

Fish Disease Diagnosis and Basic Fishery Computer Programs

The second edition of "**Disease Diagnosis and Control in North American Marine Aquaculture**," edited by Carl J. Sindermann and Donald V. Lightner, has been published by Elsevier Science Publishers, P.O. Box 330, 1000 AH Amsterdam, The Netherlands, as volume 17 in their series "Developments in Aquaculture and Fisheries Science." Sindermann is with the NMFS Northeast Fisheries Center, Woods Hole, Mass., and the University of Miami, Fla., and Lightner is with the University of Arizona's Environmental Research Laboratory in Tucson.

The control of diseases depends on correct diagnosis, proper preventive measures, and proper treatment, and this vastly updated second edition should be a big help to aquaculturists and others involved in the detection, prevention, and treatment of fish diseases. It includes excellent summaries of current information on the diseases of cultivated marine fishes and their prevention, considerably broadened now with the addition of 28 diseases of penaeid shrimps. It is very well illustrated with many photos and photomicrographs needed in identifying disease problems.

Included are contributions from 22 experts which cover the diseases of cultured marine crustaceans, mollusks, finfishes, and turtles. In addition another chapter is devoted to chemotherapy, vaccines and disease resistance, and disease problems created by introduced species. Each chapter presents specific additional references; a basic list of general dis-

ease references is presented as Appendix I. Appendix II lists chemotherapeutics for marine aquaculturists.

For each disease is given the common name (and synonyms), species affected are listed, as is the cause of the disease, gross symptoms, and method of diagnosis. Also given are the life history, biology, and epizootiology, along with the effects on the host, treatment, preventive measures, and the known geographic distribution of the disease and, finally, key references on it.

The volume is an excellent handbook to the diseases problems in North American mariculture and an excellent reference for aquaculturists, students and others wherever these diseases occur around the world. The first edition of this book was published in 1977 and in this edition, much has been rewritten and much has been added, making it even more useful. Hardbound, the 431-page volume is available from the publisher at Dfl. 200.00 or, in the United States, from Elsevier at P.O. Box 1663, Grand Central Station, New York, NY 10163 for \$105.25.

Also published by Elsevier as volume 18 in the same series is "**Basic Fishery Science Programs**," subtitled "A Compendium of Microcomputer Programs and Manual of Operation," by Saul B. Saila, Conrad W. Recksiek, and Michael H. Prager. Saila is with the University of Rhode Island's Graduate School of Oceanography, Recksiek is with the URI Department of Fisheries, Aquaculture, and Pathology, and Prager is with the Department of Oceanography, Old Dominion

University, Norfolk, VA.

Essentially, the volume is a compendium of computerized procedures, often unique to fishery science that will have widespread application for those with access to computers. Introductory chapters provide an overview of the author's FSAS (Fishery Science Applications System) system and its components, plus a tutorial on data entry, data editing, and the use of a typical application program. Additional chapters then summarize each application program, describing the analyses it performs and providing citations to pertinent fisheries literature. The computer programs described were written in the Microsoft implementation of the BASIC interpreted programming language BASICA (or GW BASIC) under the MS-DOS operating system. In addition, the authors discuss existing literature on computer applications in fisheries and suggest additional sources of information and software.

Section 2 describes the FSAS System, explaining its design and operations, system use and capabilities, and giving an FSAS tutorial, consisting of screen displays and a detailed description of each display that the user would see when using the FSAS. Also explained is the use of a spreadsheet with the FSAS.

Section 3 then gets into FSAS application programs, such as FISHPARM, a program for estimating the parameters of common fishery models by nonlinear least squares; BIREG, bivariate regression analyses; SEGREG, segmented linear regression analysis, and others. The authors have also made an effort to make their volume useful for solving problems in developing-nation fisheries. Each application program is summarized, and the analyses it performs are described, and the book should be very useful to fishery workers with access to a personal computer. Indexed, the hardbound volume is available from the publisher for US\$73.75 or Dfl. 140.00.

