

. . . BRIEFS . . .

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Gene Nakamura, AIFRB Past President, presents the Special Group Award of Merit to Andrew J. Kemmerer, Director of the Pascagoula, Mississippi NMFS Laboratory.

1984 Special Group Award of Merit

The AIFRB Special Group Award of Merit for 1984 has been presented. The Award was given to the Harvesting Technology Division of the National Marine Fisheries Service in Pascagoula, Mississippi. Dr. Eugene Nakamura, Past President of AIFRB, made the presentation on behalf of the Institute to Dr. Andrew J. Kemmerer, Director of the Laboratory at Pascagoula, who acted as the recipient.

The Award was given for the development of the TED (turtle excluder device), which is being used by the shrimp industry for reducing the bycatch of turtles during shrimp trawling (see BRIEFS 13 (5):4-5, Oct. 1984).

Association Life Cycles

The following paragraphs have been excerpted from an article by Brandi Sullivan, Editor of the Institute of Association Management Companies. The article appeared in the Fall 1984 issue of IAMC's *Elected Leader* and is used with IAMC's permission. I think the reader will recognize and associate the stages of development with those of AIFRB and with other professional organizations to which they belong. In the last

paragraphs, I discuss aspects that are applicable to AIFRB and hope that they will stimulate all members to give some thought to the future of our organization.

"As associations grow and mature, they pass through stages of development. It is critical for the officers and members to be able to identify what stage their association is experiencing, so that the organization can respond to the ever-changing needs and desires of its members.

"The conceptual stage of any association begins with a few individuals who want to achieve a specific goal for their profession. It may be that the profession does not have an association, or that existing organizations do not fulfill the needs of the profession. Typically, the motivation centers on one concrete and easily identified objective. These can run the gamut from camaraderie to the development of professional standards. Whatever the objective, the association's focus at this stage is very narrowly defined and very introverted. Its membership is usually small, and everyone knows everyone else. The association is led by the core of founders, who are writing the newsletter or balancing the checkbook. In fact, a higher level of effort is not required because the association's needs are not great. Membership does not grow appreciably and activities are limited. As time passes, the founding members develop a vested interest in maintaining the status quo. The goals of the association have not changed and the leaders perceive no need for change, and everyone is comfortable with the way things are. The impetus to add new members or new programs decreases. While new members join from time to time, they are not aggressively sought.

"Usually, at this point, the administrative mechanism does not exist that could handle a membership recruitment effort or additional activities. The elected leaders eventually reach the limits of their time to lead and administer. The latter part of this stage finds interest in the association waning and early leaders becoming less active. Because membership has not grown, the pool of members from which the association can tap leaders begins to evaporate. Members who want the association to move in other directions could become the majority and by sheer force of numbers push the association in new directions. The association must respond or regress. When the association responds, it enters a stage of upheaval, characterized by instability, insecurity, and introspection. Leaders and members question the fundamental goals of the association and their efforts to achieve these goals: Does the association still make sense? Is it all right to change? Where are we going?

cont. on page 2

Association Life Cycles cont.

How will we get there? Answering these questions requires intense and lengthy introspection, and the answers will not be what some leaders or members want to hear. Internecine battles erupt between those who are resistant to change and those who want to move forward. At some point during this stage, most association leaders recognize the need for professional management. This is a stage of significant growth and development, usually marked by one success after another. Legislative initiatives are met with favorable response from governments; programs are heavily attended; membership soars; and the treasury grows. The association now undertakes ambitious, sophisticated projects.

"Explosive growth, however, cannot be sustained. The association at some point reaches a plateau of stability, experiencing modest gains in membership and a leveling off of activity. At this point the strategic plan developed in the previous stage becomes critical and, coupled with a trends-analysis program, it provides the association with the necessary tools to monitor and anticipate activity so that it can overtake events, not be overtaken by them. One event that can overtake an association is regression — slipping back into habits and ways of thinking that existed before the association went through the stage of significant growth.

"Elected leaders must be able to identify what stage their association is in so they can provide the right kind of leadership. A dynamic association will pass through these stages many times. It will be faced, time and again, with assessing its purpose and reason for being, with evaluating its programs and services, and with assessing its members' needs. The fundamental philosophy of the association may never change, but its focus and its program will, as the environment in which it operates changes. These must change if the association is to achieve its primary goal — to benefit its members in their professional life."

When I held the Presidency of AIFRB, I received comments about the Institute which can be categorized in two major areas of concern to the members, and judging from past correspondence, these comments were not new and can be expected to be voiced again. The first concerns the activities of AIFRB in relation to its goals. Some members were content with the organization and their professional recognition. They saw little need for new endeavors and even objected to any change. Other members — as predicted in the above article — were not satisfied by just recognition and thought AIFRB's role should be broader. They asked, "What does AIFRB do for me?" They urged greater communication of professional activity, involvement in environmental problems, lobbying for legislation, etc. They also questioned the expenditures of funds and recommended that the Institute have a paid executive secretary.

The second area of concern voiced was the criteria used to elect individuals to the different categories of membership. There has been a longstanding difference about Associates, i.e. whether students should be eligible or not. However, the main concern was the perception that the criteria for Fellows were not as rigorous as during the formative years of AIFRB. Indeed, when I

was President-Elect, the Membership Committee submitted a report confirming this change and stated that the criteria were based on the Committee's interpretation of AIFRB's Policy Statements.

These two areas of concern, which question the structure of AIFRB, are not unusual in association development and I think there is a common thread — the members' perception of professional recognition. One can argue that the Institute should have maintained its more rigorous requirements, and, indeed, that there only should have been the Fellow category or that we now should create a category for Super-Fellow. It is also rational to defend our existing make-up, providing a ladder of achievement which Associates and Members can climb. I think AIFRB can resolve these differences and when this happens, AIFRB's role and level of activity will be more easily decided.

My purpose — as well as pointing out that our Institute is following a more-or-less predicted pattern of development — is to ask the membership that they consider the opposing viewpoints and help the Board of Control in a search for the answers that will be beneficial to the profession, rather than taking the easy way out and discontinuing their participation. I think the newsletter is a fitting place to air these differences and urge you to submit your viewpoints to the Editor.

Bernard E. Skud, *Past President*

Blue Tilapia Accidentally Introduced to the Lower Susquehanna River, Pennsylvania

Thirty-one specimens of *Oreochromis aureus* were collected on 18 September 1984 by biologists from Pennsylvania Power & Light Company's Ecological Studies Laboratory from two locations in the lower Susquehanna River adjacent to York County, Pennsylvania. Shorezone fish collections with a backpack electroshocker yielded 18 individuals (76-141 mm TL) from shallow (75-100 cm deep) backwater areas near the mouth of PP&L's Brunner Island Steam Electric Station cooling water discharge canal (lat 40° 5' 30", long 76° 41' 15"). Thirteen individuals (26-70 mm TL) also were collected in shallow (10-50 cm deep) pool/backwater areas approximately 1.7 km downriver from Brunner Island SES and some 200-300 m out from the west river bank. Water temperatures in these two areas were 31.0 C and 28.5 C, respectively. Additional specimens of *O. aureus* also were collected in August and September 1984 from the Susquehanna River near Wrightsville and from the river below Conowingo Dam, approximately 19.6 and 78 air km, respectively, downriver from Brunner Island SES (D. Mathur, Muddy Run Ecological Laboratory, Drumore, PA pers. comm.). Of interest is that blue tilapia made up 6% of a total 2,361 fish counted within approximately 750 m downriver from Brunner Island SES following a "cold shock" fish kill on 21 November 1984 when

temperatures dropped approximately 17 C in little more than 1 hour.

Although temperatures were suitable at the time of collection in September for reproduction and spawning of this maternal mouthbreeding species, examination of females indicated no juveniles being held in mouths or incidentally swallowed into stomachs. Two specimens were sent to Dr. Jay R. Stauffer, Jr., The Pennsylvania State University, University Park, PA for positive identification and cataloging in the University's voucher collection (The Pennsylvania State University Fish Museum, Nos. 1512 and 1513). A third specimen was sent to Mr. Delano Graff, Pennsylvania Fish Commission, Fisheries Division, Bellefonte, PA.

The local source of *O. aureus* is believed to be PP&L's Brunner Island Aquaculture Facility, a research facility currently licensed by the Pennsylvania Fish Commission to propagate and sell this and other fishes. Originally stocked in raceways at the Facility on 13 October 1982, 100-200 blue tilapia of numerous size-classes were collected on 23 & 24 August 1983 by ESL biologists in the Facility's effluent oxidation pond and from the Susquehanna River in the immediate vicinity of the oxidation pond discharge, approximately 0.3 km upriver from the mouth of the cooling water discharge canal. Anglers have also reported catching blue tilapia (900-1200g) from the Brunner Island SES cooling water discharge canal during the winter of 1983-84 (T. Beck pers. comm.).

The introduction of blue tilapia to the north temperate Susquehanna River would not normally be of concern because this species probably cannot survive prolonged temperatures below 9 C. However, winter-time survival of this species may be possible in PP&L's Brunner Island SES and Philadelphia Electric Company's Peach Bottom Atomic Power Station (downriver) thermal discharges which may provide artificially heated areas of water favoring the survival of the species during this period.

Whether *O. aureus* will develop an established population in the lower Susquehanna River remains to be documented. However, periodic sampling by PP&L and Pennsylvania Fish Commission biologists will attempt to track its success. Particular emphasis will be placed on sampling within artificially heated areas during winter months. It is requested that other biologists and anglers report confirmed or suspected specimens, along with location, weight, length, and sex (if available) to the author or to personnel at the Brunner Island Aquaculture Facility, York Haven, PA.

W. F. "Ric" Skinner, Ecol. Studies Lab.
Penn. Power & Light Co., Allentown, PA

Tiburon Pollutant Studies

The goal of the Physiological Ecology Investigation at the SWFC Tiburon Laboratory has been to contribute to an understanding of the long-term ecological consequences of pollutant effects on aquatic resources.

In our current study we selected a "model species," the striped bass (*Morone saxatilis*), within a coastal,

estuarine ecosystem — the San Francisco Bay-Delta. This species appears to be on a long-term decline in this area. We suggest that at least part of this decline may be due to the deleterious interactive effects of anthropogenic factors such as water diversion and pollution.

Initially, we were uncertain which classes of pollutants might be implicated. We now believe that certain petrochemicals, interacting with other pollutants such as PCBs and heavy metals, are involved. Our studies include measurements of petroleum hydrocarbons, chlorinated hydrocarbons, and heavy metals in selected tissues (gonads, liver, muscle) of striped bass from the field, and laboratory studies of the effect of specific compounds from these classes. Compounds were selected for lab studies based on their occurrence in striped bass in the San Francisco Bay-Delta and include benzene (a petrochemical) and zinc (a heavy metal).

Field results indicate correlations of pollutants with parasite burdens, body condition, liver condition and, most significantly, egg and gonad condition. Fish chronically exposed to pollutant stressors may be susceptible to diseases and parasites. Fish from the San Francisco Bay-Delta appear to have higher and more damaging parasite loads than fish examined from other areas to date (Coos River, Oregon; Lake Mead, Nevada; and the Hudson River, New York). Cestode-induced lesions, resulting in open wounds and secondary bacterial infections, are unique to fish from the San Francisco Bay area. It seems certain the lesions and subsequent infections cause mortality in younger fish. Even in older fish with healed lesions, there are associated deleterious conditions stemming from the earlier cestode infections. In field fish, the correlation between the burden of monocyclic aromatic hydrocarbons (MAH) and the presence of cestode lesions is significant.

Both field and laboratory results substantiate that fish exposed to chronic pollutant stress undergo significant reductions in reproductive capacity, fecundity, and gametic viability. We estimated that the reduction in viable eggs, even before spawning, was at least 50% for the 1978 prespawning females. Pollutants most implicated in causing deleterious effects on reproduction and egg condition are MAH and zinc. DDT and PCBs were also associated with egg abnormalities in some fish.

Jeanette A. Whipple
NMFS, Tiburon, CA

Introduction to IAMS LIC

In October 1975, at the invitation of the Research Librarian, Woods Hole Oceanographic Institution, 49 librarians and information specialists from the east coast of the United States and Canada convened at Woods Hole, Massachusetts, U.S.A. to discuss their

cont. on page 4

Introduction to IAMSLIC cont.

common interests and concerns in providing library and information services to the scientists, administrators, engineers, educators, and students in the discipline of marine science.

The "East Coast Marine Science Librarians" group, as it was first known, was restructured in 1978 as a formal, non-profit organization, and adopted the name "Marine Science Libraries Association". In 1979, bylaws were formally approved and the name was changed to its present "International Association of Marine Science Libraries and Information Centers" (IAMSLIC).

IAMSLIC now numbers over 100 personal and institutional members from 17 different countries. Ongoing projects of IAMSLIC and/or its members include planning and participation in the annual conferences, publication of the IAMSLIC *Newsletter*, preparation of a union list of serials held in marine science libraries and a union list of oceanographic atlases, investigation of possible sources of funding for continuation of the DIALOG database "Aquaculture", and development of or access to an electronic mail network for the use of the membership.

Successfully completed projects include publication of the *Directory of Marine Science Libraries and Information Centers*, compilation of an interlibrary loan information handbook, preparation of a bibliography entitled *Selected Readings about the Oceans*, and recommendation to the editorial board of *Aquatic Science and Fisheries Abstracts* (ASFA) that new marine science translations produced by the U.S. National Marine Fisheries Service and Canada's Department of Fisheries and Oceans be indexed in their database — a recommendation ASFA accepted in 1982.

IAMSLIC is an organization through which those interested can exchange ideas and explore issues of mutual concern. You are invited and encouraged to join us in our endeavors, as we seek to provide a forum for coordinating resource sharing within the marine-related fields. All types of libraries and information centers participate, including research and policy institutions, government agencies, colleges, universities, and non-profit and profit-making organizations. We would be enriched by your support and involvement. Annual dues are \$20.00.

Ilene Zaleski, Treas., IAMSLIC
46 Miami St., Falmouth, MA 02543

HRF Solicitation of Proposals

The Hudson River Foundation supports basic and applied research in the natural and social sciences, and educational programs concerning all aspects of the Hudson River ecosystem. Our emphasis is on studies that relate to potential human uses of the system. The geographical area of primary interest is the estuarine

portion of the River (New York Harbor to Troy Dam). Proposals will be considered which relate to any part of the watershed or nearby coastal areas. We define such areas as those which either serve as seasonal habitats for biota of the estuary or influence the physical, chemical, or biological aspects of the estuary in other ways (e.g., movements of PCB's over the Troy Dam). The Foundation might also consider research projects outside of these geographic areas if they bear on ecosystem processes and social or public policy issues that have relevance to the Foundation's basic mission.

The Hudson River Foundation is interested in supporting research at all levels of ecological organization, from detailed studies of individual organisms and populations to investigations of the River as an ecosystem. While we have a particular interest in those aspects of the system which related to human uses, especially the fishery resources, we also seek proposals for research on non-fish species of interest, food web interactions, elemental dynamics, processing of heavy metals and other toxics, and other aspects of the ecosystem which affect the fisheries and other resources.

The Foundation seeks to sponsor programs which shall be both innovative and new. We see our greatest value in fostering new research and environmental programs not yet mature enough to warrant sustained support from other funding sources. We prefer not to sponsor research already supported by other funding programs, although well-coordinated jointly-sponsored efforts will receive consideration.

The Hudson River Grants are the Foundation's principal funding program. Each proposal receives rigorous review by a Panel subcommittee and, except in rare cases, peer review of each proposal, before funding decisions are made. There is no funding limit specified for these grants but budgets generally are in the range of \$30,000 to \$70,000.

The foundation issues an invitation for proposals along with the Annual Program Plan in December of each year. Proposals are welcomed from individual researchers; researchers at colleges and universities; non-profit/non-academic institutions; profit-making institutions; and governmental (local, State, and Federal) agencies.

The Foundation prefers that individual researchers seek some institutional affiliation for the purpose of carrying out the proposed research.

Respondents to this solicitation need not be within the State of New York to apply. Institutions showing promise of deriving long-term benefits from Foundation sponsorship will be given special consideration.

Proposers for Hudson River Grants may submit applications at two times during the year, with submissions due in our office by 5:00 p.m. on February 14, 1985, and September 5, 1985.

A booklet describing the grant program in detail and providing instructions for submitting proposals can be obtained from: Proposal Section, Hudson River Foundation, 122 East 42nd Street, Suite 1901, New York, New York, 10168.



The AIFRB in China. AIFRBers of the 1984 AFS People-to-People delegation gather at a Beijing airport. Front row — Bob Wiley, Reeve Bailey, Kirk Beiningen, Cliff Burner, Bill Sigler, and Fritz Cramer. Back row — Leo Erkkila, Oliver Cope, Janice Hughes, Bev Scott, Ed Cooper, and Chuck Campbell.

The New Congress: What's Up First for Fisheries?

Budgets

Coping with federal agency budgets will take up the overwhelming majority of time early in this year's session. Extensive cuts to National Marine Fisheries Service programs, Tennessee Valley Authority budgets for fish and wildlife activities, Forest Service fishery programs, and fishery activities in other federal agencies are expected.

Fishery Conservation and Management Act (FCMA)

Reauthorization of the FCMA probably will be the only major fisheries legislation to receive prompt attention by both Houses of Congress. Already, dozens of amendments to the Act have been proposed by various interests.

Perhaps of greatest broad interest to fishery professionals are proposals to amend FCMA that have been offered by the National Wildlife Federation. The Federation would like to see that Fishery Management Plans developed by the Regional Fishery Management Councils include an assessment of habitat requirements of the fishery under management. Based on the premise that complete fishery management requires more than

allocating fish among users at levels within the bounds of optimum yield, the proposal would require all federal agencies to evaluate the effects of their activities or activities they license (such as filling in wetlands and dam construction) on federally-managed fisheries. Federal agencies would be required to mitigate the adverse effects of their activities on federally-managed fisheries, and where federal agencies refuse to take action to protect fisheries, the Federation's proposal would empower the Secretary of Commerce to condition the activities of the federal agency affecting the federally-managed fishery.

Forest Service "Below Cost" Sales Program

An issue that probably will receive rapid attention by the new Congress and will have direct effects on fishery resources is the U.S. Forest Service's (FS) practice of selling timber "below cost" and the accompanying high-volume timber-cutting programs and road building.

Intensive debate recently has centered on whether or not National Forests have been managed economically by the FS. Some sales of public timber return only a few cents to the U.S. Treasury for each taxpayer dollar spent. Even though the sale of National Forest timber in

cont. on page 6

The New Congress cont.

most years nets a profit, hundreds of millions of dollars are lost on individual sales, with some FS regions selling 80 to 90% of all timber at a loss.

The public issue is one of losing federal money at a time of growing deficits. The conservation issue is the massive road building and timber-cutting program intimately tied to the below-cost sales. The implication to fisheries of increased cutting and roading in forest areas should be clear, but maintaining the integrity of vast expanses of fish-producing watersheds in every corner of the U.S. will be difficult under the proposed program.

On National Forests most accessible, high-quality timber already has been logged. Eventually, harvestable-sized trees will grow back, but the interim presents a dilemma for the FS. Options for the FS are to reduce harvest levels or continue high levels of harvest by moving their activities into unroaded areas of poor timber quality, steep terrain, high elevation, unstable soils, or poor accessibility. The government has chosen to continue its high-volume cutting, but to do so it has elected to bear the cost of making trees accessible to private timber companies, which means building roads. Thus, because the value of timber can be low while the cost of roads, especially in remote areas, is high, taxpayers lose money.

Increased risk to fisheries is the result of timber harvest in areas of steep and unstable terrain. In addition, going into unroaded areas breaks up expanses of relatively pristine watershed.

The FS already maintains 321,000 miles of road and is adding over 4,500 miles and rebuilding over 5,500 miles annually. Besides the building of roads, increased use, the result of increased timber cutting, will continue to have adverse effects on fisheries. Forest Service researchers in North Carolina estimate that 20 to 40 times more sediment erodes from the surface alone of gravel-topped roads that are open to traffic than from such roads when closed. These estimates do not even include erosion from road cuts or built-up banks.

Although Congress's investigation will focus primarily on the economic issue of below-cost timber sales, it is hoped that biological considerations are identified. However, even on an economic basis, simple value of use of fishery resources in many forests outweighs value of timber sales on an annual basis. For example, National Forests contain about 128,000 miles of fishable streams and 2.2 million acres of fishing lakes. Anglers spend about 15.5 million 12-hour fishing days in the forests. As an example of the comparative value of fishing and timber, the George Washington National Forest, located near Washington, DC, supported about 218,400 angler-days in 1983 at an estimated value of \$6.5 million (based on FS original estimates of the value of a 12-hour angler-day for the Southern Region); total receipts from timber sales in 1983 totaled only \$800,000 before deduction of costs of building roads and administration of the timber sales.

Turning our National Forests into tree farms may not bankrupt the U.S. Treasury, but doing so probably will not help the Treasury either. Certainly, fisheries will not

be a major beneficiary in any program of maintained high-volume timber cutting and road building.

Rudolph A. Rosen, *National Wildlife Federation*
Washington, DC

Announcements and New Publications

Lake Michigan Salmonid Institute

The American Fishing Institute is sponsoring the Lake Michigan Salmonid Institute in Michigan City, IN on March 23-24, 1985. The program will be presented by Indiana State University.

GENERAL SESSIONS — The program is highly structured with eight one-hour general sessions presented during the Institute. These multimedia presentations are attended by all students. At the end of the two days, 15 hours of instruction will have been completed covering five different species. The species include the coho and chinook salmon along with the steelhead, lake and brown trout. Teaching is geared towards the shore, pier and stream fisherman as well as the offshore angler. General Session topics include:

The Species	The Waters-Offshore
Balanced Tackle	Getting the Lure Down
Terminal Tackle-Lures	Electronic Tools
The Waters-Onshore	Fishing by the Seasons

CONCURRENT SESSIONS — Between each general session, students attend several concurrent sessions. These sessions are for smaller groups and one-on-one instruction. Concurrent Sessions include:

Product Demonstration	Special Boating Class
Indoor Pool Area	Youth Classes
Electronics in Fishing	Ladies Classes
Other Area Species	Casting Techniques
Radio Communications	Instructional Films

Special emphasis is placed on conservation awareness, sportsmanship and safety throughout the two days of the Institute.

For additional information, contact: American Fishing Institute Instructional Services, Indiana State University, Terre Haute, IN 47809. Ph. (812) 232-6311 Ext. 5895.

28th Conference on Great Lakes Research

The 28th Conference on Great Lakes Research and the Annual Meeting of the International Association for Great Lakes Research, sponsored by the University of Wisconsin's Center for Great Lake Studies and the University of Wisconsin Sea Grant Institute, will be held June 3-5, 1985, at the University of Wisconsin — Milwaukee.

The deadline for receipt of abstracts is February 15, 1985. Details regarding the program, submission of abstracts, and registration can be obtained by contacting: Conference Coordinator, IAGLR-85, Center for Great Lakes Studies, 600 East Greenfield Avenue, Milwaukee, WI 53204.

Design and Evaluation of Biological Surveys in Relation to Stock Assessments

This meeting will be a Special Session of the Scientific Council of NAFO, and will convene at Dartmouth, Nova Scotia, Canada on 4-6 September 1985.

Specific topics on the program will be:

1. Survey design and operations
 - a) Stratified-random groundfish surveys (standard bottom trawls)
 - b) Surveys designed for pelagic species (hydroacoustic, midwater-trawl and aerial surveys)
 - c) Surveys of invertebrate stocks (e.g. photographic and trap surveys)
 - d) Surveys of marine mammals (e.g. aerial surveys)
 - e) Surveys of early life stages of fish and invertebrates (e.g. eggs, larvae and juveniles) for stock assessment purposes

2. Survey gear, performance and catchability
 - a) Determination of gear parameters
 - b) Variability of parameters according to towing speed, bottom conditions and topography, currents, etc.
3. Environmental factors affecting variation in catchability of survey gears
4. Evaluation of survey data
 - a) Survey indices
 - b) Abundance and biomass estimates
 - c) Reliability of survey estimates
5. Importance and value of survey data for stock assessments

Authors are requested to send titles and brief descriptions of their potential contributions to the Convener by 15 April 1985. Papers will be selected on the basis of their relevance to the topics indicated above. Authors of selected contributions will be informed by 15 May 1985. Completed manuscripts (typescript or good quality photocopy) must arrive at the NAFO Secretariat for mimeographing by 20 August 1985, addressed to Assistant Executive Secretary, Northwest Atlantic Fisheries Organization, Bedford Institute of Oceanography, P.O. Box 638, Dartmouth, Nova Scotia, Canada, B2Y 3Y9.

Publication in the *Journal of Northwest Atlantic Fishery Science* or *NAFO Scientific Council Studies* will depend on the nature and quality of individual contributions.

Further information may be obtained from the NAFO Secretariat or from the Convener: Dr. J. Messtorff, Institut für Seefischerei, Fischkai, D-2850 Bremerhaven 29, Federal Republic of Germany. Telex: 41-215716.

Olympic Wild Fish Conference Proceedings

This book was edited by J.M. Walton (AIFRB Member) and D.B. Houston of Peninsula College.

The Olympic Wild Fish Conference, co-sponsored by the Olympic National Park and Peninsula College, was held in the State of Washington in 1983. The proceedings contain 32 papers and over 300 pages of text. This conference was the first professional gathering of its kind on Washington's Olympic Peninsula to discuss the concerns about wild salmon, steelhead, cutthroat and rainbow stocks in the Pacific Northwest. Prominent fisheries scientists and managers from Alaska to California and Washington to Wyoming have contributed their most significant research and management strategies to this proceedings. Major topic headings include Genetic Differentiation of Wild Fish Stocks, Lake Studies and Management Strategies, Agency Management of Wild Fish Stocks, Cutthroat Trout, Salmon, and Steelhead. This book contains much of the latest information on wild fish management and research and will be the basis for many future decisions and research directions.

Copies of the proceedings are available by writing to Dr. James M. Walton, Peninsula College Fisheries Technology Program, Peninsula College, Port Angeles, Washington, 98362, and enclosing a check for \$15.00.

New Reports from NMFS in Texas

The following reports, originating from the NMFS Southeast Fisheries Center, Galveston Laboratory, Galveston, Texas 77550, were published in 1984 and are available from the National Technical Information Service, 5258 Port Royal Road, Springfield, VA 22161: *Orientation Characteristics of Immature Kemp's Ridley Sea Turtles*, *Lepidochelys kempi*, by Thane A. Wibbels. NOAA Technical Memorandum NMFS-SEFC-131, 67 pp.

The Growth and Movements of Captive-Reared Kemp's Ridley Sea Turtles, *Lepidochelys kempi*, *Following their Release in the Gulf of Mexico*, by James P. McVey and Thane Wibbels. NOAA Technical Memorandum NMFS-SEFC-145, 25 pp. plus figs.

Bibliographies of the National Marine Fisheries Service's Assessments of Impacts of the Buccaneer Gas and Oil Field and of Brine Disposal from Salt Domes of the Strategic Petroleum Reserve, by Charles W. Caillouet, Jr. NOAA Technical Memorandum NMFS-SEFC-147, 35 pp.

The Future of Aquaculture: Profile of a Global Growth Industry

The International Aquaculture Foundation announces the release of this new book, which has more than 50 figures and tables in color and profiles the current and future range of aquacultural production, from freshwater to marine species.

Other important topics concerning world aquaculture and United States aquaculture include:

Fish and Shellfish Production	Molluscs
Per capita Consumption	Seaweed
Aquaculture Growth by Geographic Region	Freshwater Finfish
Waste Heat Systems	Crustaceans
Aquaculture Growth by Type of Economy	Salmon Culture Methods
Aquaculture Production	Water Quality Control
Marine and Freshwater Species	Marine Finfish
Marine Species Groups	Value of the Industry
Anadromous Species	Pond and Non-pond Culture
	Twenty-five important species cultured in the United States

Order copies of this volume from GROWTH, Box 44301, Washington, D.C. 20026. The price is \$295.00.

Recent AVI Books

The following publications are available from the AVI Publishing Company, Box 831, Westport, CT 06881.

Freshwater Crayfish V

This volume by Charles R. Goldman is the only major collection of current crayfish research available. The papers are well-edited and present a cohesive body of information. Topics include studies on population, production, behavior, diseases, fungi, parasites, toxic effects of herbicides and pesticides, and effects of acidification and calcium ion accumulation. Discussions of production problems cover feeds, forage growing locations, trapping techniques, commercialization, as well as research efforts around the world.

Aquaculturists, biologists, commercial growers, ecologists and students involved in the development of crayfish into a major economical, viable food source will find this volume to be the most important source of current information on crayfish to date. The price is \$35.00.

Introduction to Freshwater Vegetation

Donald N. Reimer is the author of this book.

Managing freshwater vegetation is one of the important topics featured in this new book. In the first part of the book, the author presents full descriptions of aquatic plants and their environments. The balance of the text concentrates on the control and utilization of aquatic plants. Discussions include biological, chemical and mechanical methods of control, with specific information on control agents and herbicides.

Any fish farmer, wildlife management agency, ecologist, student or researcher will find this book very useful in understanding, identifying and controlling freshwater vegetation. The price is \$35.00.

Recent FAO Publications

The following books are available from UNIPUB, Box 1222, Ann Arbor, MI 48106.

FAO Species Catalog. Volume 3. Cephalopods of the World

Prepared by Clyde F.E. Roper, Michael J. Sweeney, and Cornelia E. Nemen, this is a worldwide annotated and illustrated inventory of the cephalopod species currently utilized or of potential value to fisheries. Wide-ranging basic information, organized by species, discusses identification, biology, fisheries, and marketing. Also included are an illustrated glossary of technical terms and measurements, a list of species by major fishing areas, a bibliography of recent literature, an index of scientific and international FAO names, and an index of local names. Species covered include chambered nautilus, cuttlefishes, squids, and octopuses. Paper \$20.50.

cont. on page 8

Recent FAO Publications cont.

Introduction to Fisheries Management

This volume by J.P. Troadec is an analysis of the extension of national jurisdiction over world fisheries and its impact upon fisheries and fisheries management. Stresses that, for good fisheries management, objectives sought and their priority must be clearly defined. Analyzes the primary methods for maintaining fishing at the level corresponding to the objective selected: limitation of catches, limitation of fishing effort, means of capture, distribution of the fish stock itself among fishermen, and taxation. Also deals with the question of the distribution among fishermen of the profits derived from the fishery. Paper \$7.50.

