

# *American Institute of Fishery Research Biologists*

## **. . . BRIEFS . . .**

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### **Happy New Year from IRS**

AIFRB Treasurer Cole has received happy news from the Internal Revenue Service — the Institute has been declared to have tax exempt status with respect to Federal income taxes. This is a giant step for the Institute and for individual members who have been uncertain in the past about personal exemptions for annual dues. This declaration by IRS means that AIFRB will owe no back taxes (which could have been thousands of dollars), so all members will share the relief held by our leadership.

Please read the Treasurer's report (written before we received final word) in this issue for more details on this good news; this is the first AIFRB financial report ever to appear in *BRIEFS*.

### **Treasurer's Report**

I was appointed Treasurer following the Board of Control meeting in Albuquerque in 1981. This position had been held by F. Heward Bell since the inception of AIFRB in 1956. Much of my initial service has been devoted to learning about our past financial history and to changing some things to conform to my style of business practices. During the transition, several problems emerged, most of which are now being resolved. I marvel at the dedication displayed by Heward Bell during our growth from 1956 to 1981.

I soon discovered that AIFRB had never applied to IRS for tax-exempt status. Most members, including me, have routinely been listing their AIFRB annual dues as if they were contributions to a tax-exempt organization. Apparently, early conversations with IRS officials led some to conclude that we were then too small an organization to need to apply. However, recent advice from a Columbus accountant's firm, Hegler, Hall Cummins and Co., soon dispelled that idea. We applied in May 1982 for Tax Exempt Status under Section 501 (c) 6. Our accountants further advised that were this application to be denied and were AIFRB to be assessed full tax, penalty, and interest, we could owe as much as \$15,000.00 in tax obligations. Several subsequent refilings have been necessary, but on January 13, 1983 I was notified by telephone that our application had been accepted although it may still be subject to technical review. My current opinion is that we will achieve tax

exempt status *and* that we will owe no back taxes. All members will be officially advised in *BRIEFS*.

To prepare us to respond to possible IRS audits and to make the turn-over of AIFRB books to succeeding Treasurers a more regularized event, Hegler and Associates developed for me a standardized bookkeeping system in a form that is compatible with yearly IRS reporting procedures for tax-exempt organizations. They were also engaged to do a Balance Sheet and an Auditor's Report as of August 31, 1982. As a requirement of the IRS, the Board of Control changed the by-laws to provide that the AIFRB fiscal year be from 9/1-8/31.

In order to handle stocks, bonds, and other investments more efficiently, an account was opened with Bache, Halsey, Stuart and Shields, Inc. (Columbus office) which includes a Money Market Assets account, as well. We intend shortly to open a Command Account with Bache to allow us to move more promptly into the Money Market fund and elsewhere. We have a business checking account with Huntington National Bank, Columbus, but do not maintain a savings account since the Money Market fund serves the same purpose.

In September 1982, President Skud appointed a two-person Investments Committee (Drs. Claire Schelske and Charles Liston) to advise the Treasurer and President on current and planned investments. Currently we hold bonds in six different power and telephone companies; the bonds are worth \$14,230.00 (8/31/82) although their face value at maturity will be \$22,000.00. These bonds were apparently purchased with funds excess to needs from 1975 to 1980. It does not seem prudent to sell them at their current below-par values, but as other investment funds become available we will look toward high, sustained yield and will try to prevent loss of capital. We have subsequently made use of short-term brokerage CD funds and preferred stocks in utilities to play differing market directions.

In December 1982, our auditors provided the Board of Control with a Management Report that, among other things, urged that AIFRB reform our present accounts-receivable practice. Members who have not paid promptly have been carried and some now owe past dues for as much as 5 years. Our auditors believe it is cheaper for a delinquent member to pay the \$25.00 reinstatement fee than it is for them to keep up a yearly payment program. We are thus encouraging delinquency. In August 1982, I estimated that our accounts receivable was \$7,390.00 from members who were in

Cont. on page 2

## Treasurer's Report Cont.

arrears; following a study of these records our accountants reduced this amount to \$4,405.00 as representing a more reasonable number that we could expect to collect. If you are one who is in arrears, please contact the Treasurer as soon as possible before he must begin the process to remove you from our membership rolls. Those in arrears 3 or more years will be contacted very shortly.

The problem of a good mailing list has been of concern to all. We had been using the Prime Computer at the Halibut Commission until January 1982. After a long delay and poor effort at start-up, we now have converted to the Ohio State University system. I hope that we have debugged zip codes, gotten initials and street addresses corrected, etc., but please contact the Treasurer if you wish your mailing address corrected or changed. We hope that this tape can be made sufficiently error-free that it can be used to generate a List of Members during Summer 1983. There are members who complained to our auditors during their accounts-receivable review that they could never get their addresses changed, etc.; we hope to solve such problems shortly. Please write me at Kottman Hall, The Ohio State University, if you are not now satisfied with your address as listed on your bill and on your latest issue of *BRIEFS*.

### American Institute of Fishery Research Biologists

#### BALANCE SHEET

August 31, 1982

#### Assets

Cash	\$ 476
Accounts receivable — members (net of allowance for doubtful accounts of \$2,990)	4,405
Investments	36,059
	<u>\$40,940</u>

#### Deferred Income and Members' Equity

Deferred income	\$ 4,729
Members' equity	36,211
	<u>\$40,940</u>

Members who desire more details of the finances of AIFRB should write me.

Charles F. Cole, Treasurer

## The New Editor Wades In

How do you feel? This is the question TV interviewers ask all who face them, and this question usually comes when the answer is obvious — it is posed to people who have just won a million dollars, to those who have just been flattened by a freight train, to Superbowl winners, to those returning emptyhanded from a fishing trip, etc. But, if this question is asked of your new *BRIEFS* editor, the answer is not so obvious. This is because I

am not altogether sure of the size of the job. However, my concerns are tempered by the knowledge that John Reintjes stands ready to guide me. John has already ably led me to the shore, and I'm ready to wade in.

To paraphrase Caesar's Gallic Wars, *Omnes Briefs production in tres partes divisa est*. The three parts of *BRIEFS* production are securing material for the newsletter, editing, and printing and distribution. Editing and printing and mailing are known quantities, and I am confident that these will go fairly smoothly. Obtaining copy for *BRIEFS* is the area in which I shall need help. As Reintjes says, the dream of a newsletter editor is to have more material than he can use. This editor will dream of this, but he knows he'll need help from all in the Institute to fill eight pages every other month. John has things organized for the members to send good items to the Editor, so please keep them coming. I'll do my part, and I'll do my best.

Let's pay tribute to John Reintjes for the splendid job he has done as *BRIEFS* Editor. For 6 years John has labored, with Eric Knaggs serving as Editor during 1981, to keep the issues coming and to improve their quality. Without *BRIEFS*, many members would have little contact with the Institute, and John Reintjes' diligence as Editor has been important in maintaining the Institute as an organization, not just a name. Many thanks, John!

Ollie Cope

## Changes in By-Laws

As reported in the October, 1982 issue of *BRIEFS*, there was much discussion of AIFRB by-laws at the 1982 meeting of the Board of Control (*Highlights Of the Board of Control Meeting*, p. 2). Changes accepted by members in attendance are detailed here:

### Article I, Section 1

1. Delete "of the Institute"--lines 1 and 2.  
Moved by Nakamura--all agreed.
2. Change (c) to read "experience in field concerned with fishery biology..."
3. Change (d) to read "distinguished achievement in fields concerned with fishery biology"
4. Last paragraph--last two lines to be deleted.  
Substitute "An affirmative vote by four members of the Membership Committee shall be required for election."

Moved by J. Helle--carried with the majority.  
President Skud called for a vote on all changes to Section I--carried.

### Article I, Section 2

1. Delete "of the Institute"--lines 1 and 2.  
Vote was called--all agreed in favour of change.

### Article I, Section 3

1. Delete "of the Insititue"--lines 1 and 2.  
Vote was called--all agreed in favour of change.

### Article I, Section 4

1. Changed to read "A Membership Committee of five Fellows and four Members shall be appointed annually by the President with the approval of the Board of Control. The Membership Committee will

review and vote on application for membership and advancement. Four will constitute a voting quorum. If the evaluation is inconclusive, a majority vote of the Board of Control will be required for a decision."

Voted on and carried.

#### **Article I, Section 5**

1. Vote called and all agreed to section as written.

#### **Proposed Amendment to Article I, Section 6**

1. Fees and Dues, second paragraph--correct spelling error of word "review"
2. Second paragraph, last line, to read "upon payment of the Admission Fee *and* of Dues after 2 years"
3. Members unanimously voted to accept changes as described.

#### **Article I, Section 7**

1. Meeting of Members--"members" should be shown in lower case in line 1 and line 5.
2. "Attendance, in person...quorum." to be changed to "Attendance of at least five voting members in good standing shall be necessary to constitute a quorum."

Change voted on and agreed to by all members.

#### **Article I, Section 8**

1. Change to--"The membership committee, by a majority vote, may designate..."
2. Delete (b)
3. Change (a) to--"by reason of age, or disability, has retired from professional employment in fisheries biology"
4. Section 8 to be designated as Section 4 and other sections changed accordingly, i.e. Section 7 in old bylaws to become Section 8.
5. These amendments voted on and approved.

#### **Article II, Section 2**

1. Delete--"The date and place of the first meeting shall be determined by the President."
- All agreed.

#### **Article II, Section 4**

1. Change to--"...at least one elected officer and four district directors representing at least three regions, shall constitute a quorum."
2. Add--"The same quorum applies to mail or telephone balloting."
3. All voted agreement with changes.