The Migration of Fishes From Fresh to Salt Water

Publication of "**Diadromy in Fishes, Migrations Between Freshwater and Marine Environments**" by R. M. McDowall has been announced by Timber Press, 9999 S.W. Wilshire, Portland, Oregon 97225. The author is manager of the Freshwater Fisheries Center, Ministry of Agriculture and Fisheries, New Zealand. The book differs somewhat from other general volumes on fish migrations in being a review of anadromy, catadromy, and marine and freshwater amphidromy.

Initial chapters discuss the early beliefs and studies of diadromy and review the terminology involved, as well as the taxonomic extent of diadromy. Another chapter discusses geographical variations in diadromy and the origin and evolution of diadromy. Then follow detailed analyses of each of the three forms of migration by family grouping.

With some groups of fishes, diadromy is a strong, important part of their life history strategy (i.e., certain lampreys, eels, sturgeons, salmon, etc). For other groups, diadromy is a rarity. The author has provided a good synthesis of the knowledge on the subject and discussion of diadromy for some southern hemisphere species adds to the review.

Other chapters discuss diadromy as an adaptive life history strategy and the phenomenon of landlocking where a diadromous population becomes an exclusively freshwater population. Another, from the author's southern hemisphere perspective, examines the "transportability" of diadromy when such migratory species are transplanted, and the successes and failures with the transplants and reasons therefore.

Fisheries for diadromous species are also reviewed, group by group, as are distance and persistence in diadromous migrations. Also presented is the status of various diadromous fishes—i.e., which ones are rare, endangered, declining, extinct, vulnerable, of indeterminate status, or are of regional

concern.

The book is a good review of diadromy and its scope and significance in fish behavior and ecology. It includes a lengthy bibliography and an appendix listing the diadromous fish species according to type of diadromy and latitudinal range. Indexed, the 308 page volume is available from the publisher for \$47.95 plus \$3 postage.

A Manual on Safety at the Seashore

"**Exploring Nature Safely**" by Ed Arrigoni has been published by Nature Safety Consultants, P.O. Box 22696, Honolulu, HI 96822. And while the manual seems aimed at professors or school teachers or youth group leaders, it presents considerable information of use to biologists or others who either chaperone, lead, or otherwise deal with citizen groups on field trips to their facilities or the seashore. Indeed, much of the information in the book addresses safety aspects in the seashore/marine environment. Another aspect of the book teaches how to study such areas without damaging the environment.

Chapter 1, "Starting Out," presents considerable information on how to plan and execute a safe outing, warning of many unsafe conditions or potential dangers that may face a group field trip. Another chapter deals specifically with outings on land, while the next reviews safety in the water environment—primarily marine, though it discusses safety along rivers and lakes too. Another chapter warns of hazardous plants and animals, including dangerous sea creatures. Color plates help illustrate many such hazardous creatures. Appendix A reviews first aid considerations, including measures to take if poisoned by various marine species. Appendix B lists other useful sources of information. Indexed, the 256-page paperback volume would be a fine handbook for those who visit marine environments with groups for either education or pleasure. It presents a lot of cautionary material that many other

outdoor safety/survival volumes ignore or overlook, but which are well worth remembering.

A Detailed Review of Fish Nutrition

"**Nutrition of Pond Fishes**" by Balfour Hepher has been published by the Cambridge University Press, 32 East 57th Street, New York, NY 10022. The late Dr. Hepher was formerly director of the Fish and Aquaculture Research Station, Dor, Israel, and had nearly a 40-year career in the field of aquaculture, during which he pioneered some of the important concepts of fish nutrition. Rather than a practical guide, the volume is a scholarly review of fish nutrition, utilizing a multidisciplinary approach to present a comprehensive account for students and scientists.

The book is presented in two parts. Part I thoroughly reviews food requirements, starting with the balance of energy—determining the food ration—and looking at the rudiments of food ingestion, the digestive process, and absorption of foods, factors affecting digestibility, and the various digestive enzymes, gastrointestinal flora, etc. Likewise reviewed are the energy pathways—the metabolism of carbohydrates, lipids, and proteins. Other chapters look at metabolism (how fish maintain life processes, the effects of water temperature, the energy costs of movement, and the utilization of metabolizable energy for maintenance) and growth (conditions affecting growth, potential growth rates, growth on reduced food rations and a summary of dietary energy requirements). Two other chapters examine the requirements of fish for protein and the sources of protein and the need for the other essential nutrients (i.e., essential fatty acids, vitamins, minerals, etc.), and the differing needs of various species for vitamins etc.