District Activities

CENTRAL CALIFORNIA

Tina Echeverria, Director

A dinner meeting was held on Jan. 10 at which Charles Hansen, a biologist with TERA Corporation, presented a program on power plants, the use of water in the cooling systems, and the biological consequences. Water usage issues are a major concern in California, particularly in the Sacramento-San Joaquin Delta waters which empty into San Francisco Bay. The use of waters that are nursery grounds for many anadromous fishes, particularly striped bass, *Morone saxatilis*, necessitate preventive measures so that the larvae and juveniles are not killed. Chuck presented an informative talk on the methods currently used to minimize loss of fish and ongoing plans to further improve the existing methods.

Thesis and Dissertation Abstracts

An Environmental Model Predicting the Relative Recruitment Success of the Blue Crab, *Callinectes sapidus* (Rathbun), in Chesapeake Bay, Virginia

Andrew J. Applegate, M.A. 1983
College of William and Mary in Virginia

The relationships between parental spawning stock size of *Callinectes sapidus* and environmental and meteorological features at the mouth of Chesapeake Bay, Va. can be used to predict winter dredge fishery catch. Estimates of recruitment and spawning stock size are obtained by application of the Leslie stock analysis method to catch rates observed in the winter dredge fishery. A stock recruitment model is employed to determine the degree of density-dependent survival mechanisms. A survival index is developed from the stock recruitment model to test significant environmental relationships.

The blue crab stock recruitment model exhibits a "peaked-dome," characteristic of finfish with high fecundity which support heavy rates of exploitation. The survival index exhibits significant relationships with submerged aquatic vegetation acreage, Chesapeake Bay streamflow, incident sunshine, average atmospheric pressure, and prevalent wind conditions surrounding the time of spawning and larval development. Many of these relationships are explained on the basis of ontogenic behavioral response patterns impacting vertical distribution of larvae. This vertical distribution is important in determining the degree to which *C. sapidus* larvae are subject to estuarine salt-wedge circulation and normal circulation on the adjacent coastal shelf. Conditions creating favorable patterns of vertical distribution and circulation promote larval retention, recruitment and survival, and subsequent recruitment into the winter dredge fishery.

Age, Growth and Reproduction of American Eels, *Anguilla rostrata* (LeSueur), from the Chesapeake Bay Area

Marion Yvonne Hedgepeth, M.A. 1983
College of William and Mary in Virginia

American eels, *Anguilla rostrata*, (elvers through silver stages) were collected between January and September 1981 from tributaries of the Chesapeake Bay and the eastern shore of Maryland. Age-Groups I through IX were encountered. Age-Group III was the most abundant age-group among the yellow eels. Observed lengths and weights-at-age were quite variable. The von Bertalanffy equation: $L_t = 797.24(1 - e^{-(t - 0.1953(t - 0.8528))})$ described theoretical growth in length. American eels from the Chesapeake Bay area were longer at a given age than European eels, *Anguilla anguilla*, and longer than American eels from areas north of the Chesapeake Bay and tropical and subtropical areas, presumably due to the effects of extremely high and low water temperatures on feeding periodicity. Also, American eels from the Chesapeake Bay area appeared to mature and migrate at an earlier age than eels from northern areas. It was estimated that female eels became silver and migrated by the age of 6 or 7 years or approximately 550 millimeters in total length, while male eels became silver and migrated by the age of 5 to 7 or approximately 300 millimeters total length.

Fishing pressure appeared to be the greatest factor in determining the size distribution of eels in a given area. Also, water temperatures had a great effect on CPUE during the course of the study. Mean catch-per-unit-effort for total numbers of eels collected was highest during the months of May and July, while mean CPUE values for total weights were highest during the months of July and September. CPUE values for both total numbers and total weights were highest at water temperatures of 25 to 29.9 degrees C. and in salinities 20 to 24.9 ‰. Mean marginal increment widths on otoliths of eels peaked in mid- to late spring when eels were most active. The average size of yellow eels in the samples was 400 mm and 242 g (Age-Group V), while the most preferred market size is 450 g or 1 lb. A commercial eelpot mesh size of 1" by 1/2" diameter was recommended for use in Virginia waters.

Macroscopic and histological observations of gonadal tissue examined in this study showed no advanced sexual products present. Most ovaries of yellow eels were Stage II. Eight transforming female eels which had been collected from the lower James River were examined and found to contain non-overlapping gonads similar to the organs of Syrski. A female silver eel had a Stage IV ovary and a testis from a male silver eel was classified as Early Stage III. The testes contained crypts of primary and secondary spermatocytes which had not been photographed from eels before under natural conditions. Reproductive maturation data supported the hypothesis that the production of more advanced sexual products must occur during migration or just prior to spawning.

Striped Bass Management in the Chesapeake Bay

Thor John Lassen, M.A. 1983
College of William and Mary in Virginia

The management of striped bass in the Chesapeake Bay is complicated by the differences between fishery regulations that exist in Virginia, Maryland, and the Potomac River. This thesis examines those regulations, evaluates them as to their effectiveness, and develops recommendations to better coordinate striped bass management in the Bay. A review of the life history of striped bass, the commercial and recreational fisheries, the state regulatory agencies, and the striped bass regulations is presented. This thesis concludes with several recommendations: 1) Maryland should establish a permanent 14 inch size limit; 2) the use of maximum size limits should be reexamined; 3) mesh size restrictions should correspond to established size limits; 4) Virginia and the Potomac River Fisheries Commission should adopt a license requirement to sell striped bass caught with hook and line; 5) Virginia and the Potomac River Fisheries Commis-

sion should increase license fees; 6) spawning area closures should be monitored for effectiveness in protecting spawning activity; 7) Virginia should consider weekend prohibitions on specific gear during the spawning season; 8) the winter drift gillnet fishery should be closely monitored to prevent potential overexploitation; 9) Virginia and the Potomac River Fisheries Commission should establish a ten-fish-per-day recreational creel limit for striped bass.

**Antibody Production in Spot (*Leiostomus xanthurus* Lacepede):
A Model to Test the Impact of Elizabeth River Sediments on the
Humoral Immune System of Fish**

Catherine N. Pourreau, M.A. 1984
College of William and Mary in Virginia

A single intraperitoneal injection of sheep red blood cells in spot, *Leiostomus xanthurus* Lacepede, elicited significant serum antibody production within 25 days at a temperature range of 25-27°C and 17ppt salinity. Serum antibodies were first detected 10 days post-injection using the microtiter agglutination test. The rate of antibody production was dose-dependent. Similar maximum titers were obtained after 25 days with all antigen concentrations injected. Natural hemagglutinins were very low. Spot did not appear adversely affected by captivity, or experimental manipulation.

This humoral immune test model was used to evaluate the impact of polyaromatic hydrocarbon-contaminated sediments from the Elizabeth River on the competence of spot to produce antibodies. Fish exposed continuously to contaminated sediments showed significantly higher antibody levels 25 days post-injection than those exposed to reference sediments. Overall antibody levels were low. Pollutant-exposed fish also showed altered feeding behavior, hyperactivity, emaciation, and gross damage to gills, fins, skin, and liver. Fish exposed to reference sediments exhibited few pathological signs.

**Accumulation of Toxic Organic Pollutants in the
Blue Crab *Callinectes sapidus***

Robert C. Hale, Ph.D. 1983
College of William and Mary in Virginia

Levels of toxic organic pollutants (TOP) were examined in the blue crabs, *Callinectes sapidus*, of Virginia waters. Alkyl substituted polynuclear aromatic hydrocarbons (ASPAH), thought derived from weathered petroleum, were the most common organic pollutants present. Unsubstituted aromatics, heterosubstituted aromatics, polychlorinated biphenyls (PCB), and DDT metabolites were also detected by the analytical procedure employed.

Highest levels of ASPAH were found in crabs from the heavily industrialized Hampton Roads area of the James River. Lower concentrations were detected in crabs from the Pocomoke Sound, the upper James, and the Rappahannock River sampling sites. PCB levels were elevated in samples taken from both James River stations.

Levels of TOP were generally higher in crabs sampled in June than in September of 1981.

Concentrations of pollutants in the tissues and tissue lipid content were correlated. Highest levels of both were detected in the hepatopancreas, followed by egg, ovary, and muscle.

TOP levels in field samples and *in-vivo* biotransformation of the model compound benzo(a)pyrene (B(a)P) in the hepatopancreas, during in-laboratory experiments, suggested that differences may exist in the uptake and elimination of pollutants as a function of the sex and maturity of the crabs. It appeared that the metabolism of aromatic hydrocarbons varied with the molt stage of the crabs.

A variety of polar metabolites of tritium-labeled B(a)P were detected in the hepatopancreas of blue crabs, when examined by normal and reverse-phase high performance liquid chromatography.

In conclusion, to accurately assess the levels and effects of TOP in biota from the field, several factors must be considered. Among these are the species and tissues examined, the sex, maturity, and condition

of the individuals selected for analysis, and the location and season of sampling.

**Climate Scale Environmental Factors Affecting Year-Class
Fluctuations of Atlantic Croaker (*Micropogonias undulatus*) in the
Chesapeake Bay**

Brenda L. Norcross, Ph.D. 1983
College of William and Mary in Virginia

A conceptual life history of the Atlantic croaker (*Micropogonias undulatus*) identifies the effects of the environment on juvenile recruitment. In a multi-disciplinary approach to modelling, the major effects are investigated, quantified, and presented in a flow chart. The model is divided into three sub models, each representing a major component which affects juvenile recruitment.

North/south spawning location in the Mid-Atlantic Bight is affected by the bottom water temperature as influenced by the cessation of the summer winds in relation to timing of croaker migration. The pelagic phase is the most critical time in the life history of a larval croaker as they are subjected to wind-induced transport which may cause direct loss off the shelf and entrainment in the Gulf Stream, or indirect loss by prolonging time in transit to the nursery area. The magnitude of this wind-included effect is a function of the direction, strength, duration, and time relative to spawning and is incorporated in an equation to predict year-class strength of croaker.

The juvenile croaker overwinter in the Chesapeake Bay system. Winter temperature is shown to be the predominant variable affecting year-class survival to the following summer in very cold years. However, in very warm years, the predictive capabilities of the model are improved when a measure of fall recruitment, i.e. wind-induced transport, is incorporated.

Croaker is basically a density-independent stock as juvenile recruitment is erratic and dependent upon these environmental parameters. The effect of spawning stock size is only apparent after accounting for density-independent effects, and slightly improves the explained variance of the statistical relationship.

Year-class strength and fishing pressure cause interannual variability in commercial catch. Overfishing a weak year-class reduces spawning potential, and several poor year-classes in a row magnify this.

The model, tested for the 1982-82 data, predicts a strong year-class.

**Energy Utilization in Bay Anchovy and Black Sea Bass Eggs
and Larvae Contrasting Ecological Roles**

John Wotring Tucker, Jr., Ph.D. 1983
College of William and Mary in Virginia

The objective of this study was a comparison of developmental changes and energy utilization in eggs, unfed larvae, and fed larvae of two marine fish species that both have pelagic early stages, but differ in phylogeny and early life ecology. The bay anchovy (*Anchoa mitchilli*), a clupeiform, spawns in estuaries and shallow coastal waters. The black sea bass (*Centropristis striata striata*), a perciform, spawns offshore at 15-50 m depths. Densities of zooplankton eaten by first-feeding fish larvae are normally higher in coastal waters than offshore. An important determinant of survival of larval fishes is their ability to fulfill nutritional requirements after yolk energy is exhausted. Faster-growing larvae are less likely to be preyed upon. The manner in which energy is partitioned may indicate relative plasticity with respect to departures from optimal food composition or abundance. Differences among species might result from different feeding strategies or from adaptation to different feeding conditions.

Energy utilization was assessed by constructing energy budgets ($I = G + M + F\&U$): ingested calories, I, from feeding rates; growth calories, G, from composition and weight; metabolic calories, M, from oxygen uptake; egested and excreted calories, F&U, by difference.

cont. on page 10

Thesis and Dissertations cont.

Three lines of evidence were found that suggest black sea bass were able to resist fluctuations in food availability better (survive and grow at lower densities): (1) Sea bass have more time to find food and develop feeding skills — 50 hours between first feeding and yolk exhaustion vs 10 hours for anchovies. (2) Sea bass feed more efficiently and probably pay a lower metabolic price for their food. Over the first 5 days of feeding, capture success averaged 85% for sea bass and 60% for anchovies. (3) During the first 5 days, sea bass gross growth efficiency (12%) was twice that of anchovies (6%).

Sea bass may also be more resistant to starvation from complete food deprivation. Their yolk lasts longer. During starvation, their weight-specific metabolism is lower and they lose body calories at a lower rate.

The bay anchovy seems to be adapted to the high food densities, and the black sea bass to the low food densities, that characterize their respective habitats. For sea bass the food supply is more difficult to exploit, and this requires greater efficiency.

On the Anatomy and Phylogeny of the Zoarcidae (Teleostei: Perciformes)

Michael Eric Anderson, Ph.D. 1984
College of William and Mary in Virginia

The eelpouts, Zoarcidae, are a group of bony fishes, most species of which inhabit continental shelves and slopes of boreal seas. There are about 200 species of eelpouts, most of which are rare in collections; thus they have been only cursorially studied by most workers. As a result, the systematics of the family is in a poor state. This work is a contribution to the improvement of that state.

The anatomy of all nominal genera of Zoarcidae was studied in an attempt to reconstruct phylogeny and establish the limits of genera. From analysis of a matrix of 63 characters, the 43 nominal genera recognized here form two subfamilies. One, *Lycozoarcinae*, contains only the primitive *Lycozarcus regani*. The other, *Zoarcinae*, is divided into three tribes, Zoarcini, Gymnelini, and Lycodini. The more primitive zoarcids are characterized by having 4-6 suborbital bones arranged in a circular pattern close to the orbit, and complete cephalic lateralis pore patterns, except some of the few deep-sea forms. The more derived zoarcids are characterized by having 6-11 suborbital bones arranged in an "L-shaped" pattern away from the orbit (except a few which have lost some bones) and the loss of the interorbital pores (except for a few reversals).

An hypothesis is presented for the sister group relationship of Zoarcidae with six zoarceoid families: Ptilichthyidae, Zapruidae, Anarhichantidae, Stichaeidae, Pholididae and Scytalinidae. Bathymasteridae is hypothesized to be the primitive sister group of all the above taxa. The zoarceoids are probably most closely related to notothenioids and some of the trachinoids than to blennioids, a group recently restricted to six tropical-subtropical families.

Since fully 45% of the genera recognized here are known from less than 15 specimens each, zoogeographic patterns are unsatisfactorily resolved. Considering the known distributions of all zoarcid genera, the highest endemism is found in temperate South America (30%), the northwestern Pacific (23%) and northeastern Pacific (11%). The best known deep-sea genera and species are wide-ranging, perhaps due to the benthic, precocious larvae of most species.

Anatomical Observations on the Ampullae of Lorenzini from Selected Skates and Galeoid Sharks of the Western North Atlantic

William Raschi, Ph.D. 1984
College of William and Mary in Virginia

The gross structure of the ampullae of Lorenzini and its distribution on the body of 40 species of skates (Rajoidae) and 5 species of sharks

(Galeomorphii) were compared in an attempt to investigate correlations within this system to feeding mechanisms. Three general lines of morphological change are observed. A larger proportion of the ampullary pores are associated with the ventral surface of the dorsoventrally flattened skates than the more conically shaped sharks. The relative proportion of ventral pores is significantly reduced on those species inhabiting aphotic waters. Secondly, the more piscivorous rajoids possess an array of ventral pores which covers the majority of the body surface whereas those species feeding predominantly on infaunal invertebrates exhibit a comparatively reduced pattern which are primarily concentrated around the mouth. The density of these pores on the adult is inversely related to the collective mobility of each species' prey items. Similarly, the relative density of pores on the sharks is reduced in both those species inhabiting pelagic waters and those exhibiting reduced prey selectivity. Lastly, the overall size of, and the number of alveoli associated with, each ampulla is directly related to the habitat depth of each skate species.

The proposed effects of each of these modifications is discussed. The overall pore distribution appears compensatory for reduced visual input whereas relative densities (resolution) further reflect major differences in feeding strategies. Increased ampullary size and complexity suggest mechanisms for increased sensitivity and signal-to-noise ratios.

Feeding Strategies and Functional Morphology of Demersal Deep-Sea Ophidiid Fishes

H. Jacque Carter, Ph.D. 1984
College of William and Mary in Virginia

The hypothesis is advanced that ophidiid fishes prevalent beneath oligotrophic tropical seas have evolved trophic specializations appropriate for existence in regions of low primary productivity where ultimate energy available for food production in benthic communities is low. The feeding strategies of these tropical-dwelling deep-sea fishes are discussed within the context of this hypothesis.

The feeding strategies of tropical-dwelling deep-sea ophidiid fishes are examined through an analysis of food habits and examination of morphological features related to feeding. Three main modes of feeding are evident among these fishes: (1) predation upon small benthopelagic or planktonic organisms by small-bodied species of limited locomotory ability; (2) predation upon benthic-benthopelagic organisms with increasing reliance upon larger nektonic prey by mobile large-bodied species; (3) predation upon benthic organisms with diminished reliance upon benthopelagic and planktonic organisms. The first feeding mode is shown to be more widespread among deep-sea ophidiids studied. Ontogenetic feeding changes in select species show a shift from small benthic-benthopelagic prey in small fish to more mobile nektonic prey in larger fish. Smaller fish utilize such small-sized prey as calanoid copepods, gammarid amphipods, and cumaceans, while larger fish show increasing reliance on decapods and fish. In contrast, several small-bodied species studied show no ontogenetic feeding changes in relation to prey size.

Variation and select interrelations of morphological features related to feeding are studied in 18 species of ophidiids. Cluster analysis is employed as a verification procedure to determine the correspondence between feeding morphology and diet. Six morphological species groups are identified among species examined based on similarity of characters related to feeding. The results show poor correspondence between morphologically structured guilds based on characters assumed related to feeding and feeding guilds based on stomach content analysis. In addition, morphological characters are interpreted ecologically, based on information in the literature and gut content analysis. In several instances there is strong support of the hypothesized adaptations reported in the literature while in other cases there was little or no support.

The functional relationship of the feeding apparatus is considered to better understand trophic specializations and feeding adaptations in these fishes. *Dicrolene intronigra* serves to illustrate the feeding

mechanism in deep-sea ophidiid fishes. A basic description of the mechanical units of the head and their movements involved in feeding are presented.

Food Habits and Body Composition of some Dominant Deep-Sea Fishes from Temperate and Tropical Regions of the Western North Atlantic

Roy E. Crabtree, Ph.D. 1984

College of William and Mary in Virginia

Food habits of 23 species of demersal deep-sea fishes from the temperate Middle Atlantic Bight and the tropical Bahamas region are described. In addition, body composition parameters, including percent water, ash, carbon, and nitrogen, are discussed for 48 demersal species from these study areas.

Food habits data on Bahamian species are combined with those from other studies in an attempt to describe the trophic structure of this tropical deep-sea fish assemblage. Numerical classification techniques are used to group species based upon similarity of diets. Four groups are evident, including a group which feeds largely on polychaetes, a second which feeds mainly on copepods along with other small crustaceans, a third group which feeds on small crustaceans but most heavily on mysids and amphipods, and finally a fourth group which feeds heavily on natant decapods and teleosts. Within each group a variety of taxa and feeding modes are apparent, including benthic species as well as benthopelagic species with and without swimbladders. Thus a variety of feeding mechanisms which result in similar diets are displayed by these fish assemblages.

Body composition parameters are variable; however, some trends are evident. Benthopelagic species without swimbladders tend to have higher water contents and more poorly ossified skeletons than other species. In addition, percent water shows a positive correlation with depth of occurrence, but it is apparent that at all depths, species with a variety of body compositions have successfully adapted to life in the deep sea.

The diets and body compositions of tropical species are compared with those of temperate Middle Atlantic Bight species in an attempt to account for taxonomic differences between the two areas. Species with high water contents appear to be more abundant in the Bahamas study area than in the Middle Atlantic Bight. Accordingly, species with relatively inactive life style seem to be more important in the Bahamas region. Differences in trophic structure may account for other differences between the Middle Atlantic Bight and Bahamian faunas.

Predation by Tulip Snails, *Fasciolaria tulipa*, on Queen Conchs, *Strombus gigas*

Darryl Edward Jory, M.A. 1982

University of Miami

Aspects of the predator-prey relationship between tulip snails, *Fasciolaria tulipa*, and its prey queen conchs *Strombus gigas*, were investigated in laboratory and field studies. Predation rates, the number of conchs consumed/tulip snail/day, were determined monthly in the laboratory for each of five size-classes of tulip snails. Rates varied between 0.04 and 0.2 with an annual mean of 0.123 conchs consumed/tulip snail/day, equivalent to about 45 conchs consumed/tulip snail/year. Summer rates were higher than in the winter, and water temperature, not photoperiod length, appears to be responsible for seasonal variation in predation rates. All tulip snail size-classes consumed more conchs of certain sizes than others, both in laboratory and field experiments. However, the optimal size of conch could not be determined because the handling time was not measured. The mean size and range of conchs consumed increased with increasing tulip snail size. There was evidence for tulip snails actively and passively selecting some conch sizes, but it was impossible to discriminate the prey selection mechanism. The concepts of "Ingestive Conditioning"

and Type III functional response can both explain why tulip snails from the Berry Islands, Bahamas, recognized conch as prey faster than did South Florida tulip snails. Cannibalism and simultaneous attacks by more than one tulip snail were observed. Chemical analysis of conch flesh indicated increasing energetic yield from increasing shell length. Information on the number of dead conchs and live tulip snails found in different areas of the Berry Islands, Bahamas, and Los Roques, Venezuela, could be used, with reservations, to assess the role of tulip snails as predators of conchs.

In Memorium

Stanley R. Killick

Stanley R. Killick of New Westminster, British Columbia, passed away in August 1984. Stanley became a Member of AIFRB in 1969, and became Emeritus in 1980. He is remembered chiefly for his work with the International Pacific Salmon Commission.

Stanley Killick's friends and associates will always miss him.

Our District Directors

It has been nearly 2 years since BRIEFS listed the names and addresses of AIFRB District Directors and Regional Directors. Here is the roster as it stands today.

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BRIEFS, the newsletter of the American Institute of Fishery Research Biologists, is published six times a year. It is intended to communicate the professional activities and accomplishments of the Institute, its Districts, and Members; the results of research; the effects of management; unusual biological events; matters affecting the profession; political problems; and other matters of importance to the fishery community. Comments and contributions should be sent to the Editor, Dr. Oliver B. Cope, 15 Adamswood Road, Asheville, NC 28803. Subscription \$15 a year to Institutions and Non-Members.

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APRIL, 1985

AIFRB Asiatic Exchange China — Japan — Korea

A delegation of AIFRB members will be participating in the Asiatic Fishery Exchange organized through the Citizen Ambassador Program of People-to-People International. The purpose of the project is the technical exchange of various aspects of fishery science with their East Asian counterparts. Past President Bernard E. Skud is the Leader of the delegation and has been working with People-to-People International since last July establishing particular topics for discussion, selecting visitation sites, and contacting AIFRB members. People-to-People International is handling all of the administrative arrangements, such as travel schedules, procurement of visas, etc. The delegation will spend 3 weeks visiting major institutions concerned with fishery research and fish production in Japan, China and Korea during May and June, 1985.

The AIFRB members of the delegation are: Carl E. Bond, Corvallis, OR; Philip T. Briggs, Stony Brook, NY; Frederick A. Copes, Stevens Point, WI; Michael B. Dell, Ephrata, WA; Ronald A. Fritzsche, Arcata, CA; Robert H. Gray, Richland, WA; Richard L. Hassinger, White Bear Lake, MN; John H. Helle, Juneau, AK; Robert B. Herrmann, New Bern, NC; James B. Higman, Miami, FL; Edwin W. Irby, Jr., West Palm Beach, FL; John F. Karinen, Auke Bay, AK; Paul F. Kubicek, San Ramon, CA; Charles R. Liston, East Lansing, MI; Richard E. Noble, Olympia, WA; John B. Owen, Grand Forks, ND; Alfred Perlmutter, New York, NY; Kenneth Roberson, Glenallen, AK; Bennie A. Rohr, Pascagoula, MS; Donald F. Samuelson, Aberdeen, WA; Glen M. Southward, Las Cruces, NM; Thomas F. Thuemler, Marinette, WI; James B. Walton, Port Angeles, WA; William J. Wilson, Anchorage, AK. Five wives of members will round out the delegation of 30.

The delegation will convene on May 24 in Seattle, Washington and will be visiting institutions in Tokyo, Shimizu, Sapporo, Kushiro, Shanghai, Wuxi, and Pusan. In addition to national fishery agencies and their laboratories, the group will visit with scientific societies, aquaculture projects, commercial operations, and other research institutions. Some of these organizations are: Japanese Society of Scientific Fisheries, Far Seas Research Laboratory, Hokkaido Salmon Hatchery,

Shanghai Research Institute of Aquatic Products, Institute of Estuaries and Coasts, Lake Tai Aquaculture Research Station, Chaijiang Fishery Research Institute, Korea Fisheries Research and Development Agency, and Pusan Fisheries College.

Two AIFRB members, Laurie McHugh and Bill Royce, have graciously agreed to provide copies of their recently published books for distribution during the trip. AIFRB members of the delegation have received requests from their colleagues to obtain information on particular aspects of fishery research in these three countries, and any other AIFRB members who are seeking similar information can contact any of the delegation members. A report on the Exchange will appear in a later issue of BRIEFS.

The Citizen Ambassador Program and People-to-People International were founded in 1956 by President Eisenhower with the intent of improving international understanding by using the median of technical exchange between professionals.

Student Travel Raffle Awards

The Second Annual AIFRB Travel Raffle Awards have been made. The recipients are Jeffrey Allan Tellock of Miami, FL, Mark S. Tisa of Blacksburg, VA, and Brian D. Winter of Seattle, WA. These students are to be congratulated on being winners, and AIFRB grants the money in the hope that they will gain in many ways from their attendance at the scientific meetings of their choice.

Let's Hear From Our Fellows

President Hugh MacCrimmon has advanced a proposal that seems to have considerable merit and be worthy of serious consideration. The idea involves submission of feature articles for BRIEFS. The essays would be prepared by Fellows of AIFRB, either on an invited or a volunteer basis.

Hugh feels that there are among our colleagues those who would appreciate a forum for bringing forth their constructive thoughts either on the AIFRB or, more likely, some fisheries-related issue to our membership.

cont. on page 2

Let's Hear From Our Fellows cont.

Our Fellows, with their long experience and demonstrated judgement and observations, surely represent a well-stocked storehouse of ideas, criticisms, and perceptions that should be shared with our AIFRB associates.

Of course, anyone in any category of our membership is encouraged to send items for publication in BRIEFS, and the submissions will always receive favorable attention. BRIEFS has enjoyed the luxury of good articles written by AIFRBers at all levels of membership, writings based on thinking and analysis. Our reason for focusing on Fellows for this program is that Fellows are "old-timers" in AIFRB who have seen changes in the Institute and in the fisheries community and have often formed opinions and devised solutions to problems. These jewels merit a spotlight in BRIEFS.

Fellows, some of you will receive invitations from the Editor or an officer to pen something on a specific topic. But — don't wait for an invitation. If you have an idea, write something for BRIEFS. It is suggested that articles be limited to 4 or 5 typed pages to conform to the general format of BRIEFS.

Ollie Cope
BRIEFS Editor

Comment on "Association Life Cycles"

Bernard Skud's article in the February issue of BRIEFS on association life cycles, the activities of AIFRB in relation to its goals, and the question of professional recognition is thought-provoking.

The criteria for selection of Fellows may not have been applied as rigorously in recent years as they were earlier. But, judging from the January 1984 membership list, which shows that no more than about 25 percent of the members are Fellows, the awarding of Fellowship status does not seem to have been done without some discrimination, even if only on the basis of longevity. Perhaps it would now be appropriate to institute a category of "Senior Fellow." Twenty or even twenty-five years in the profession, publication record, diversified experience, accomplishments, etc., might be some of the criteria applied. A quota might be considered, so that no more than five or ten percent of the membership could be Senior Fellows at any one time, making it obvious that election to this category is indeed a distinction.

There is another important question that has bothered me for some years. It is, who is a Fishery Research Biologist, eligible for membership in any of the categories. The Policy Statements issued (or reissued) in February 1983 state that "a fishery biologist puts more emphasis upon the factors affecting production rates and population dynamics than does the traditional fish biologist." But many of the names in the membership list, including Fellows, are those of people who are not fishery biologists as defined in the Policy Statements, even though many work for fishery-oriented organizations, and many are distinguished scientists working in fields more or less related to fisheries. I wonder how many times the Committee has

rejected an application or nomination for membership on the basis of strict application of the definition of Fishery Research Biologist. Here is an area where the Membership Committee should definitely exercise more selectivity for the benefit of the goals of the organization.

Conservation of Atlantic

John P. Wise
International Commission for the Protection of Tunas
Madrid, Spain

✓ Estimation of Age Structure of Albacore in the Northeastern Pacific by Gillnetting

The Pacific albacore (*Thunnus alalunga*) resource is harvested by several fisheries, each having a unique selectivity for fish size and type of fishing gear. To date, the only measure of the size structure for this population is that derived from the commercial troll and bait-boat catches. These gears do not provide an unbiased sample of the underlying population from which they are taken.

Fishery biologists Dave Holts, Earl Weber, and Norm Bartoo have analysed the results of a gillnet sampling experiment conducted in August 1984. The aim of their research was to provide an unbiased estimate of the size structure for the local albacore population using passive fishing gear. The sampling plan included chartering the commercial gillnet vessel, *Steel Fin II*, to set and retrieve the specially designed gillnets. These nets consisted of several different mesh sizes from 4 to 10 inches (in 1-inch intervals) and were fished in various different depth strata from the surface to below the thermocline. A total of 12 night and 2 daytime sampling sets were made at depths from 1 to 20 meters. Time needed for retrieval was approximately 3-6 hours depending on the number of fish caught and sea conditions. The mean soak time was 11.3 hours.