#### **Article III, Section 1**

1. President Skud to follow-up on an annual report.
2. Second paragraph--insert after "standing committees," "and a list of Directors and"  
Delete--"and a list of membership or amendments thereto."  
New paragraph to be added--"if the presidency shall be vacated by death, incapability or resignation, the Past President or the President-Elect, whoever is in office, shall serve as President."  
This item not voted on; rather, President Skud asked G. Nakamura to review Articles III to V and provide a new wording to Board of Control by mail and that that business be then completed.  
Nakamura agreed to review whole and contact members.

#### **Article IV**

1. Change--"The fiscal year of the Institute shall be from September 1 through August 31."

Moved by Nakamura, seconded by Helle--carried.

## **AIFRB Award Presented**

President Bernard E. Skud presented the first AIFRB Group Award of Excellence to the Canadian Journal of Fisheries and Aquatic Sciences on January 3, 1983 in Winnipeg, Manitoba. The award, announced in the October issue of *BRIEFS* (Vol. 11, No. 5), was presented during the annual Canadian Conference For Fisheries Research (CCFFR). Jeff Watson, Director of the Information Branch of Canadian Fisheries and Oceans and Editor-in-chief of the Journal, accepted the award on behalf of the Journal staff. Remarks by Skud and Watson and the wording on the certificate will be published in the Journal later this year.

The Canadian Journal of Fisheries and Aquatic Sciences (formerly the Journal of the Fisheries Research Board of Canada) actually can trace its origin to 1901 when the Contributions to Canadian Biology was first published. Since then the Journal has changed its name five times and has gained world-wide recognition for the caliber of its scientific articles. AIFRB's award recognizes this achievement as well as the contribution of the Journal in furthering the standards of professionalism among fishery scientists. (Members of AIFRB who are interested in a history of the Journal should see the article prepared by Jeff Watson in the October, 1982 issue of *BRIEFS*)

## **Legislative Activities**

**Dingell-Johnson Expansion (H.R. 4961)** — The following is adapted from a report by Carl Sullivan at the 1982 Annual Business Meeting of the Southern Division, American Fisheries Society, November 2, 1982: This bill seeks to bring funding up to roughly 100 million dollars a year. To do this, a compromise was reached with the boating industry in that the tax was dropped on boats and motors but it did generate new sources of revenue. The compromise did the following: (1) generated \$12-15 million by expanding the 10% tax to all fishing tackle not now included; (2) all imported duty on foreign-manufactured tackle is to go to the D-J program. At present, this is some \$15 million that goes into the general revenue account of the U.S. Government; (3) would levy a 3% tax on trolling motors and electronic fish-finders; (4) would place the outboard motor fuel tax in the D-J program, provided that 1/3 of the money would be used for boating law administration and safety, 1/3 for boating access, and 1/3 for routine discretionary D-J activities. The thrust of this legislation was to increase the fund from \$30 million to \$100 million but not to change the formula. On the new monies created, coastal states would divide between marine and freshwater programs on the basis of the number of marine anglers to the number of freshwater

## Legislative Activities *cont.*

anglers. The bill was not making much "headway", so the tax portion of the bill was attached by the Senate on a new provision on the Administration's multi-billion dollar tax bill. When the Senate and the House met to resolve their difference on the tax bill, a compromise was reached. Unfortunately, the D-J portion was left out, for reasons unknown. Congressman Breaux has stated the compromise version of the D-J bill that has received support will be reintroduced, probably in the lame duck session. Passage looks very good for next year.

## Controversial Alaska Fish and Game Subsistence Law

One of the most divisive issues since the battle for statehood in the 1950's faced Alaska's voters in November: repeal of the state law which gives priority to rural residents in harvesting fish and game. There is no consensus among fish and game biologists, with some professionals strongly in favor of repeal and others just as strongly against. The Alaska District of AIFRB has taken no position.

Nearly everyone agrees that rural Alaskans, (primarily Natives), should have priority in use of fish and game for food. There is also general agreement that the State, not the Federal government, should manage Alaska's fish and game resources. The disagreement concerns the likely course of events if the present law is repealed. The key to the issue is a provision in the Alaska National Interest Land Claims Act (ANILCA) that mandates federal assumption of fish and game management on federal lands (about  $\frac{2}{3}$  of Alaska) if the needs of subsistence users are not met. The existing state subsistence law satisfies the intent of this national legislation and retains management control by the State.

Proponents of repeal, which include urban sport hunters and fishermen and many professional fish and game managers, believe that everyone should have equal opportunity to harvest fish and game, that repeal would simplify and promote scientific management, and that Federal takeover of management is an empty threat that can be forestalled by negotiation between the State and the Federal government, or by modifying ANILCA in Congress.

Opponents of repeal also include many professional fish and game managers, the Governor, United Fishermen of Alaska (the principal voice of commercial fishermen) and all native organizations. Their concern is that repeal would assure federal management of much of Alaska's fish and wildlife resources, exclusion of non-natives from hunting and fishing on more than 44 million acres of native-owned land, and bitter polarization of urban and rural residents. They believe that changing subsistence provisions of ANILCA by Congress is wishful thinking and that imperfections in the state subsistence law can be remedied by amendment without outright repeal. Commercial fishermen fear that repeal could result in judicial reallocation of fish

resources similar to that in the Pacific Northwest resulting from the Boldt Decision, and destruction of the limited entry system.

The subsistence law repeal was defeated in the November election, with 58% of the vote favoring retention of the current law. The issue is not dead, however. Advocates of repeal are planning new strategies and newly-elected Governor Sheffield (who opposed repeal) has promised to correct inequities in the present law during the 1983 legislative session.

*Theodore R. Merrell, Jr., NMFS, Auke Bay, AK*

## ✓ Tagging Studies of Bluefin Tuna in the Pacific Ocean

Northern bluefin tuna occur around Japan and off California and Baja California, but spawning apparently occurs only in the western Pacific. Tagging studies carried out by various organizations in the 1950's and 1960's produced 11 trans-Pacific migrants, 9 of which went from the eastern to the western Pacific and 2 of which went in the opposite direction.

Additional tagging studies have recently been commenced by the Inter-American Tropical Tuna Commission (IATTC) and the Far Seas Fisheries Research Laboratory of Japan. This report deals only with the IATTC studies.

In 1979 and 1980, 414 purse seine-caught bluefin were tagged and released in the eastern Pacific Ocean. During 1979, 1980, and 1981, 46 of these were recaptured in the eastern Pacific. In 1982, one of these was recaptured in the western Pacific after 988 days at liberty.

During the 1980-1982 period, 3,640 bluefin caught by the summer troll fishery which takes place off Shikoku Island were tagged and released, as were 671 bluefin caught by the winter troll fishery which takes place at the south end of Kyushu Island. The summer-caught fish are about 3-5 months old and average about 20 cm in length, while the winter-caught fish are about 9-12 months old and average about 50 cm in length. Several hundred of these have been recaptured in the western Pacific. In addition, 16 fish tagged in the summer fishery have been recaptured in the eastern Pacific during the following summer, when they were about 15-18 months old. Two others were caught in the albacore gillnet fishery, which takes place far offshore to the east of Japan; these may have been in route to the eastern Pacific. None of those tagged in the winter fishery were recaptured in the eastern Pacific during the following summer, but 24 were recaptured there the summer after that, when they were about 27-30 months old. Lengths at release and recapture have been obtained for a considerable portion of the tagged fish. It appears that the growth is more rapid for the fish which remain in the western Pacific than for those which migrate to the eastern Pacific, but data for more years will be required to determine whether this difference is consistent.

*William H. Bayliff, La Jolla, California*



## Studies at Lake Worth, Florida

The Florida Department of Natural Resources' Marine Research Laboratory, through its West Palm Beach Field Station and Coastal Zone Management, are currently investigating fish populations in Lake Worth, a coastal lagoon, and the Loxahatchee River, an estuary in southeast Florida. During the 1860's the first man-made inlet was cut into the 22-mile-long Lake Worth, which had been a freshwater lake. Now, salt water enters the lake from a north and south inlet at Palm Beach and Boynton, Florida, respectively, while freshwater enters from three canals and local storm runoff. The Loxahatchee River System, which is just north of Lake Worth, consists of three forks which empty into the Atlantic Ocean at Jupiter, Florida. Undeveloped portions of the main northwest fork have been designated by the U.S. National Park Service as eligible for inclusion in the National Wild and Scenic Rivers System. In 1958, a major canal system was constructed on the southwest fork to divert fresh water more quickly from the Loxahatchee slough to the ocean. The U.S. Army Corps of Engineers is currently investigating the effects of restoring the natural flow of water back down the northwest fork. The current FDNR-CZM study will be examining the recruitment of juvenile and larval fishes, several water-quality parameters, food and feeding habits, and age and growth of five target species. The five target species will include snook, *Centropomus undecimalis*; red drum, *Sciaenops ocellata*; grey snapper, *Lutjanus griseus*; striped mullet, *Mugil cephalus* and spotfin mojarra, *Eucinostomus argenteus*. In addition, the study will try to assess the amount of habitat loss around the highly urbanized Lake Worth area.

Marion Hedgepeth, West Palm Beach, FL  
Florida Dept. of Natural Resources

## Stock and Recruitment

In **BRIEFS** (Vol. 11, No. 6), Drs. Skud and Pauly invite views on inter- and intra-specific stock-recruitment relations. Obviously both relations occur, but in a complex (in space & time & in species-to-species variable) manner. It might be more profitable to study and quantify the various processes which are involved in shaping these relations, rather than to try to derive a simple stock-recruitment relation.

