book begins with some basic facts about fish and what happens to them after capture. Chapters 4 and 5 then outline the handling of fish at sea and on shore, respectively. Subsequent chapters relate modern techniques of freezing, cold storage, freezing at sea, thawing fish, smoking and canning fish, handling and processing shellfish, and "other" products (i.e., minced fish, fish blocks and cakes, pastes, spreads, pates, marinades, etc.), fish byproducts (i.e., fish meal, silage, oils, FPC's, etc.), hygiene, and quality assessment and quality control.

Well illustrated, the book provides a well-rounded, easily readable account of the theory and practice of fish handling and processing. While the fishing industry and practices in nations other than England are not mentioned, the book does provide good and sound information with wide applicability.

Indexed, the 192-page hardbound volume is available from Her Majesty's Stationery Office, 49 High Holborn, London WC1V 6HB England for £10.

"Proceedings of the Seventh An-

Climatological Atlas of the World Ocean

The National Oceanographic Data Center (NODC) has announced the availability of digital data tapes containing data drom the "Climatological Atlas of the World Ocean" (NOAA Prof. Pap. 13). The atlas represents the published results of a project to provide researchers with objectively analyzed, gridded fields of major oceanographic variables. Data analysis and compilation of the atlas was carried out by Sydney Levitus of the NOAA's Geophysical Fluid Dynamics Laboratory.

The atlas and data tapes present a synthesis of all temperature, salinity, and oxygen data available from NODC's Oceanographic Station Data, Mechanical Bathythermograph, and Expendable Bathythermograph files. The data have been analyzed in a consistent, objective manner at standard oceanographic depth levels on a one-degree latitude-longitude grid between the surface and ocean bottom with a maximum depth of 5,500 m. The data tapes described in this brochure contain annual summaries of temperature, salinity, dissolved oxygen, and percent oxygen saturation and seasonal summaries of temperature and salinity.

These analyses are intended primarily for use in the study of the role of the oceans in controlling the earth's climate, but they can also be used for other scientific investigations. Preliminary results have already been used in a variety of ways ranging from diagnostic studies of the role of the oceans in the global heat balance to computations of the general circulation of the Atlantic Ocean.

Copies of the annual analyses (temperature, salinity, dissolved oxygen, percent oxygen saturation) and seasonal analyses (temperature and salinity only) from the "Climatological Atlas of the World Ocean" are available from the NODC on magnetic tape. These data constitute NODC Accession No. 83000073. Magnetic tape characteristics are: 9 track, 1600 BPI, fixed block, record length = 80 bytes, 50 records (4,000 bytes) per physical block. The short unpacking program used to read the tapes is included as the first file on each tape.

Cost of the tapes (subject to change without notice) is as follows: Individual tapes (please specify), $110; annual analyses (2 tapes), $220; seasonal analyses (4 tapes), $440; and annual and seasonal analyses (6 tapes), $660.

Orders for digital data tapes should be directed to: National Oceanographic Data Center, User Services Branch, NOAA/NESDIS E/OC21, Washington, DC 20235. Telephone: 202-634-7500 (commercial) or FTS 634-7500. Please make check or money order payable to "Department of Commerce/NOAA/NODC." All payments must be in U.S. Dollars and drawn on a bank located in the United States. Bound paper copies of the "Climatological Atlas of the World Ocean" (NOAA Professional Paper No. 13) are available at $11.00 each from: Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402. When ordering refer to Stock No. 003-017-00509-7.

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nual Tropical and Subtropical Fisheries Technological Conference of the Americas," compiled by Ranzell Nickelson II, has been published by the Sea Grant Program, Texas A&M University, College Station, TX 77843. The volume provides 38 articles, edited by their respective authors, on a wide variety of topics including shark longlining, handling, and quality; verifying "freshness" of tournament-caught fish, edibility characteristics and chemical composition of 16 southeastern U.S. marine fishes; retort pouch processing, minced turbot and pollock patties, and more.

Papers are presented on *Vibrio cholerae* and seafoods, bacteriology of fresh and spoiling tropical fish, hydrocarbon analysis of shrimp from oil polluted waters, biological treatment of fish processing wastes in the tropics, TMA formation in dried fish, controlled atmosphere packaging of swordfish steaks, shrimp stored in vacuum and atmospheres containing CO_2, islolation of organisms of public health significance from clams and oysters, and packaging and microbiology of seafoods in transit. Also discussed are FAO fish utilization programs in Latin America, trends in export of Federally inspected fish, FAO marketing information and advisory services for fish products, and optimized drying conditions for stockfish produced from underutilized species.

The 391-page volume paperbound presents a wide variety of articles and progress reports for food technologists interested in the unique problems of production, processing, packaging, distribution, and utilization of tropical and subtropical fish species, and is available from the publisher for $10.

POLAND PUBLISHES FISH ENCYCLOPEDIA

Publication of **"Encyklopedia ryb Morskich"** (Encyclopedia of Marine Fishes), by Stanislaw Rutkowicz, has been announced by the Polish Maritime News. Publisher is Wydawnictwo Morskie, Maritime Publishers of Gdansk, ul.Szeroka 38/40, 80-835 Gdansk, Poland. The author, a former FAO biologist, was a senior scientist at the Department of Ichthyology of MIR, Sea Fisheries Institute, Gdynia.

The large volume contains descriptions and color illustrations of 1,000 important marine species from the Atlantic, Pacific, and Indian Oceans. Selected for inclusion were those species commercially or recreationally valuable as well as numerous aquarium fishes. Some other species were included for taxonomic or systematic reasons.