The catch included 454 albacore, 276 skipjack tuna, 2 bigeye tuna and several incidental species (Table 1). The *Steel Fin II* also sampled the population using commercial trolling gear to compare with the catches from the gillnets. This produced 513 albacore and 155 skipjack. While the gillnet captured a slightly wider size range of albacore, the great majority of the catches by both gears were fish between 62 and 68 cm in length.

TABLE 1. Incidental catch taken in gillnet

Species		Catch
Bigeye tuna	<i>Thunnus obesus</i>	2
Bullet mackerel	<i>Auxis rochei</i>	13
Pacific mackerel	<i>Scomber japonicus</i>	12
Jack mackerel	<i>Trachurus symmetricus</i>	8
Swordfish	<i>Xiphias gladius</i>	5
Blue shark	<i>Prionace glauca</i>	332
Bigeye thresher	<i>Alopias superciliosus</i>	1
Bonito shark	<i>Isurus oxyrinchus</i>	34
Scalloped hammerhead	<i>Sphyrna lewini</i>	5
Pacific pomfret	<i>Brama japonica</i>	5
Louvar	<i>Luverus imperialis</i>	3

The cumulative length frequencies were plotted on probit paper and used to develop gear-selectivity curves. A complete net selectivity analysis was not possible because too few or no albacore were caught in some mesh sizes. Where possible, however, selectivity curves were fitted to the data and provide some useful information. The slopes of the lines are approximately the same, indicating homoscedasticity in the relationship between size of albacore caught and the different mesh sizes.

The horizontal and vertical catch distributions within the net varied in several ways. General observation indicated that the catch tended to be clumped or grouped into one or more sections of the net. Often fish would be hauled aboard in groups of three or more, with long sections of empty net between. Rarely were they scattered throughout the net. Groups within each set also tended to be located at similar depths in the net. With only one exception, all catches came from above the steepest part of the temperature break in the thermocline. In addition to albacore and skipjack tuna, there were 11 other species of fish taken by gillnet (Table 1).

There is no way to estimate fish loss due to sharks but net damage was heavy during some sets. California sea lions (*Zalophus californianus*) were observed during two sets and several fish were recovered from the net badly mauled. No sea lions were tangled in the net.

This study shows that gillnets are a useful sampling tool for albacore and that it is possible to quantify the effects of gear selectivity with adequate sampling results. It is anticipated that with an increase in sampling stations an adequate sample size can be obtained that will allow for a rigorous statistical analysis. This in turn can provide an unbiased estimate of the age structure of the local albacore population.

Norman W. Bartoo
U.S. NMFS, La Jolla, CA

U.S.-Soviet Cooperative Research Cruise

Since 1969, fishery biologists from the National Marine Fisheries Service Southwest Fisheries Center in La Jolla have joined their Soviet colleagues in a cooperative fisheries survey in waters off the California coast. This year, scientists from both countries have worked aboard the Soviet research vessel, *Mys Babushkina*, from mid-March through late April off the California coast collecting biological samples to estimate the abundance of commercially important fishes such as the northern anchovy and Pacific hake.

The information derived from the Soviet research cruise is considered the most up-to-date and reliable check on the status of the hake population before the start of the fishing season. The Pacific Fishery Management Council, which is responsible for managing U.S. west-coast fisheries within the 200-mile limit, will consider the data collected during the forthcoming cruise when establishing this year's limit for the hake fishery.

The U.S. and the Soviets have a stake in assuring the continued abundance of the hake fishery. For the past 8 years, Soviet processing ships have worked with U.S.

fishermen off the Pacific Northwest who trawl for hake and then deliver the fish for processing aboard Soviet ships for ultimate consumption by Soviet citizens. These "joint venture" fishing operations benefit American fishermen by providing a market for hake (which has little market appeal for American consumers) and benefit the Soviets, chronically short of high-quality protein foods, who cannot operate within the U.S. 200-mile zone unless they are directly supporting American fishermen.

The *Mys Babushkina* arrived in Long Beach, California, about March 11. Scheduled to go aboard as the U.S. observer was Dimitry Abramenkoff, a Russian-speaking fishery biologist at the Southwest Fisheries Center and a veteran of past cooperative cruises on Soviet research vessels. The *Mys Babushkina* then travelled south to the Mexican border to begin a survey pattern which runs from San Diego to San Francisco, in an area from 3 to 300 miles from the coast. The Soviet vessel will return to Long Beach in late April.

Using fine-meshed nylon plankton nets, a tow will be taken at each biological station. Half of the resulting sample will be retained by the Soviets and the other half will be preserved and boxed for subsequent sorting at the Southwest Fisheries Center. From the numbers of anchovy and hake eggs and larvae collected in the samples, fishery biologists will estimate the size of the year's spawning stock of these two species. The annual estimates are an important part of the effort to prevent the overfishing of these stocks. Information gathered during the cruise of the Soviet research vessel will augment similar data collected each year on cruises conducted by the Southwest Fisheries Center and the California Department of Fish and Game.

Southeastern Charterboat Survey

The Southeast Fisheries Center's Panama City Laboratory has completed its third year of a southeastern charterboat survey. The 1984 survey obtained data from 31 boat captains who were contracted to provide daily fishing information, and also from 26 boat captains who volunteered to supply the same information. The boats were distributed from North Carolina to Texas and included Puerto Rico and the U.S. Virgin Islands. The response rate (weekly submission of daily fishing logs) was 98.9% for contracted captains and 54.0% for volunteer captains. Contracted captains reported 4,677 trips during which 22,303.5 hours were spent fishing and during which 198,355 fishes were caught. Volunteer captains reported 1,520 trips during which 6,774.0 hours were spent fishing and during which 32,682 fishes were caught. The five most frequently caught species by trolling were dolphin, Spanish mackerel, king mackerel, little tunny, and bluefish. The five most frequently caught species by non-trolling methods were unspecified seatrouts, Atlantic croaker, red snapper, black sea bass, and gray triggerfish.

Eugene Nakamura
NMFS, Panama City, FL

Record Black Marlin Migration

On a January day 2 years ago a Monsieur J.P. Carlier of Paris, France, was fishing off Cabo San Lucas, Baja California, Mexico, one of the world's prime fishing grounds for marine gamefish, when he hooked into a large marlin. After playing the fish and bringing it alongside the fishing boat, he did not reach for the customary gaff. Instead he picked up a pole fitted with a metal applicator tip and a dart tag. Aiming for the back of the marlin, he thrust the metal tag into the muscles of the fish, taking care to avoid the head. A yellow plastic streamer, imprinted with the words "National Marine Fisheries Service" and a five-digit number, protruded from the body of the marlin where it could readily be seen. Monsieur Carlier then released the marlin by cutting the leader as close to the hook as possible.

Six hundred and thirteen days later, a Japanese long-line fishing boat recaptured this fish, a 130-pound black marlin, west of Norfolk Island in the southwest Pacific, off northeast New Zealand, 5,763 nautical miles straight-line from the point where Monsieur Carlier released it off Baja California.

According to James L. Squire, a fishery biologist with the National Marine Fisheries Service, Southwest Fisheries Center in La Jolla, California, this is the longest migration of a tagged marlin recorded thus far in either the Atlantic or Pacific Ocean. "This fish," said Squire, "traveled from the northern (23 degrees N) to the southern (31 degrees S) hemisphere at an average speed per day (based on the straight-line distance) of 9.4 nautical miles." After confirming this record with the staff of the National Marine Fisheries Service, Southeast Fisheries Center in Miami, Florida, which conducts a billfish tagging program in the Atlantic and Gulf of Mexico, Squire established that this was indeed a record migration for a tagged marlin.

Explained Squire, "We furnish tagging equipment and maintain records in cooperation with the International Gamefish Association and other government scientists throughout the Pacific, but the program depends entirely on the cooperation of the sport fisherman who does the tagging." When Monsieur Carlier made the decision to tag and release the black marlin, he joined a growing group of concerned anglers who are now tagging and releasing their fish. Although the staff of the Marine Game Fish Tagging Program has concentrated on obtaining information for marlin, sailfish, and swordfish, other large gamefish such as yellowtail, roosterfish, dolphin, wahoo, and various tunas are also included in the record keeping, Squire pointed out.

Third Western Groundfish Conference

The third Western Groundfish Conference was held February, 1985 in Union, Washington. This unique conference is dedicated to the regional understanding of the inter and intra multispecies-multifishery actions of the West Coast's most valuable fishery. The uniqueness of this conference is in its format, which features presentations of completed, ongoing, and proposed groundfish research. This format has resulted in advancing the dissemination of provocative theories and threshold ideas covering all aspects of the West Coast groundfish

fishery, prior to what normally would be available through the literature.

This is the third conference and the third time the Southwest Fishery Center's Tiburon Laboratory has co-chaired the conference. This year Mr. Edward Ueber, Tiburon's economist, and Dr. Robert Frances, a biologist of the Northwest Alaska Fishery Center, superbly orchestrated the largest and most varied conference ever. Over 60 people from these two research centers formed the nucleus of the participants. Other participants represented 10 states, 2 countries, and nearly 25 different entities. These entities included private citizens, consultants, Federal agencies, State agencies, interstate compacts, international compacts, and 10 universities.

Each conference has a special session on a current topic of interest. Fisheries economics and management was the special session of the 1985 conference. The highlight of the special session and conference was the panel discussion on alternative tools for managing the groundfish fishery. Panelists from Alaska, British Columbia, Oregon, and California discussed methods and previous programs, fielded questions, and stimulated the roughly 150 conference participants. This panel and special session were only two of the many fascinating scientific topics presented. Other excellent presentations included: juvenile fish stock assessment; effects of El Niño; cannibalism in walleye pollock; indirect aging methods; and other pertinent areas of groundfish research.

Another excellent facet of the conference is the poster session. Each conference has increased the scope and quality of this session. This year one could learn of walleye pollock, rockfish, and synchronous patterns of fish year-class strength by walking among the high quality graphic displays.

In order to encourage further broadening of the conference participants the 1986 conference will be hosted by Alaska Sea Grant and co-chaired by two non-NMFS personnel. The 1987 conference will be held in Oregon and hosted and chaired by the Oregon Department of Fish and Wildlife. Although travel funds may be in short supply, senior scientists are already planning funding for these upcoming Western Groundfish Conferences. This conference is on the frontier of national and international scientific fishery research and has rightly received praise and recognition as a meeting which teaches, stimulates, and increases the understanding of the West Coast groundfish fishery.

Edward Ueber
NMFS, Tiburon, CA

District News

ALASKA

D.R. Gibbons, Director

Prior to the evening presentation at the January 30 meeting, Director Gibbons briefly reviewed the Alaska District activities for the past summer and fall, and his attendance at the Board of Control meeting in New York State. Specific mention was made of the AIFRB-hosted picnic and baseball game for the *Oshoro Maru*, progress on the Old-Growth Forest/Fisheries and Wildlife Symposium (galley proofs are presently being reviewed), and the luncheon meetings of the Anchorage

AIFRB members.

A proposal for the District to sponsor a technical session at the Alaska AFS Chapter meetings next November 19-21 in Kodiak were tentatively approved. The suggested topics discussed included shellfish/groundfish subjects.

Past District Directors were designated as a nominations committee for the upcoming Director and Secretary-Treasurer elections this summer/fall.

Dr. Michael Dahlberg presented a multi-media overview of a 1984 summer work cruise on the Japanese research vessel, the *Oshoro Maru*. Mike started with a brief review of the Japanese high-seas fishing fleets, including the shore-based and ocean squid and salmon fisheries. At the present time, the ocean squid fishery is regulated by allowing squid gill-netting only in water temperatures above 15 C to "protect" salmon stocks which are thought to inhabit colder waters. The squid fishery is much more intense than any other ocean fishery and has the potential to harvest much greater quantities of salmon than the targeted salmon fishery.

The presentation next shifted to his observations on the research vessel during the trip from Kodiak to Honolulu. The sampling took place on a course of 150 W. Longitude. During this trip, the quantity of monofilament gillnet fish was approximately equal to the total distance traversed. In addition, gillnets, plankton nets, long-line gear, underwater cameras, and extremely sophisticated electronics gear were used. Fish, bird, and marine mammal species captured and observations on mammal sitings and surface debris were recorded. Approximately 90% of the debris observed were composed of styrofoam and plastics. Four species of squid, thirty-one species of fish, six species of marine birds, and two species of mammals were captured in the sampling gear.

CENTRAL CALIFORNIA Tina Wyllie Echeverria, *Director*

The Western Groundfish Conference was held in Union, Washington, Feb. 11-13, 1985. It is a biannual meeting held for the purpose of exchanging information on current and planned research involving the groundfishes of the Northeastern Pacific Ocean. Approximately 140 researchers and graduate students attended this year's meeting. Paget Leh and I prepared a poster session for the meeting outlining what AIFRB is and how to join. It was met with favorable response and interest by the group and is available for loan to other members interested in promoting the association. Contact either Paget or me if you wish to display the poster.

A district dinner meeting was held on March 14. Ken Beer, a fishery biologist with an aquaculture firm in Sacramento (The Fishery), presented a talk on "Commercial aquaculture of white sturgeon and striped bass, and its implication for fishery enhancement." Currently the California Department of Fish and Game is engaged in rearing striped bass for enhancement purposes and also funds grants for striped bass research in the private sector. The University of California at Davis has succeeded in spawning and rearing white sturgeon. Both species are reared in private aquaculture ventures and there is hope that the state and the private sector can

coordinate efforts in managing and enhancing the wild populations of these species.

NORTHWEST WASHINGTON Ed A. Best, *Director*

At our November 1984 meeting, Ken Ferjancic, a district member, gave a very interesting report on the growing catfish farming industry. At the present time the industry is located in the South, with 80% of the pond acreage located in Mississippi. Approximately 200 million pounds was harvested in 1983 and it will be larger in 1984.

It takes about 18 months to grow a catfish to a marketable size of 1 to 1 1/4 pounds. The growing, processing, and marketing is strictly controlled on a cooperative basis. Fish are available the year round. The fish are processed from killing to packaging in less than 3 minutes. At the present time markets are somewhat limited to the southern tier of states due to transportation costs.

SOUTHERN CALIFORNIA Peter L. Haaker, *Director*

The February meeting featured Dr. Robert Kearney, Chief Scientist at the Inter-American Tropical Tuna Commission, La Jolla. He presented a talk on "Fishery Potentials and Research in the Western Pacific Ocean".

The business meeting was presided over by the new director, Peter L. Haaker, who moved into the directorship, when Director Ron Rinaldo left because of a job transfer. The membership decided to leave the vice-director position open until next year's elections. Ann Brierton will remain Secretary-Treasurer.

Suggestions were taken from the membership as to the topic of our annual symposium. A number of suggestions were made and a committee was formed to decide from them.

Book Review

Try something different to add another dimension to your inquiry into the biology and behavior of fishes. As anyone who has tried to sketch a fish knows, few things can look so different from the real thing, when drawn. A slight misplacement of the mouth or eye; a slight error in the profile curve; or the wrong location of a fin; and the drawing fails to resemble the fish.

A solution to these problems and a challenge to any fishery biologist is "Gyotaku", or Japanese fish printing. Often scientists have been criticized for their lack of aesthetic appreciation. Here is something you can appreciate and get a new perspective of fishes. You may not have a picture you can publish with your next article but you will find a new experience that you will enjoy.

The Printer's Catch — An Artist's Guide to Pacific Coast Edible Marine Animals by Christopher M. Dewees, is a fine addition to your library or a superb gift to someone or to your public or school library. A very handsome book with colored and black and white prints and accurate descriptions of 53 fishes and 10 invertebrates, it contains simple instructions for printing fish and sources for materials, especially the printing paper.

Sea Challengers, 4 Sommerset Rise, Monterey, CA

cont. on page 6

Book Review cont.

93940, are the publishers. *The Printer's Catch*, printed in Japan, hardcover, 128 pages, 10" X 8", \$26.95.

John W. Reintjes

Announcements and New Publications

Conference — Perspectives on Nonpoint Source Pollution

This conference on clean water through controlling nonpoint sources is designed to bring together all those concerned with nonpoint source pollution, including agricultural, forestry, mining, construction, industry, governmental, environmental, and other interests, both public and private. Sponsored by the N.A. Lake Management Society and several federal agencies, the conference will be held at the Hyatt Regency Hotel, Kansas City, MO on May 19-22, 1985.

The agenda include plenary sessions, panel discussions, sessions on institutional issues of nonpoint source pollution, nonpoint source pollution and water quality impacts, nonpoint source issues (agricultural, urban, rural, TVA demonstration project, Indians), and making decisions about nonpoint source pollution.

Registration fee is \$50 — send to N.A. Lake Management Society, Box 217, Merrifield, VA 22116.

Seminar — How To Write Better

Technical Reports, Proposals, & Papers

The Office of Professional Development, P.O. Drawer 912, Clemson University, Clemson, SC 29633 is offering a series of 1-day seminars in Atlanta, GA on May 2, 1985; Clemson, SC on May 8; Greensboro, NC on May 9; and Orlando, FL on May 21.

Topics will be essentials of technical writing, planning your writing, organizing your facts and ideas, developing a successful written presentation, and editing and rewriting.

Registration is through the above office and address, and the fee is \$165. Telephone 803-656-2200.

Stock Identification Workshop

The National Marine Fisheries Service's Southeast Fisheries Center, under the auspices of its Panama City Laboratory, is sponsoring a workshop on the identification and separation of fish stocks for fisheries management. The workshop will be held on or about November 5-7, 1985 at the Miracle Mile Resort Complex in Panama City Beach, Florida. The workshop will consist of plenary sessions with invited reviews of stock identification techniques and a contributed-paper section on applications and examples. A discussion panel will critique the methodologies. Plenary review papers and abstracts of contributed papers will be printed as proceedings of the workshop.

Persons wishing additional information should contact Eugene Nakamura or Herman Kumpf, Panama City Laboratory, 3500 Delwood Beach Road, Panama City, FL 32407-7499. Phone: (904) 234-6541.

International Symposium on Applied Lake And Watershed Management

This conference on all inland waters, including reservoirs, is being sponsored by the N.A. Lake Management Society at Lake Geneva, WI on November 13-16, 1985.

Topics will cover lake protection/restoration techniques, lake/watershed assessment methods and results, lake/watershed management program priorities and strategies, toxic contaminant issues, biological perspectives, special situations management, lake use considerations, and organization/socio-economic considerations.

Registration fee is \$85 — send to N.A. Lake Management Society, Box 217, Merrifield, VA 22116.

International Symposium on Population and Community Ecology In the Benguela Upwelling Region and Comparable Frontal Systems

The Benguela Ecology Programme, the Sea Fisheries Research Institute, the South African National Committee for Oceanographic

Research, the Council for Scientific and Industrial Research, and the University of Cape Town have issued the first announcement of this symposium to be held at Cape Town, South Africa on September 8-12, 1986.

Subjects to be covered are coastal upwelling, frontal processes, primary production, decomposition, nutrient cycling, interannual variability, food web analysis, intertidal communities, sedimentary record, pelagic fish populations, demersal fish populations, alternative resources, top predators, and invertebrate populations.

Provisional registration fee is R2 — write to The Symposium Secretariat S.355, CSIR, Box 395, 0001 Pretoria, South Africa.

Restoration of Rivers and Streams

James A. Gore of the University of Tulsa is the author of this 320-page illustrated book.

Since it is true that rivers and streams are capable of a natural recovery process, why is *restoration* necessary? The author of this new book explains that it is actual recovery *enhancement* that occurs when an attempt is made to reclaim a river or stream. The process of enhancement enables the ecosystem to stabilize at a much faster rate than through the physical biological processes that occur naturally. This comprehensive new book is the first to deal exclusively with the restoration of rivers and streams.

All of the major topics which must be addressed when considering reclamation of a river ecosystem are detailed. Specific chapters deal with hydrologic considerations, including the estimation of meander patterns as well as geomorphic considerations of runoff patterns. Also covered are the preservation and restoration of water quality, as well as biological techniques for restoration of riparian vegetation, habitat enhancement for benthic invertebrates and fisheries, and methods for determining successful biotic restoration.

For the first time, previously scattered or hitherto unpublished information will be located in a single volume. The book displays a selection of theories, experiences, and techniques which have shown to be useful in enhancing the recovery of damaged running water ecosystems. This authoritative volume is sure to become the standard reference for biologists, hydrologists, engineers, and other stream managers.

The volume can be ordered from Butterworth Publishers, 80 Montvale Avenue, Stoneham, MA 02180 for \$39.95.

An Introduction to the Aquatic Insects of North America

This second edition of a book edited by Richard W. Merritt of Michigan State University and Kenneth W. Cummins of Oregon State University provides you with a standard and up-to-date reference on the systematics and biology-ecology of aquatic insects in North America. Thirty-four authors, each an expert in his own field, contributed to this authoritatively written and exciting edition.

This one-of-a-kind resource provides well-illustrated keys to allow accurate and efficient identification of separate-life stages of the major taxonomic groups — orders, families and genera. In addition several introductory chapters afford extensive coverage of: the morphology of aquatic insects; specific collecting, sampling, and rearing methods; aquatic insect respiration, habitat, life history, and behavioral adaptations; ecology and distribution of aquatic insects; phylogenetic and evolutionary relationships.

The book has been completely updated to provide you an extensive resource that you will refer to often in your profession. This revised edition offers: two new chapters — "Aquatic Insect Respiration" and "Habitat, Life History, and Behavioral Adaptations of Aquatic Insects"; increased coverage of ecology, phylogeny, sampling, and rearing; updated ecological tables at the end of each chapter; a choice of two bindings — hardbound for library use and plastic comb for the laboratory; completely updated bibliography — now over 2850 references.

This volume is for sale by Kendall/Hunt Publishing Co., 2460 Kerper Blvd., Dubuque, Iowa 52001. Price \$54 hardbound, \$42.95 plastic comb soft cover.

Urban Fishing Symposium Proceedings

The Fisheries Management and Fisheries Administrators Sections of the American Fisheries Society sponsored an urban fishing symposium in Grand Rapids, Michigan on October 5-8, 1983. Now the proceedings of the symposium has been published by the Sport Fishing Institute. The 307-page hardback book is considered a valuable reference for starting new or upgrading old urban fishing programs.

The Urban Fishing Symposium and its Proceedings were structured to reach people over a broad spectrum of interests. This volume presents overview papers dealing with the needs and opportunities for urban fishing development. Major sections of the proceedings address the topics of urban fishing program planning, implementation, information, and education. Eight case studies, which are diverse both in program methods and geographic locations, depict how these factors work together to create urban fishing opportunities.

The book can be ordered for \$25 from Sport Fishing Institute, 1010 Massachusetts Avenue, N.W., Suite 100, Washington, D.C. 20001.

Journal of Applied Ichthyology

Paul Parey Scientific Publishers announces a new periodical for 1985. The *Journal of Applied Ichthyology* publishes original articles by renowned international scientists; brief notes; and reviews of books in the fields of ichthyology, aquaculture, and marine fishery; ichthyopathology and ichthy-immunology; environmental toxicology using fishes as test objects; basic research of fish management. The emphasis is on the application of scientific research findings.

Articles will be published in full in English and German, possibly French; each article will be summarized in all three languages. The journal is a quarterly; subscription price is \$50 plus \$4.50 postage.

Manuscripts should be sent to: Professor Dr. W. Ahme, Institute of Zoology and Hydrobiology, University of Munich, Kaulbachstrasse 37, D-8000 Munich 22, West Germany.

Information is available from: Paul Parey Scientific Publishers, 35 West 38th St. #3W, New York, NY 10018, T. 212/730-0518.

Thesis Abstracts

Distribution, Abundance, and Recruitment Patterns of Fish Larvae Around Cubagua Island, Venezuela Montserrat Esteve de Romero, M.S. 1985 University of Miami

This study was designed to shed information on the pathways followed by the early stages of coral reef fishes. It was carried out on two adjacent areas at Charagato, Cubagua Island, Venezuela. Two different ecotopes were considered, the seagrass bed habitat and the coral reef habitat. Both areas were sampled weekly for 17 weeks, July 27 to December 15, 1983. Samples were taken with a paired bongo net (60-cm mouth opening), using continuous oblique tows. The sampling gear was equipped with 0.333 mm-mesh-size nets and a flowmeter. Wind speed and direction, water temperature, oxygen content, and salinity were recorded simultaneously.

Sampling resulted in the collection of 2,729 larvae representing 39 families. The families with the most abundant larvae were: Clupeidae, Clinidae, Gobiidae, and Blenniidae.

Larvae were evenly distributed over the seagrass bed (1,532 larvae) and over the coral reef (1,197 larvae). The larval densities found in the two environments were statistically the same ($P \leq 0.05$). Similarly, no significant differences were found in the standard length of larvae collected in the two environments ($P \leq 0.05$).

Larval abundance peaks were observed in July 27, and during the September-October period. A third larval peak occurred in November. Some families were present throughout the sampling period, while others showed restricted occurrence.

Larval abundance appeared to be associated with changes in the prevalent wind direction and moon phase, with larval abundance peaks occurring at new and full moon. The ichthyoplankton species composition

changed with the surface water temperature and time of the year. Large differences in larval numbers between each side of the bongo net suggested extremely patchy larval aggregations.

Fishery Legislation

Federal Budgets

Sport fishing pumps over \$17 billion into the U.S. economy each year and commercial fishing adds another \$2.4 billion. But that doesn't seem to carry much weight in distributing the federal funds that keep the wheels of government turning. The Reagan Administration's proposed budget for fiscal year (FY) 1986 totals nearly \$1 trillion. Of that amount, nearly \$300 billion will go to defense, \$400 billion to entitlements paid directly to individuals (such as social security benefits), about \$100 billion to state and local governments, almost \$150 billion just to pay interest on the national debt, and the remainder (about \$70 billion) will run the remaining thousands of non-defense-related federal programs.

In turn, the government estimates it will receive about \$800 billion in tax receipts and revenues in FY 1986, leaving a shortfall estimated at about \$180 billion — the deficit.

Although the President has pledged to cut the deficit, in reality defense spending is proposed for a 13% increase, Social Security and Medicare entitlements an increase of 4.7%, and interest on the national debt will rise 9.3%. Given these rather modest increases proposed for the federal government's major programs, reducing the deficit will require drastic cuts to remaining programs. The proposed budget would provide only \$12 billion total for all federal environment and natural resource-related programs. Major cuts are proposed for many federal fishery programs.

National Marine Fisheries Service (NMFS) — There have been few changes in the Administration-proposed budget for the NMFS in the past several years. The Administration requests huge cuts to the NMFS budget, and Congress eventually restores nearly all of the cuts and occasionally increases funding for critical programs. Last year Congress was especially generous. For example, habitat conservation and research programs received funding 15% above the level needed simply to maintain current efforts. This year, those increases were added to the same percentage cuts proposed in past years, with the result that the Administration proposes reducing the NMFS total budget for operations, research, and facilities by 45%, from \$153 million to \$84 million.

Grants to states for management and research on anadromous fish and commercial fisheries research and development would be eliminated. Critical fishery habitat conservation programs would be cut by 44%, and habitat research by 57%. Recreational fisheries information would be cut by about 20%, and surveys of saltwater anglers would be cut by about a third. The Atlantic salmon tagging programs would end, as would all federal funding for operation of "Mitchell Act" salmon and steelhead hatcheries on the Columbia River. Collection and analysis of general resource information would be cut from \$54 million to only \$29 million, with the resultant proposed closure of major NMFS labs in Gloucester (MA), Oxford (MD), Bay St. Louis (MS), Galveston (TX), Tiburon (CA), Manchester (WA), Little Port Walter (HI), Cook (WA), Pasco (WA), and Auke Creek (AK). In addition, major cuts are proposed for laboratories at Milford (CT), Sandy Hook (NJ), Beaufort (NC), and Portland (OR).

U.S. Fish and Wildlife Service (FWS) — The proposed budget for FWS fishery resources would maintain programs at current levels. Nonetheless, major initiatives within the FWS to focus its activities on fisheries of major national significance have been stymied by the Administration's request to Congress for funds. For example, adequate funding to evaluate the effectiveness of new Lower Snake River hatcheries was not requested. Operational funding for laboratories has been eroded by cost increases in overhead and other base operating expenses, yet increased funds for laboratory operations were not provided. In addition, no new monies were provided for gearing up operations at the new Gainesville Fishery Research Laboratory, which will become ready for occupancy in Fall 1985. Additional funds needed for fishery management on national wildlife refuges were not pro-

cont. on page 8

Fishery Legislation *cont.*

vided and straightening out the operations and maintenance budget for the National Fish Hatchery System was given little attention in the proposed budget. Diversions from hatchery maintenance to hatchery operations for the purpose of maintaining production has resulted in a diversion of \$5.7 million in funding for annual maintenance since 1981.

In addition, the Administration's budget request to Congress seeks to change the new expansion legislation for the Sport Fish Restoration Program. The new monies, commonly known as the Wallop-Breaux Fund, generated by last year's expansion of the Sport Fish Restoration Program are subject to automatic appropriation. The Administration's budget request seeks to change the law and make all sport fish restoration funds subject to annual appropriations and thus the yearly whim of the Administration and Congress. The Administration's objective is to impound the majority of funds available under the program which, under present law, would be provided automatically to state fishery programs. The loss this year would mean no disbursement of new revenues collected from motor boat fuel taxes and import duties on fishing tackle and pleasure boats, amounting to an estimated \$77 million.

U.S. Forest Service — Forest Service funding for anadromous fish habitat improvement is proposed for a \$1.15 million cut from the 1985 level of \$3.8 million. Even at current funding levels, a 10% decline in anadromous fishery production is predicted to occur on Forest Service lands within the next 15 years. The proposed budget for the cold and warmwater fish habitat improvement program would subtract \$200,000 from the current \$1.7 million program. Forest Service fishery activities occur on 190 million acres and support an estimated 15.5 million 12-hour fishing user days.

Bureau of Land Management — Fisheries and wildlife programs on the BLM's 310 million acres would be cut by 15% (FY 1985 funding is \$13.5 million) and 21 jobs would be eliminated. The proposed budget would leave less than one person per million acres to handle both fish and wildlife on BLM lands and only \$43,500 per million acres total to administer all fishery and wildlife programs.