Intra-specific stock-recruitment relations are most pronounced in heavily cannibalistic fish (such as walleye, pollock) where this relation can cause long-term fluctuation of stock (period ca 12 years). Furthermore, numerical studies have shown that an intra-specific stock-recruitment component must exist in all stocks to a variable degree.

The intra-specific stock-recruitment relations are, in most cases, masked with time- and space-variable inter-specific stock-recruitment relations, brought about mainly by predation on juveniles. (The inter-specific relations *via* competition for food occur to a considerable lesser degree.) The inter-specific relations can be quantitatively studied in holistic ecosystem simula-

tions such as DYNUMES, which have spatial resolution (i.e., enable the study of the modification of predator-prey relations caused by seasonal migrations). Thus, studies lead also to the determination of the parameters of stock fluctuations by natural as well as man-made causes.

—Thus “back to the basics”! Stock-recruitment relations is not a simple basic problem, but a great problem complex, and no single and simple “universal” relation exists.

T. Laevastu, Seattle, WA  
Northwest & Alaska Fisheries Center

## ✓ New Approach to Studies of Genetic Variability in Fishes

Critical to the realistic application of population dynamics models in fisheries biology is an understanding of what constitutes a unit stock. All too often the definition of a stock is based upon what is operationally or politically convenient, and has little biological reality. Ideally, before undertaking assessment studies, the fisheries scientist should carefully map the self-contained and self-perpetuating genetic units. But for pelagic populations which lack obvious geographic isolation and are experimentally difficult to separate into subspecies, such an idealized course of action is seldom followed.

In the past, attempts to identify subspecies of pelagic organisms have used morphological, ecological, or, more recently, electrophoretic characters. These studies have proven more difficult than population analysis of terrestrial or freshwater species, for a variety of reasons. Clearly, new and more powerful techniques of population analysis must be designed to facilitate the task of stock segregation.

The U.S. NMFS, La Jolla, California, is initiating a study which will apply a new technique for measuring genetic variability to the problem of defining unit stocks for pelagic species. The technique requires smaller sample sizes because of its greater resolution of the underlying genetic differentiation which must accompany stock segregation. The technique, which can quantitatively define the relatedness between any two individuals or groups, involves the analysis of DNA of the mitochondria (mtDNA). Fragments, created by the action of restriction endonucleases on the mtDNA, are electrophoretically separated and compared between individuals in order to calculate the frequency of nucleotide (base pair) differences. The greater the differences, the more distant the relationship. Although the restriction endonuclease approach does not necessarily detect all of the variation in the mtDNA genome, it is much simpler and more practical than completely sequencing the mtDNA molecule. The mtDNA technique has a degree of genetic resolution which before now has not been focused on fishery stock problems or population investigations of highly migratory animals.

In a pilot study of mtDNA variability in skipjack tuna from the Atlantic and Pacific Oceans, no fixed

## Genetic Variability in Fishes *cont.*

base pair differences were demonstrated between fish from the two oceans. These results, although preliminary, suggest current or very recent genetic contact between skipjack tuna caught off Hawaii and those caught off Brazil. Perhaps it is time to consider the null hypothesis of genetic studies. That is, the failure of previous techniques to establish significant levels of differentiation in skipjack tuna may not be due to the use of insufficiently variable characters, but rather that such differentiation does not, indeed, exist.

Andrew E. Dizon, ~~LAFFC~~ La Jolla, California

## AIFRB District Doings

### CAROLINA

William R. Nicholson, *Director*

The problem of trying to maintain a District in which members are too few and too dispersed to sustain regularly scheduled meetings is one of major concern. A newsletter is being sent to members in the Carolina District soliciting their views on the use of an Executive Committee, appointed by the Director, to maintain contact among members on items of mutual interest and concern. If other Districts have evolved any novel or successful way of coping with this problem, please express your ways and means in the next issue of *BRIEFS*, so we can profit by them.

### CENTRAL CALIFORNIA

Tom Jow, *Director*

The Central California District held its annual banquet in San Francisco Chinatown on December 4, 1982. An outstanding nine-course dinner planned by Tina Echeverria and Bob Tasto was enjoyed by 55 members and guests.

Regular bi-monthly dinner meetings will be resumed in January. Tina and Bob, program committee persons, have arranged for Dan Miller to speak to members and guests at the Harbor House, Vallejo, on January 20, 1983. Dan, a California Department of Fish and Game Marine Biologist, will talk on marine mammals, sharks, and human interactions. Dan has interviewed most of the white shark attack victims, including a biologist on his staff who was bitten at the time of the AIFRB Annual Meeting at Hilton Head Island in September.

### GREAT LAKES, SOUTH CENTRAL

Charles R. Liston, *Director*

I became the Great Lakes South Central Director in September 1982, and subsequent to our Board-of-Control meeting at Hilton Head I have been corresponding with Fred Binkowski, University of Wisconsin, regarding meeting arrangements for next fall in Milwaukee. Also, Fred and I met at Des Moines, Iowa in December to go over the meeting plans. A decision has been made, through the suggestion of Bernie Skud, for the AIFRB to provide refreshments for AFS at the picnic next fall.

We are going ahead with a planning session and dinner on January 20. Our district used to sponsor some six seminars per year, rotating the meeting place between East Lansing and Ann Arbor, Michigan. Our seminars

stopped after 1980, but I believe we can continue them, beginning this year. I will be suggesting at our January 20 meeting that we carry on our informal dinner gatherings with seminars approximately four times each year in the future. I hope to re-ignite the interest in communicating among the members, and hope to enlist many new members with these procedures.

### GULF OF MEXICO, NE

Thomas W. Duke, *Director*

The District held one meeting last year and discussed the use of the Adaptive Environmental Assessment process to evaluate the potential impact of the release of drilling fluids on fisheries. The use of this technique by institutions having environmental stewardship and resource development responsibilities also was discussed. A meeting is being planned for the spring of 1983 to confer on a topic such as occurrence of oxygen depletion in inshore waters of the Gulf of Mexico. As part of the meeting, members may have the opportunity to tour fishery research commercial vessels plying their trade in the Gulf.

### NEW YORK - NEW JERSEY

Phyllis H. Cahn, *Director*

The District will feature a Symposium on "Fisheries and the Utilities: Past, Present, and Future" to be held on Friday, March 11, at the American Museum of Natural History, Portrait Room, 10 a.m. to 3 p.m.

The Keynoter will be Dr. William Kirk, Director, Consolidated Edison, Environmental Division, who will discuss "Historical Aspects of Fisheries and the Hudson River Power Plants." Dr. Jeffrey Waxman, who works with Dr. Kirk, will help with organizing the Symposium. Dr. C. Lavett Smith, AMNH, helped to obtain the Museum facilities.

### OREGON-SOUTHWEST WASHINGTON

Clyde S. Sayce, *Director*

We are having the same problems with regular District meetings caused by the dispersal of members. We are exploring the practicality of a Corvallis Sub-District and a Portland Sub-District for meetings.

Our Biennial election resulted in Howard F. Horton, Oregon State Univ., District Director; Leon Verhoeven, Deputy Director; and Fred H. Everest, Jr., Secretary.

### NORTHWEST WASHINGTON

John S. Isakson, *Director*

Thirty-three members and guests attended the November 23, 1982 district meeting. Bylaws were briefly reviewed and two members (Bell and Van Cleve) asked for copies upon which their comments were later forwarded to Gene Nakamura.

The program by Dr. Murray Hayes and Mr. Richard Bakkala (NMFS-RACE Montlake) was entitled "Can Large Scale Surveys Provide a Basis for Understanding the Bering Sea Ecosystem?" The results of a 1979 joint U.S./Japanese trawl and acoustic survey of the eastern Bering Sea were reviewed. At the time, this was the largest fishery survey ever launched in the Bering Sea, covering an area of 650,000 sq. kilometers (the size of Washington, Oregon, and Idaho combined). Hundreds of trawls produced data on the abundance and distribution of 176 fishes (including 3 new to science) and a variety of crustaceans. Total benthic and midwater

biomass was estimated to be 11 million metric tons, dominated by pollack, other cods, and flatfish. Dick discussed the dominant distributional patterns and noted changes seen in the area since surveys first began in the early 1970's.

Following a period of questions from the floor, Dr. Hayes returned the focus to the tough question: "Where are we going in fishery science?" That is, is the press for larger, more comprehensive and costly surveys diverting us from identifying the processes upon which predictive capabilities must eventually be based? How do we build into future research the consolidation of complex and massive information and the uncovering and testing of ideas? He reviewed modes of integration and synthesis by examples ranging from single-discipline scientific papers, to only partially satisfactory "syntheses" such as OCSEAP, to the current states of application of "models" ranging from predation analysis, energy flow, recurrent group analysis, top-down modeling, etc. all these, he concluded, are feeble efforts.

The audience only partially agreed. Many agreed that "incremental science" has reached a peak in effectiveness. Discussion focused on a renewed effort at clearheaded hypothesis testing, a return to principles of ecology, and a need for scientists from key disciplines to communicate directly, not via separate chapters in a book or report.

Dr. Hayes closed the meeting with a quote from a former federal scientist who said that understanding of fisheries will come only when we appreciate the total environment and understand at least some basic aspects of species interactions. That scientist was Spencer Baird (ca 1880).