Part II examines the sources of fish foods and their utilization—natural foods and the estimation of their contribution or consumption and their composition. Likewise, supplement-

tary feeds and their utilization are also reviewed and discussed, including types of supplemental feeds, feeding levels, feed composition, frequency of feeding, feed utilization, and feed conversion ratios. Appendices list apparent digestibility of feed ingredients, essential amino acid composition of fish and feed ingredients, proximate analyses of natural food organisms, and feeding charts for various species. The book also includes more than 60 pages of references, a systematic index for fish, and a subject index. Hardbound, the 388-page reference volume is available from the publisher for \$69.50.

Guaranteeing High Quality Seafood for the Consumer

Publication of "**Quality Assurance of Seafood**" by Carmine Gorga and Louis J. Ronsivalli under the AVI Books imprint has been announced by Van Nostrand Reinhold, 115 Fifth Avenue, New York, NY 10003. Gorga is a fisheries consultant and Ronsivalli, retired, was a director of the NMFS Gloucester Technological Laboratory in Massachusetts. The book is published in three parts: I, assurance of seafood supply; II, assurance of seafood quality; and 3, administration and economics of quality assurance.

The authors stress that seafood quality assurance is not the same as seafood quality control; the former is a guarantee, and they use this book to provide a step-by-step review and discussion of the attitudes and steps that need to be adopted to guarantee the ultimate arbiter—the consumer—high quality fresh fish and fillets (shellfish or such products as canned, pickled, cured, or dried fish are not addressed). The book is suited for a broad audience, and it explains the various procedures in terms easily understood by processors, fishermen, as well as market owners and the consumers.

Part 1 presents general information on the values of seafoods, strategies for assuring the seafood supply, and the role of the U.S. government in the

process. Part 2 then goes into seafood quality—how it is defined and measured, and how, why, and how fast seafood quality deteriorates. Then the authors discuss how to assure high seafood quality, discussing the roles of the fishermen, processors, retailers, and the consumers. Chapters in part 3 then outline the planning, administration, and coordination needed to assure high quality seafoods as well as the economics and economic benefits therein. Appendices discuss fish lipids, effects of decreasing temperature on the physical state of water in fish tissue, importance of accurately measuring seafood quality, spoilage rates of seafood, and provide formulae for the determination of gross profit margins and some specific costs. Indexed, the 245-page hardbound volume is available from the publisher for \$42.95.

Freshwater Fishes of the Southern U.S.

Publication of "**Fishes of Arkansas**" by Henry W. Robison and Thomas M. Buchanan has been announced by The University of Arkansas Press, Fayetteville, AR 72701. This is an immense (536 pages), thorough, and scholarly volume, long in the making, and useful well beyond the boundaries of the State of Arkansas, at least in part owing to the number of fishes that traverse the Mississippi River and partly because most other Arkansas fishes have ranges well outside state borders. Indeed, with this volume and "Fishes of Wisconsin" one would have a fairly thorough coverage of central United States freshwater fishes.

Both authors have published extensively on Arkansas fishes and Robison, professor of biology at Southern Arkansas University, Magnolia, is coauthor of "The Fishes of Oklahoma." Buchanan, a professor of biology at Westark Community College at Fort Smith, is author of "Key to the Fishes of Arkansas."

The authors begin with a history of ichthyology in Arkansas, mentioning

the role of Spencer F. Baird studying specimens collected by U.S. Army Capt. R. B. Marcy and sent back to the Smithsonian Institution, as well as other area collection efforts for the U.S. National Museum and the U.S. Fish Commission. Another chapter reviews the state's aquatic environment—the terrestrial and aquatic settings, environmental alterations, the rare, endangered, and introduced species, and its commercial fisheries.