Anadromous Fish Conservation Act

A bill to provide a simple reauthorization of the Anadromous Fish Conservation Act, H.R. 1025, has passed through House committee and been approved on the floor of the House of Representatives. The reauthorization would extend the current provisions of the Act an additional 3 years. Hearings have yet to be held in the Senate.

Commercial Fisheries Research and Development Act

A bill to replace the current Commercial Fisheries Research and Development Act was introduced in the House by Reps. John Breaux (LA) and Don Young (AK). The bill is titled the Interjurisdictional

Fisheries Research Act of 1985 (H.R. 1028) and simply reorients the current commercial R&D act grants-to-states program toward federal priorities. Specifically, the bill would mandate that federal funds provided by the Act are used on fisheries which are classified as "inter-jurisdictional" in nature. The bill encourages, through an increased percentage federal share, the use of federal monies in research on fisheries for which interstate fishery management plans are in place or for which the state fisheries are managed in a manner consistent with fishery management plans adopted by the regional fishery management council. The bill was strongly supported in hearings and mark-ups in the House Subcommittee on Fisheries and Wildlife Conservation and the Environment and in the full Merchant Marine and Fisheries Committee. However, H.R. 1028 was prevented from reaching a vote by the full House on 19 March under a unanimous consent agreement due to objections from Rep. Robert Walker (PA) who opposed the bill. The basis for Walker's opposition was that H.R. 1028 was inconsistent with the Administration's budget proposal which deletes all funding for the Commercial Fisheries Research and Development Act. The bill is expected to be returned to the floor for additional debate and eventual vote. No hearings have been held on H.R. 1028 in the Senate.

Rudolph A. Rosen, *National Wildlife Federation*
Washington, DC

Membership Report

PROMOTION TO FELLOW

Dr. Richard R. Straty

AK

NEW ASSOCIATES

Jeffrey A. Tellock

FL

Craig A. Brown

FL

William E. Lynch, Jr.

OH

Dr. Brenda L. Norcross

VA

NEW MEMBERS

Thomas N. Todd

MI

Dr. Henrietta Margolis-Nunno

NY

Dr. R. John Gibson

NEWF

Frank P. Almeida

MA

Dr. Donna D. Turgeon

DC

EMERITUS STATUS

Richard A. Wagner

OR

Edward C. Greenhood

CA

Dr. Frederick C. Cleaver

OR

Sammy M. Ray

Membership Chairperson

BRIEFS, the newsletter of the American Institute of Fishery Research Biologists, is published six times a year. It is intended to communicate the professional activities and accomplishments of the Institute, its Districts, and Members; the results of research; the effects of management; unusual biological events; matters affecting the profession; political problems; and other matters of importance to the fishery community. Comments and contributions should be sent to the Editor, Dr. Oliver B. Cope, 15 Adamswood Road, Asheville, NC 28803. Subscription \$15 a year to Institutions and Non-Members.

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Research Biologists*

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VOL. 14, NO. 3

JUNE 1985

AIFRB Award Nominations — Now

The time is ripe for the AIFRB membership to submit nominations for three of our prestigious awards for 1985. All are urged to take the time to give serious thought to identification of really noteworthy individuals, groups, and accomplishments so the awards for this year will reflect the high standards we expect for these honors.

AIFRB Outstanding Achievement Award for Individuals

This award is reserved for persons who have authored significant publications in fisheries, have rendered exceptional service to the profession, have demonstrated outstanding teaching or training of students, have been responsible for important discoveries or inventions, or have made major contributions to the advancement of Fishery Science.

Richard J. Myhre is chairman of the committee which will review the nominations. AIFRB members should submit nominations to Dick at P.O. Box 95009, Seattle, WA 98145-2009. Nominations should be submitted by August 1, 1985, and should include brief summaries of noteworthy qualifications of the nominee. Final selection will be made by the Board of Control at its September meeting.

AIFRB Group Award of Excellence

This honor is given each year to an organization which has established an outstanding record for contributions to fisheries. The criteria for judging are similar to those for the award for individuals — significant publications, exceptional service, outstanding teaching or training, important discoveries or inventions, and major contributions to the advancement of Fishery Science.

Richard J. Myhre is also the chairman of the committee for this award. Nominations should go to Dick at P.O. Box 95009, Seattle, WA 98145-2009, and should arrive by August 1, 1985. As with the award for individuals, nominations for the group award should include summaries of the group's qualifications. The Board of Control will choose the awardee at its September meeting.

W. F. Thompson Best Paper Award

This award recognizes outstanding student research in fisheries. The criteria for nomination and selection are: The research should have been done while the nominee was a student; the publication of the research may be multi-authored; the paper must have been published in 1985 or in two previous years; the paper must pertain to fish or aquatic sciences; and only the student who did the research is eligible for the cash award.

This award is \$750 and a Certificate. Any co-authors will receive Certificates but no cash.

The chairman of the committee to review nominations for this award is Dr. W. Kwain, Lake Superior Fisheries Research Unit, P.O. Box 130, Sault Ste. Marie, Ontario, Canada P6A 5L5.

Nominations (including reprints of the papers) should be sent to Dr. Kwain as soon as possible, and no later than the middle of August 1985.

Recruiting Drive

Membership Chairperson Sammy M. Ray, with the encouragement of President Hugh MacCrimmon, has spearheaded a campaign to increase AIFRB membership. He has contacted the District Directors, who are responsible (according to our bylaws) for the recruiting of new membership. Sammy has offered suggestions for the mechanics of seeking new people at the District level and has made the District Directors aware of the promotional materials and the nomination and application forms available from AIFRB.

The results of the first month of effort (April) have been summarized by Sammy Ray; he has received eight applications for new membership, three from Alaska and one each from Pennsylvania, Virginia, Southern California, Texas, and Oregon. Moreover, several District Directors have sent Sammy a list of potential members, and Sammy has written each prospect with an invitation to submit an application.

We all hope that this effort will continue and yield results. With this record of accomplishment in April, the full membership should be stimulated to renew the search for new people and help make AIFRB bigger and better.

AIFRB Financial Report

AIFRB's Treasurer, Charles F. Cole, has furnished information on the financial status of our Institute as of May 19, 1985. The summary is in a format different than the one presented in the last report in BRIEFS

because the Treasurer feels that the Balance Sheet prepared by our auditors, Cummins Krasik Gabelman Hohl and Company, does not provide sufficient detail, and, in addition, would make little sense to most readers.

Current Financial Situation in AIFRB as of May 29, 1985

EXPENDITURES	Yearly Budget	Sept. 1 thru May 29
Travel	\$ 4,000.00	\$ 0.00
BRIEFS, Printing	3,600.00	2,556.89
BRIEFS, Postage	1,200.00	1,186.90
Offices, Supplies	1,100.00	1,163.02
Offices, Postage	500.00	518.57
Awards	3,250.00	1,570.50
Computer	0.00	647.06
Trans. to Investment	9,000.00	7,900.00
Bank Charges	100.00	75.06
Telephone	0.00	57.84
Expense Advances	0.00	550.00
Alaska Book	13,000.00	8,057.60
Miscellaneous	0.00	3,375.76
TOTAL	\$34,750.00	\$27,609.20
INCOME	Budget	Sept. 1 thru May 29
Deposits to date		
from Investments	\$14,600.00	\$14,600.00
from Dues	12,500.00	12,568.38
for Alaska Book	1,000.00	1,000.00
Realized Income		
Money Mart	1,200.00	1,100.00
Bonds	1,673.76	836.88
CDs	695.00	0.00
TOTAL	\$31,668.76	\$30,105.26
ASSETS		May 29 (approximate)
Checkbook Balance		\$ 1,060.91
Bache Cash Account		.20
MoneyMart Assets		7,580.00
AmCap Fd 236sh		2,800.00
Bell Canada Bond 4k		3,040.00
ChesPotBond 1k		765.00
CommEd. Bond 3k		1,990.00
CommEd. Bond 5k		3,360.00
11l Bell Bond 2k		1,400.00
PacG&E Bond 5k		3,545.00
CD due 6/11 5k		5,000.00
CD due 9/26 2k		2,000.00
TOTAL		\$32,541.11

More Student Travel Raffle

The April 1985 issue of BRIEFS carried the names of three recipients of Student Travel Raffle Awards. Treasurer Cole now announces the names of the final two students, David Beauchamp and Craig Brown, whose names were selected in the 1985 drawing. These AIFRB Associates will use the \$250 awards to attend scientific meetings to enhance their fishery careers.

The full list of 1985 winners is:

David Beauchamp, Seattle, WA
Craig Brown, Miami, FL
Jeffrey Allan Tellock, Miami, FL
Mark S. Tisa, Blacksburg, VA
Brian D. Winter, Seattle, WA

Paddlefish Conservation

Whatever else one might say about him, the Ayatollah Khomeini did, however indirectly, help resurrect the paddlefish (*Polyodon spathula*) in America. In 1980, the U.S. government, angered by a Khomeini-inspired takeover of its embassy in Teheran, called a halt to trade with Iran, thus isolating one of its most important suppliers of caviar. The consequent search for a native source of this delicacy led to the paddlefish, and as its commercial value became more apparent, efforts increased to locate, understand, and effectively manage paddlefish populations.

There are other factors contributing to the paddlefish's reemergence as a species of interest. Among them are environmental concerns and recognition of its unique place in history, explains Allen A. Elser of the Montana Dept. of Fish, Wildlife, and Parks. Elser has attended many paddlefish conferences and is conducting extensive research on its life history, and obviously admires this "relic fish that is kind of ancient and extremely long-lived." He is also regretful that "its population has been reduced through manmade efforts." Elser is nonetheless optimistic about this species' prospects, and this attitude is shared by other researchers around the country. "The future of the paddlefish is the best it's ever been," states Kim Graham of the Missouri Department of Conservation.

Only 10 years ago, Graham continues, he would have answered questions about the future "quite differently." Most fish specialists agree that were it not for the increased attention of the past 10-15 years, the paddlefish's future might well have been dim. Population levels of this fish, which once were "common throughout the Mississippi/Missouri basin," had dipped alarmingly by the mid-50s when the first real attempts were made to draw life histories.

In part, this near demise could be attributed to the paddlefish's natural characteristics and tendencies — paddlefish are long-lived, they mature at different rates, and their spawning generally is unobservable. So, when researchers began in the 1950s to try to observe and develop management plans for this species, their efforts often were thwarted. Even now, with the increased availability of advanced technologies such as telemetry

and electrophoresis, the paddlefish remains enigmatic, its movements very nearly as shrouded in mystery as they were 30 years ago.

Also, human factors began emerging in the 1960s and 1970s to further threaten the prospects for this fish. The Harry S. Truman Dam impounded in the Osage River in Missouri, for example, altered water flow patterns in areas where paddlefish normally resided and spawned, as did similar projects to construct dams and lay pipeline crossings in other places. The effects on the species might have been devastating were it not for the fact that as the number of projects grew, so too did researchers' interest in and concern about the paddlefish.

Informal working groups have been organized periodically over the last 10-15 years, fostering discussion among biologists from "paddlefish states" — Mississippi, Missouri, Arkansas, New Mexico, and Tennessee.

Harvesting paddlefish eggs for caviar is not a new concept. The species was first harvested for this purpose at the turn of the century, and overharvesting significantly reduced its numbers. After 1980, when the ban on trade with Iran went into effect, "a number of entrepreneurial types sprang up, particularly in Arkansas and Tennessee," Elser says. The lessons of the past, however, combined with biologists' increased knowledge about the paddlefish, convinced them that steps should be taken to protect this fish.

There has been a problem facing the paddlefish since the imposition of the trade ban; people — usually having commercial, rather than sport fishing interests — "are taking too many paddlefish simply to obtain their eggs," Graham says. "They throw away the rest of the fish," sacrificing edible, nourishing paddlefish because it isn't useful in caviar production. This situation is further compounded by the tendency of some individuals, intent upon producing the best, most commercially appealing caviar, to throw back all but the largest female fish they catch. However, Elser says that "experimental regulations" currently being enforced in some Midwestern States may prove effective at eliminating this situation. A two-fish-per-season limit (where previously the limit had been one fish per day) has been in effect in Montana since 1981; it allows for no "throw backs," is policed using a self-locking tag system, and thus far has proven successful in helping the State's biologists protect and accurately assess the size of the paddlefish population.

As the above statement suggests, biologists' interest goes beyond finding ways to prevent encroachment on the paddlefish population by caviar entrepreneurs. At the Montana Department of Fish, Wildlife, and Parks, the Fisheries Division is conducting life history research using two paddlefish populations. At the first research site, on the Missouri River above Ft. Peck, they are attempting to document the instream flow for spawning, in order to determine the environmental and habitat needs of paddlefish. Specifically, the study is intended to assess dam impoundments and pipeline crossings, as

Paddlefish Conservation (cont.)

well as water requirements, in light of their impact on spawning behavior.

The second project operates out of a reservoir in North Dakota to "document the amount of pressure among fishermen in this heavily regulated area for paddlefish" Elser says. A serious effort is underway as well to accurately count paddlefish in the area so that regulations can be made more appropriate in light of demand.

The State of Missouri, too, is studying the effect on paddlefish population size of establishing strict limits and regulations, of further restricting the length of the fishing season, and of creating protected areas and no-fishing zones. Researchers — in particular, a group headed by the Missouri Department of Conservation's Graham — are looking for ways to boost species numbers "artificially" should regulations and restrictions prove insufficient to maintain populations. Graham's group is attempting to perform maintenance stocking by breeding paddlefish in a hatchery and then releasing them in the river, despite the fact that paddlefish are extremely difficult to raise through hatching, Graham says the group is encouraged by its recent success at having completely restocked southern Missouri's Table Rock Lake using hatching methodology. Whereas before virtually no paddlefish had existed in the lake, "now we're snagging 1,500 to 2,000 per year," Graham claims. "In essence, what we've done is to create a new fish population."

Despite the recent upsurge of interest in paddlefish and the advances that are in part attributable to it, a number of questions are unanswered — questions about their life history and habitat requirements; questions about what effect new management methods, such as artificial breeding and hatching, will have. "The big question in Montana is still 'where do they spawn...and how?'" Elser's words underscore the fact that much of what this ancient fish does is as yet unknown.

Just as the effects of what fish personnel are doing are unknown, their actions are the target of questions. Elser and Graham say that the topic of regulations and limitations is one that is debated regularly at the meetings they attend, and out in the field as well. In fact, Graham says of the sport fishermen he has encountered: "They're incredibly loyal and concerned about the fate of this fish. The majority wants us to restrict (catch levels and fishing seasons) even more!" Then too there is the question, posed here by Elser, about artificial propagation — about its potential impact on genetic integrity. "We don't know much yet about the genetic makeup of this species," he explains. What is the likelihood that a paddlefish population reared artificially and sent out to replace or replenish the stock in another area might pollute genetically or in some other way adversely affect that second population?

*Extracted from Fish and Wildlife Reference
Service Newsletter*

Marine Life Abundant After El Niño

The warm, nutrient-poor, and unproductive ocean waters of the past 2 years off central California are now once again returning to a rich and productive state, according to Norm Abramson, Director of the National Marine Fisheries Service's (NMFS), Southwest Fisheries Center Laboratory at Tiburon, California.

Evidence for this was collected during a NMFS research cruise conducted on the NOAA Ship, *David Starr Jordan*, in April, 1985 in the Gulf of the Farallones off San Francisco. Biologists found that many forms of sea life which were previously scarce during the warm water condition in 1983 and 1984 known as El Niño are once again flourishing.

According to Pete Adams, fishery biologist and cruise leader on the *Jordan*, small, shrimp-like crustaceans called euphausiids or "krill" are particularly abundant. The inch-long krill are important prey for many local fish such as salmon, as well as sea birds and marine mammals, and thus are a vital part of the marine ecosystem. Also found in abundance were juvenile fishes, particularly this year's crop of young rockfishes. As adults, these fish are the target of a large Pacific coast commercial fishery, and are variously called "rockfish", "rockcod", "snapper", or "ocean perch" in fish markets and restaurants.

Similar reports have come from biologists at the Tiburon Laboratory who, while diving, have observed vast swarms of small crustaceans in areas closer to shore on the Mendocino Coast where they have been scarce since the El Niño. Dr. Edward Hobson, fishery biologist and leader of this diving group, points out that these organisms are important prey for the younger stages of most commercially important fish species in this area. The biologists also found that juvenile canary rockfish appeared inshore earlier and in greater numbers than during any of the past 10 years.

Director Abramson believes that the abundance of young fish and invertebrates, both inshore and offshore, means good news for both fishermen and consumers. All signs point to an abundance of food fish in the immediate future when the survivors of this year's bumper crop of juvenile fish reach catchable size and begin to enter the commercial fishery.

NMFS SW Fisheries Center, La Jolla, CA

✓ Acoustic Tracking of Tuna

The past 5 years have seen a dramatic increase in the use of fish aggregation devices (FADs) for harvesting pelagic species such as tuna. These FADs are buoys of various designs that are usually moored in quite deep water (e.g. 500 fathoms). Their effectiveness depends on exploiting the tendency of pelagic species to aggregate around floating objects such as logs or other debris. Although the aggregating effect of natural objects and FADs is well documented, the underlying influences on fish behavior which result in these aggregations, and the advantages of aggregating to the fish, are largely unknown. Consequently, deployment strategies and

harvesting techniques for FADs are not now based on a scientific understanding of fish behavior.

In 1983 NMFS (Honolulu) and the Hawaii Institute of Marine Biology (University of Hawaii) began an ongoing collaborative program to use acoustic telemetry to monitor the horizontal and vertical movements of yellowfin tuna (*Thunnus albacares*) found in association with FADs. Additional funding for the project is supplied by the Sea Grant College of Hawaii.

The project is innovative in using sportfishing techniques and a small (36') vessel to capture and then track the animals. These facets allow the cost of the program to be minimized. Expendable bathythermograph probes deployed from the pursuit vessel allow the tuna's vertical movements to be correlated with ocean thermal strata. The longest track so far obtained covered a period of 6 days.

Diurnal rhythms in the movement of the fish around the FADs are becoming apparent and the range of excursions away from the FADs by individual fish are being documented. The vertical movements of the animals are frequently closely associated with thermal phenomena although these associations also show diurnal patterns, being different depending on time of day. The program will soon be expanded to include other pelagic species found in association with FADs.

Kim Holland
Hawaii Institute of Marine Biology,
Kaneohe, Hawaii

Announcements and New Publications

1985 Arctic Science Conference

This conference (the 36th Alaska Science Conference) will take place on September 27-29, 1985 on the Fairbanks Campus of the University of Alaska. Technical sessions will cover biological sciences (including wildlife, biology, fisheries, ecology, biological oceanography), and other sciences, physical sciences and social sciences. Symposia and workshops will address biological engineering, advances in wildlife research, ecology and fisheries of the Chena River, current research on arctic fishes, and other topics of importance to the fishery community.

For registration and other information, write Dr. Robert G. White, 311 Irving Bldg., Institute of Arctic Biology, University of Alaska, Fairbanks, Alaska 99701. Registration fee is \$50 (regular) or \$25 (university student).

Hudson River Foundation 1985 River Symposium

The Hudson River Foundation for Science and Environmental Research offers the Symposium as an annual event at which scientists, educators, policy-makers, and the public can present their work and exchange information on current issues of the Hudson River. The 1985 Symposium will feature formal presentations by nine of the Foundation's current grantees, and twenty-two exhibits on research and educational programs concerning the Hudson River. There will be ample oppor-

tunity throughout the day for all participants to take part in group discussion as well as to talk individually with other members of the Hudson River community.

The Symposium will be held at: Overlook Lodge Conference Center, Bear Mountain State Park, Tuesday, July 9, 1985, 9:15 a.m.-5:45 p.m. A buffet lunch will be provided.

The program will include papers on phytoplankton, chlorinated hydrocarbon contaminants, PCBs and striped bass, DNA analysis of striped bass populations, benthic macro-invertebrates, light and depth zonation of sessile populations, and other fishery-related topics.

Write to: 1985 Annual River Symposium, Hudson River Foundation, 122 East 42nd Street, Suite 109, New York, N.Y. 10168.

Sun Valley '85

The American Fisheries Society and the International Association of Fish and Wildlife Agencies will hold their 1985 national meetings at the Sun Valley Resort at Sun Valley, Idaho, September 6-12.

Registration information is available from Steve Barton, Idaho Department of Fish and Game, P.O. Box 25, Boise, Idaho 83707. AFS registration is \$35.

Second International Symposium on Indo-Pacific Marine Biology

A preliminary announcement has been issued for this symposium (June 22-July 9, 1986). In June/July 1974, The Western Society of Naturalists and the University of Guam's Marine Laboratory co-convened an International Symposium on Indo-Pacific Reef Biology. The meeting was quite successful and advanced our knowledge of the fragile ecosystems in the Indo-Pacific. The WSN and the University of Guam are proud to announce the SECOND INTERNATIONAL SYMPOSIUM ON INDO-PACIFIC MARINE BIOLOGY with the same venue, Guam, and similar and new emphases on further acquainting marine scientists with the very critical problems of these ecosystems. Marine scientists are invited to participate in the meeting, engage in discussions and thus enlarge their knowledge of ongoing research in the Indo-Pacific.

The BULLETIN OF MARINE SCIENCE, University of Miami, will again act as the publisher of symposium manuscripts and abstracts for those wishing to participate in the Special Issue of the Proceedings. BSM 1983, Volume 33, No. 3, the Special Issue from the 1982 Australian meeting, is an example of these syntheses published for the convenors.

The program indicates the major areas of discussion and, accompanied by several afternoons of Contributed Papers, makes for an interesting and significant meeting. Your attention is directed to the enclosed Request for the Second Circular form which should be returned to the WSN Secretary **not later than 1 OCTOBER 1985**. English will be the official language of the symposium, both for manuscripts and presentations. Posters may be exhibited for those not wishing to present a paper.

cont. on page 6

Announcements & Pub. cont.

As in previous meetings the WSN has made arrangements for group airfares and accommodations, both for the Guam portion of the meeting and the post-symposium sections held on the islands of Truk and Ponape. It is envisioned that this field work will enhance the academic presentations. Please write or phone the WSN Secretary for further details.

The program includes symposia and contributed papers on behavior of marine crustaceans, ecology of marine crustaceans, biogeography and evolution of marine crustaceans, recruitment mechanisms of coral reef fish, introduced marine species in the Indo-Pacific, *Acanthaster* biology and reef management, and field trips to points of interest. Write Prof. David H. Montgomery, Biological Sciences Department, California Polytechnic State Univ., San Luis Obispo, CA 93407.

Artificial Reefs

Artificial Reefs — Marine and Freshwater Applications (ISBN 0-87371-010-X, 589 pages, \$49.95) edited by Frank M. D'Itri, Institute of Water Research, Michigan State University, is now available from Lewis Publishers, Inc. This is the first complete book on artificial reefs, and includes U.S., Canadian, and Japanese technology.

This book is intended for fisheries biologists, ecologists, limnologists, oceanographers, aquatic resource managers and planners, commercial and private fishing groups, and environmental scientists. *Artificial Reefs — Marine and Freshwater Applications* is organized into four sections: 1) Physical and limnological characteristics, 2) Design and construction, 3) Ecology, 4) Legal, economic, regulatory, and organizational considerations in siting and construction.

Both a practical and a theoretical work, the information presented in this new book should also stimulate further research for a more integrated approach to fisheries enhancement and artificial reef management.

Available from Lewis Publishers, Inc., 121 South Main Street, P.O. Box 519, Chelsea, MI 48118, (313) 475-8619.

Aquatic Toxicology and Hazard Assessment — Seventh Symposium

This hardbound book, the seventh in ASTM's series on aquatic toxicology and hazard assessment, contains state-of-the-art developments concerning the fate and effect of chemicals in aquatic environments. The publication discusses approaches for determining the impact of pollution on aquatic ecosystems through toxicological and chemical fate assessments.

Thirty-seven papers are divided into five major sections: Methods Development, Refinement, and Evaluation; Evaluation of Chemicals and Chemical Wastes; Assessing Impacts of Wastes on Aquatic Ecosystems; Bioavailability; and National Water Quality Criteria.

Toxicologists, environmental scientists, ecologists, biologists, chemists, and regulatory agencies will be particularly interested in adding this to their working libraries.

The volume costs \$48 for ASTM members and \$60 to others. Order from ASTM, 1916 Race Street, Philadelphia, PA 19103.

Marine Plankton Life Cycle Strategies

This book, edited by AIFRB Fellow Karen A. Steidinger and Linda M. Walker, summarizes selected plankton life cycles, stages, development, physiology, behavior, modes of transport, environmental parameters and species interactions. Emphasis is placed on the significance of life cycles and their stages in ecological analyses of populations and communities. Recognized experts in planktonology discuss current concepts such as the energy-bonus hypothesis and active settling, and present recent research on dinoflagellate cysts and differences in planktonic larvae and benthic adult metabolism. Researchers in botany, ecology, invertebrate zoology and aquaculture will find information in this book to help them evaluate occurrence, abundance, distribution and potential dispersal, and extended distribution of many plankters.

Contents: Planktonic Diatoms. Life Histories, Dispersal and Survival in Marine, Planktonic Dinoflagellates. Cellular Specialization and Reproduction in Planktonic Foraminifera and Radiolaria. Planktonic Copepoda (including Monstrilloidea). Aspects of the Physiology and Ecology of Pelagic Larvae of Marine Benthic Invertebrates. Life History and Ecology of Pelagic Fish Eggs and Larvae. Index. 168 pp., 7 x 10, 1984.

The price is \$58. Order from CRC Press, Inc., 2000 Corporate Blvd., N.W., Boca Raton, Florida 33431.

Fish Migration

The migration of fish is a compelling topic, not only as an aspect of the more general question of animal migration, but also in its relevance to the understanding and management of freshwater and marine fisheries. This volume is a major review of the topic and will be of particular interest to those involved with animal behavior, behavioral ecology and fisheries.

The patterns of migration discussed include diadromous (between fresh and sea water), as exemplified by salmon and lampreys, which reproduce in fresh water, eels which reproduce in sea water, and gobies (non-breeding migrations), as well as potamodromous (fresh water only — kokanee salmon, trout and suckers) and oceanodromous (sea water only — herring and cod). A large part of the text is devoted to orientation, which includes discussion of the initiation of cues and means of navigation. Physiological adaptation to changing environments is considered at length, as are the ecological and evolutionary aspects of fish migration.

This book is not only the first major review of the subject since the work of Harden-Jones in 1968, but also the first in a much longer period to address questions of physiology as they relate to the migration of fish.

Brian McKeown is a Professor in the Department of Biological Sciences at Simon Fraser University in British Columbia, Canada.

This volume has 224 pages, is illustrated, and can be ordered from ISBS, P.O. Box 1632, Beaverton, OR 97075.

Sharks of the World

This is part 1 of volume 4 of the *FAO Species Catalogue*, and covers the Hexanchiformes to Lamniformes. Edited by Leonard J.V. Compagno, this annotated and illustrated catalog of shark species known to date covers the following orders and families — Order Hexanchiformes: Family Chlamydoselachidae, Family Hexanchidae; Order Squaliformes: Family Echinorhinidae, Family Squalidae, Family Oxynotidae; Order Pristiophoriformes: Family Pristiophoridae; Order Squatiniformes: Family Squatinidae; Order Heterodontiformes: Family Heterodontidae; Order Orectolobiformes: Family Parascyllidae, Family Brachaeluridae, Family Orectolobidae, Family Hemiscyllidae, Family Stegostomatidae, Family Ginglymostomatidae, Family Rhinodontidae; Order Lamniformes: Family Odontaspidae, Family Mitsukurinidae, Family Pseudocarchariidae, Family Megachasmidae, Family Alopiidae, Family Cetorhinidae, Family Lamnidae.

(FAO Fisheries Synopsis No. 125, Volume 4, Part 1.)
FAO, 1984, 247 pp., Order #5011-F2611. Paper \$18.50.
Order from UNIPUB, P.O. Box 1222, Ann Arbor, MI 48106.

Thesis and Dissertation Abstracts

Simulating Optimal Harvest Strategies for Mixed-Species Trawl Fisheries off the Northeast Coast of the United States

Steven Anthony Murawski, Ph.D., 1984
University of Massachusetts

An integrated top-down approach to the definition, analysis, and modeling of mixed-species fishery systems is described and illustrated. Rather than structuring the system primarily with regard to biological interactions of component species (bottom-up philosophy), the fishery system is defined in terms of important technological interactions among component species of interest. Sufficient biological detail is then added to provide a realistic but parsimonious description of attributes of the fishery important for management. Optimization of various productivity measures is based on modeling studies incorporating the initial definition of the fishery system.

The top-down approach is illustrated for the multispecies otter trawl fisheries off the Northeastern

United States. A series of relatively discrete mixed-species fisheries was identified based on numerical classification experiments utilizing multispecies landings data categorized by statistical reporting area, depth of capture, and month. Cluster analysis studies of landings data from Maine through North Carolina resulted in a hierarchical classification of nine major fisheries reflecting broad geographic/ecologic zones, and 29 subfisheries within them.

Multivariate analysis of research trawl survey data for the period 1963-1981 revealed that significant patterns in demersal fish species co-occurrence (and hence technological interactions) were determined by a number of biotic and abiotic factors. Variation in the co-occurrence of seven important demersal fish stocks in the Georges Bank region was adequately described by log-linear models incorporating statistical reporting area, depth zone, season, and, in some cases, species abundance data.

Multispecies analogs of traditional single-species dynamic pool yield models were developed and implemented to assess the impacts of various fishing practices on yield potentials from mixed-species fishery systems. Two models and associated computer programs were developed: one assumes species mixtures exploited by a single fishery; the second assumes several discrete fisheries operating simultaneously or sequentially during the year.

A linear programming model for multispecies, multi-fishery optimization is described and used in concert with the mixed-species yield per recruitment analyses to identify and evaluate alternative fishing strategies. The objectives of the linear programming studies were to identify harvest strategies that result in certain fishing mortality rate goals for each important species, while minimizing total fishing effort among the several operational fisheries competing for the same group of species.

Energy Utilization Model for Silver Perch, *Bairdiella chrysoura*

Hugh Anthony Brooks, Ph.D., 1985
College of William and Mary in Virginia

An energetics model was constructed as an alternative method to length frequency analysis for the estimation of growth for juvenile silver perch, *Bairdiella chrysoura*. The model approach was adopted since estimation of juvenile estuarine fish growth by only collecting length or weight frequency data is difficult due to the large bodies of water and variety of microhabitats that must be regularly sampled over short time intervals. Field and laboratory data was included in analysis of model compartments for growth, metabolism, food intake and energy loss in waste products.