#### **SOUTHERN CALIFORNIA** Norman W. Bartoo, *Director*

The Southern California AIFRB District remains active during the current year. Following the wishes of the approximately 56 members in the district, general meetings are held regularly at approximately 2-month intervals during the university academic year. Additionally, special meetings or events are occasionally held. Scheduled meeting dates include Nov. 17, 1982; Jan. 12, 1983; Mar. 9, 1983; and May 11, 1983. Attendance is approximately 15 members per regular meeting with about 25 for the guest night meeting (Jan 12). A special event of an educational nature on the current state of the art in the various aspects in the fisheries field is under development, is tentatively scheduled for May 1983, and will be chaired by a yet unnamed member.

#### **TEXAS** Clark T. Fontaine, *Director*

The District completed an election of new Officers on January 3. The new Officers are: Director Robert R. Stickney, Dept. of Wildlife and Fisheries Science, Texas A&M Univ.; Associate Director Andre N. Landry, Jr., LeMarque; and Secretary Loretta F. Sullivan, NMFS Galveston.

While I was Director I was unable to generate interest among members for District meetings. I have suggested to the new Director that a priority for 1983 should be the organization of District meetings. I have pledged my full support to Dr. Stickney for the continuation of the AIFRB in Texas.

## **New Publications and Announcements**

### **American Fisheries Society Annual Meeting, 1983**

The 1983 Annual Meeting (113th) of the American Fisheries Society will be held at the University of Wisconsin-Milwaukee, August 14-20, 1983. Contributed papers, posters, and special symposia are planned which will offer a broad range of subjects in aquatic science that have broad geographic interest.

Tentative symposium topics include: Biology and Management of Sturgeon, Fish and Wildlife Relationships to Mining, Mitigation Techniques for Acidified Waters, Impacts of Water Level Fluctuations on Salmon Nests, Trace Elements in Cooling Lakes, Rhythmicity in Fishes, Biology and Management of Forage Fish, Trends in Muskellunge Management and Husbandry, Fisheries Economics, Status and Management of North American Salmon, Fishes as Primary Consumers, Larval Fish Habitats, and Fish Tumors Related to Carcinogenic Contaminants. Two training workshops are planned on Computer Applications in Fisheries and Dissolved Gas Supersaturation. Social activities and tours will make good use of Milwaukee's famous cultural attractions.

All questions should be directed to C.C. Coutant, 1983 AFS Program Chairman, Environmental Sciences Division, Oak Ridge National Laboratory, Oak Ridge, TN 37830 USA (telephone 615-574-7386).

### **Salmon and Trout Migratory Behavior Symposium**

Fishery scientists, from around the world, presented 33 papers on the migration and distribution of salmonids. Proceedings, 309 pages, edited by E. L. Brannon and E. O. Salo, are now available. Copies can be purchased from Dr. E. L. Brannon, School of Fisheries, University of Washington, Seattle, WA 98195 for \$19.50 plus \$1.50 postage and handling.

### **Great Lakes Research Conference**

The 26th Annual Conference on Great Lakes Research will be held in Oswego, New York, May 24-26, 1983. The conference site is the campus of the State University College at Oswego, on the shore of Lake Ontario. The conference is multidisciplinary, and sessions will include wide-ranging topics on Great Lakes research and resource management. The annual conference is the major research-communication event of the International Association for Great Lakes Research (IAGLR). Although IAGLR and the annual conferences traditionally have focused on the Laurentian Great Lakes of North America, the conferences and the Association's *Journal of Great Lakes Research* encompass all aspects of research on the world's large lakes and the human societies surrounding them.

For further information on the conference or IAGLR, write to Mrs. Linda Sawyer, IAGLR, 66 Sheldon Hall, SUNY, Oswego, NY 13126. Phone 315-341-3042.

### **Annual Tuna Conference**

The 34th Annual Tuna Conference will be held at the University of California Conference Center, Lake Arrowhead, California, May 15-18, 1983. The Tuna

## Announcements cont.

Conference is an annual event sponsored by the California Department of Fish and Game, Long Beach, California; the Inter-American Tropical Tuna Commission, La Jolla, California; and the U.S. National Marine Fisheries Service, La Jolla, California. Since 1950 it has provided a relaxed, informal atmosphere in which to meet and exchange scientific information and discuss current topics in tuna research and tuna fisheries.

A regular feature of the Tuna Conference during the 1960's was a session entitled "Physiology and Behavior." In recent years, presentations concerning the basic biology of tunas have been few in relation to fisheries and population studies. In an attempt to fill the void, this year's Tuna Conference will emphasize the biological aspects of the tunas, in particular their physiological ecology and behavior. However, presentations on topics other than physiology and behavior will also be welcome. In addition, space will be provided for poster presentations on any aspect of tuna research.

Further information may be obtained from Robert J. Olson, Inter-American Tropical Tuna Commission, c/o Scripps Institution of Oceanography, La Jolla, CA 92093. Phone 619-453-2820, Ext. 373.

### Future Fisheries Biologists of America (Narragansett Chapter)

Our facetious choice of name should not belie our seriousness of purpose. FFBA was formed by a group of students at the University of Rhode Island Graduate School of Oceanography who are interested in fostering communication among biologists interested in fisheries science. Our meetings, which are held at biweekly coffee hours, welcome speakers from academic institutions, government laboratories, and the commercial fishing community. FFBA provides a forum for discussion ranging from scholarly research to ideas that are a bit less serious.

We invite you to stop by and join us for coffee when you are in the area. If you would enjoy being featured as

a speaker, simply call a few weeks in advance. Our lavish honorarium: all the coffee you can drink and the donut of your choice.

Cynthia Jones, Univ. of Rhode Island

*(If students at other academic institutions decide to form chapters of FFBA, please notify the Editor of BRIEFS. Because FFBA is an unstructured, no-dues organization, AIFRB is offering its newsletter as a vehicle of communication among chapters. I am hereby urging AIFRB members to participate, when asked, in meetings of FFBA chapters. Bernard E. Skud, AIFRB President)*

## Membership Report

### New FELLOW:

Dr. John Mark Dean SC

### Promotion to FELLOW:

Dr. Joseph R. Sylvester WI

### New MEMBERS:

William B. Jackson TX  
Dr. Michael M. Sinclair NS  
Richard A. Holt OR  
Dr. James E. Sanders OR  
Dr. John S. Rohovec OR  
Dr. Mac V. Rawson GA  
Dr. Larry A. Neilson VA  
Dr. Richard J. Neves VA  
Dr. R. W. McCauley ONT  
Dr. Robert H. Ellis OR  
Dr. Warren "J" Groberg OR  
Dr. Lewis J. Haldoson AK

### Promotion to MEMBER:

Dr. William W. Smoker AK  
David L. Waltemyer AK

### New ASSOCIATES:

Lewis S. Incze WA  
Dr. James R. Winton OR  
Marty M. Hale FL  
Calvin L. Blood WA  
Mark Hudy FL  
Raymond M. Newman MN  
Reginal M. Harrell SC  
John T. Lamkin DC  
Dr. Rudolph A. Rosen DC  
Phillip J. Hilgert WA

**EMERITUS** status by approval  
of Board of Control:  
Dr. Oliver B. Cope NC

Sammy M. Ray, Membership Chairman

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. 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.

## American Institute of Fishery Research Biologists

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APRIL, 1983

**El Niño May Change  
Local Fishing Prospects**

Recreational fishermen can expect to see changes in both the type and abundance of fish available off the southern California coast and further north, if current "El Niño" conditions persist. According to researchers at NMFS' Southwest Fisheries Center in La Jolla, California the unusually warm sea conditions at the equator — a phenomenon known as El Niño — are shifting the tropical marine environment northward, bringing important commercial and recreational fish in range of local anglers.

Mr. Jim Squire, fishery biologist and recreational fishing authority at the Southwest Fisheries Center, reports that sea-surface temperatures in January and February of 1983 are very similar to conditions recorded in January of 1958, during the biggest El Niño in recent history.

Squire recently examined historical records of fish catches from the years prior to, during, and following El Niño which occurred in 1957-58, 1972-73, and 1976-77. Based on these records, Squire believes that if conditions similar to those of 1957-58 continue to develop off the northeast Pacific coast, anglers can expect that:

- Catches of yellowtail should increase substantially in 1983, and as high or higher catches might be expected the year after El Niño subsides. However, the higher catches in 1983 and beyond will not necessarily indicate an increase in population size.
- Catches of Pacific barracuda will increase in 1983 and in the year following the warm period.
- Because the stock size of the white sea bass is currently quite low, the total number of fish caught in 1983 will likely remain small, although El Niño conditions may bring a slight increase in catch.
- Catches of Pacific bonito off southern California will respond positively to the warm conditions and, though stock size in general is reduced, anglers can expect higher catches.
- The recreational albacore fishery will probably see a decline in catch if the influence of El Niño remains evident during the summer and fall of 1983. Recreational fishery catches of albacore during the

warm periods of 1957-1958 and 1972-73 declined substantially, reaching their lows 1 yr after El Niño conditions subsided. In contrast, the mobility of the commercial albacore fleet enables it to fish distant areas compared to the recreational fleet, and the commercial fishery experienced little or no decline in catch during past El Niños.

Squire also points out that if El Niño conditions persist, tropical fish species may begin to appear off the California coast. Dolphinfinch, skipjack, bullet mackerel, shortbilled spearfish, triggerfish, thread herring, trunkfish, pilot fish, and green jacks are some of the species that may be pushed to the north of their normal range. Fish typical to California waters, such as white sea bass and bluefin tuna, may begin to appear as far north as Alaska.