Introductory chapters present data on morphology, anatomy, structure and senses of fishes and the biology and ecology of fish. The systematic listing of fish is based on the 1970 FAO "Taxonomic classification," and lists 97 orders and about 450 families of marine and freshwater fishes. An illustrated taxonomic key is given to about 100 orders and 250 families. Each species account presents the scientific name and common names in several primary languages. Opposite the picture is data on

size, morphology, biology, ecology, importance, and catches, along with symbols indicating common fishing techniques (i.e., trawl, seine, etc.), uses (canned, frozen, etc.), and a chart illustrating distributional range.

Useful indexes are provided to scientific names and common names in English, Russian, Polish, German, Spanish, French, etc. Species are also indexed by FAO Statistical grid areas. The 660-page hardbound book is available from the publisher for Zl4000. The Polish-language volume is aimed at an audience of fishermen, fisheries students, and natural history schools, etc. It will be most useful to those with Polish language skills, although the species accounts, distribution maps, and use of symbols provide much data for other readers.

Fish Feeding Habits, Predation, and Behavior

"Gutshop '81 Fish Food Habits Studies," published by Washington Sea Grant, 3716 Brooklyn Ave. N.E., Seattle, WA 98105 presents the proceedings of the third such Pacific workshop. Editors are Gregor Cailliet and Charles Simenstad.

The workshop and volume were divided into five topics: Methodology and Statistical Analysis, Bioenergetics of Fish Feeding (i.e. bioenergetics of optimal foraging; trophic transfer of nonassimilated energy from fishes; and bioenergetic effects of feeding activity upon growth and metabolism), Competition and Resource Partitioning, Feeding Behavior of Fishes and Prey, and Fish Feeding as a Structuring Force on Prey Communities.

The first two workshops (1976 and 1978) brought together scientists involved in studies of food habits, predation, feeding behavior, competition and food web structure to achieve some consensus on sampling design and techniques, analysis and statistical procedures, and interpretive tools for fish food habits studies. Thus, the third workshop was more concerned with interpretive concerns with contributors getting into testing of hypotheses regarding ecological concepts involving predation and feeding behavior, and into the role of feeding ecology in the population dynamics of exploited fish populations.

Much broader than the previous workshops, "Gutshop '81" presentations touched upon almost all the major habitats of fishes from at least 22 families. Topics included: Statistics and presentation of results, benefits and constraints upon laboratory and microcosm feeding experiments, sampling problems, mathematical and conceptual models of predator-prey interactions, bioenergetic experiments and models, competition and partitioning of prey resources, feeding behavior, and predation effects upon the structure and abundance of prey assemblages.

The volume is available from the publisher (make checks payable to "University of Washington") for $8. Copies of "Gutshop '78" are also available at $5 while the first, "Fish Food Habits '76" is available from NTIS, Springfield, VA 22151, Order No. PB281819 AS for $13.50 (paper) and $3.50 (microfiche).

State and National Record Fishes Listed

The **"Sportsmans Book of U.S. Records,"** published annually by compiler Joseph Glogan, contains several sections on fish and angling records of interest to sportsmen and those involved in recreational fisheries. The volume differs from other records compilations by listing records for each state plus U.S. national records, and it is a quick and handy source of data on the largest fishes caught by anglers. Species weight records are given state-by-state as well as a table of national records. Separate listings are provided for the heaviest fresh- and saltwater fishes taken on various line classes, fly line leader records, tippets, plus a variety of miscellaneous records or oddities of fishing tackle or other fish catches.

As the title suggests, other sportsmen's records are also included related to hunting, shooting, etc. Thus, the pocketsized paperbound volume is a concise and comprehensive source of records data. The first four editions (1980, 1981, 1982, and 1983) are available from: Sportsmans Book of U.S. Records, 328 East Main Street, Rochester, NY 14604 for $4.95 (plus 75 cents postage) each.

Some Invertebrates and Fishes of Baja California

Publication of **"Marine Animals of Baja California,"** subtitled "A Guide to the Common Fish and Invertebrates," by Daniel W. Gotshall, has been announced by Sea Challengers, 1851 Don Avenue, Los Osos, CA 93402. The volume provides brief descriptions and photographs of 125 species of fish and 62 species of invertebrates commonly encountered in the shallow waters of Baja California.

Text is spare, but includes data on common and scientific names, maximum known size of each species, one or two identifying characters to look for underwater. Most of the photographs — all of live specimens — are excellent and were taken along both peninsula coasts, and out to 250 miles southwest of Cabo San Lucas to the Islas Revillagigedos. Juvenile specimens and both male and female, are shown for several species to facilitate identification.

To identify fishes, readers are advised to study the photographs before diving and to use a "pictorial key" to fish and invertebrate families — line drawings of a representative species of the families shown in the book. In all, 43 fish families are illustrated; invertebrates shown include sponges, hydroids, anemones, gorgonians, sea stars and urchins, sea cucumbers, snails, polychaetes, and more.

To avoid duplication, the author omitted some of the species (covered in his earlier books on Pacific Coast inshore fishes and subtidal marine invertebrates) whose southern range extends down the west coast of the peninsula. Also excluded were such tiny fishes as gobies, tube blennies, and clingfish which often are hidden from view or difficult to identify underwater.

The 112-page volume is a handy reference for the underwater naturalist and is available from the publisher for $17.95 (paperbound) or $29.95 (hardbound, 200 only). A brief bibliography and index is included.