Food habit studies indicated that silver perch is a planktivore that feeds on calanoid copepods during the day and mysids at night. Estimated energy utilization for silver perch at maintenance and maximum rations were

cont. on page 8

Theses & Dissertations cont.

similar to literature values for yellow perch, *Perca flavescens*, and brown trout, *Salmo trutta*. Model simulation of growth for silver perch in the York River, Virginia from July through October 1981 contained less variation in the size prediction than growth rates determined by length frequency analysis. The model did not contain periods of negative growth as did the field data. By the end of the season, model predictions of silver perch length matched the average length of silver perch captured in the lower York River.

The construction of energy utilization models through complimentary laboratory and field research has been demonstrated to be a viable method for estimating growth for juvenile fishes. Length frequency analysis is limited to only expressing growth over time. The advantages of an energetics model are that it also defines trophic and ecological interactions as well as environmental factors that impact growth.

Seasonal Movements of Penaeid Shrimp, Atlantic Croaker, and Gulf Menhaden Through Three Marshland Migration Routes Surrounding Calcasieu Lake in Southwestern Louisiana

Brian Lee Marotz, M.S., 1984
Louisiana State University

Coastal land loss and saltwater intrusion have deleterious effects on Louisiana's marshland habitat. Water control structures, placed across inland waterways to stabilize hydrography, apparently inhibit seasonal migrations of certain economically important fishery species. The proper design of water control devices and faunal movements should be investigated to reduce detrimental biological effects.

Six stationary fish traps, suspended from a platform in two columns of three, were placed in each of three major migration routes surrounding Calcasieu Lake, where modified water control structures are scheduled for operation. The traps were set for a 24-hour interval once each week for 14 months. The passive trap system captured migratory organisms traveling landward and seaward at the water surface, mid-depth, and bottom. Catches were analysed to determine the seasonal presence, relative abundance, movements, and vertical distribution of gulf menhaden, Atlantic croaker, white shrimp, and brown shrimp. These species were among the 10 most abundant species captured at all stations. Salinity, water temperature, and dissolved oxygen were measured before and after trap sets to assess their relevancy as factors influencing species movements.

A comparison between compatible data obtained on the Sabine National Wildlife Refuge, west of Calcasieu Lake, and in the Cameron-Creole Watershed, east of the Lake, revealed little biological and environmental difference among the two sides. This indicates that results of the Sabine study may be used to help decide upon the appropriate design and management of water control structures proposed for the Cameron-Creole site. Fewer

croaker were captured at the surface than at lower depths. Gulf menhaden were captured in greater numbers at mid-depth and surface. Fewer brown shrimp were taken near the bottom, whereas white shrimp captures were more variable by depth. These results provide some information required by management personnel to operate the weir gates for maximization of species movements.

A Study of the Relative Selectivity of Six Shallow, Estuarine-Marsh Sampling Gears and the Distribution of Fish and Crustaceans in the

Sabine National Wildlife Refuge, Louisiana
Richard Daniel Hartman, M.S., 1984
Louisiana State University

Seven gears for sampling fishes and crustaceans were evaluated in the shallow, estuarine marsh of Sabine National Wildlife Refuge in southwest Louisiana. The sampling equipment evaluated consisted of two sizes of otter trawls, two widths of surface push trawls, a long-haul seine, a throw trap, and a stationary plexiglass trap. Numbers of individuals, and numbers of species captured, ease of use, density of organisms (numbers/m²), and several diversity indices were the criteria used to evaluate the effectiveness of each gear. Although the otter trawls were easiest to use, the fewest fish and the lowest density of organisms of all but a few important species were found when this gear was used. The surface push trawl was the most expensive and cumbersome gear to use, but the most individuals overall were captured by the widest push trawl and it showed the highest density of organisms for all sampling equipment except the throw trap. The long-haul seine was the most difficult gear to use in the field but captured the most species and generally the most individuals of all gear types during each sampling period. Otter trawls proved to be very inefficient in shallow water except for a few benthic species.

Few important correlations between species abundance and environmental factors were found although cyprinodonts were consistently negatively correlated with water depth and dissolved oxygen levels.

Electrophoretic Stock Identification of Summer Flounder, *Paralichthys dentatus*

Garret Van Housen, M.A., 1984
College of William and Mary in Virginia

The stock structure of summer flounder, *Paralichthys dentatus*, has recently been under contention by fishery managers and biologists because of conflicting conclusions drawn from morphometric, meristic, tagging, and egg and larval distribution studies. This study had the objective of examining the genetic relationships among populations of flounder using biochemical genetic variants as detected by starch gel electrophoresis.

Five of the seventeen enzymatic loci analyzed were found to be polymorphic. Significant differences between regions were detected using the likelihood-ratio test for

heterogeneity. Cluster analysis of genetic similarities between sample pairs supported the heterogeneity test findings of genetically distinct stocks north and south of Cape Lookout, North Carolina. This conclusion should be approached cautiously because of the small number of individuals in samples from along North Carolina's Outer Banks. Tagging studies have led some to believe that this inshore North Carolina population may be genetically distinct from populations to its north and south. Evidence is discussed which calls this idea into question.

Average heterozygosity was calculated for 360 individuals at 14 loci and was found to be high, as in most pleuronectiform studies. This finding, as well as interpretations of the heterogeneity tests, are discussed in light of the neutralist-selectionist controversy.

The Distribution and Abundance of the Bottlenose Dolphin, *Tursiops truncatus*, in Virginia

Robert A. Blaylock, M.A., 1984
College of William and Mary in Virginia

Aerial surveys were conducted in July-October 1980, and May-June 1981, in the Chesapeake Bay mouth and the nearshore coastal waters of Virginia south of Cape Charles to assess the distribution and abundance of bottlenose dolphins (*Tursiops truncatus*). Ancillary data were collected to examine relationships between dolphin density and distribution and selected environmental factors. Individual dolphins that were recognizable by distinctively shaped or scarred dorsal fins were photographically recorded during small boat surveys and from shore.

716.6 linear km of aerial surveys in the Chesapeake Bay mouth resulted in 5 herd sightings which gave a strip census density estimate of 0.0035 (± 0.00182 S.E.) herds km^{-2} . Aerial surveys totalling 435.1 linear km along the coast between Cape Charles and False Cape (within 2 km of shore) produced 48 herd sightings and a strip census density estimate of 0.0435 (± 0.00232 S.E.). Data from Chesapeake Bay mouth transects were not sufficient for line transect analysis, but the coastal surveys resulted in an estimated herd density of 0.0811 (± 0.00125) herds km^{-2} based on a Fourier series analysis of herd distribution perpendicular to the transect. Dolphins were sighted primarily within 1.6 km of the shore.

There was a direct relationship between monthly mean herd density and water temperature, but no relationship between mean herd density and air temperature. This suggests that dolphin distribution is related to the distribution of its prey. There was no significant difference in the number of dolphins moving with or against tidal flow.

During 1980 and 1981, 24 individuals were identified and photographed. Of 7 identified in 1980, 5 were resighted in 1981, suggesting seasonal residency. Twelve *Tursiops* were stranded and retrieved during the study period, but there was no apparent relationship between strandings and estimated monthly abundance.

Experimental Spat Collection of the Catarina Scallop, (*Argopecten circularis*) in Bacochibampo Bay, Guaymas, Sonora, Mexico

Carlos Francisco Reyes, M.S. 1985
University of Miami

A study on spat settlement of catarina scallop (*Argopecten circularis*) was conducted between July 1983 and July 1984 at Bacochibampo Bay, Guaymas, Sonora, Mexico. Spat were collected using onion bags filled with gillnet mesh, strung from polypropylene ropes, at four stations in the bay. Scallop spat were collected year-round, with three peaks in abundance, November, February and May. Spat settlement in Bacochibampo Bay was significantly related to water temperature, which increased from December (17°C) to July (27.5°C); an increase in settlement was observed, and two settlement peaks were found, during this period. There was a significant regression between spat size (shell length and height) and surface water temperature. A density effect that reduces growth inside the bags as number of spat per bag increase was found. Pooling all the data showed that settlement increased exponentially with increasing water depth at all stations during the year of study. There were significant differences in the number of spat collected per month at each station. However, no significant differences were determined for sampling lines within each station. The most productive station in terms of spat collecting was the station located in the deepest area at the mouth of the bay, with the strongest currents and open sea conditions prevalent. For some months the size of the spat collected at depth was larger than the size of spat collected close to the surface; during other months the reverse was observed, while no clear pattern could be determined for certain months. The results on experimental spat collection obtained during the course of this study compare favorably with results obtained in scallop culture operations in Japan, suggesting the commercial culture of scallops in the Pacific coast of Mexico could be initially supported by spat collection methods developed in this study. The biological information obtained from scallop spat collection and growth experiments in this study can be useful for a better understanding of the fisheries for this species. Spawning and spat settlement peaks, spat size distribution, and spat settlement depth determined with spat collectors may be used as baseline data to detect future changes, perhaps due to pollution or overfishing, in scallop commercial grounds of the Mexican Pacific, by permanent monitoring on spat settlement on these commercial grounds.

Comparison of Daily Growth Rates of the Mummichog, *Fundulus heteroclitus*, in Habitats of Different Salinity Regimes

James G. Hoff, M.A., 1985
College of William and Mary in Virginia

Daily growth increments from otoliths of the mummichog, *Fundulus heteroclitus*, were compared from

cont. on page 10

Theses & Dissertations cont.

habitats of different salinity regimes. Biweekly collections were made at four stations in both Blevins (polyhaline) and Goalders (oligohaline) creeks within the York River estuary, Virginia. This sampling design enabled the comparison of growth rates within and between creeks. Linear regressions of length vs. adjusted age were computed for samples from each of the eight stations. Analysis of covariance indicated that there were no significant differences in the regression lines when data were grouped to compare among creek growth rates. Pooled data from each creek were then compared, and no significant differences in lines were detected.

A mark and recapture study was undertaken to determine the home range of *Fundulus heteroclitus* within Blevins Creek. The majority of individuals in the population exhibited a home range of less than 30 meters along the creek bank.

Membership Report

PROMOTION TO FELLOW

Dr. John H. Helle	AK
Dr. Dilip Mathur	PA
Dr. Gary E. Davis	CA

PROMOTION TO MEMBER

Herbert W. Jaenicke	AK
Paul F. Kubicek	CA
Allyn M. Lopez	FL

NEW MEMBERS

Ronald G. Taylor	FL
Dr. Kenneth W. Turgeon	DC
Thomas B. Hoff	PA
Dr. Paul F. Woods	AK

NEW ASSOCIATES

Christopher M. Moore	VA
Dr. Peter W. Perschbacher	TX
Dr. Mark T. Hill	ID
David A. Beauchamp	WA

EMERITUS

William R. Nicholson	NC
Dr. George Post	AZ
Merle G. Galbraith	IL
Dr. Donald W. Strasburg	MD

Sammy M. Ray

Membership Chairperson

In Memoriam

Robert B. Chapoton

Robert B. Chapoton passed away at Beaufort, North Carolina on May 16, 1985.

An employee of the National Marine Fisheries Service, Robert became an AIFRB Associate Member in 1964 and rose to Fellow status in 1975. He was also an active member of the American Fisheries Society.

His colleagues, AIFRB associates, and friends will miss Robert B. Chapoton.

BRIEFS, the newsletter of the American Institute of Fishery Research Biologists, is published six times a year. It is intended to communicate the professional activities and accomplishments of the Institute, its Districts, and Members; the results of research; the effects of management; unusual biological events; matters affecting the profession; political problems; and other matters of importance to the fishery community. Comments and contributions should be sent to the Editor, Dr. Oliver B. Cope, 15 Adamswood Road, Asheville, NC 28803. Subscription \$15 a year to Institutions and Non-Members.

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VOL. 14, NO. 4

AUGUST 1985

Annual Meeting of AMERICAN INSTITUTE OF FISHERY RESEARCH BIOLOGISTS

to be held at

Sun Valley Resort, Sun Valley, Idaho

September 7-8, 1985

1. Call to Order and Adoption of Agenda
2. Reports —
 - i) Treasurer
 - ii) Membership
 - iii) Publications
3. Awards
 - i) W.F. Thompson Best Student Paper 1985
 - ii) Outstanding Achievement Award 1985
 - iii) Group Award of Excellence 1985
 - iv) Student Travel Raffle Awards
4. District Directors' Reports
5. Other Business
 - i) Unfinished Business
 - ii) New Business
6. Operations: Bylaws, Policy, etc.
7. Duties of Officers and Committees
8. Installation of Officers
9. Date and Place of Next Meeting
10. Adjournment

All AIFRB members are urged to submit any items which they feel should be considered at the annual meeting.

AIFRB Publishes Symposium Proceedings

AIFRB has entered a new arena with the publication of *Fish and Wildlife Relationships in Old-Growth Forests*. This enterprise is AIFRB's first publishing venture beyond the issuance of items for only the membership (BRIEFS, Directory to Members, etc.). The 432-page book covers the Proceedings of a Symposium Sponsored by the Alaska District of AIFRB, the North-

west Section of The Wildlife Society, and the Alaska Council on Science and Technology. The Symposium, held in Juneau, Alaska, generated considerable interest among aquatic and terrestrial workers, so it was appropriate for AIFRB to undertake the publication of this volume.

Financial support for printing was furnished by the Alaska Conservation Foundation, the Alaska Council on Science and Technology, The Alaska Department of Fish and Game, AIFRB, the National Audubon Society, NMFS (Alaska Region), NMFS (Auke Bay Laboratory-Alaska), The Pope and Young Club, Territorial Sportsmen, Inc. (Alaska), the U.S. Forest Service (Alaska Region), and the U.S. Forest Service (Pacific Northwest Forest and Range Experiment Station). Proceeds from book sales belong to AIFRB, which sells the volume for \$20.

The Proceedings contains 52 articles on diverse fish, wildlife, and related topics grouped into Old-Growth Forests — Fisheries Ecology, Timber Management/Fish Management Productivity, Community Structure and Ecology of Old-Growth Forests, Wildlife Ecology of Old-Growth Forests, Wildlife Management in Old-Growth Forests, and Relationships between Deer and Old-Growth Forests on Vancouver Island: A Case Study.

All AIFRB people will wish to purchase copies of this book, which is available from John W. Reintjes, Rt. 4, Box 85, Morehead City, NC 28557.

Recruiting Drive Update

The recruiting drive for AIFRB membership (see BRIEFS for June 1985) goes forward. Under the leadership of Membership Chairperson Sammy Ray, the drive continues to help us gain new members, and we fully expect this momentum to continue. In May, four applications were received, one each from Massachusetts and Ontario, and two from Southern California. June saw six applications come in, one each from New Jersey, Mexico, Pennsylvania, and Oregon, and two from Central California.

Although these numbers are not phenomenal, it is obvious that the District Directors have been energetic in their salesmanship, and they deserve credit for their successes. We expect that the July results, when they are tabulated, will show that the recruiting efforts reaped rewards for AIFRB.

AIFRB Asiatic Fisheries Exchange

The AIFRB/People-to-People Fishery Delegation returned to Seattle on June 14 after completing a professionally-rewarding 3-week, 20,000-mile tour of research laboratories, universities, aquaculture facilities, and industrial sites in Japan, China, and Korea. The 27 AIFRB members who participated (5 were accompanied by their wives) were from 15 states and represented academia (10), state agencies (8), private industry or other non-government institutions (5), and federal agencies (4). Our schedule of visits was tasking, but the enthusiasm of the delegation never waned and this attitude and the compatibility of the group contributed to the success of the trip. (The participants' ratings ranged from super to fantastic). Much was learned about fish and fisheries, research and management, and in the course of our travels, about the local culture. To convey this information to AIFRB, I have asked each member of the delegation to highlight the activities for the period that he was reporter for our trip Journal. The full Journal will be completed this fall and will be available on loan from each delegation member.

I am indebted to People-to-People International for arranging the AIFRB scientific exchange and to the individual participants who made the trip so memorable. I would also like to thank Fellows McHugh and Royce for providing copies of their recent books for distribution to Chinese research institutions, and Fellow Atkinson, who presented an overview of Asiatic Fisheries at the Delegation's initial meeting.

I also want to acknowledge the support for this venture by the AIFRB Board of Control and the encouragement that was expressed in letters and phone calls from other AIFRB invitees who were unable to participate in this trip. At our business meeting in September, I will urge the Board to consider the sponsorship of future exchanges.

I wish to thank Lianne Armstrong for preparing the figure for this article.

Bernard E. Skud, *Delegation Leader*
Past President (RI)

May 24 AIFRB delegation assembled for a reception and banquet at the Four Seasons Olympic Hotel, with Mr. and Mrs. Clinton Atkinson as Guests of Honor and Dr. and Mrs. William Royce as Honored Guests. Mr. Atkinson presented a brief overview of the fisheries of Japan, the Republic of Korea, and the People's Republic of China.

Ronald A. Fritzsche (CA)

May 25-26 Our briefing continued during the morning. John Luppert, People-to-People, led the discussion, aided by assistants Jonelle Bellis and Kathryn Parker. We obtained information on currency, customs, etc. in Japan, China, and Korea — also advice on food, illness, etc., as well as suggestions during the scientific exchanges.

We departed the Sea-Tac Airport in the afternoon for a 9-hour flight to Narita Airport in Tokyo. We stayed at the Miyako Hotel along with a Russian volleyball team.

I challenged them to a game (on behalf of the delegation) but their coach unfortunately (?) declined.

William S. "Corky" Perret (LA)

May 27 A visit to the Ministry of Agriculture and Fisheries was preceded by a sightseeing tour. We visited the Imperial Palace Plaza where we stopped for a group picture. Mr. Y. Igahora, Director, Research Department, Fisheries Agency, welcomed us to the Fisheries Agency and expressed his wishes for the success of our trip. Mr. B. E. Skud replied. Members of the staff of the Fisheries Agency presented brief reports on (a) current research and study, (b) salmon research, (c) salmon hatchery and release programs, and (d) their planning for fisheries research. We lunched at the Happoen Garden restaurant and spent the afternoon in a sightseeing tour, visiting Asakusa Kannon Temple, its Nakamise Arcade, Nihonbashi and Ginza streets.

G. Morris Southward (NM) and Guy C. Powell (AK)

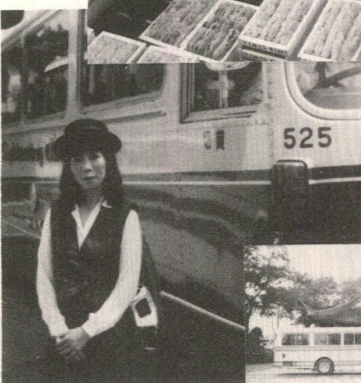
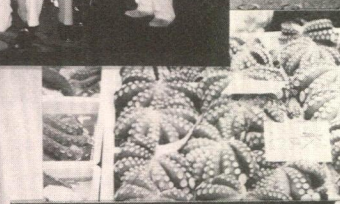
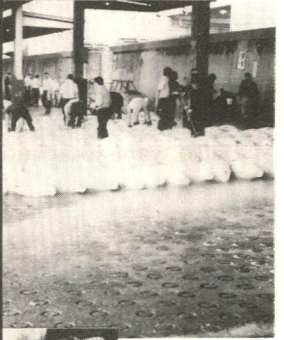
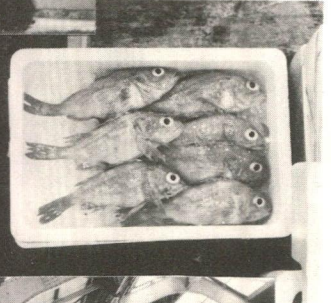
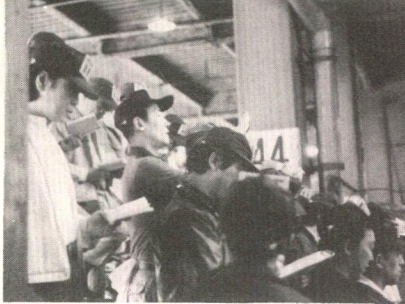
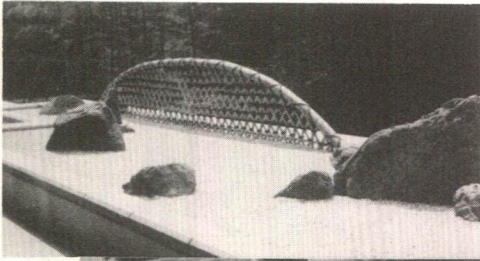
May 28 The 50-year-old Tsukizi Wholesale Fish and Produce Market was visited too, early in the morning (5 AM). Amid a bedlam of noise and frantic activity were exclamations of surprise and astonishment at the quantity and colorful variety of 300-400 species of fish and shellfish. Mr. Konoshita, manager of the market, briefed us on the market's operations. It operates 6 days a week. The turnover each day is about 3,000 tons of seafood worth 2.27 billion yen. Wholesale and outside buyers participated in the morning sales, bidding for 1,200-1,300 different seafood products. Workers in the market are trained by the Tokyo Sanitary Department which also conducts bacterial testing and other inspections there.

In the afternoon, Professor Uno, Tokyo University of Fisheries, welcomed us and summarized the current annual fisheries production of Japan. The University accepts 180 students a year for a 4-year undergraduate fisheries degree and currently is requesting permission for graduate studies. Discussion centered on information about the validity, life history, and migratory habits of *O. masu*, the cherry salmon. Salmon hatchery production and survival, oyster production, shrimp mariculture potential, and artificial reef programs were other topics of our afternoon session.

James B. Higman (FL) and Edwin W. Irby (FL)

May 29 The delegation traveled by bus to Shimizu and visited the Tokai University Science Museum and the Far Seas Fishery Research Laboratory. The Science Museum featured an excellent aquarium in which a tank for large fish could be viewed from the bottom as well as the sides. There was a display on *Euphausia superba* and an "automated aquarium" of robotic aquatic animals showing some of the mechanical features of locomotion. At the Far Seas Laboratory we learned of their research efforts and plans. Presentations by Al Perlmutter on pheromones, by Jack Helle on stock identification in southeastern Alaska salmon, and by Ken Roberson on the Copper River salmon were well received.

Carl E. Bond (OR) and John B. Owen (ND)



May 30 We flew from Tokyo Airport (Haneda) to Kushiro. We visited the Hokkaido Regional Fisheries Laboratory in the afternoon. Bernie Skud and John Karinen gave talks. Dr. Kato discussed scallop culture and Mr. Kobayashi presented details on rehabilitation of herring stocks. Mr. Nose gave a summary of the lab's operations and equipment. A tour of the facilities followed the technical session. Members of the lab joined us at a local restaurant to continue our earlier discussions.

Mike Dell (WA) and Richard L. Hasinger (MN)

May 31 Flew from Kushiro to Chitose. We had lunch at Shikotsu Lake in the scenic mountains near Sapporo. We visited Hokkaido Sake-Maso Fukajo or Chitose Hatchery, the oldest hatchery on Hokkaido, dating back to 1888. It was extensively remodeled in 1971. We watched a superb video tape of the hatchery operations. Chitose Hatchery is presently the fifth largest hatchery in Japan and has a 125 million egg capacity. The hatchery is primarily (95%) devoted to chum salmon (*Oncorhynchus keta*) production.

This hatchery does several unique things: First, part of the feeding raceways are covered and have artificial lights to control the photoperiod. These sections are used to "artificially advance" the smolting time for cherry salmon. Second, capturing the brood stock is done in a copy of an American fish wheel about 20 km downriver from the hatchery. Third, they use an automatic dead egg sorter that will sort 3,000-4,000 eggs per hour. It works on the principle of differences between live and dead eggs in light transmission.

The day ended with a boisterously friendly spring lamb barbecue at the Sapporo Beer Garten with many toasts — "Compai" — to Japanese and American friendship with the local diners.

Jack H. Helle (AK) and William J. Wilson (AK)

June 1 & 2 Departed Chitose Airport outside of Sapporo, with an intermediate stop in Tokyo, and arrived at Shanghai International Airport at 9:35 PM. Sunday June 2 was a rest and cultural orientation day for the delegation. We visited the historical Yu Garden, a bazaar, a Buddhist Temple, and the Shanghai International Trading Center. The first official Chinese/AIFRB Delegation function was the welcome banquet that evening with Wang Naili, Vice Chairman of the Shanghai Institute of Science and Technology as primary speaker. The delegates were warmly welcomed and toasted — "GomBay" — by Chinese biologists, engineers, and other scientists at the excellent full-course banquet in the Park Hotel across from the People's Park.

Bennie A. Rohr (MS)

June 3 We toured the Dingshan Lake Cooperative Fisheries Farm Station, which is 65 km southwest of Shanghai. The 30.5-ha commercial fisheries farm was constructed in 1980. The main activities at the farm are pond culture, pen culture, fish-food production, and the propagation of fingerlings. Production in the past 5

years was 1,283 metric tons of fish, 313 mt fingerlings, and 550 mt black clams (mussels).

The standard of living for members of this fisheries commune has improved each year of operation and annual salaries are now about \$600 (1,500 Yuan). We toured the pen (cage) culture area where bream, grass, silver, and black carp are held in 10 x 10 x 2-m-deep net pens. Hundreds of these pens were placed side by side. Stocking densities of 1.5 - 2.0 kg of fish per sq m are used. Fish are fed both artificial and natural food. We visited a fisherman's home and family and went to the Farm's restaurant and had an 18-course meal including hog bellies, jellyfish, ox, beef, freshwater shrimp, carp soup, and black carp seasoned with ginger, plus fruits and vegetables.

Robert B. Herrmann (NC) and Donald F. Samuelson (WA)

June 4 AM We met with officials of the Shanghai Association for Science and Technology, host for the AIFRB delegation visit for China. The "Association" is composed of 125 separate scientific groups including the Shanghai Fishery Research Institute of Aquatic Products, East China Sea Research Institute which we visited, and other organizations covering a broad diversity of research activity. Personnel from the two "Institutes" and the "Association" provided us with a thorough overview of fisheries research activity in the Shanghai area or sponsored by organizations based there.

Kenneth Roberson (AK)

June 4 PM Our delegation was divided into two groups, one going to the Shanghai Fishery Research Institute and the other to the East China Seas Fisheries Institute. The Director, Song Xiao-hu, of the former gave the group a tour of the facilities, followed by discussion with the staff. They are involved in studies of the distribution of fishes of the Yangtze River, ecological and pollution studies, selective cultivation of freshwater bream, disease studies on black carp, and macrobrachian culture. They are particularly interested in rehabilitating certain native fish stocks in the Yangtze: sturgeon, paddlefish, Chinese freshwater crab, and the Song Jaine perch.

Thomas F. Thuemler (WI)

June 5 The delegation traveled by train to Wuxi (Woo Shee), located 130 km west of Shanghai on Lake Tai. During the morning session, we visited the Chanjiang Freshwater Fisheries Research Center, which has a staff of 320. Research is conducted on lake fisheries, pond culture, nutrition, diseases, and environmental protection. The Center manages 80 ponds and provides training for foreign fishery students with financial support from FAO. The training school is well-equipped with a library, mainframe computer, impressive instrumentation, videotaping facilities, and several laboratories. We divided into two groups for technical discussions on lake fisheries and pond culture.

Paul F. Kubicek (CA) and Richard E. Noble (WA)

June 6 Today we visited a fish farm and silk factory, and observed a lady with fishing cormorants. The Helue aquaculture farm is a completely integrated operation in which waste products from pigs, cows, and the growing of silkworms are used to fertilize ponds used to grow fish (several species of carp). Droppings from the fish are retrieved in bottom muds and used to fertilize crops.

The highlight of the day involved a 3-hour trip down the Grand Canal from downtown Wuxi to Lake Tai. Over 66% of all Wuxi's goods are transported on the canal which was originally built to transport concubines for the emperor between north and south China. After a minor collision with a towboat we reached Lake Tai and viewed fishing operations involving numerous Chinese sampans, junks, and trawlers. Our hosts purchased some freshly caught ice fish (*Salangidae*) which were later consumed at dinner. Five of the more adventuresome delegates completed the day with an evening of dancing. Details surrounding this event are still a bit sketchy.

Robert H. Gray (WA)

June 7 After returning from Wuxi, we visited the Shanghai Fisheries College (SFC), were given an English brochure describing the history and organization of the college, and were shown a well-prepared video-tape of research activities. SFC has 339 teachers and 1,200 students, and maintains two research vessels and a fish collection of some 1,600 specimens.

We divided into two sections. In the marine section, we had a lengthy discussion on the Alaska pollock in response to questions from the Chinese, who plan to send a vessel to that area. Our questions focused on the fisheries of the East China Sea. During the aquaculture/ecology discussion session, the Chinese showed great interest in beginning a channel catfish culturing program and asked several questions about such programs in the U.S. They also expressed interest in controlling man-induced impacts, such as pollution, and asked for advice based on our experiences.

Charles R. Liston (MI) and Paul F. Kubicek (CA)

June 8-9 The Vice-Dean of the Shanghai Research and Development Center for Coastal Zone Resources (East China Normal University) outlined the history of the Center, its affiliations with other scientific organizations, and its research activities. Bernie Skud reported on his research on the interactions of pelagic species, and Mike Dell reported on the impacts of hydroelectric dams on fish. The University Staff spoke on the culture of ice or noodle fish (*Salangidae*). The group later toured the museum. In the evening of the 8th, the Shanghai Association for Science and Technology held a banquet for our delegation. Speeches stressing mutual assistance, cooperative programs, and international friendship were presented. On the morning of the 9th we departed Shanghai, flew to Tokyo and then to Seoul, South Korea.

Alfred Perlmutter (NY)

June 10 We had a delightful and enlightening meeting with scientists of the Korea Fisheries Research and

Development Agency at their fine harborside facilities. This agency conducts most Korean fisheries research. Their competence and efficiency show. After our briefing and discussions we were impressed with magnificent displays and models depicting life histories, shellfish culture, fishing methods, fishing gear, fishing vessels, fish products, and much more.