From NMFS news release dated March 3, 1983

**Availability of  
Saltonstall-Kennedy Funds**

For fiscal year 1983, S-K funds will be available to assist persons in carrying out research and development projects addressed to any aspect of a United States fishery involving the United States fishing industry (recreational or commercial) including, but not limited to, harvesting, processing, marketing, and associated infrastructures. Projects will be funded through grants and cooperative agreements. Any individual who is a citizen or national of the U.S. is eligible to apply for funding under this solicitation. The NMFS, NMFS employees and their immediate relatives are not eligible to apply.

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**Have You Paid Your 1983 Dues?**

**Send \$10.00 to**

Dr. C. F. Cole, AIFRB Treasurer  
Ohio State University

2021 Coffey Road • Columbus, Ohio 43210

## Saltonstall-Kennedy Act

The Saltonstall-Kennedy Act makes up to 30% of the gross receipts collected under the customs laws from duties on fishery products available to the Secretary of Commerce. At least 50% of these funds must be used by the Secretary each year to make grants to assist persons in carrying out research and development projects addressed to U.S. fisheries. For fiscal year 1983, about \$8 million of S-K monies are available to fund fisheries "R&D" projects which promote the goals and priorities of the NMFS fisheries development and utilization program.

The NMFS has two objectives for funding projects:

- (1) to maintain stability in and strengthen traditional fisheries, and;
- (2) provide for the growth of the fishing industry through the increased use of nontraditional resources.

Briefly, the priorities for the two regions covered by this Notice to Fishermen are:

Northeast Region - projects supporting the growth of the squid and mackerel fisheries and maintaining product quality in traditional offshore fisheries through improvements in harvesting and processing operations.

Southeast Region - projects having the general purpose of helping to shift current harvesting, processing and marketing activities from traditional shrimp fisheries into alternate fisheries, particularly the coastal pelagics (herrings, menhaden, sardines, tunas, bonitos, ladyfish, jacks, etc.)

Applications for funding under this program shall be accepted between 1 February and 1 April, 1983. Applications should be submitted to the appropriate NMFS Regional Office or to NMFS (Director of Industry Services) Washington, DC if the application does not directly address the development of a particular fishery or region.

Federal Register, Vol. 48, No. 15

## Use of Acoustic Telemetry, ✓ Satellites, and Ships to Investigate Relationships Between Albacore and Ocean Frontal Boundaries

An investigation of small-scale movements and aggregation of albacore in relation to oceanic temperature and color boundaries was conducted by the Southwest Fisheries Center, NMFS, in cooperation with the American Fishermen's Research Foundation. Ocean

color and infrared satellite data, collected contemporaneously with observations made from ships at sea, were used to investigate the small-scale migration patterns of albacore tuna in relation to oceanographic conditions.

NIMBUS 7 Coastal Zone Color Scanner (CZCS) and NOAA 6 satellite AVHRR infrared data were collected at the Scripps Institution of Oceanography Remote Sensing Facility in conjunction with field experiments where (a) acoustic telemetering methods were used to track the horizontal and vertical movements of free-swimming albacore, and (b) expendable bathythermograph observations were made to determine subsurface ocean thermal structure. Three albacore were tracked for approximately 24 hrs and one for about 15 hrs. The results showed: (a) total distances tracked ranged from about 40 to 60 km, with all fish remaining in the same parcel of warm water that was separated from waters to the north and inshore by a 4°F temperature gradient as shown by infrared thermal imagery, (b) tracked fish spent most of the time in waters within and below the thermocline, and only small amounts of time in the upper mixed layer, (c) the fish exhibited marked vertical excursions in depth, with the range being larger during daytime hours than during nighttime hours, (d) the fish spent the majority of the time in waters with temperatures considerably lower (about 45°-60°F) than what has been generally believed to be the preferred temperature range for albacore (60° - 66°F), and (e) when undergoing vertical changes in depth, the fish frequently within a 20-min period passed through a vertical gradient of temperature amounting to 12 - 15°F, or about 3+ times greater than the horizontal temperature gradient at the surface indicated by ship measurements and the infrared thermal imagery.

These findings indicate that the causal factor(s) involved in the aggregation of tunas on the warm side of ocean surface temperature fronts, a phenomenon which has been observed on scientific cruises, is well known by fishermen, and has economic significance, is probably not related to thermal-physiological mechanism(s) as has been previously suspected. Instead, it appears that a behavioral mechanism(s) related to feeding may be responsible. Ocean color measurements made by the CZCS in conjunction with the tracking study provide data which support this hypothesis.

The diffuse attenuation coefficient (k), a measure of water clarity measured by the CZCS, showed a gradient nearly coincident with the sea-surface temperature gradient pattern, with lower values of k in the warm waters and higher values in the cooler waters. The distribution of color boundaries indicated by the ratio of blue:green color bands measured by the CZCS was also similar to the gradient pattern observed in the diffuse attenuation coefficient (k).

The results show that the albacore remained in water that had higher clarity than adjacent waters. This suggests that water clarity, as it affects the tuna being able

to see its prey, may play a key role in the mechanism(s) underlying the aggregation of tunas on the warm, clear side of ocean-surface thermal fronts.

R. Michael Laurs  
NMFS/SWFC, La Jolla, CA

## Sonic Tracking Studies of Tunas ✓

Tracking experiments conducted by two agencies during 1981 on yellowfin tuna tagged with ultrasonic transmitters have brought the number of tuna species so studied to five. Through the years, different types of transmitters built to monitor such parameters as swimming depth, ambient water temperature, and body temperature have been used to track skipjack, bluefin, albacore, bigeye, and yellowfin. In 1969, two small (about 45 cm) skipjack were tracked by U.S. FWS personnel in the Hawaiian Islands with transmitters that indicated only the horizontal location of the fish. About 8 yrs later, four more skipjack were tracked by the U.S. NMFS, this time with tags which provided information on swimming depth as well as horizontal location. During 1981, scientists from the Centre de Recherches Océanographiques de Dakar-Thiaroye tracked two skipjack using transmitters that indicated the water temperature in which the fish were swimming. Swimming depth was inferred from the water temperature and information on the vertical temperature profile.

Giant bluefin tuna averaging about 250 kg were tracked off Nova Scotia and New England during 1969 and 1970 by scientists from the Woods Hole Oceanographic Institution (WHOI). Some of the bluefin were tagged with transmitters equipped with a small harpoon shaft for inserting into the musculature near the first dorsal fin. The transmitters monitored muscle and ambient temperature simultaneously. In other bluefin a cylindrical-shaped transmitter containing a thermister for measuring stomach temperature and another thermister at the end of a wire lead attached to the transmitter was placed in the stomach. The wire lead ran up the oesophagus and was threaded out the last gill slit to measure water temperature.

Six albacore were tracked in the northeastern Pacific in 1972 by scientists of the U.S. NMFS. The acoustic transmitters provided only horizontal location of the fish. It was later reported that the same agency had tracked three more albacore in 1979. Two of the fish carried tags that gave swimming depth, and another fish was fitted with a transmitter that indicated water temperature. Detailed information on the latest NMFS tracking studies on albacore is given elsewhere in this issue.

In 1970, the WHOI scientists who tracked the bluefin also tracked a bigeye tuna equipped with a transmitter containing the same equipment for measuring stomach and ambient water temperature mentioned above. Some 10 yrs later, the Far Seas Fisheries Research

Laboratory, in conjunction with the Shizuoka Prefectural Fisheries Experimental Station, Japan tracked three bigeye in 1980 and 1981. The translation of the report from which this information was taken did not specify whether the sonic tags they utilized transmitted information on depth or water temperature.

The same Japanese agencies tracked six yellowfin during 1981, using depth-sensing transmitters either inserted into the stomach or attached to the back of the fish. During 1981 WHOI, in conjunction with the Inter-American Tropical Tuna Commission, tagged and tracked four yellowfin tuna ranging in length from 87 to 98 cm. Transmitters for monitoring depth and horizontal location were either placed in the stomachs of the fish or attached to the base of the anal fin. Two of the four yellowfin were tracked in the open ocean near the mouth of the Gulf of Panama and the other two were tracked close to Clipperton Island. The tracks lasted 9.3, 18.25, 46.1, and 48 hrs.

Robert J. Olson  
IATTC, La Jolla, CA

## National Marine Sanctuary Program

The Marine Protection, Research and Sanctuaries Act authorizes the Secretary of Commerce to designate ocean waters as marine sanctuaries to protect or restore their conservational, recreational, ecological or esthetic values. Marine sanctuaries are built around the existence of distinctive marine resources whose protection and beneficial use requires comprehensive, geographically-oriented planning and management.

Marine sanctuaries may be designated as far seaward as the outer edge of the continental shelf, in coastal waters where the tide ebbs and flows, or in the Great Lakes and their connecting waters. Any person may recommend a site for consideration as a possible sanctuary. The procedures for considering an area are designed to ascertain the desirability of and public interest in the designation of a particular site. These procedures and the criteria for review of sanctuary candidates are described in the marine sanctuary regulations (Title 15 of the Code of Federal Regulations, Part 922).

The established sanctuaries are Point Reyes-Farallon Islands (CA), the Channel Islands (CA), U.S.S. Monitor (NC), Gray's Reef (GA), Key Largo (FL), and Looe Key (FL). Others that are being considered or evaluated for selection are La Parguera (PR), Humpback Whale Wintering Grounds (HI), Fagatele Bay (American Samoa), Cordell Bank (CA) and Norfolk Canyon (VA).