Species accounts then make up the bulk of the book, with extensive data provided on the state's 215 species in 63 genera and 27 families (17 of the species have been introduced and one, the rainbow smelt, made its own way into Arkansas waters after having been introduced in northern states). The state's ichthyofauna is quite diverse, representing a little over 20 percent of the roughly 950 freshwater fishes in North America north of southern Mexico. The bulk of the 215 species are found in five families: 66 cyprinids, 41 percids, 20 centrarchids, 19 ictalurids, and 18 catostomids—more than 75 percent of the states fish species.

Economically, fishes are very important to the state as game, food, and bait: The state is the top-ranking producer of bait fish (a \$20 million industry), and Arkansas ranks second to Mississippi in channel catfish production, at about \$13 million. In 1985 alone, commercial fishermen harvested over 17 million pounds of wild fish worth \$7.5 million.

Keys are provided to the families and to the species within each family. Data on each species includes general characteristics, life colors, variation and taxonomy, distribution, habitat, biology, data on their uses, if any, and how to distinguish them from similar species. Each species is well illustrated (often in color), and range maps depict their distribution in the state and in the nation, with a key for pre-1960 collections and 1960-87 collection records.

Appendices list scientific collections of Arkansas fishes, methods of preservation of fish specimens, aids to fish identification, and the fishes

known to occur in Arkansas. Also included is a glossary and an extensive literature cited section. Layout and design are excellent, and the volume is a fine encyclopedia of Arkansas fishes that would be useful to students, biologists, anglers, and others interested in the region's ichthyofauna. Hardbound, the 536 page volume is available from the publisher for \$50 (cloth) or \$30 (paper).

FISH CULTURE AROUND THE WORLD

Publication of "**Intensive Fish Farming**," edited by Jonathan Shepherd and Niall Bromage has been announced by Blackwell Scientific Publications, Inc., P.O. Box 50009, Palo Alto, CA 94303. Shepherd, former deputy director of the Institute of Aquaculture in Scotland is managing director of a Spanish aquaculture firm; Bromage is with the Institute of Aquaculture, University of Stirling, Scotland, and their book provides an authoritative review of current fish farming methods. The title term "intensive" separates the methods used for such species as channel catfish, trout, salmon, and yellowtail from the "extensive" means which, they say, relies more on art than science. Intensively farmed fish, they clarify, are "bred, reared and harvested within purpose-built facilities at high stocking densities" where the farmer uses mainly formulated diets and good husbandry instead of just fertilizers to improve nutrition in very large fish ponds.

Successful examples are reviewed in specific chapters on intensive marine farming in Japan by Takeshi Watanabe, fish culture in the United States by Nick Parker, and the development of polyculture in Israel by Shmuel Sharig. Watanabe's chapter discusses the culture of such species as red seabream, *Pagrus major*; yellowtail, *Seriola quinqueradiata*; and Japanese flounder, *Paralichthys olivaceus*, including broodstock maintenance, spawning, larval rearing, feeding

schedules, growth, and production. Parker reviews culture of channel catfish, trout, salmon, striped bass (and hybrids), baitfish, tropical fish, and exotic species such as the various carps and tilapias. Sharig has reviewed the progression of fish culture in Israel from carp monoculture and polyculture with different size groups of carp, carp and mullet, tilapias, and using as many as 3-5 different species, into more intensive culture systems utilizing pond aeration, automatic feeders, higher stocking rates, etc., and adapting fish ponds for use for irrigation storage and merging them into the overall farm water scheme.

Initial chapters lead the reader through a general discussion of fish farming, the environmental requirements of fish and farm site evaluation, fish farming systems and culture practices, propagation and stock improvement, fish nutrition and growth, and fish health and disease. Overall, the book provides a good review of intensive fish farming practices and the factors that either aid or detract from their success, and it would be useful for students and others interested in these up-to-date and proven methods of fish culture.

One appendix provides an economic case study of Atlantic salmon farming; another lists useful information, i.e., aquaculture journals and related periodicals and scientific and common names of farmed fishes. Indexed, the hardbound 404-page volume is available from the publisher.