David P. Borgeson (MI)

June 11 AM Pusan Coop Fish Market is the largest in Korea. Thirty percent (350,000 metric tons/yr) of all fish auctioned in Korea go through this market. Over 50 species of mainly coastal fish are auctioned to licensed fish dealers. Quality determines price and producers (fishermen) are paid in cash the same day as the sale. The market employs 55, is fully computerized, and has a large cold-storage facility, micro lab, wastewater treatment plant, a fisherman house, and a credit union for the fishermen. The market also supplies fishermen with crushed ice.

Frederick A. Copes (WI)

June 11 PM We visited the National Fisheries University of Pusan. Dr. Bung Don Lee, President of the University, gave us an introduction and history of the school. It was founded in 1941 with 240 students. It now has about 5,000. There are 21 undergraduate departments, 11 masters departments, and 7 doctoral departments. The discussion that took place ranged from class size at the University (40 to 50 in lectures and 15 to 25 in laboratories), to teaching load (at least 11 hours per week by government regulation), to requests for increased Korean quotas of Alaska pollock (*Theragra chalcogramma*), to pollution and what can be done with affected shellfish stocks, to a needed increase of Korean aquaculture by a third.

Philip T. Briggs (NY)

June 12 Highlights of the visit to Daerin Fishing Co. were (1) a summary of the company's history, organization, assets and distribution of plants, fishing activities, and business objectives, and (2) a tour of the Pusan Fish processing plant. Most products are destined for the U.S. market (Campbell Soup, Van Camp, etc.). We saw the processing of salmon (from Alaska), herring (from San Francisco Bay), Alaska pollock, cod, flatfish, and shrimp.

Highlights of the visit to Unchon Fish Farm and Eel Culture Facility in Kyongsangnam-do were (1) use of semiclosed water systems employing geothermal water and (2) phenomenal rate of production of eels — 100 metric tons of eels are produced per year using only 700m³ of water/day. The eels are held at high temperatures (27-29°C) and low oxygen levels (2.5-4.5 mg/l), with high loading densities (28 kg/m³). Disease problems are virtually non-existent. The uncertain availability of wild elvers to stock the operation appears to be a weak link.

John F. Karinen (AK)

cont. on page 6

June 13 This final day of our trip was spent enjoying the cultural and scenic aspects of the Pusan area. We also visited the beautiful, well-kept U.N. Memorial Cemetery for the Korean War, where the dead from 22 nations are buried. Our final group activity was a farewell banquet at the Commodore Hotel, featuring both Korean and Western food. The closing ceremonies at the conclusion of the meal were MC'd by Mrs. Jonelle Bellis of People-to-People, with thanks to all for the success of our scientific and cultural experience from our leader, Bernie Skud. Poetic readings were given by Carl Bond and Don Samuelson, followed by a sing-along led by Chuck Liston and his guitar.

Robert B. Hermann (NC)

June 14 Pusan to Seoul via Korean Airlines, Seoul to Seattle via Northwest. The trip was over. The first reunion of the delegation is scheduled for September during the AFS meeting in Sun Valley, Idaho, when AIFRB meets to hold its annual business meeting.

✓ Recent Trends in the Philippine Tuna Fishery

During the 1970s the Philippine tuna fishery emerged as the largest and most valuable fishery in the country. Total production of tuna and tuna-like species increased from less than 25,000 metric tons in the early 1970s to over 200,000 mt in the 1980s. Approximately half the tuna catch consists of skipjack (*Katsuwonus pelamis*) and yellowfin (*Thunnus albacares*), and half frigate tuna (*Auxis thazard*) and eastern little tuna (*Euthynnus affinis*). Several other tuna and tuna-like species are occasionally caught in Philippine waters, but they are not landed in commercial quantity and are not distinguished in Philippine fisheries statistics.

Tuna fishing is undertaken by both the small-scale and commercial fishing sectors. Small-scale fishermen operate boats less than 3 gross tons, most of which are wooden double-outrigger canoes known as *bancas*. Although they have traditionally accounted for the majority of tuna production, the small-scale fishermen's share of the catch has declined steadily since 1977. Landings by commercial operators, however, have increased rapidly as a result of the successful introduction of large-scale tuna purse-seining operations in combination with fish aggregating devices, locally known as *payaos*. This has been accompanied by dramatic increases in frozen and canned tuna exports which exceed US\$90 million at their highest level in 1980 and 1981.

Since 1981 frozen tuna exports have declined, and permits have been granted to import tuna to meet the demands of the local tuna processing industry. Part of the problem underlying the decline of the Philippine tuna export industry may be the high rate of exploitation and the increasing volume of juvenile fish landed by the commercial ringnet and purse-seine fisheries. In General Santos City in the southern Philippines, for ex-

ample, about 100 tons of small skipjack, weighing 70-100 grams each, are unloaded daily during the height of the tuna fishing season from March to September. Due to their small size a substantial portion of these fish are misidentified and are reported as roundscads (*Decapterus spp.*) or as frigate mackerels (*Auxis spp.*). This may account for the increase in nominal catch of roundscads and frigate mackerel since 1975 and the large decrease in tuna production in the area.

Available catch reports from commercial export operators also indicate that the purse-seine tuna fishery in the Philippines is catching a significant quantity of small tunas. Data from four export operators indicate that almost two-thirds of their production consisted of undersized tuna. They are undersized from a biological viewpoint inasmuch as the tuna have yet to reach first maturity, and also from an economic viewpoint since small tuna do not have the same commercial value as large tuna because they are not suitable for export and processing. The problem may be worse than these limited data suggest. According to White and Yesaki (1982), "more than 95% of all skipjack landed in the Philippines are less than 30 cm in length, and fish are routinely landed at 14 cm long. Indeed skipjack between 10 to 12 cm are sometimes found in the catches of the ringnets and smaller purse-seine vessels." The problem is further aggravated by the fact that large numbers of small tuna are not landed but are used as bait for longlines at the *payaos*.

In view of the size composition of present tuna catches from Philippine *payaos*, it now seems ironical that Peterson et al. (1975) concluded their report on the first trips of the *Royal Venture* and the *Southward Ho* by writing:

...small tuna are not attractive to cannery buyers due to increased labor costs and poor recovery when processed. The preponderance of fish under 2 kg (24 cm.) in the catches suggests that in any case, it may be advisable to avoid fishing for tuna, especially skipjack, in this area at this time of the year.

Aprieto (1981) also emphasized that "the rapidly growing seine tuna fishery is catching an apparently significant quantity of immature tunas (10-30 cm) and that therefore it is likely the tuna resources will reach a level of sustainable yield sooner than expected, followed by a period of declining catches of smaller, less profitable fish."

It now seems that the problem of small tuna landings anticipated by others is occurring. Part of the problem is due to the widespread use of *payaos* because they render small tunas accessible to fisheries which previously had no access to them. A ban on catching or landing tuna below a certain size or on regulating the use and placement of *payaos* in the Philippines could alleviate the problem in areas where very small tuna are available to the *payao* fishery.

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Jesse M. Floyd
Pac. Isl. Devel. Program
East-West Center, Honolulu, HI

✓ **New Tuna Laboratory**

On June 14 the laboratory of the Inter-American Tropical Tuna Commission at Achotines, Los Santos Province, Panama, was officially opened by the Minister of Commerce. This inauguration was attended by approximately 400 guests from government, local administrations, and the Los Santos area.

The Achotines laboratory was established by the IATTC primarily to research the early life history of tunas which are seasonally abundant in near-shore waters. Additional cooperative projects with the Direccion General de Recursos Marinos of Panama on coastal species are also anticipated. At the time of the inauguration facilities included a number of fish rearing tanks served by a seawater reticulation system, five large ponds for culturing food for juvenile tunas, a 21-foot research vessel and several smaller craft, three apartments for scientific staff, quarters for manual workers, and kitchen/dining facilities. Construction is continuing, with the next major projects to be improving the salt-water system and construction of new dry lab facilities.

The Commission is optimistic that laboratory experiments on larval and juvenile tunas captured at night near the Achotines facility will greatly assist to fill the present tremendous gap in scientific knowledge of the early life history of tunas. Early work at the facility has proven that larval scombrids can be captured in the area, transported to holding tanks, and fed on a variety of live and prepared foods. Tank experiments have also been commenced to investigate the effects of tagging on several species of snapper which are dominant in local commercial fish catches. The facility will be fully operational after the installation of the new sea-water system later this year.

Robert E. Kearney
Inter-American Tropical Tuna Commission
La Jolla, California

✓ **Running Hot and Cold in the ETP: Some Simple Hypotheses About Origin and Persistence of the Tuna-Dolphin Association**

Origin of tuna-dolphin associations in the eastern tropical Pacific Ocean (ETP) can be explained on the

basis of mixed-layer depth and optimum sustained cruising speed. Persistence of associations, despite potentially intense competition, can be explained on the basis of morphology, feeding rates, relative ability to locate prey, and prey distribution.

The shallow mixed layer apparently forces both groups into a relatively narrow vertical section of the water column. Within this section, dolphin schools swim on average the predicted optimum sustained speed for neonates (120 cm. sec⁻¹). This speed is also optimum for age III tuna because these large fish are the same length as neonate dolphin (85-120 cm). Radio-tagged age III tuna swim at this optimum speed voluntarily *in situ*, and most of the tuna caught with dolphin are age III fish. Thus tuna caught with dolphin tend to be the size that would be swimming the same speed anyway. The association could originate fortuitously, simply if both groups were moving in approximately the same direction.

But persistence of tuna-dolphin associations appears anomalous because each dolphin requires about 10 times as much prey as each tuna, and stomach content analyses indicate that yellowfin tuna and spotted dolphin in associated schools have identical feeding preferences. By implication, competition between the two groups for limited food resources could be intense.

Simple foraging models show that tuna, which have smaller stomachs than dolphin, can mitigate this competition if they feed at least as fast as the dolphin. In any encounter with patches of prey, tuna will approach satiation sooner than dolphin and be relatively more full at any time prior to satiation of both groups. Tuna will fill up faster and perceive higher prey densities than the dolphin.

But when prey is limited such that tuna cannot completely fill their stomachs, any association with dolphin will only reduce further the proportion of encountered prey accruing to tuna. Tuna will benefit by the association only if they encounter this limited food supply more frequently than when not associated.

These modeling results imply that tuna-dolphin associations should be more frequent in areas where prey occurs in rare, dense patches than in areas where prey is more uniformly distributed and thus more frequently encountered. Because prey of tuna and dolphin are more closely coupled than their predators to local variations in oceanographic conditions, this hypothetical relationship between prey density and frequency of tuna-dolphin associations can be tested by correlating oceanographic factors with catch records from the tuna fishery.

Elizabeth F. Vetter
NMFS/SWFC, La Jolla, CA

Gulf Shrimp Fishery Studies

The Gulf shrimp fishery will undergo substantial scrutiny in the next year as a result of congressional concern and a desire of the council to coordinate regulations more closely with the states. Congressman John

cont. on page 8

Gulf Shrimp Fishery Studies cont.

Breaux has asked the Gulf fishery management community for a report documenting the harvesting capacity in the Gulf shrimp fishery, recommending the appropriate capacity, describing methods of achieving it, and identifying impacts on the various users. He has also requested an analysis of the effect of taking shrimp at a larger size and what the economic impact would be on various users. Mr. Breaux stresses that he is not advocating any management strategy, but desires to see an evaluation of all possible solutions to the current economic problems faced by the shrimp industry.

In related action, the Council is seeking to establish more coordinated state and federal regulations to enhance both management of shrimp and enforcement of the regulations. This action was triggered by a request from the Louisiana Department of Wildlife and Fisheries, which has difficulty in enforcing a minimum size limit on small white shrimp, abundant in offshore waters in the winter months. Additionally, the Louisiana Shrimp Association has asked that the Council review the effects of a limited entry program in the Gulf shrimp fishery.

The Council is initiating an analysis of these important subjects and will consider the resources needed to develop answers to the critical but complicated questions.

From Gulf Fishery News, May/June 1985

Retirements

On May 31, 1985 two long-time Fellows of AIFRB and members of the International Pacific Halibut Commission staff retired. Mr. William Hardman joined the Halibut Commission in March 1948 and AIFRB in 1959 and became a Fellow in 1975. Mr. Richard Myhre began working for the Halibut Commission in June 1949. Dick joined AIFRB in 1959, became a Fellow in 1971, and served one 3-year term as District Director of the Northwest Washington District.

E. A. Best
Director, NW Washington District

News from the Districts

Alaska

Dave R. Gibbons, Director

At the business sessions of the April 9 meeting, Director Gibbons discussed the national AIFRB membership drive. Several potential new Alaskan members were mentioned, including Donald Mortensen and Adrian Celewycz of the Auke Bay Laboratory, and Lyman Thorsteinson of the Anchorage National Ocean Services office. It was suggested that a new copy of the Alaskan membership directory be distributed with the next meeting notice. Additionally, new applications should be sent to the present nominees.

There was a short discussion on alternative District meeting activities. A "seminar Over Beer" (SOB) meeting was one suggestion by members with Bruce

Wing and Norm Howse offering space for this type of meeting. Also discussed was a social activity (picnic) for which a date should be set far enough in advance for members to effectively plan around their busy summer schedules. A fall 1985 banquet is also a possibility.

Correspondence was received concerning Outstanding Achievement, Group and Student awards from the national AIFRB and a request for abstracts of local university theses for Briefs. Also re the Old-Growth Forest Symposium, galley proofs have been returned to the printer and, if all goes well, the volume should be off the presses in about eight weeks.

Gary Sanders (ADF&G, Region 1 Sport-fish Division) reviewed regional research activities and plans for future work in southeast Alaska. Discussions on the Juneau area were emphasized since the expanding urban population is having a major impact on native salmonid stocks and local fisheries management. Specific concerns in the Juneau urban area include the Taku River chinook stocks, changes in the size and distribution of local cutthroat and Dolly Varden stocks, needs for land-use studies and habitat inventories, and the increasing demands for salmonid stocking of local lakes, ponds, and streams.

He also discussed research activities involving better inventories of steelhead and chinook salmon stocks in Haines, Yakutat, and southern southeast Alaska. Gary stressed the need for general surveys on the economic value of sportfish.

Gary concluded with a discussion of the prospects and uses for research funds from the pending Wallop-Breaux Bill. He outlined the following high priorities: 1) improvement of the Tongass Land Management Plan habitat inventory data file, including access; 2) expansion of coho salmon research to include 11 index sites throughout southeast Alaska; 3) expansion of cooperative studies with the US Forest Service to document the economic importance of marine and freshwater sportfisheries; and 4) acquisition of sport-fishing access, particularly along road systems in the developing urban areas.

OREGON-SOUTHWEST WASHINGTON **H.F. Horton,** *Director*

The Oregon-Southwest Washington District of AIFRB met at the Mallory Motor Hotel in Portland on April 24, 1985. Thirty members and spouses were in attendance for dinner, a program, and a business meeting. The program was presented by Rollie Schmitten, Director, Northwest Region, NMFS, who spoke on the topic, "Evolving Fishery Management Issues From the Perspective of the NMFS Regional Director." Rollie shared many thoughtful comments on the role of natural resource managers and the type of leadership required to produce an effective management organization. Some of the most difficult management issues are still related to equitable division of a limited resource among many users.

Announcements and New Publications

Conference — Liming Acidic Waters

A conference on *Liming Acidic Waters: Environmental and Policy Concerns* will take place at the Hilton Hotel, Albany, NY on October 30-31, 1985. With five fishery-oriented agencies and organizations cooperating with the sponsor, Acid Rain Information Clearinghouse, the agenda covers several topics under Chemistry of Neutralizing, Current State and National Policies, and Sector/Constituency Policy perspectives.

Program brochures are available from: Acid Rain Information Clearinghouse, 33 S. Washington St., Rochester, NY 14608. The registration fee, \$125, includes meals and materials.

TFM and Bayer 73: Lampricides in the Aquatic Environment

The National Research Council of Canada announces the publication of this book, Publication NRCC 22488, in English and French versions.

TFM (3-trifluoromethyl-4-nitrophenol) is the principal lampricide currently licensed for control of the sea lamprey (*Petromyzon marinus*) in the Great Lakes of North America. A second approved lampricide, Bayer 73 or clonitralid (the 2-aminoethanol salt of 2', 5-dichloro-4'-nitrosalicylanilide), is also used to a limited extent. Between 1958 and 1983, approximately 1,265,000 kg of TFM and 8,400 kg of Bayer 73 were applied to the tributaries of the Great Lakes to control sea lamprey larvae.

Sea lampreys are considered to have played a significant role in the severe reduction of fish populations in the Great Lakes. Although lampricides have been successful in significantly reducing the abundance of sea lampreys, concern has been raised over the possible effects of the repetitive use of lampricides on nontarget organisms in the aquatic environment. In order to investigate the scientific aspects of this concern, the Subcommittee on Water of the National Research Council of Canada's Associate Committee on Scientific Criteria for Environmental Quality requested that a Scientific Panel be assembled to:

- (1) gather and critically evaluate the available information on the fate and effects of the lampricides TFM and Bayer 73 in the aquatic environment of the Great Lakes and extract the relevant scientific criteria; and
- (2) identify critical gaps in the scientific information and recommend research to fill them.

The literature base on which this document is founded consists of published journal articles, theses, and unpublished material relating to the use of lampricides contained in reports to the Great Lakes Fishery Commission, as well as data provided by the United States Fish and Wildlife Service and the Canadian Department of Fisheries and Oceans.

Order from: Publications, NRCC/CNRC, Ottawa, Ontario, Canada K1A 0R6. The price is \$5.00.

Contaminants in Aquatic Ecosystems

ASTM has produced STP 865, *Validation and Predictability of Laboratory Methods for Assessing the Fate and Effects of Contaminants in Aquatic Ecosystems*.

STP 865 presents new research efforts to determine the validity and predictability of laboratory methods available for environmental hazard assessment and research. Current laboratory methods used to assess the fate and effects of contaminants in the environment include laboratory microcosms, single species laboratory bioassays, and computer modeling techniques.

This volume addresses the urgent need among toxicologists, ecotoxicologists, and environmental scientists to validate and establish the limits of predictability of current laboratory assessment procedures.

Fifteen technical papers with over seventy illustrations provide valuable research data on environmental hazards assessment methods by comparing laboratory microcosm and modeling tests with studies under similar conditions in the environment.

Major areas of interest discussed in STP 865 include:

- Comparing the fate and effects of contaminants, including chemicals and organisms, in laboratory ecosystems with results from similar environmental studies
- Integrating the use of microcosms and mathematical models for comprehensive assessment of the effects of environmental contaminants
- Validating of computerized fate models

Consulting companies, governmental laboratories, and academic disciplines interested in the effects of environmental contaminants can benefit from the findings in this publication. Specific governmental groups who will find this volume a welcomed edition to their reference libraries include the EPA, Fish and Wildlife Service, and State Natural Resources Department. Toxicologists, ecotoxicologists and environmental scientists will find this book particularly useful in the development and evaluation of aquatic hazard assessment procedures.

STP 865 costs \$27.20 for ASTM members and \$34.00 for others. Order from ASTM, 1916 Race St., Philadelphia, PA 19103.

Hydrobiological Journal

This journal, the English translation of *Gidrobiologicheskii Zhurnal*, presents authoritative translations of original work and reviews from the principal Soviet periodical on freshwater biology. The broad range of topics covered include: physiology, biochemistry, ecology and conservation of freshwater fish, invertebrates, vascular plants, zoo- and phytoplankton, as well as freshwater water quality and toxicology, and biological effects of pollution of inland waters and seas adjoining the U.S.S.R.

In addition, the journal explores freshwater commercial fisheries, aquatic parasitology and biological aspects of sanitary engineering, as well as biological utilization of brackish waters. While most of the papers deal with inland waters, the journal also publishes articles on Soviet expeditionary work, especially in tropical seas.

cont. on page 10

Announcements and Publications cont.

The editor of the translations is Robert J. Behnke of Colorado State University. The 1985 volume is Volume 21, and costs \$270 for the bimonthly issues. Back issues are available for volumes 5-19. Subscriptions through the American Fisheries Society save 5%. Order from AFS at 5410 Grosvenor Lane, Suite 110, Bethesda, MD 20814-2199.

Journal of Ichthyology

This journal, the English translation of *Voprosy Ikhtiologii*, provides American and other Western readers access to outstanding Soviet work in the field. All scientists, marine biologists, limnologists and oceanologists will welcome these original papers dealing with fisheries management, fish culture, aquaculture, physiology and biochemistry of both marine and freshwater fish, fish systematics and zoogeography. The emphasis is on promotion of reproduction of commercially-useful fish and of their well-being for the purpose of ensuring the highest protein yields, rather than on sports fisheries.

In addition to reporting on fish of Eurasia, the journal is a source for data on Arctic and Antarctic fish not available elsewhere, as well as on Soviet expeditionary work on high seas and cooperative fisheries programs with other countries.

Edited by Robert J. Behnke, the 1985 volume is Volume 25; several past volumes are available. The cost is \$315, with a 5% discount from the American Fisheries Society. Order from AFS at 5410 Grosvenor Lane, Suite 110, Bethesda, MD 20814-2199.

CRC Handbook of Mariculture, Vol. 1: Crustacean Aquaculture

This book from the CRC Series in Marine Science is edited by James P. McVey of the National Marine Fisheries Service. Current step-by-step procedures and techniques utilized in the culture of commercially important crustaceans are described by recognized culturists. Section I contains specific methods for the culture and preparation of algae, rotifers, *Artemia*, and other foodstuffs used in crustacean hatcheries. Section II provides detailed descriptions of all aspects of culture techniques for the three main groups of crustaceans: marine shrimp (*Penaeidae*), freshwater shrimp (*Macrobrachium rosenbergii*), and lobster (*Homarus americanus*). Section III describes various diseases, treatments, and methods used in combatting disease problems experienced in crustacean culture. Section IV provides the most recent information available on crustacean nutritional requirements. Aquaculturists will find this volume to be a valuable reference providing state-of-the-art techniques, a comprehensive bibliography, and specific guidelines for new procedures. 456 pp., 7 x 10, 1983, ISBN-0-8493-0220-X.

The volume can be ordered from CRC Press, Inc., 2000 Corporate Blvd., N.W., Boca Raton, Florida 33431.

Thesis and Dissertation Abstracts

Distribution, Reproductive Biology, and Social Structure of the Redband Parrotfish, *Sparisoma aurofrenatum* (Valenciennes)

Ileana E. Clavijo, Ph.D. 1982

University of Puerto Rico — Mayaguez

Aspects of the biology of the redband parrotfish, *Sparisoma aurofrenatum* (Valenciennes), including relative abundance, density, reproduction, and social structure, were studied in coral reefs from Puerto Rico. The relative abundance and densities of juveniles and adults were obtained from transect counts. Diel, annual, and lunar reproductive activity were studied by collecting individuals and examining their gonads, and from spawning observations. A subsample of gonads was prepared histologically to investigate protogyny and monandry, i.e., that all males are derived from females through sex reversal. Fertilized eggs were obtained in the field and laboratory and allowed to develop in aquaria, and early larvae were described. The social structure was studied by monitoring individuals and counting fish in different social categories. Male-removal experiments were combined with data on histology, size, and gonadal activity in order to determine where within the social structure sex change occurs.

Sparisoma aurofrenatum comprised 9 to 36 percent of herbivorous fishes on reefs. Adult densities were higher in offshore than inshore reefs, while juvenile densities were equal in all reefs.

Reproduction occurred throughout the year, with maximum activity occurring from November to April. Juvenile periodicity in recruitment supports this reproductive seasonality. A daily peak in reproductive activity was found from 1 to 4 hours before sunset, and no marked lunar periodicity was found. Histological results support protogyny and strict monandry.

Reproduction appears to be restricted to individuals in the territorial harem. Territories averaged 88 square meters in size and were defended intraspecifically by males. One male and an average of five females live in a territory. Approximately 89 percent of the total population consisted of territorial males and females. Ten percent of the total population consisted of non-territorial or wandering males, while one percent of the total population included wandering females, migrating females, and migrating males. Migrating fish are active at dawn and dusk and may represent territorial fish seeking nocturnal shelter.

The evidence obtained during this study suggests the following life history sequence in *S. aurofrenatum*: juveniles mature as territorial females; these females initiate sex reversal outside of the territory as wandering females and complete sex change as wandering males; and these males, in turn, become territorial males when territories become available.

A Characterization of Puerto Rican Fish Assemblages

Joseph J. Kimmel, Ph.D. 1985

University of Puerto Rico — Mayaguez

A new species-time method for assessing the abun-

dance of coral reef fishes is described and tested against established techniques. The relative abundance of 80 species in a fish assemblage were estimated using three visual assessment methods. Results of two species-time methods, the Rapid Visual Technique (RVT) of Jones and Thompson (1978) and a new method, the Visual Fast Count (VFC), are compared to the traditional transect method. The VFC is similar to the RVT, but is an attempt to improve on the quantitative nature of the results. Results from each method were significantly correlated, but important differences between methods were found. With an equal number of replicates, both RVT and VFC methods yielded significantly more species than the transect method. The distribution of species' abundances estimated by the RVT was significantly different from that determined by either VFC or transect methods; VFC and transect results were not different. A qualitative similarity index using presence-absence data was calculated and compared among methods. Values ranged from 84.3% to 85.9%, illustrating a consistent level of similarity for the faunas censused, regardless of census method. Quantitative similarities (percent similarity), however, ranged from 45.8% to 85.7% and suggest a closer agreement between the transect and the VFC methods than between these methods and the RVT. If transect results are assumed to be the most representative of a population's natural abundance, relative distributions determined by the VFC method are more representative than those determined by the RVT. Variance in percent similarity values calculated within each method (8 replicate samples) was used to compare precision among methods. The RVT method was statistically more precise than others.

This new methodology is used to characterize the various fish assemblages found in the La Parguera ecosystem. Over 30,000 individual fishes belonging to over 250 species were visually censused in 168 samples from 21 recognizably distinct areas. Samples clustered into 21 groups which corresponded to the *a priori* selected biotopes. Ten major site groups and 15 species groups were recognized. Site groups were separated into reef and non-reef categories. The reef category was divided further into shoreward and offshore components, both of which offer high and low physiographic relief to their respective species. The non-reef category is that characterized primarily by soft or unconsolidated sediments. Species groups represent three types: those ubiquitous species associated with most coral reefs (6 groups); those associated with one to a few reef areas (6 groups); and those associated with non-reef biotopes (3 groups). Ordination analysis of biotopes reflected results of cluster analysis with habitat heterogeneity, depth, and distance from shore hypothesized as being important factors determining ordination patterns. Estimation of diversity (H') and its components, evenness (J') and richness (R), showed that reef areas are slightly more diverse than non-reef areas and that this was primarily due to a greater R at reef stations. J' values were similar among stations with the exception of inshore, non-reef sites (inshore lagoons, grass beds, and mangroves) where values of J' were low.

Larval Development of the French Grunt, *Haemulon flavolineatum* (Demarest), Comparative Development of Western Atlantic Species of *Haemulon* (Pisces, Haemulidae) and Comments on Intrageneric Relationships

Kenyon C. Lindeman, M.S. 1984

University of Puerto Rico — Mayaguez

Developmental series were constructed for early-juveniles of twelve and late larvae of five species of western Atlantic *Haemulon* from reared wild-caught larvae, seine, handnet, and rotenone collections, and museum material. Developmental morphology, pigmentation, and osteology of *H. flavolineatum* from 6.2 mm SL were examined in detail. Larvae do not possess pelvic, ventral gut, or dorsal midline pigment. One or two stellate melanophores are usually present along the anal-fin base in the area supported by the third to seventh rays. Two or three melanophores are usually present on the midventral caudal peduncle. A dark caudal spot showing a dorsoventral constriction is centered over the caudal base by 7.5-8 mm. Melanophores appear on the snout and opercle at 8.5-9.5 mm and anterior caudal peduncle at 10-11 mm and grow caudad and rostrad, respectively, to form a complete midlateral stripe by 13-13.5 mm. The premaxilla, maxilla, dentary, and cleithrum ossify by at least 6.2 mm. Fins developed full complements of elements in the following sequence: (1) principal caudal, anal, and second dorsal (6.6-6.8 mm); (2) first dorsal (ca. 8 mm); (3) pelvics (9.2 mm); and (4) pectorals (10 mm). Two radial cartilages were placed distally below the parhypural and second preural haemal spine from 6.6 mm to at least 40 mm.

Larvae (3-10 mm) of western Atlantic species of *Haemulon* apparently show little lateral pigment. Most external melanophores are present on the ventral midline, although the dorsal midline may also show melanophores and the caudal spot initially appears by ca. 8-10 mm. Number and placement of midline melanophores and combinations of modal dorsal and anal ray frequencies aid identification above ca. 6.5 mm. The larval and an early-juvenile pattern often intergrade between 10 and 15 mm. From ca. 15 to 50 mm, the early-juvenile pattern consisting of a dark midlateral stripe, two to four dorsolateral stripes, and a caudal spot is present. Caudal spot morphologies, spot placement relative to the caudal base, midlateral stripe presence, and stripe/spot connections often show significant ontogenetic changes not accounted for in previous studies. A previously unused character, third dorsolateral stripe length, greatly aids identification above 18-23 mm. Limited comparisons of osteological development and variability in squamation are also discussed. A new key accommodating the extreme morphological similarities of early-juvenile *Haemulon* is presented.

Several intrageneric groupings of previous authors are not supported by the use of early-juvenile and reexamination of adult characters.

Membership Report

NEW FELLOW

James Joseph CA

NEW MEMBERS

Douglas A. DeHart OR

John S. Sunada CA

NEW ASSOCIATES

Fernando Bernal-Brooks MEX

John J. Grant CA

Cleveland R. Stewart III AK

Lyman Thorsteinson AK

Jody Zaitlin CA

Sammy M. Ray

Membership Chairperson

BRIEFS, the newsletter of the American Institute of Fishery Research Biologists, is published six times a year. It is intended to communicate the professional activities and accomplishments of the Institute, its Districts, and Members; the results of research; the effects of management; unusual biological events; matters affecting the profession; political problems; and other matters of importance to the fishery community. Comments and contributions should be sent to the Editor, Dr. Oliver B. Cope, 15 Adamswood Road, Asheville, NC 28803. Subscription \$15 a year to Institutions and Non-Members.