In September 1982, the Western Oil and Gas Association filed suit against NOAA in Federal District Court challenging the designation of the Channel Islands National Marine Sanctuary and the issuance of regulations prohibiting new oil and gas development within

cont. on page 4

## National Marine Sanctuary Program

the Sanctuary boundaries. The Sanctuary, located offshore in southern California, was originally designated in September 1980. Defenders of Wildlife, representing 13 environmental groups, the State of California and the County of Santa Barbara have intervened on NOAA's behalf in this suit. NOAA and the Department of Justice filed an answer in this legal action in December, 1982.

For further information contact: Sanctuary Programs Division, NOAA, 3300 Whitehaven St. N.W., Washington, DC 20235.

## North American Lake Management Society

The North American Lake Management Society (NALMS) was organized in 1981. NALMS recent brochure describes the Society as (1) an effective lobbyist, (2) a network of limnologists, lake managers, and concerned citizens that spans North America, (3) a forum centered around a quarterly newsletter publishing articles that encourage discussion among its readers, and (4) a technology transfer organization publishing technical and lake management articles in its quarterly, *Lake Line*, and planning further publishing and data collection and dissemination.

In 1983 NALMS will publish the Proceedings of NALMS 2nd annual conference which will be made available to members and will conduct an International Symposium on Lake and Reservoir Management on October 18-20 in Knoxville, Tenn. Applications for membership (\$15 per year) can be sent to NALMS, c/o J. Taggart, 11700 Swarts Drive, Fairfax, VA 22030.

## U.S.-Soviet Research Cruise Scheduled

Every year since 1969, U.S. fishery biologists from the NMFS' Southwest Fisheries Center (SWFC) in La Jolla, California have joined their Soviet scientific counterparts in a cooperative fisheries survey study in the waters off the California coast. This year, the Soviet research vessel *Ekvator* will spend from mid-March through late April in California waters as scientists from both countries collect biological samples used to estimate the abundance of commercially important fish populations.

According to Dr. Izadore Barrett, SWFC Director, the information supplied by the Soviet research cruise is considered the most up-to-date check on the status of the area's hake population prior to the fishing season. The Pacific Fishery Management Council (responsible for managing west-coast fisheries within the 200-mi limit) will consider the data collected during the upcoming

cruise when establishing this year's limit for the hake fishery. The limit on catch is part of an effort to protect the hake population from overfishing.

Both the Soviets and the U.S. have an interest in ensuring the continued abundance of the hake fishery. For the past 5 or 6 yrs, Soviet processing ships have worked in conjunction with U.S. fishermen, who trawl for hake and deliver it to be processed aboard the Soviet ships. The fish is then delivered to Soviet markets. These "joint venture" fishing operations benefit American fishermen by providing a market for hake, as well as the Soviets, who cannot operate within the 200-mi limit unless they are supporting American fishermen.

With the U.S.S.R. supplying the research ship, the upcoming cruise will provide U.S. researchers with a low-cost opportunity to study both the hake and anchovy fisheries. "With research ship costs running as high as \$8,000 to \$10,000 a day, and ship availability limited, a cooperative venture such as this is really a bargain for us. It gives us the chance to collect information during a season and in an area which might not otherwise be monitored," said Dr. Roger Hewitt, fishery biologist with the SWFC.

The Soviet ship will arrive in Long Beach, California in mid-March, and then travel south to the Mexican border to begin a survey pattern which runs from San Diego to San Francisco, in an area covering from 3 to 300 mi from the coast. It will return to Long Beach in late April.

From NMFS news release dated March 10, 1983

## 1983 Bluefin Tuna Quotas

During the recent special meeting of the International Commission for the Conservation of Atlantic Tunas (ICCAT) held in Madeira Island, Portugal in mid-November, the Commission decided to continue conservation measures for bluefin tuna in the western Atlantic. However, the catch limit will be raised from 1,160 metric tons (mt) in 1982 to 2,660 mt in 1983 to allow for adequate scientific monitoring of the stock. The U.S. share of the catch will increase from 605 mt to 1,387.3 mt. The share for Canada and Japan will be 573.3 mt and 699.4 mt, respectively.

Concern for the continued low level of abundance of small bluefin tuna also resulted in a decision to limit the catch of bluefin smaller than 120 cm (approximately 47 in.) in length to no more than 15 percent by weight of the total catch in the western Atlantic. During 1983, there will be no directed fishery in spawning areas such as the Gulf of Mexico.

Virtual population analyses, which were improved since last year's meeting, were used in two different papers which produced some differing results in estimating the population of younger and older fish. The scientists were unable to agree at what catch level a



decline in the population will occur. One view was that juvenile levels are 21% of the 1960 level, with a further decline likely in adult abundance. The other view was that spawning biomass and potential will increase until 1983, with a decreasing trend thereafter. The scientists were of the opinion that the 1982 catches were insufficient to monitor the stock but concluded that the weight of evidence suggests that the catch levels kept should be conservative.

As a result of the increase in the amount of Atlantic bluefin tuna available to the domestic fishery for 1983, the NMFS is now in the process of initiating the regulatory process to allocate the 1983 quota amongst the various gear types in the fishery. The allocations will respond specifically to the ICCAT recommendations dealing with the 1983 U.S. quota for 1,387.3 mt (1528.8 st), limiting the catch of bluefin less than 120 cm, and the prohibition of a directed fishery in the Gulf of Mexico. The regulatory process will include the preparation of proposed regulations, the conduct of public hearings, establishment of comment periods and the preparation of final regulations. Public hearings are expected to take place during the latter part of February or early March. Final regulations are expected to be implemented by the end of April.

The 1982 regulations that became final on June 10, 1982 will remain in effect until replaced by the new regulations.

NMFS Newsletter, Northeast Region

## Sea Grant Graduates

The Education Committee of the Council of Sea Grant Directors conducted a study of Sea Grant training and education programs nationwide. The study purpose was to evaluate the magnitude of the program and to describe the contribution of Sea Grant students, during their school years, but more importantly, after they left the University and entered the economic sector.

The committee sent a survey to all Sea Grant programs nationwide. It was found that nearly 7,000 students had worked on Sea Grant projects since the program began.

Many of these students served under a professor on a specific project, in the field or in the laboratory. Some did not. Course offerings by Sea Grant, in such areas as marine veterinary science or coastal management, also attracted students who are included in the 7,000 number.

The most common fields of study for Sea Grant students were biology (13%), marine science (12%), and engineering (11%). Social sciences were also represented, most strongly by economics (8%) and law (8%). In all, nearly 70 fields were reported, including such diverse areas as horticulture, public health, and seafood sanitation.

The survey found that the majority of students entered the private sector (40%), with about half of their jobs related to Sea Grant experience. These jobs were in private consulting firms, food companies, and marinas, to name a few. The public sector and universities accounted for 32% and 28%, respectively, of graduate employment. Public sector employment was often in a marine-related field, such as coastal or resource management programs. Most former students found their Sea Grant experience valuable training that influenced their employment, either by shaping their interests or by helping them directly to land a job.

Sandra Goolden, N.Y. Sea Grant Institute  
(Excerpted from "Coastlines")

## U.S. Cracks Down on Fisheries Violators

In a major crackdown against scofflaws, NOAA has announced that it will begin legal proceedings to collect more than \$330,000 in outstanding fines owed the Government by commercial fishermen in New England, New Jersey, Virginia, North Carolina, and Delaware.

The unpaid penalties, some from violations as far back as 1977, have been assessed against almost 60 individuals, many repeat offenders, who have violated the MFCMA that regulates the U.S. fishery out to 200 mi.

According to NOAA, collection actions have already begun in U.S. District court in Boston. Recent settlement of a large number of fines involving foreign violations of the New England fishery will enable NOAA to concentrate its resources on collecting these unpaid domestic penalties.

Allen Peterson, Northeast Regional Director of the agency's National Marine Fisheries Service, voiced concern for what he said were fishermen abiding by the rules who are placed at a disadvantage in competing with chronic violators.

"We can no longer tolerate a situation in which the actions of relatively few violators call into question our determination to make the law work the way Congress intended," Peterson said. He added that the agency would revoke fishing permits and take legal action to seize assets, including vessels, if necessary.

NMFS news release dated January 17, 1983

## Great Lakes Pink Salmon Flourished

In 1956, a small number of pink salmon (21,000+) from the Skeena River, British Columbia, were released into Thunder Bay, Lake Superior (Nunan 1967; Kwain 1978) by the Ontario Ministry of Natural Resources. The purpose of this introduction was to attempt establishment of a sport and commercial fishery for the native people of the Hudson Bay and James Bay areas.

## Great Lakes Pink Salmon

All the pink salmon (513,000 eyed eggs and sac-fry; 224,000 fingerlings) were planted in Goose Creek, a tributary of Hudson Bay in the same year, but no adults returned.

Mature pink salmon were first reported in Lake Superior in 1959 by Schumacher and Eddy (1960). By 1971, they were reported as much more abundant and widespread (Lawrie and Rahner 1972). For the past 24 yrs, pink salmon have expanded into all the Great lakes (Lake Huron by 1969; Lake Michigan by 1973; Lakes Erie and Ontario by 1979). These pink salmon form the only known self-perpetuating population in fresh water, and their increase and spread has been remarkable. They are now regarded as one of the established exotics in the Great Lakes.

The spawning behavior of Great Lakes pink salmon is essentially indistinguishable from that recorded for sea-run fish (Hart 1973). Egg sizes do not differ significantly and the eggs are entirely similar in their bright orange-red coloration. Although Great Lakes pink salmon produce only 1,000 eggs per female, as compared to 1,500-1,900 in the sea-run fish, fecundity appears to be related to the size of the fish (average weight 0.58 kg for Lake Superior pink salmon and 2.2 kg for sea-run pink salmon).