Asian Fisheries Society Produces New Journal

A new scientific journal, *Asian Fisheries Science*, has been initiated by the Asian Fisheries Society, MC P.O. Box 1501, Makati, Metro Manila, Philippines and is edited by J. L. Maclean, who reports that it is the first such regional journal dealing with fisheries and aquaculture research. The geographical scope of the new publication is the Indo-Pacific faunal zone, and it will feature studies and

research activity in the various institutions and nations within that region. The institutional price is US\$25 per volume (two issues), and one volume per year is scheduled. Airmail is \$8 extra per volume. Individual subscriptions cost \$12 per volume or \$9 for Society members. The initial volume ran 106 pages and carried nine articles on topics ranging from the effects of eyestalk ablation on molting, growth, reproduction, and energy budget of *Macrobrachium nobilii*; leguminous seeds as protein sources for milkfish, and maintenance of genetic quality in cultured tilapia, to parasites of wild and diseased young cultured golden snappers in Malaysia, aspects of reproductive biology of stolephorid anchovies in Papua New Guinea, and experimental culture of *Penaeus semisulcatus*, *P. brasiliensis* and *P. penicillatus* in Taiwan.

The Study of Marine Microbes

Publication of "**Marine Microbiology**" by B. Austin has been announced by Cambridge University Press, 32 East 57th Street, New York, NY 10022. The author is with the academic staff of Heriot-Watt University's Department of Brewing and Biological Sciences and has done specialized study at the Fish Diseases Laboratory in Weymouth, U.K.

This concise volume is aimed at providing undergraduate students with a background in marine microbiology, with emphasis on such newer aspects as biotechnology, fish and shellfish pathology, and deep-sea microbiology. It also introduces the habitats and ecology of marine microorganisms, their taxonomy, and pertinent microbiological techniques and methods, and it covers its topics very well and with a minimum of jargon.

Chapters specifically report microbiological methods, quantification of marine microbial populations, taxonomy of marine microorganisms and their ecology, microbiology of the macroorganisms and diseases of both

marine vertebrates and invertebrates, microbiology of the deep sea environment. Also discussed are useful aspects of marine microorganisms (biodegradation of pollutants, settling of invertebrate larvae, formation of manganese nodules, fermented food products) and problems (biodeterioration/biofouling of objects, mobilization of heavy metals, reservoirs for human pathogens, spoilage and food poisoning microorganisms in fish); and biotechnology (pharmaceutical compounds including antibiotics, antiviral compounds, antitumor compounds, enzymes, surfactants, and other potentially useful microbial products). Well written, the 222-page hardbound volume is available from the publisher for \$59.50 (paperbound, \$19.95).

ICLARM Reports Discuss Fish Research, Culture

“Length-Based Methods in Fisheries Research,” edited by D. Pauly and G. R. Morgan has been copublished by the Kuwait Institute for Scientific Research and the International Center for Living Aquatic Resources Management (ICLARM), MC P.O. Box 1501, Makati, Metro Manila, Philippines. The volume constitutes the Proceedings of the International Conference on the Theory and Application of Length-Based Methods for Stock Assessment held 11-16 February 1985 in Mazzara del Vallo, Sicily, Italy.

Included are 22 papers from the conference, along with the reports of three of the four working groups formed during the conference, plus three contributions written immediately thereafter—chairman J. A. Gulland’s overview, a review of programs discussed at the conference by the editors of the volume, and a note on some aspects of the problem of length-to-age vs. age-to-length conversion. The contributions review length-based methodologies for stock assessment of fish and aquatic invertebrates with particular reference to their

precision and accuracy; review and test computer programs implementing length-based methods; and help identify the specific features of sampling schemes used to obtain length-frequency data for stock assessment. The 468-page hardbound volume includes author, geographic, and species indexes and is available from ICLARM as ICLARM Conference Proceedings 13 or, in the United States, from International Specialized Book Services, P.O. Box 1632, Beaverton, OR 97075 (price not listed).

ICLARM Conference Proceedings 14 is **“Detritus and Microbial Ecology in Aquaculture,”** edited by D. J. W. Moriarty and R. S. V. Pullin. This presents the Proceedings of the Conference on Detrital Systems for Aquaculture held 26-31 August 1985 in Bellagio, Como, Italy. Contributions are grouped under session topics: Microbial ecology in aquaculture, production and characteristics of detritus, productivity and food chains, and manipulation of detrital systems for aquaculture. Also included is a conference consensus statement; general, genera and species, and geographic indexes; and a list of participants.