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1985 Board of Control Meeting

AIFRB's Board of Control held its scheduled 1985 annual meeting at Sun Valley Lodge, Sun Valley, Idaho on September 7 and 8. President Hugh MacCrimmon chaired the meeting and was pleased with the lively and earnest discussions of the many timely and essential topics that arose. The attendance at the meeting represented a healthy mix of national and District leadership, and ideas and opinions were advanced from all quarters.

An article covering details of the meeting will appear in the December issue of BRIEFS.

Questionnaire

In the middle of this issue of BRIEFS is a questionnaire. The purpose of the questionnaire is to learn about the feelings of the AIFRB membership concerning the election process in AIFRB in the changing fishery profession. Bill Royce has fashioned the questions in a thoughtful way to bring out the ideas and impressions of AIFRB people, and every one of us is urged to complete the form in a constructive way and return it to Bill.

Skud Editor of NAFO Journal

The Scientific Council of the Northwest Atlantic Fisheries Organization (NAFO) has appointed Bernard E. Skud, Past President of AIFRB, as the Editor of the Journal of Northwest Atlantic Fishery Science.

NAFO replaced the former International Commission for the Northwest Atlantic Fisheries (ICNAF) in 1979. Countries participating in NAFO are Bulgaria, Canada, Cuba, EEC (Denmark, Federal Republic of Germany, France, Italy, and the United Kingdom), Faroe Islands, German Democratic Republic, Greenland, Iceland, Japan, Norway, Poland, Portugal, Romania, Spain, and the Union of Soviet Socialist Republics. The United States, a former member of ICNAF, sends observers to NAFO meetings, but is not yet an official participant.

NAFO'S Scientific Council issued the first volume of the new Journal in 1980. Vincent M. Hodder, the Assistant Executive Secretary of NAFO, has been serving as Editor since that time and Skud's appointment was effective in July of this year. Each annual volume of the Journal consists of two issues (spring and autumn). The content mainly concerns fisheries science in the north-

west Atlantic and emphasizes environmental, biological, ecological, and fishery aspects of living marine resources and ecosystems. Articles of general applicability, and methodological and review papers, relevant to other regions but pertinent to the research in the northwest Atlantic, also are considered for publication. In the manuscript review process, the Editor is assisted by five Associate Editors who are experts in particular fields: W. G. Doubleday, Ottawa, Ontario — Biomathematics; G. P. Ennis, St. John's, Newfoundland — Invertebrate Fishery Biology; M. D. Grosslein, Woods Hole, MA and R. G. Halliday, Dartmouth, Nova Scotia — Vertebrate Fishery Biology; and G. A. Robinson, Plymouth, England — Biological Oceanography. Each manuscript also is reviewed by referees selected by the editors.

Authors interested in publishing in the journal should submit manuscripts to Bernard E. Skud, Editor JNAFS, NOAA/NMFS South Ferry Road, Narragansett, RI 02882. Orders for back issues and future issues should be sent to J. C. Esteves Cardoso, Executive Secretary, Northwest Fisheries Organization, Bedford Institute of Oceanography, P.O. Box 638, Dartmouth, Nova Scotia, Canada B2Y 3Y9. The current subscription rate is \$20.00 (Canadian) per year. A price list for separate issues is available on request.

The Purse Seine Tuna Fishery in the Western Indian Ocean

The development of purse seining in the western Indian Ocean began with 4 years of prospecting commencing in 1979. Results during the first 2 years were not conclusive, but suggested that contrary to expectations, purse seining in the Indian Ocean might be economically feasible. Results during the third season proved successful and led to the arrival of four vessels the following year to commence fishing on a commercial basis. In late 1983, at the start of the fifth season, a group of 13 vessels had arrived from the Atlantic, and by the end of 1984 the fleet had 48 seiners.

The first purse seiner trials in the Indian Ocean began in late 1979, when the Mauritian vessel, LADY SUSHIL, began operation; little data are available on the results of these early campaigns, but it is reported that the areas prospected included the Indian Ocean as far east as Sumatra. Exploratory fishing by French

(cont. on page 2)

The Purse Seine Tuna Fishery (cont.)

purse seiners began in December 1980, with the arrival of the ILE DE SEIN, a vessel 48 metres in length with a capacity of 320 MT. During December 1980 to March 1981, results of the ILE DE SEIN showed that purse seine operations from the Seychelles port of Victoria would be feasible, with catches averaging 10 MT per day in the zone to the east of the Seychelles EEZ between 3 and 5 degrees south.

The potential of purse seining in the Indian Ocean was conclusively demonstrated between November 1981 and June 1982 by the French vessel, YVES DE KERGUELEN, a 69-metre vessel with 800 MT capacity. The area surveyed by the KERGUELEN included the Mozambique Canal, the Amirantes Plateau, the Mahe Plateau, the north bank of the Saya de Malha, and the region to the east of the Seychelles EEZ extending towards the Chagos Archipelago. During the prospection, 1370 MT were caught with an average catch rate of 10 MT per day, which was considered successful given that the vessel was operating in isolation.

In response to the favorable results of previous trials and poor catches in the Atlantic, four French seiners from the western Atlantic arrived in late 1982. The vessels were operating on a commercial basis and the results overall were successful. A total of 8,410 MT were landed during the season, from December 1980 to March 1981, primarily in the zone to the east of the Seychelles EEZ. By late 1983, 13 French and Ivoirian seiners had moved from the Atlantic to the Indian Ocean. By December 1984, 32 vessels were present, representing almost all the French and Ivoirian purse seiner fleet. The total catch by the French Ivoirian fleet during 1984 was 74,900 MT. Spanish purse seiners began arriving in early 1984. The number of vessels increased from four in March to 16 in December, roughly half the Spanish purse seiner fleet. The total catch for 1984 by Spanish vessels was 14,200 MT.

The total catch by all vessels during 1984 was 97,700 MT, including 54,200 MT of yellowfin and 43,200 MT of skipjack. Other species landed in small quantities included bigeye, albacore and bonito.

Though purse seining in the western Indian Ocean began on a large scale only in late 1983, the seasonal phenomena which characterize the fishery have been known for some time. The fishing year is determined largely by the oceanographic conditions prevalent during the north-west monsoon (December-March, the southern summer), the south-east monsoon (July-September, the southern winter), and the two inter-monsoon periods. From the data available to date, it is apparent that the best fishing is during September-October to March-April, from the end of the south-east monsoon to the end of the north-west monsoon. During the north-west monsoon, weather conditions are optimal, with relatively weak winds compared to those of the south-east monsoon. As weather conditions deteriorate at the end of the north-west monsoon, catch rates drop rather quickly.

The highest catch rates during the 1983/84 and 1984/85 seasons have been observed from October to November. During the 1982/83 season, however, catch

rates peaked much later in the season, during March-April. Skipjack were caught in large numbers throughout the north-west monsoon, due to the continued presence of driftwood-associated schools and relative lack of bird-associated and free-swimming schools. In the western Indian Ocean, catches from driftwood-associated schools are mostly skipjack with some small yellowfin, as in the Atlantic, whereas catches from bird-associated schools and free-swimming schools are mostly yellowfin.

During the 1983/84 season, catch rates remained high from October until March; however, unlike the previous year, yellowfin increased from 50% of the catch during September-October to 75% in November. Catches from driftwood-associated schools dropped from 80% of the total in October to 25% in November. The decline in the catch of skipjack was probably due to oceanographic conditions resulting in an increased availability of yellowfin in bird-associated schools; the tendency of the fleet is to target on higher-priced yellowfin whenever possible. A roughly similar pattern was observed during the 1984/85 season, though with greater variation in catch rates from month to month due to adverse weather conditions during December and February. The Seychelles International Airport Monthly Weather Summary reported the coexistence of a weak pressure pattern in the southern Indian Ocean and a fairly strong high pressure region over the Arabian Sea during February, which resulted in consistently strong north-westerly winds. For comparison, the mean wind speed at Mahe was 9.1 knots, compared to the February average of 6.4 knots. It was reportedly the first time in years that such strong winds had continued for so many days.

During March, a pressure build-up over the southwest Indian Ocean caused the Inter-Tropical Convergence Zone (ITCZ) to move farther north than usual for the time of year. Thus as catch rates increased following the poor conditions during February, they were well below the level experienced during the same period in 1984. They were more comparable to those of April 1984, at which time the ITCZ had moved to the same latitude. Similarly, the data for April 1985 indicate the same seasonal decline in fishing success as observed in the past, but the decline is more pronounced.

At the beginning of 1985, 48 vessels were fishing in the western Indian Ocean. By June, 16 vessels had left the region in anticipation of poor catches during the south-east monsoon; however, catch rates during June this year were twice as great as for June 1984, 12 MT per day as compared to 5 MT per day. The reasons for the unexpected improvement are not clear, though an intense anticyclone south of Madagascar which has resulted in a persistent high pressure ridge over the region may be important. The mean wind speed at Mahe was 8.5 knots, compared to the June average of 10.5 knots. As of mid-July, a total catch of 53,800 MT has been reported for 1985. A significant decrease in the average monthly catch rate for 1985 over the same period in 1984 has been noticed (10 vs. 13 MT per day), though this is attributed more to anomalous environmental conditions than a decline in absolute abundance.

Research on the purse seine fishery is being conducted by scientists from France, Spain, and the Seychelles, and by the FAO/UNDP Indo-Pacific Tuna Programme. The French research organization, ORSTOM, collects detailed catch statistics and oceanographic data from the French vessels, and has several studies ongoing, including an in-depth analysis of stock abundance and fishing success in relation to oceanographic and meteorological conditions.

Seychelles Fishing Authority has recently implemented, with assistance from FAO, a data collection and processing system to monitor the fishery, and publishes the Seychelles Tuna Fishery Bulletin. Toward the end of 1985, the Seychelles will commence an observer programme for collection of research data on board the seiners. The observer programme, to be conducted in collaboration with FAO and ORSTOM, will provide high quality data for analysis of the abundance and productivity of the stocks and for further research on environmental factors.

Timothy Lawson, FAO/UNDP Indo-Pacific Tuna Programme
Japan Trust Fund Project
Victoria, Republic of Seychelles

Fishery Legislation

Fishery Conservation and Management Act (FCMA)

Legislation to reauthorize and amend the FCMA has been approved by the House Merchant Marine and Fisheries Committee and awaits action by the full House (expected during October). House Bill 1533, authored by Reps. John Breaux (LA) and Don Young (AK), became the primary vehicle for House action. Bills also were introduced by Reps. Doug Bosco (CA) and James Howard (NJ). All House bills included provisions that would enhance protection of marine fish habitat and establish new requirements for membership on the Regional Fishery Management Councils.

H. R. 1533 was reported to the full House on 10 June. As reported, the bill would mandate that fishery management plans include information on habitat requirements of the fishery and provide discretionary authority to the Councils to comment to federal agencies on activities that affect fisheries habitat (federal agencies would be required to respond to Council comments within 45 days, under provisions of the bill).

In the Senate, hearings were held on 23 July by the Committee on Commerce, Science and Transportation where witnesses testified on provisions of three Senate bills. The bills were introduced by Sens. Frank Lautenberg (NJ), Ted Stevens (AK), and Slade Gorton (WA). Further Committee action is expected in early October.

S. 747 (Lautenberg) contains provisions that would delete the current exemption of highly migratory species (tuna) from federal management within the zone 3 - 200 miles offshore. Provisions also would require each Council to include representative numbers of commercial and recreational fishermen including "at least one practicing commercial fisherman". In addition, the bill provides substantial provisions to ensure greater protection of fishery habitat, such as requiring fishery management plans to evaluate habitat needs of fisheries

and require the Secretary of Commerce to establish a regional habitat planning and coordination process. The bills authored by Sens. Stevens and Gorton primarily address concerns over allocation of fishing rights to foreign fishermen fishing in U.S. waters.

Federal Budgets

Senate action on budgets for the National Marine Fisheries Service (NMFS) and the U.S. Fish and Wildlife Service (FWS) has been agonizingly slow. At press time the Senate still had yet to move on the budgets even though the end of Fiscal Year 1985 was only a few days away. Highlights from the House-passed bills are provided below.

FWS

On 31 July 1985 the House approved spending increases totaling more than \$150 million for the U.S. Fish and Wildlife Service for Fiscal Year 1986. For fisheries, that meant a modest increase. The House also refused to go along with the Reagan Administrations' request to withhold at least \$77 million from the Wallop-Breaux (Dingell-Johnson) fund for state sport fishing and boating programs. The following table provides details of this year's budget for FWS fisheries programs (hopefully, the next issue of BRIEFS will carry the final results of Congressional action in FY 1986).

Program	FY 85 Appropriated (x \$1,000)	FY 86 Administration Request (x \$1,000)	FY 86 House Passed (x \$1,000)
Fishery Resources			
Hatchery Operation & Maint.	24,532	23,969	25,719
Lower Snake River Hatcheries	4,499	5,649	5,649
Fishery Management on Refuges	2,173	2,146	2,146
Population Management	1,723	1,691	1,691
Law Enforcement	2,143	2,115	2,115
Research & Development	11,119	10,906	11,776
Fishery Construction			
Anadromous Fish Research Ctr. (Connecticut River, MA)	500	0	5,500
Coleman National Fish Hatchery Rehabilitation	0	200	2,000
Anadromous Fish Conservation			
Grants to States	3,200	0	1,500
Striped Bass Study	600	0	500
Sport Fish Restoration (Wallop-Breaux fund, formerly Dingell-Johnson)	38,086	44,000	Automatic appropriation approved. All funds to be distributed (approx. \$130 million) expected available)

(cont. on page 4)

Fishery Legislation (cont.)

NMFS

The House passed the Fiscal Year 1986 budget for the NMFS on 16 July 1985 as part of its funding for the Departments of Commerce, Justice, State, the Judiciary and Related Agencies. With only a few minor exceptions, funds for fishery resource programs were maintained at FY 1985 levels. Action by the House restores reductions sought by the Reagan Administration of \$84 million from the current NMFS budget of \$153 million for operations, research, and facilities.

Had the Administration's recommended budget been approved by the House it would have eliminated anadromous fish grants to states, striped bass research, Columbia River hatchery funding, most nearshore ecosystems research, and several research laboratories, as well as reduced numerous programs. (See BRIEFS 14(2):7-8.)

National Fish Hatchery System

On 18 September 1984 the House Subcommittee on Fisheries and Wildlife Conservation and the Environment held hearings on H.R. 6213, a bill to establish a national fish hatchery system (see BRIEFS 13(5):6-7). As a result of that hearing, a revised bill was drafted by Reps. John Breaux (LA) and Don Young (AK) and introduced on 1 August 1985. The bill's number is H.R. 3167.

Currently, eight federal agencies claim some responsibility for federal fish hatcheries and, while each hatchery requires an act of Congress to build, Congress has said little about the purposes for which fish are to be raised or the national need to maintain a system of federal fish hatcheries.

The basic tenet of H.R. 3167 is that hatcheries and the stocking programs provided for by those hatcheries should have clear Congressionally-endorsed missions. H.R. 3167 would eliminate the fractured approach to federal hatchery authority by establishing a national fish hatchery system which would include the majority of federally-funded hatcheries. The primary purposes of the system would be as follows: (1) provide fish for stocking to replace fish lost because of federal projects such as dams; (2) restore fishery resources that are depleted due to over-fishing, habitat degradation, or other causes; (3) stock waters subject to international or Indian treaty obligations; (4) conduct federal research; and (5) help recover endangered species. Secondary purposes of the system would be to stock fish on federal lands such as national wildlife refuges and national parks.

Stocking of fish would be required to be conducted in a biologically sound manner, emphasizing use of native species where possible and coordination of stocking with habitat improvement or protection and harvest management programs. Replacement of fisheries destroyed as a result of construction or operation of federal projects would proceed under criteria established through formal fishery mitigation plans, and payment for such fisheries mitigation would come directly through reimbursements from those benefiting directly from the federal water projects, such as irrigators and electric power users. In addition,

congressional approval would be required to close a federal hatchery or transfer its funding to another source.

Hearings on H.R. 3167 were scheduled for 2 October.

Rudolph A. Rosen, *National Wildlife Federation
Washington, DC*

District Activities

CENTRAL CALIFORNIA **T. Wyllie Echeverria**, *Director*

Dr. Robert Lea, an Associate Marine Biologist with the California Department of Fish and Game, was the guest speaker at our District dinner meeting on May 9, 1985. Dr. Lea discussed the effects of "El Niño" on marine fish species in coastal waters off California. El Niño is the popular term for the unusually warm water temperatures, associated with a lack of upwelling, which were experienced in the Eastern Pacific Ocean during 1983 and 1984. Fish species normally restricted to tropical and semi-tropical waters, such as barracuda and swordfish, were found in Northern California waters. Dr. Lea presented interesting slides documenting this unusual event.

The Central California District conducted a membership survey in May and June of this year. We received nine requests for membership information and eight nominations for new members. We are very pleased with the response from our members and guests; 38 percent responded to our one-page survey. We recommend this approach to other districts interested in recruiting new members or updating mailing lists.

NORTHWEST WASHINGTON

Ronald E. Westley, *Director*

Outgoing District Director Ed A. Best reports that the Northwest Washington District has elected new officers for the coming biennium. Ronald E. Westley is the new District Director and John F. Palmisano is the new Vice Director. A total of 80 ballots were cast in this election.

Announcements and New Publications

IAMSLIC at VIMS

Registration forms are now available for the 11th Annual Conference of the International Association of Marine Science Libraries and Information Centers (IAMSLIC). The conference, hosted by the Virginia Institute of Marine Science (VIMS), will begin with a reception on Monday, October 14, and run through Friday, October 18, 1985. Sessions will be held at VIMS in Gloucester Point and at the Holiday Inn 1776 in Williamsburg. In addition to presentations by invited speakers and members, there will be social events designed to highlight the Tidewater area and to provide ample opportunity for getting acquainted with members of the marine information profession.

IAMSLIC was organized in 1975 to provide a forum for resource sharing and information exchange among marine science libraries. Members represent a diversity of sectors including research and policy institutions, government agencies, academic, and non-profit and profit-making institutions.

The theme for the 1985 conference is "Marine Science Information: an International Commodity." Scheduled sessions include a panel discussion by members of the Intergovernmental Oceanographic Commission's Committee on Marine Information, speakers on sources and management of aquaculture information, an overview of participation in international information networks, and an exhibit of library management software.

To receive a registration packet for this conference, write to IAMSLIC, VIMS Library, Gloucester Point, Virginia 23062, USA, or call (804) 642-7114.

Midwest Fish and Wildlife Conference

The 47th Midwest Fish and Wildlife Conference will be held December 15-18, 1985 at the Amway Grand Plaza Hotel in Grand Rapids, Michigan. *New Dimensions in Fisheries and Wildlife* will be a series of outstanding papers for resource managers, educators, and students featuring state-of-the-art conservation projects and programs.

Information is available from the Michigan Department of Natural Resources, 350 Ottawa N.W., Grand Rapids, Michigan 49503.

Large Lakes Conference

A preliminary announcement has been issued for the *World Conference on Large Lakes — Mackinac '86*. The Governor of Michigan has accepted an invitation from the Governor of Shiga Prefecture, Japan, to host the second *World Conference on Large Lakes* to build upon the successful results of the *Shiga World Lake Environment Conference '84*. The purpose of the Mackinac '86 conference is to provide an international forum for scientists, policy makers, business, and citizen leaders to exchange and discuss scientific and technical knowledge concerning chemical contamination of the freshwater large lake environment.

Governor James J. Blanchard of Michigan is the sponsor of the conference, and the following organizations are co-hosts: U.S. Environmental Protection Agency, International Joint Commission, Council of Great Lakes Governors, General Motors Corporation, Michigan Sea Grant College Program, Environment Canada, Center for the Great Lakes, Dow Chemical Company, and Great Lakes United.

A plenary session on *State of the World's Large Lakes* will be followed by sessions on *Sources and Fate*, *Biological Effects*, *Fisheries Management*, and *Social, Economic, and Legal Considerations*. A plenary session will conclude the conference with discussion, summaries, and recommendations of future actions.

The conference will be held May 18-21, 1986 at the Grand Hotel, Mackinac Island, Michigan. Further information is available from William Marks, Michigan Dept. of Natural Resources, P.O. Box 30028, Lansing, Michigan 48909.

American Fisheries Society 1986 Annual Meeting

The American Fisheries Society has issued its first call for papers for its 1986 Annual Meeting with the International Association of Fish and Wildlife Agencies. The

meeting will be held September 14-18, 1986 at the Biltmore Plaza, Providence, Rhode Island. The meeting will feature symposia, contributed paper sessions, poster sessions, social events, and business meetings.

Proposals for symposia or organized contributed paper sessions are hereby invited. Proposals (including a brief justification, speakers' names, paper titles and abstracts, time required, and section sponsorship, if any) for these special sessions must be received by December 1, 1985. Preference will be given to symposia that are tightly structured, evaluate specific hypotheses, and contribute to our understanding of fishery science.

Titles and abstracts for poster and contributed paper sessions also are solicited. These abstracts must be received no later than January 1, 1986. Abstracts (not to exceed 200 words) should be informative, rather than indicative, and must be typed (double spaced) on a single sheet of paper, and include in order: 1) a succinct, descriptive title, 2) the full name, address, and telephone number of each author (with speaker underlined), and 3) a text that provides objectives, principal results, and conclusions. In addition, the following information should be typed at the bottom of the page: 1) your preference for poster or contributed paper session, 2) your projection needs, if any, 3) the mailing address to which correspondence is to be sent, and 4) whether you are a student (i.e., a student at the time of abstract submission). Papers should report on recent research that has not been published and must include new, specific information.

The original and six copies of the *abstract* must be submitted for review by the Program Committee. If authors wish to be notified of the receipt of their abstract, and, subsequently, of its acceptance, they should enclose two self-addressed and *stamped* postcards (9 x 12.5 cm) bearing the title of the paper and the author's name. One will be returned upon receipt of the abstract; the second will be returned when a decision as to acceptance is made.

All special-session proposals, abstracts, and questions regarding the program should be directed to Roy A. Stein, 1986 Program Chair, Department of Zoology, 1735 Neil Avenue, The Ohio State University, Columbus, OH 43210 USA, telephone 614/422-7826 or 422-8088. Questions regarding facilities and meeting arrangements should be directed to Richard T. Sisson, 1986 Arrangements Chair, Department of Environmental Management, Division of Fish and Wildlife, Government Center, Tower Hill Road, Wakefield, RI 02879 USA, 401/789-3094.

The 1986 Annual Meeting of AIFRB's Board of Control will be held at the same time and place as the AFS meeting.

Photographic and Illustrated Key of Selected New York Fishes

This is a set of 35mm slides for 39 fish species, and has been prepared by Dr. James M. Haynes, Gerald C. Bucher, and Norman J. Frisch. Each species is represented by two slides, one of the fish in full color,

(cont. on pg. 6)

Announcements & Publications (cont.)

and the other as a line drawing with key identification features and taxonomic affiliations.

Further information is available from Dr. James M. Haynes, Department of Biological Sciences, SUNY College at Brockport, Brockport, NY 14420.

Husbandry of Kemp's Ridley Sea Turtles

This 93-page report, *The Husbandry of Hatchling to Yearling Kemp's Ridley Sea Turtles* (*Lepidochelys kempi*), was issued in July 1985 as NOAA Technical Memorandum NMFS-SEFC-158. Emanating from the Southeast Fisheries Center at Galveston, Texas, the report was authored by Clark T. Fontaine, Kenneth T. Marvin, Theodore D. Williams, William J. Browning, Richard M. Harris, Kathy L. Williams Indelicato, Georga A. Shattuck, and Robert A. Sadler.

The book contains details and illustrations pertaining to sea turtle head start research facilities, head start operations (including weighing, measuring, feeding, growth, health care, tagging, transportation, and release), and sea turtle head start research and general observations (covering recaptures, food utilization, food color preference, celestial orientation, re-cycled seawater, and general observations). This comprehensive report on Kemp's Ridley sea turtle culture tells of the Galveston Laboratory's efforts to increase the population of this endangered species, and documents the successes of the research.

The Southeast Fisheries Center, Galveston Laboratory is at Galveston, Texas 77550.

FAO Fishery Publications

Documents Presented at the Symposium on Stock Enhancement in the Management of Freshwater Fish. EIFAC Technical Papers No. 42, Suppl. 1 contains 22 papers which consider the advantages and disadvantages of stockings with native species - salmon, non-salmonids, and brown trout - into European waters. Presents and analyzes recent stocking activities in Poland, Ireland, Finland, Sweden, Norway, Scotland, and France. Suppl. 2 presents 26 papers assessing the relative advantages and disadvantages of introducing new fish species into European waters. Features case histories and experiences with several species; country reviews for Finland, Denmark, Sweden, France, Ireland, and Hungary; and analyses of the ecological and practical aspects of introductions. Also includes the conclusions and recommendations of the Symposium.

Suppl. 1 contains 284 pages and costs \$21.00; Suppl. 2 has 557 pages and costs \$20.50.

Report of the EIFAC Working Party on Stock Enhancement. EIFAC Technical Papers No. 44 reviews the present status of stocking and proposes a code of practice for regulating the introduction and transfer of fish into European waters. Also calls for further study on the effectiveness of stocking waters with native species to maintain fisheries productivity.

This report has 49 pages and costs \$7.50.

These FAO publications are available from UNIPUB InfoSource International, Box 1222, Ann Arbor, MI 48106.

Acute Toxicities of Organic Chemicals to Fathead Minnows (*Pimephales promelas*) Vol. II

Within the last few years, attention has focused upon predictive environmental toxicology as a technique for screening chemicals for potential hazard to the environment. Due to the value of using structure-activity relationships to estimate aquatic toxicity, strong needs have developed for accurate data bases.

Acute Toxicities of Organic Chemicals to Fathead Minnows (Pimephales promelas) Vol. II contains original test data for an additional 125 organic chemicals (Vol. I contains test data for 174 organic chemicals) using a single test species. This second book in a continuing series emphasizes test results from narcotic chemicals. The book contains the following information: test chemical name and commercial source; molecular formula and weight; chemical purity; method of chemical analysis including measured concentrations for each treatment over 96 hrs of exposure; test temperature; dissolved oxygen, hardness, alkalinity, and pH values for all treatments plus the control; length, weight, and loading factors for test organisms; and mortality (LC50) and effect (EC50) values for 96 hrs in addition to graphical depictions of the mortality and effect data in relationship to observation periods. It also contains detailed behavioral observations of the test organisms recorded during the exposures.

Vol. III of *Acute Toxicities of Organic Chemicals to Fathead Minnows (Pimephales promelas)* will be available in the first half of 1986. It will contain 96 hr acute toxicity test results with fathead minnows and approximately 150 chemicals.

This book can be ordered for \$57.95 from the Center for Lake Superior Environmental Studies, University of Wisconsin-Superior, Wisconsin 54880.

Thesis and Dissertation Abstracts

An Analysis of the Contamination by and Effects of Highway-Generated Heavy Metals on Roadside Stream Ecosystems

John M. Mudre, Ph.D. 1985

Virginia Polytechnic Institute and State University

This study examined the consequences of the opening and operation of a new highway north of Richmond, Virginia with respect to contamination of the aquatic environment with heavy metals (Zn, Cd, and Pb), and the effects of these metals on the biota of roadside streams. Sixteen sites located on six small, soft-water streams that were crossed by the highway, encompassing six reference sites located upstream of the highway, six sites located directly at the highway, and four sites located downstream of the highway, were sampled over

a 2½-year period, allowing both spatial and temporal analyses.

Traffic densities on the highway averaged about 12,000 vehicles per day (vpd). Significant increases in the metals concentrations of sediment, benthic invertebrates, fish whole-bodies, and fish tissues (liver, kidney, and bone) were noted over the course of the study, although the increases varied in magnitude, and were not always consistent. Sediment metals concentrations followed a dynamic plateau. Fish whole-body concentrations of Cd and Pb increased steadily over the course of the study. Spot-sampling for the same parameters along another nearby, more heavily travelled highway (50,000 vpd) indicated that increases in metals concentrations in the different ecosystem components at the study streams would have been greater had there been more traffic.

A number of biotic parameters were investigated to determine whether metals contamination was affecting the biological integrity of the study sites. These were: benthic macroinvertebrate diversity and density; the percentage of the aquatic insect community that was composed of chironomids; and fish community diversity, density, and biomass. Only benthos density, the percent chironomids, and fish species diversity showed changes that could be related to metals contamination. Indications from spot sampling along the more heavily travelled highway were that if more contamination had been experienced, more biotic parameters would have been disturbed, and to a larger extent. Fish community structure analyses using the Pinkham-Pearson coefficient of similarity indicated that fish community structure became increasingly altered at highway sites, and to a lesser degree at downstream sites, over the study period.

A Systematic Revision of the South American Freshwater Stingrays

(Chondrichthys: Potamotrygonidae)

Ricardo S. Rosa, Ph.D. 1985

College of William and Mary in Virginia

Three genera are recognized in the family Potamotrygonidae of neotropical freshwater stingrays: *Potamotrygon*, *Paratrygon*, and *Plesiotrygon*, the latter being described as a new genus. *Potamotrygon* is polytypic, and both *Paratrygon* and *Plesiotrygon* are monotypic, as far as known. The family name Potamotrygonidae has priority over Paratrygonidae Gill.

Nineteen previously described species of Potamotrygonidae are recognized: *Paratrygon aiereba*, *Potamotrygon brachyura*, *P. castexi*, *P. constellata*, *P. dummerillii*, *P. falkneri*, *P. henlei*, *P. histrix*, *P. humerosa*, *P. leopoldi*, *P. magdalenae*, *P. motoro*, *P. ocellata*, *P. orbignyi*, *P. schroederi*, *P. schuemacheri*, *P. scobina*, *P. signata*, and *P. yepezi*. One additional specific name is established as new (*Plesiotrygon iwamae*). Three of the eighteen recognized species of *Potamotrygon* are resurrected from synonymy (*P. dumerillii*, *P. henlei*, and *P. orbignyi*), one previously overlooked subspecific name (*Trygon histrix ocellata*) is erected to specific rank, and one previously overlooked specific

name (*Taeniura constellata*) is placed in the genus *Potamotrygon* and treated as a senior synonym of *P. circularis*. The remaining names previously assigned to the Potamotrygonidae include: eight junior synonyms (*Disceus thayeri*, *Potamotrygon brumi*, *P. circularis*, *P. laticeps*, *P. menchacai*, *Trygon mulleri*, *T. reticulatus*, and *T. stroglyopterus*), five doubtful names (*Elipesurus spinicauda*, *Potamotrygon africana*, *P. alba*, *P. humboldtii*, and *Trygon garrapa*), two invalid names (*Potamotrygon labratoris* and *P. pauckei*), two doubtful names corresponding to one unidentified marine species of the family Dasyatidae (*Raja ajereba* and *R. orbicularis*), and one freshwater species of *Dasyatis* (*D. garouaensis*) originally described in the genus *Potamotrygon*.