Fry emigration initiates soon after emerging from the gravel and the peak of the emigration occurs in the middle of May. Fry do not feed in the stream. The hasty disappearance of these fry from nearshore areas during the summer might be attributed to their avoidance of unfavorable nearshore water temperatures; therefore, they seek cooler water at deeper depths. The postulated early movement of landlocked fish to deep water is a difference which might affect their growth adversely as food is generally more abundant in nearshore areas.

In their native north Pacific environment, these salmon are obligate anadromes characterized by an essentially invariant 2-yr life cycle, egg deposition to egg deposition. Three-yr-old pink salmon have been reported only twice from the west coast of North America (Anas 1959; Turner and Bilton 1968). In Lake Superior, however, 3-yr-old pink salmon have not been uncommon (Wagner and Stauffer 1980) and their occurrence appears to have allowed establishment of an even-year spawning stock in Lake Superior in addition to the odd-year stock originally introduced (Kwain and Chappel 1978).

Pink salmon are slower growing in oligotrophic water than their counterparts are in the richer feeding grounds of the north Pacific, and both Wagner and Stauffer (1980) and Kwain and Chappel (1978) have suggested that this is the cause of the observed delay in maturity. It is well documented for salmonids (Ricker 1964), as well as for many other groups of fish, that the average, slower-growing individuals in a population reach maturity at an older age and that males generally mature

at an average age younger than females. Pink salmon from Lake Superior are consistent with those biological tenants, even to the surprising extent that some pink salmon (all females) did not mature until age IV. Five precocious male pink salmon (age I) have also been found in the Michipicoten River, Lake Superior, during the 1981 spawning run.

The plasticity of the pink salmon life history in the Great Lakes clearly denies the invariant 2-yr life cycle theory; however, it does provide the potential for genetic engineering and the opportunity to establish the long-awaited off-year pink salmon runs in the northwest.

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W. Kwain, Lake Superior Fisheries Research Unit  
Sault Ste. Marie, Ontario

## Nominations for the 1983 W.F. Thompsen Award, AIFRB

The Award Committee for selection of the 1983 W.F. Thompson Award has been convened and would like to receive recommendations for the best student paper published during the years 1980 through 1982. The student winning the award will receive a certificate from AIFRB and a check for \$750.

Papers can be multiple-authored; occasionally, as in 1980, a major professor is a junior author. In this case, the student receives the certificate and the \$750 award, while the professor receives a certificate acknowledging his role in the outstanding paper.

Papers should be concerned with freshwater or marine fisheries problems and may deal with biological or management topics. The papers are judged on the basis of originality, development and organization, and interest to current problems in fisheries.

Nominations for papers must be received no later than 15 July 1983. A final decision on the award will be announced by 31 August 1983. *Seven* copies of the paper should be sent to Dr. John B. Pearce, Chairman, AIFRB W.F. Thompson Award Committee, NMFS/NOAA, Northeast Fisheries Center, Sandy Hook Laboratory, Highlands, NJ 07732.

If there are questions in regard to the award, the Chairman can be contacted at Area Code 201-872-0200, Ext. 206 or FTS 342-8206.

## New Publications and Announcements

### U.S. Directory of Marine Scientists

The latest edition of the *U.S. Directory of Marine Scientists* has been prepared under the auspices of the Ocean Sciences Board of the National Research Council. The new *Directory* updates and expands on the information covered in the 1975 edition. It provides name, affiliation, mailing address, organization telephone number, and fields of expertise for more than 4,000 active marine scientists working in academic institutions, government agencies, and industry.

You will find the *Directory* to be an indispensable and easy-to-use reference — separate indexes by name, by area of expertise, and by organization guide you to the information you need quickly and precisely.

The *Directory* is available for \$12.25 in paper binding.

### Acid Rain/Fisheries

The Northeastern Division of the American Fisheries Society has produced a 1982 book, *Acid Rain/Fisheries, the Proceedings of an International Symposium on Acidic Rain and Fishery Impacts on Northeastern North America*. This hard-bound volume, compiled under the direction of Terry A. Haines, Chairman, and Raymond E. Johnson, Editor, has 357 + vii pages and is derived from the August 2-5, 1981 symposium at Cornell University, Ithaca, New York.

This book on acid rain and fisheries contains sections on historical perspective, case histories, geochemistry, impacts on decomposers, plants, invertebrates, impacts on fish, impacts on amphibians, prognosis and remedial action, and socio-economics and political concerns.

Copies can be obtained (price not known) from the American Fisheries Society, 5410 Grosvenor Lane, Bethesda, MD 20814.

### Fishes of the Upper Colorado River System: Present and Future

The Western Division of the American Fisheries Society, the Fish and Wildlife Service's Region VI, and the Upper Colorado Region of the Bureau of Reclamation co-sponsored a 1981 symposium in Albuquerque. The meeting focussed on fishes of the Upper Colorado River System, with emphasis on endangered and threatened species. The Western Division in 1982 published the proceedings of the symposium, edited by William H. Miller, Harold M. Tyus, and Clarence A. Carlson.

This book of 137 pages has chapters on the literature on the Upper Colorado River and its fishes, distribution and abundance of 54 species of fishes (with maps), new impacts by man, mitigation of aquatic species habitat losses, mitigation and Section 7 of the Endangered Species Act, providing water for endangered species, endangered species preservation, the Colorado River Fishes Recovery Team, and life history and prospects for recovery of Colorado squawfish, humpback and bonytail chubs, and razorback sucker.

The volume is for sale (\$10.00) by the American Fisheries Society, 5410 Grosvenor Lane, Bethesda, MD 20814

### National Academy Publications

The following items are still available from National Academy Press, 2101 Constitution Avenue, N.W., Washington, D.C. 20418.

#### *Doctoral Scientists In Oceanography*

This is an up-to-date review of the demographic and institutional backgrounds of oceanographers in the United States today. Who are they? How are they educated? Where are they employed? How have their characteristics changed in the past decade? ISBN 0-309-03133-8; 1981, 155 pages, paperbound, \$9.25.

#### *The International Mussel Watch*

A promising strategy for the monitoring of coastal pollution, the Mussel Watch utilizes bivalves as recorders of levels of environmental contaminants. This report presents an informed assessment of the strengths and weaknesses of the Mussel Watch concept and provides a state-of-the-art evaluation of the use of bivalves in marine monitoring. ISBN 0-309-03040-4; 1980, 248 pages, paperbound, \$12.50.

#### *Marine Invertebrates*

This fully indexed and illustrated manual contains a wealth of information on the latest methods for maintaining and rearing marine invertebrates in laboratories. Provides general information on setting up, stocking, and maintaining the marine aquarium and detailed directions on animal care and handling; feeding requirements; and more. ISBN 0-309-03134-6; 1981, 382 pages, paperbound, \$19.25.

#### *The Continuing Quest: Large-Scale Ocean Science for the Future*

This report describes some challenging research areas for the 1980s, including physical oceanography, biological oceanography, chemical oceanography, marine geology and geophysics, estuarine and coastal studies, equatorial dynamics, the Southern Ocean, boundary layer processes, open-ocean problems, seafloor sediments, and the deep seabed. ISBN 0-309-02798-5; 1979, 91 pages, paperbound, \$8.25.

#### *Continental Margins: Geological and Geophysical Research Needs*

This report presents detailed recommendations on the priorities, funding, manpower, and technology necessary to mount a broad program of continental margins research in the 1980s. It provides an excellent overview of the state of continental margins science, with discussions of current knowledge of the seafloor, sediments and their geochemistry and diagenesis, the geophysical and geological evolution of continental margins, seismic studies, remote sensing, drilling, and more. ISBN 0-309-02793-4; 1979, 302 pages, paperbound, \$17.25.

### Eighth National Marine Recreational Fisheries Symposium

The 8th National Marine Recreational Fisheries Symposium will be held April 26 and 27, 1983 at the Embarcadero Holiday Inn, San Diego, CA. The symposium will assess status of marine recreational fishing & identify problems and potential solutions. Interested persons contact John Caponiti (813) 893-3788.

### Western Atlantic Turtle Symposium

The Western Atlantic Turtle Symposium (WATS) will be held in San Jose, Costa Rica on July 17-22, 1983. After business meetings and the opening address, sessions will be held on species synopses covering six species of marine turtles, research techniques, and habitat alteration impacts. Later sessions will deal with sea turtle conservation, utilization, culture, and enforcement-regulation; sea turtle status of stocks and management options; and recommendations for future actions. Another feature will be poster sessions covering sea turtle research.

## New Publications and Announcements

For information on registration, accommodations, and transportation, write or call F.H. Berry, Secretary for WATS, NMFS, 75 Virginia Beach Drive, Miami, Florida 33149. Phone (303) 361-4276.

### RNRF Symposium on the Application of Remote Sensing to Resource Management

The American Society of Photogrammetry, in cooperation with the Renewable Natural Resources Foundation, and under the auspices of Commission VII, International Society for Photogrammetry and Remote Sensing, will sponsor the RNRF Symposium on the Application of Remote Sensing to Resource Management in Seattle, Washington on May 22-27, 1983. After the preliminary tutorial program, sessions will be held on environmental monitoring, vegetation damage, water resources (hydrology, coastal zone, wetlands, fisheries), and law. There will also be a study tour to Mt. St. Helens.