Individual articles discuss the use of manures, human wastes, and terrestrial vegetation and aquatic macrophytes in aquaculture; detrital and algal-based food chains in aquaculture; the role of meiofauna in marine detrital systems; composition and nutritive values of detritus; carbon pathways in aquatic detrital systems; production of organic fertilizers by composting; conversion of cellulosic and other organic wastes into microbial proteins; methods for determining biomass and productivity of microorganisms in detrital food webs; the role and impact of anaerobic microbial processes in aquatic systems; trophic dynamics of particle-bound bacteria in pelagic ecosystems, functional roles of the major groups of bacteria associated with detritus; and more. The 420-page paperbound volume is available either from ICLARM or from ISBS at \$28.50, or, in Germany, from TRIOPS, Toeche-Mittler Distribution,

Hindenburgstr. 33, 6100 Darmstadt, Frankfurt, FRG.

Practical Feeding of Farmed Fishes

Publication of **“Nutrition and Feeding of Fish”** by Tom Lovell and others has been published as an AVI imprint by Van Nostrand Reinhold, 115 Fifth Avenue, New York, NY 10003. Some specific chapters are written by experts in the field of nutrition for the particular species involved.

Following a review of the basic concepts of feeding fishes, Lovell reviews energy requirements and sources and necessary nutrients—proteins and amino acids, vitamins, essential lipids, and minerals, along with such nonnutrient diet components as toxins and anti-metabolites, diet additives, and accidental contaminants. Also discussed is fish digestion and metabolism, measuring nutrient digestibility in fish, and the rate of metabolism (oxygen consumption) in fish. Two additional chapters address feed formulation—ingredients and processing—and the use of fish feeding experiments.

Then comes the “meat” of the book, the practical chapters on feeding of the following fishes: Channel catfish by Lovell, tilapias by Chhorn Lim, salmon and trout by NMFS scientist Ronald W. Hardy, penaeid shrimps by Lim and Amber Persyn, eels by Shigeru Arai, and crawfish by Edwin H. Robinson. Each of these chapters review the species’ nutritional requirements, feeding practices, the various feeds available, feeding rates and methods, etc. Where appropriate, the utilization of natural feeds is discussed. Appendices list composition of fish feed ingredients and the common and scientific names of species fish involved.

This is a very practical and useful book for aquaculturists and students and would also likely be of interest to those involved in fish food formulation and in setting up studies of fish feeding experiments. Indexed, the 260-page

hardbound book is available from the publisher for \$46.95.

International Marine Policy

The potential for conflict and cooperation in marine affairs between and among the developed and developing nations is the general theme for "**North-South Perspectives on Marine Policy**," edited by Michael A. Morris, professor of Political Science at Clemson University, and published in the Special Studies in Ocean Science and Policy Series by Westview Press, 5500 Central Avenue, Boulder, CO 80301. Marine fisheries development can be vital to less developed

island-nations and this volume views aspects of such issues in relation to overall marine policy, which includes sea-bed resources, marine pollution, navigation rights, military policy, and more.

The volume is divided into three parts, with Part 1 presenting perspectives of developed nations, Part 2 the perspectives of the developing nations, while papers in Part 3 deal with aspects of North-South marine interactions. One paper in part 2, "Optimal Development of Third World Fisheries" by Conner Bailey deals very specifically with marine fisheries matters. Several other contributions include aspects of fisheries in discussions of other marine

resources and issues. Major aspects of the contributions are then synthesized in a concluding chapter by the editor. Paperbound, the 267-page volume is available from the publisher for \$28.50.

Price Correction for Northwest Coastal Fishes

The price listed (\$29.95) for the book "Coastal Fishes of the Pacific Northwest" by Lamb and Edgell, published by Harbour Publishing Co., Ltd., P.O. Box 219, Madeira Park, B.C., Can., V0N 2H0 in 50(s) was incorrect. The correct price in the United States is \$14.95 and in Canada it is \$16.95.