Potamotrygon and *Paratrygon* are regarded as sister groups, and *Plesiotrygon* as the primitive potamotrygonid genus, based on a cladistic analysis of stingray characters. *Plesiotrygon* is restricted to the upper Amazon drainage, and *Paratrygon* is known from most of the Amazon drainage, occurring also in Rio Orinoco. Eleven species of *Potamotrygon* have Amazonian distribution (including Rio Tocantins), four of which occur also in other drainages. Four species of *Potamotrygon* are apparently endemic to Rio Paraguay and lower Rio Parana drainages (*P. brachyura*, *P. falkneri*, *P. histrix*, and *P. schuemacheri*); *P. yepezi* is endemic to the Maracaibo basin in Venezuela; *P. magdalenae* is endemic to Rio Magdalena and Rio Atrato drainages in Colombia, and *P. signata* is apparently endemic to Rio Parnaiba drainage in Brazil.

Diel Movement of Brown Shrimp (*Penaeus aztecus*) at a Southwest Louisiana

Estuarine Lake-Marsh Interface

Thomas Wayne Schultz, M.S. 1985

Louisiana State University

A total of 1,008 samples were taken during the 21-week study of diel movement of brown shrimp at Sabine National Wildlife Refuge. Weekly 24-hour sampling was conducted using incoming and outgoing passive traps at top, middle, and bottom levels of West Cove Canal during 8 consecutive 3-hour intervals each week from 13 March to 31 July, 1982. Tide direction, current velocity, and water level were recorded for each interval, as were water temperatures, salinities, and dissolved oxygen readings at each trapping level. Diel comparisons indicated that brown shrimp moved predominantly at night, with smaller shrimp caught in the incoming than in the outgoing traps. Environmental comparisons indicated that brown shrimp movement was typically the same as tide direction, and changes in the catch-related variables of current velocity, salinity, and current direction were closely associated with changes in water level. Indications are, from the literature and the results of this study, that present water management practices may seriously impede brown shrimp use of the marsh nursery, and methods are suggested to accommodate the developmental needs of this economically important estuarine species.

Thesis and Dissertation Abstracts (cont.)

Ontogeny of the Sexually Dimorphic Sonic Muscle in Three Sciaenid Species

Gary Hill, M.A. 1985
College of William and Mary in Virginia

The ontogeny of the swimbladder and sexually dimorphic sonic muscles were examined in three sciaenid species — croaker (*Micropogonias undulatus*), spot (*Leiostomus xanthurus*), and weakfish (*Cynoscion regalis*). In croaker, both sexes possessed the sonic muscles, but they grew larger and heavier in males than in females. Muscle development began at the same standard length in both sexes (45 mm S.L.) when the fish were approximately 4-5 months old and the gonads were starting to develop, but before the onset of gametogenesis. Spot sonic muscle occurred only in males and first appeared at 105 mm S.L. at approximately 6-7 months of age, before maturation of the gonads. Weakfish sonic muscle was present in males only, and first appeared at 119 mm S.L. at approximately 11 months of age, concurrent with gonadal maturation. Sonic muscle development was synchronous with the growth of the gonads in all three species. Swimbladders grew larger in male croakers than in females, but there was no sexual difference in swimbladder size in spot or weakfish.

Membership Report

PROMOTION TO MEMBER

Dr. Rudolph A. Rosen	VA
Charles M. Wooley	MD

NEW ASSOCIATES

Jonathan Heifetz	AK
Erick F. Hallen, Jr.	CA
Macrae N. Morse	ONT

NEW MEMBERS

— Bruce A. Halgren	NJ
Dr. Stefan K. Grimm	MA
Bruce A. Barton	OR
Dr. Michael A. Saiki	CA
Dr. James W. Meade	PA

Sammy M. Ray
Membership Chairperson

BRIEFS, the newsletter of the American Institute of Fishery Research Biologists, is published six times a year. It is intended to communicate the professional activities and accomplishments of the Institute, its Districts, and Members; the results of research; the effects of management; unusual biological events; matters affecting the profession; political problems; and other matters of importance to the fishery community. Comments and contributions should be sent to the Editor, Dr. Oliver B. Cope, 15 Adamswood Road, Asheville, NC 28803. Subscription \$15 a year to Institutions and Non-Members.

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DECEMBER 1985



Participants in the AIFRB Board of Control meeting in Sun Valley, Idaho, September 1985. Standing, Howard Tanner, Director, Great Lakes, S. Cent. District; Ed Best, Director, Washington, NW District; Dave Gibbons, Director, Alaska District; Hugh MacCrimmon, AIFRB President; Eric Prince, Director, Florida District; Pete Haaker, Director, Southern California District; Pete Cole, AIFRB Treasurer; Herb Lawler, AIFRB Secretary. Kneeling, Oliver Cope, BRIEFS EDITOR; Ron Rinaldo, Director, Washington, DC Metro District.

John Hunter Elected

Dr. John R. Hunter of La Jolla, California has been elected as AIFRB's President-Elect. Secretary Herb Lawler notifies us that the membership cast an overwhelming 429 ballots, and that John Hunter received the majority. Congratulations go to the membership for such fine participation and to John Hunter for his victory.

The Board of Control Meeting

The 1985 Board of Control meeting at Sun Valley, Idaho was called to order at 8:30 am, September 7, by President Hugh MacCrimmon. Present were officers MacCrimmon, Cole, Lawler, and Cope, and District Directors Prince, Gibbons, Best, Haaker, Rinaldo, and Tanner.

cont. on page 2

The Board of Control Meeting cont.

An informal report by President MacCrimmon pointed out that the CPA audit for 1984 was completed, he felt a new directory should be published, a microcomputer has been purchased and is in use at the Treasurer's office, the annual dues have been raised to \$15, all actions in the 1984 minutes (except the Seattle Award) have been completed, the validity of the home address of AIFRB (Edmunds, Washington) should be determined, and the value of the briefing book begun by Past President Skud should be acknowledged.

Reports from the Districts (written reports from only Central California, Southern California, Washington NW, Washington DC, and Florida) were received and entered as attachments to the minutes. Gibbons gave a oral report from Alaska and reported K V. Koski was appointed as the new District Director. Rinaldo of Washington DC requested funds for revival of his District. Tanner of Great Lakes, S. Central District told of plans to increase activity in his District.

Secretary Herb Lawler described his activities, including preparation of HIGHLIGHTS and an article for BRIEFS.

Treasurer Pete Cole, commenting on his written report, told of his success in getting AIFRB accounts into a form acceptable to an accountant, the depreciation of the value of the new computer, the correctness of our revenue data, and the need for authority to change signatures for AIFRB business.

Membership Chairperson Sammy Ray was not present but submitted a written report which showed the acceptance of 26 new Associates, 19 Members, and 2 Fellows. There were 21 promotions and 2 denials, and Emeritus status went to 12 persons. The Board discussed recruiting problems, and it was suggested that District Directors step up their efforts in graduate schools.

Written reports on BRIEFS preparation by Oliver Cope and BRIEFS production by John Reintjes were discussed. Cope described the contents of the last seven issues and the lack of success in securing articles from some sources and reports from District Directors. A survey of printing costs in the Asheville, NC area revealed that the present printer in Beaufort, NC offers lower prices. John Reintjes has agreed to serve as Production Editor for another year.

Reports were received from Awards Committees. Eric Prince, Chairman of the Travel Raffle Committee, reported he sent notices to 50 colleges and universities, and 7 applications were received. Five awards were made. W. Kwain, Chairman of the W. F. Thompson Award Committee, reported that 16 papers were nominated; the winner was a paper by Katherine Meyers and Howard Horton on temporal use of an Oregon estuary by hatchery and wild juvenile salmon.

Dick Myhre, Chairman of the Outstanding Achievement Award Committee, submitted his committee's nominations; the Board of Control chose Dr. Peter

Larkin as this year's recipient. Dick Myhre's committee also offered nominations for the Group Award for Outstanding Achievement; the Board selected the Sport Fishing Institute as the winner.

The Nominating Committee (Peter Haaker, Chairman) for proposing candidates for AIFRB's President-Elect position submitted several names; the Board decided upon John Hunter and William Fox as the candidates.

Discussions were held on a possible course of action in connection with AIFRB's participation with the Peace Corps and other agencies in promoting an Executive Corps of Experts. Ron Rinaldo was appointed to establish a committee to explore possibilities.

A Treasurer's office management contract was the subject of dialogue aimed at securing office assistance for the Treasurer. Pete Cole will probe the options.

Dave Gibbons was appointed to oversee the promotion and sales of AIFRB's new book "Fish and Wildlife Relationships in Old-Growth Forests."

Some time was devoted to conversations on the relationships between AIFRB and AFS. Bill Royce will study the matter and write a report.

The proposed budget for AIFRB for 1985/86 was approved by the Board.

The meeting was adjourned at 12:05 pm on September 8.

G. "Herb" Lawler, *AIFRB Secretary*

Pacific Sardine Comeback

The Pacific sardine whose dramatic decline in the late 1940's sparked a multi-million dollar scientific investigation is making a comeback, according to marine biologists Patricia Wolf of the California Department of Fish and Game (DFG) and Paul E. Smith of the National Marine Fisheries Service (NMFS) Southwest Fisheries Center in La Jolla, California.

Sardines were the glamour fish of the second and third decades of this century, supporting the most valuable fishery in the United States in terms of tons landed at an annual yield of approximately 600,000 tons. The Nobel Prize-winning writer, John Steinbeck, graphically depicted the heyday of this fishery in the decade between 1934 and 1945 in his novel, *Cannery Row*.

First noted in the Pacific Northwest, a severe decline in sardine landings began during the 1945-46 season and moved progressively southward. A low was reached when the 1953-54 sardine season in California yielded only 4,500 tons of sardines. Sardines, a standard food item packed in the familiar oval cans in mustard or tomato sauce, disappeared from American food market shelves.

In an attempt to understand the causes of this decline in sardine numbers, fishery biologists and

oceanographers from the DFG, NMFS, and the Scripps Institution of Oceanography organized under the umbrella of the California Cooperative Oceanic Fisheries Investigations to begin the most intensive study ever undertaken of any marine fish found in U.S. coastal waters. Although fishery biologists everywhere have not agreed on the reasons for the precipitous decline in the sardine landings, most believe that the prolonged heavy fishing which occurred from 1928-29 through 1945-46, combined with unfavorable environmental changes, resulted in the spectacular failure of the sardine fishery in California.

Acting on the advice of fishery biologists who advocated a complete ban on sardine fishing to permit the sardine resource to recover from extremely low levels, California legislators voted to prohibit sardine fishing in 1974. A feature of this law also provided for a 1,000 ton annual fishery when the DFG determined that the population of adult sardines had reached 20,000 tons.

Signs of an encouraging increase appeared as early as 1981 as sardines occurred in ever greater numbers in the incidental catch of mackerel and live bait fisheries, in aerial observations, in annual DFG sea surveys, and, increasingly, as larvae in plankton collections made by the NMFS during biological surveys.

Because the population level of the Pacific sardine is too low to be estimated reliably by existing techniques, Wolf and Smith designed a new survey system to estimate whether the adult sardine population is above or below 20,000 tons, the number which would signal the beginning of a commercial fishery. Their approach was based on the egg production method developed earlier by NMFS scientists at the Southwest Fisheries Center. As a first step, Wolf and Smith calculated the minimum geographic area which they estimated encompassed a spawning population of 20,000 tons of adult sardines. The location and extent of the survey area, and the time of year of the survey, were determined from the historical record of occurrences of sardine eggs and larvae found in the plankton samples during those times in past years when the sardine biomass levels were estimated to be near 20,000 tons.

In May 1985 Wolf and Smith employed their new method off southern California over the total survey area. They found 11 biological stations positive for sardine eggs in a total spawning area of 710 square nautical miles, indicating a very high probability that there were at least 20,000 tons of spawning biomass of sardines off California.

The results of the survey were presented to the DFG who now plan to open a 1,000-ton limited sardine fishery beginning January 1, 1986. According to California law, the sardines caught may be used either as human or animal food or for reduction to fish meal.

The Pacific sardine story, famous in the annals of both literature and biology, may now have a new beginning. This small fish, once hunted at night during the

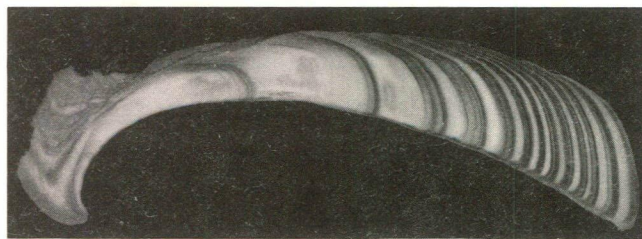
dark of the moon along the Pacific Coast from southern Baja California, and into the Gulf of California, appears to be making a modest comeback. With a bit of luck, the distinctive luminescent fireballs produced as the dense sardine schools move through the surface layers of the sea will once again be a nighttime sight off the California coast.

NMFS Southwest Fisheries Center
La Jolla, CA

Age Techniques for Two Ocean Bivalves

Techniques have been developed to expose internal age/growth structures in the valves of the Atlantic surf clam, *Spisula solidissima*, and ocean quahog, *Arctica islandica*. The methods permit making accurate age estimates, basic information for population assessment studies of these commercially important bivalves.

For surf clams, the method is initiated by excision of a portion of the hinge, called the chondrophore, and umbo area from a valve. The excised piece is glued on a slide and a thin section is produced. Light transmitted through the thin section exposes translucent annuli in contrast with opaque growth increments. A mark-recapture experiment has validated the annual periodicity of annuli; correspondence was found between the number and relative location of annuli in the chondrophore and valve.



Surf clam, *Spisula solidissima*, age is determined from thin sections of the chondrophore, a more rapid method than preparing peel replicates.

For ocean quahogs, the method involves preparation of acetate peels. The left valve is first sectioned (oriented so as to include a single tooth in the valve). The specimen is then bleached to remove the heavy periostracum and embedded in an epoxy resin. After the epoxy hardens, the embedment is ground and polished to a high luster and the exposed cut surfaces are etched. These surfaces are finally flooded with acetone and covered with a sheet of acetate. After the acetone has evaporated, the acetate is peeled off. Microscopic examination of the peel reveals the sequence of annuli and growth increments replicated in the acetate. Examinations of the microstructure of the shell by Scanning Electron Microscope defined the prismatic components of the annuli in contrast with the predominantly homogeneous structure of growth increments. Again, a mark-

cont. on page 4

Age Techniques for Two Ocean Bivalves cont.

recapture experiment validated the annual periodicity of annuli.

Surf clams are relatively short-lived, fast growing animals compared to ocean quahogs. A longevity of 37 years has been found for surf clams. Ocean quahogs 100 years old are not uncommon and one specimen has been estimated to be 225 years of age — perhaps the oldest known bivalve.

More details are described in Dr. Ropes' article in *Marine Fisheries Review*, 1984, 46(2):27-35.

John W. Ropes
NMFS, Woods Hole, MA 02543

AIFRB People in the News

Reeve Bailey

Reeve Bailey, AIFRB Fellow and Past President of AFS, received the 1985 Justin Leonard Award of the Michigan Chapter of AFS. Reeve is Emeritus Professor of Zoology and Emeritus Curator of Fishes at the University of Michigan.

John Funk

John Funk, AIFRB Fellow and Emeritus, and AFS Honorary Member, received in 1985 a Certificate of Recognition from the Missouri Department of Conservation for contributing his reprint library to the U.S. Fish and Wildlife Research Center at Columbia, Missouri.

Bob Stickney

Bob Stickney, former District Director of AIFRB's Texas District, has become Director of the School of Fisheries at the University of Washington. After leaving Texas, Bob became Director of the Fisheries Research Laboratory, Southern Illinois University.

District News

CENTRAL CALIFORNIA T. Wyllie Echeverria, *Director*

The biannual business meeting was held on September 12. The membership present at the meeting voted unanimously to advance the position of Vice-Director to be the next director in the name of continuity. I wish to welcome Brian Waters of the Pacific Gas and Electric Company as the new District Director beginning at the annual banquet on December 14. Robert N. Tasto was elected Vice District Director and Edward Ueber, Secretary/Treasurer for the two-year term. As outgoing Director I wish to express my thanks to Paget Leh Lenarz, the Secretary/Treasurer, for an outstanding job, especially with the recruitment drive. Also, the Program Committee, consisting of Tom Moore of California Dept. Fish and Game, Tom

Lambert of Pacific Gas & Electric Co., and Chuck Hanson of Tera Corp., for an outstanding job of presenting interesting programs throughout their 2-year term.

Dr. Paul Kubicek, senior biologist with Pacific Gas & Electric Co., was the guest speaker at the District meeting on November 14. Dr. Kubicek presented a slide show and discussed his participation in the People-to-People Fisheries Research Delegation to Japan, China, and Korea. The delegation, organized by Past-President Bernie Skud, was a big success and it was of interest to all to see some of the research institutes, projects, and problems with which these countries are involved.

Announcements and New Publications

Aquaculture Convention

Growth Through Unity — Aquaculture Reno '86 will be the fourth international gathering for the aquaculture industry. It will take place at the MGM Grand Hotel in Reno, Nevada on January 19-23, 1986. Sponsored by the World Mariculture Society, the Catfish Farmers of America, the Fish Culture Section of AFS, and the U.S. Trout Farmers Association, the meetings will feature reports on commercial developments, research workshops, a trade show, poster sessions, and annual meetings of the sponsoring organizations.

Information is available from all of the sponsoring organizations and from Aquaculture '86, Glasscock Convention Services, 500 E. Markham, Suite 100, Little Rock, Arkansas 72201 (501/376-7346).

Wildlife and Fisheries Statistics

Workshop on Creel Surveys

The Southeastern Cooperative Wildlife and Fisheries Statistics Project is sponsoring a workshop on wildlife and fisheries statistics in creel surveys on February 19-21, 1986 at North Carolina State University in Raleigh, NC.

The aim of the workshop is to give an overview of the important concepts of creel surveys, with emphasis on design, analysis, and interpretation of results. Topics will include access point, roving clerk, and aerial surveys and design considerations such as stratification and unusual probability sampling. The workshop is intended for biologists with little formal training in statistics. Emphasis will be on important concepts rather than the technicalities.

For further information contact Dr. K. H. Pollock, Dept. of Statistics, North Carolina State University, Box 8203, Raleigh, NC 27695-8203 (919/737-2533). There is a \$125 registration fee for employees of organizations that are not contributing members of the Statistics Project.

Acid Rain Conference

Acid Rain: Clouds Over the Midwest — Science and Solutions, sponsored by the National Clean Air Fund, will be held March 7 and 8 at the Americana Congress Hotel in Chicago, Illinois.

There have been many conferences but this one is unique. *Acid Rain: Clouds Over the Midwest* is being organized to raise public awareness about the scientific, technological and policy issues raised by acid rain damage in the Midwest. It offers the first opportunity for scientists, citizens, and policy makers of the Midwest to examine the threat acid deposition poses and the alternative solutions in the region as a whole.

There will be evaluations of the present and potential impacts of acid rain in the Midwestern states by prominent scientists. Manufacturers of control equipment and electric utility spokespeople will discuss the latest in pollution-control equipment that can be used to minimize emissions of acid rain-forming pollutants from the use of the high-sulfur coals so important to the economy of sections of the Midwest.

The 2-day session will conclude with a discussion on public policies available to control acid rain. Options to be described will run the range from mandating the use of control technology, using low-sulfur coal reserves, conservation, and others. Representatives from some of the states will present the actions being taken on research in their states. Several well-known national legislators have also been invited to present the national legislative proposals to control acid rain and what these proposals would mean for the Midwest.

For information on how to become a co-sponsoring organization or how to register for the conference, contact Leanne at (608) 257-4994 or write to; *Acid Rain: Clouds Over the Midwest*, c/o Sierra Club, 214 N. Henry St., Madison, WI 53703.

Symposium — Anadromous and Catadromous Fishes

The Northeastern Division of the American Fisheries Society is sponsoring an international symposium on *Common Strategies of Anadromous and Catadromous Fishes*, March 9-13, 1986, at the Boston Park Plaza Hotel, Park Plaza at Arlington Street, Boston, Massachusetts 02117. The goal of the Symposium is to gather international experts on subjects related to diadromy to develop hypotheses and theoretical paradigms about anadromous and catadromous fish behavior and physiology. This information will be used to chart new directions in diadromous fish research and management for the next decade. Fifty scientists of various disciplines, representing 11 countries, will present lectures in one of four topic areas: (1) utilization of the freshwater habitat; (2) transition to and from the marine environment; (3) ocean migration; and (4) recruitment mechanisms. All information will be represented in sequential sessions; ample time is scheduled for formal and informal discussions. A buffet social will be held at the New England Aquarium. Pre-

registration fee (before 1 February 1986) for the complete symposium is \$75 US regular, or \$50 US student.

Also scheduled is a "New Technology Workshop", which will provide an introduction to the latest fisheries applications of hydroacoustics, optical pattern recognition, and PIT (passive integrated transponder) tags. Participants will learn how these techniques can help meet current fisheries research and management goals, and will have the opportunity to ask about their own applications.

Requests for Symposium and Workshop information and registration should be directed to:

Stephen G. Rideout

4 Whatley Street

Hadley, Mass. 01035 USA.

Symposium facilities will accommodate 400 persons, so pre-registration is advised. Hotel reservations should be made directly with Boston Park Plaza by dialing (800) 225-2008, (617) 426-2000, or TELEX 940107.

42nd Northeast Fish and Wildlife Conference

The *42nd Annual Northeast Fish and Wildlife Conference* has issued its second call for presentations. The Conference, to be held on April 27-30, 1986 at the Hershey Lodge and Convention Center, Hershey, PA, will feature fishery sessions and wildlife sessions.

The fishery sessions will provide for a very diversified technical program, wherein Special Topic Modules will focus on fishery issues that are timely and of regional significance. Moreover, as always, the General Inland, Marine, and Anadromous Fishery Sessions will be conducted with enthusiasm. Social activities and tours are also planned.

For information, contact Joe Green, Pa. Fish Commission, Box 1673, 3532 Walnut St., Progress, Harrisburg, PA 17105.

International Wetlands Symposium

Charleston, South Carolina will be the site of an *International Symposium on Ecology and Management of Wetlands* on June 16-20, 1986. The sponsors of the conference will be the U.S. Army Corps of Engineers, the Environmental Protection Agency, the Fish and Wildlife Service, the Agricultural Research Service, the Forest Service, the College of Charleston, Clemson University, the S.C. Sea Grant Consortium, the S.C. Wildlife and Marine Resources Dept., the S.C. Dept. of Health and Environmental Control, N.C. State University, Westvaco, the International Union of Forestry Research Organizations, Man and Biosphere, the Society of American Foresters, and the Soil Science Society of America.

Themes for the Symposium will be *The Resource*, *Wetlands Ecology, Use and Management*, and *Values*. Panel topics will be *Potential Impacts of Global Warm-*

cont. on page 6

Announcements and Publications cont.

ing Trends on Wetlands, Global Impacts of Wetland Alteration, Technology Transfer, and Development Without Damage. The program will consist of invited papers, contributed poster sessions, panel discussions, exhibits, field trips, and pre- and postsymposium tours.

Information is available from Donal D. Hook, Department of Forestry, Southeastern Forest Experiment Station, 2730 Savannah Highway, Charleston, SC 29407.

Videotape — Larval Fish Ecology

The Larval Fish Laboratory, in cooperation with the Colorado Cooperative Fish and Wildlife Research Unit, has prepared a videotape for the U.S. Fish and Wildlife Service. Entitled *Larval Fish Ecology: A Critical Management Concern*, the videotape is a 24-minute introduction to the ecology of fish larvae in North American freshwaters and its importance in the management of aquatic resources.

Illustrations include eggs and larvae of various representative species, scenes of the aquatic environment, and some adverse impacts that affect fish larvae. There are also scenes of culture operations, stocking, collecting, laboratory study, and representative literature.

To arrange for copies of the videotape contact the Office of Information Transfer, U.S. Fish and Wildlife Service, 2629 Redwing Road, Fort Collins, Colorado 80526 (303/226-9100).

Workshop — Stream Habitat Improvement

The Pennsylvania Fish Commission will host the *Fifth Stream Habitat Improvement Workshop* at Lock Haven University, Lock Haven, Pennsylvania on August 11-14, 1986. This biennial workshop promotes discussion and review of techniques for improving and/or repairing trout stream habitats, with state, federal, and private fishery workers as the participants. The principal topics will be planning and design, bioengineering, construction and maintenance, and biological assessment. Titles are due by December 15, 1985, and abstracts for papers or poster sessions are due by February 1, 1986; these should be sent to Jack G. Miller, Pennsylvania Fish Commission, 450 Robinson Lane, Bellefonte, PA 16823-9616. Information on programs and registration can be secured from the above location.

Estuarine Ecology Book

Estuarine Ecology of the Southeastern United States and Gulf of Mexico is authored by AIFRB Fellow Robert R. Stickney and published by the Texas A & M University Press, College Station, Texas. This 1984 volume has 310 pages and costs \$24.50.

The purpose of the book is to bring together data on

the physical, chemical, geological, and biological characteristics of the estuaries of the region, although the author includes much material from other areas. Chapters cover marine and estuary science; freshwater inflow, sedimentary processes; physical relationships; estuarine chemistry; primary producers, decomposers, and detritus; zooplankton; benthos; estuarine fishes; higher vertebrates; and man's influence on estuaries.

This volume is a valuable reference, and contains a wealth of literature citations.

Unipub FAO Publications

The following new volumes are available from Unipub InfoSource International, Box 1222, Ann Arbor, MI 48106.

Synopsis of Biological Data on the Eel. Fisheries synopsis Ser. No. 80, Rev. 1, 1985, 73 pp., \$7.50. By C.L. Deelder.

This synopsis compiles and reviews previously scattered information on the identity, distribution, life history, populations, exploitation, protection and management, and culture of the eel, *Anguilla anguilla* (Linnaeus, 1758). Chapters cover nomenclature, taxonomy, and morphology; differential population distribution; population abundance and density; mortality and morbidity; and protective regulatory measures.

FAO Species Catalogues: Volume 2: Scombrids of the World. An Annotated and Illustrated Catalogue of Tunas, Mackerels, Bonitos, and Related Species Known to Date. Fisheries Synopsis Ser. No. 125, Vol. 2, 1984, 137 pp., \$10.50. By Bruce B. Collette and Cornelia E. Nauen.

This is the second in a series of worldwide species catalogs produced by the Food and Agriculture organization of the United Nations (FAO). It deals with the family Scombridae and is primarily meant for individuals and institutions involved with scombrid fisheries. The Scombridae include many very important commercial species (including tuna and mackerel), which justifies this interest. The book includes an inventory of scientific and vernacular names, information on systematics, geographical distribution, habitat, biology, and fisheries. The line drawings used in the introductory text and in the catalog and key are excellent and justify the volume by themselves. Information is provided in a clear format and is easy to find and well referenced. An excellent volume, of value to fisheries scientists, fish taxonomists, and anyone involved in the fisheries for these species. Highly recommended.

In Memoriam

Karl F. Lagler

Dr. Karl F. Lagler, a Founding Member of AIFRB and our President in 1967-68, passed away suddenly on August 25 in Ann Arbor, Michigan. An emeritus fisheries professor at the University of Michigan and world renowned expert on fisheries and conservation, Karl was well known for his research on river basin development and aquaculture in third-world countries in Southeast Asia, Northeast Africa, and West Africa.

Dr. Lagler is best known as a fishery educator and as author or co-author of *Ichthyology* and *Freshwater Fishery Biology*, two of the fishery community's most widely used textbooks. He was author of more than 150 technical papers and 5 other books. Karl supervised the graduate work of more than 110 students, who later became leaders in fishery management all around the world.

Among Dr. Lagler's numerous associations with professional organizations, he was elected an Honorary Member of AFS, a Fellow of the International Academy of Zoologists, a Fellow of AAAS, and a Life Member of the American Society of Ichthyologists and Herpetologists.

AIFRB and the entire fisheries community have lost a giant.

John T. Gharrett

John T. Gharrett passed away on August 29, 1985 at age 76. John became a Fellow of AIFRB in 1958 and assumed Emeritus status in 1977. A fishery scientist and administrator, Mr. Gharrett was well known to industry, government, and academia.

John graduated Phi Beta Kappa from the University of Washington School of Fisheries in 1940 and was employed by the International Pacific Halibut Commission. In 1945 he accepted a fishery research position with the Oregon State Fish Commission and became the first full-time Executive Director of the Pacific Marine Fisheries Commission in 1950.

In 1955 Mr. Gharrett moved to Alaska with the U.S. Bureau of Commercial Fisheries (BCF) and in 1958 became Regional Director there. He was active in the transition of federal fishery control to the new state of Alaska in 1959 and 1960. Next, Mr. Gharrett spent several years as Regional Director for BCF in the New England Region during the influx of huge foreign fishing fleets off the Atlantic Coast. Later, he worked in the Washington, D.C. offices of BCF and in the Seattle Regional Office where he was active in the initiation of the Pacific Fisheries Council formulated under the Magnuson Act. He retired in 1976.

As a fisheries scientist and administrator, Mr. Gharrett authored and co-authored a number of scientific publications and was a member of several professional associations.

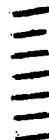
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BRIEFS, the newsletter of the American Institute of Fishery Research Biologists, is published six times a year. It is intended to communicate the professional activities and accomplishments of the Institute, its Districts, and Members; the results of research; the effects of management; unusual biological events; matters affecting the profession; political problems; and other matters of importance to the fishery community. Comments and contributions should be sent to the Editor, Dr. Oliver B. Cope, 15 Adamswood Road, Asheville, NC 28803. Subscription, \$15 a year to Institutions and Non-Members.

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