For further information, write Roger A. Harding, Arrangements Chairman, ASP/RNRF Symposium, 1215 Ridge St., SE, Olympia, WA 98503.

### Trophic Relationships in Marine Species Relevant to Fisheries Management in the Northwest Atlantic

At the 5th Annual Meeting of the Northwest Atlantic Fisheries Organization in Leningrad, USSR on September 7-9, 1983, there will be a special session devoted to Trophic Relationships in Marine Species Relevant to Fisheries Management in the Northwest Atlantic. The general theme will focus on progress in the study of predator-prey and competitive relationships among marine species, with emphasis on implications for fisheries management advice. Reviews of multispecies interactions in other regions of the North Atlantic are welcome, since comparisons among areas with slightly different species assemblages and physical regimes should yield important insights.

For further information, write or call Dr. G. R. Lilly, Northwest Atlantic Fisheries Center, P.O. Box 5667, St. John's, Newfoundland, Canada A1C 5X1. Phone 1-709-772-5477.

## Progress in Legislation

**Anadromous Fish Conservation and Protection Act of 1982 (Senate Bill 3123)** — This Bill was introduced in December, 1982 and is planned to be reintroduced this spring. Comments on the Bill have been requested, and you can write your Congressman to express your views.

### FINDINGS AND PURPOSE

Sec. 2. (a) Congress finds that —

(1) through homing instincts and natural selection, discrete populations of anadromous fish have evolved genetic diversity that ensures the greatest likelihood of their survival under the particular conditions of their home environments;

(2) the biological integrity and genetic diversity of individual populations of fish that have adapted to different environments are essential to the survival of the species to which they belong;

(3) anadromous fish stocks produced by hatchery systems are frequently characterized by marked fluctuations in abundance and are maintained only through constant human intervention, high energy requirements, and high economic costs;

(4) artificial propagation of large numbers of hatchery fish produced from narrow genetic base has created populations that are vulnerable to disease, competition, predation, fluctuations in physical environments, and changes in budget priorities;

(5) in the past, indiscriminate releases of hatchery-produced fish into streams have adversely affected the survival of naturally spawning populations; and

(6) the most practical and economical means of preserving a species is to protect those inherited traits that assure the biological integrity and maintain the genetic diversity of individual naturally spawning populations of fish.

(b) The purpose of this Act is to provide for the conservation and protection of naturally spawning populations that have adapted to the unique and diverse environments into which they are born by preserving their biological integrity and genetic diversity.

## Activities in the Districts

### NORTHWEST WASHINGTON

John S. Isakson, Director

On January 18, 1983, 25 members and guests heard a very thought-provoking paper by Dr. Percy M. Washington titled "An Analysis of Factors Affecting the Production of Coho Salmon (*Oncorhynchus kisutch*) in the Columbia River." The abstract of this paper follows:

The production of coho salmon in the Oregon Production Index area from 1960 to 1980 was primarily the result of enhancement programs at Columbia River hatcheries. During that period, the numbers of adults produced increased as the numbers and average size of yearlings increased from 1960 to 1971. Adult production peaked in 1971 and then decreased to disastrous levels after 1976. The objective of this paper was to investigate why increases in the numbers and the average individual weight of yearlings released did not result in expected production increases. Environmental degradation, predation, loss of wild runs, ocean density-related phenomena, and factors related to the quality of releases are the hypotheses examined that could explain the collapse in production.

Some of those hypotheses were tested in this paper. One of the more plausible hypotheses relating to quality of releases was that increased rearing densities tended to increase stress, particularly among smaller individuals; these stressed fish could be less physiologically capable of successfully outmigrating, resulting in reduced survival rates from release to adulthood. It was further hypothesized that the mortalities among yearling during the first 6 mo after release were the results of various discrete and discontinuous forces during substage of life history which were bounded by challenge points.

Through analysis of adult sex ratios and jack return data, it was shown that most of the mortalities occurred

(92-99%) during the first 6 mo after release. An analysis of migration timing and in-river survival was made to evaluate the above hypotheses. We used a size dichotomy method, which compares length frequency distributions of release groups of tagged fish with length distributions of the same tagged fish groups recovered in experimental seining immediately above tidewater. Critical to this method was the assumption that the change in size distribution from release to recovery above tidewater was due to size-selectivity mortality, not growth as has been assumed in other approaches; this assumption was tested, and it was found that growth cannot account for the change in size frequencies. Furthermore, most of this mortality ( $\bar{x} = 74\%$ ) was shown to occur before the fish even entered saltwater.

Multiple regression techniques were used to determine the effects of various hatchery practices on adult production. Adult production was found to be best measured in terms of jack returns. Among these hatchery-related factors, pond loading densities was a statistically significant factor negatively affecting the survival of coho to adulthood. Hatchery rearing densities have increased over the past 20 yrs. However, density accounted for only 5% of the variation in returns. Part of the variation may be due to difficulty in measuring the true density. An experiment is suggested to better measure the effects of density on survival of coho to adulthood.

On February 15, 1983, 20 members and guests of the District met to hear a very interesting presentation by Dr. Robert Trumble, Chief WDF Bait Fish Management Division. His talk was titled "Patterns of Exploitation in Puget Sound Herring." He initially focused on the known life history of the Pacific herring and followed with a discussion of the present understanding of this species' distribution, abundance, and spawning locations in the inside waters of Washington. The two general spawning categories he noted were: the Strait of Georgia group, which favors the more physically active headland areas and spawns heavily on various large kelps; and the other, more widely distributed, group in the sound which spawns in embayments for the most part and spawns much more lightly and primarily on eelgrass.

Three fisheries operate on herring in the inside waters of Washington in different locations: the sac-roë fishery occurs in the southern Strait of Georgia, the winter all-purpose fishery primarily operates northwest of Orcas Island and southwest of Bellingham, and the bait fishery is spread through most areas. The sac-roë fishery is relatively new (last 10 yrs) and, along with the all-purpose fishery, has declined from peaks of 3,800 to over 4,000 short tons landed to no catch, as dictated by management of the fishery. The all-purpose fishing is showing some recovery after bottoming out in 1976; the sac-roë fishing bottomed out in 1981. The sport bait fishery has been fairly constant since 1957, with a slight

increase in landings in the 1970s, to present, as compared to years before. The sport bait landings are consistent but small (max. a little over 1,000 short tons) compared to high periods in the other two fisheries.

A major change in the fishery has been in age composition. In the early 1970s, three strong year-classes, side by side, were in the fishery, whereas in more recent years, single year-class (1975 and 1978) have been available in the fishery. In Bellingham Bay, the winter herring fishery in 1980-81 had 3-4 times more age II and age III fish in the landings than in the following season.

Hydroacoustic and midwater trawl surveys since 1976 provide herring stock-assessment data that are proving very useful in the Strait of Georgia herring fishery. More details are available on this fishery in: Trumble *et al.* 1981. The Strait of Georgia Herring Fishery: A Case History of Timely Management Aided by Hydroacoustic Surveys. *Fishery Bulletin* 80(2) : 381-388.

## TEXAS

Robert R. Stickney, *Director*

The Texas Division of AIFRB held its first of what we hope will be many productive meetings on Friday, March 11, 1983 at the National Marine Fisheries Service laboratory in Galveston, Texas. Eight of the 23 Texas Division members were in attendance. The agenda included a business meeting in the morning with brief presentations on each individual's current research activity in the afternoon.

The major result of our business meeting was the decision to begin holding workshops and symposia with various groups within the state. For example, there are annual meetings of the Texas Academy of Science, the Texas Chapter of the American Fisheries Society, and the Texas Fish Farmers Conference, all of which would provide opportunities for interaction. In addition, special symposia and workshops will be organized from time to time. Our first project will be to hold a workshop on recruitment to estuaries by fishes and shrimp (1 day for each group). Andy Landre and Ed Klima are beginning to make preparations for the workshop, which is scheduled for July or August, 1983. We are also examining the possibility of having joint sponsorship by Sea Grant at Texas A&M University. At present, NMFS and AIFRB will sponsor the meeting. We will conduct a mailing of as many fisheries scientists in Texas and adjacent states as possible.

Sammy Ray provided our Division with an excellent overview of current activities within AIFRB. He also provided each Division member with literature on AIFRB which we can distribute among our colleagues.

The interest generated during our meeting indicates that the Division will be very active over the next 2 yrs. We feel that increased visibility will provide incentive for other fishery scientists in the state to join AIFRB, and we will be actively recruiting eligible members in conjunction with our workshops and other activities.

## Membership Report

### Promotion to MEMBER:

William J. Wilson AK

### New MEMBERS:

Harold L. Bergman WY

Dr. Frederick A. Copes WI

Dr. Christopher Frantsi NB

### New ASSOCIATES:

William M. Blaylock WA

James B. Byrne RI

Daryl G. Ellison NE

Kenneth P. Ferjancic WA

Dr. Brian Douglas Fry IN

John H. Hunt FL

Dennis C. Lees WA

Mark A. Winter FL

Sammy M. Ray, *Membership Chairman*

**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. 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.

## DISTRICT DIRECTORS

Turnover in directorships in AIFRB Districts and Regions takes place occasionally, so BRIEFS provides an update when it seems appropriate. We have two new District Directors, so the current list is given here:

### Alaska

John H. Helle\*  
NOAA-NMFS  
Box 155  
Auke Bay, AK 99821

### California, Southern

Norman W. Bartoo\*  
NOAA-NMFS  
Box 271  
La Jolla, CA 92038

### California, Central

Tom Jow  
Calif. Dep. Fish & Game  
411 Burgess Drive  
Menlo Park, CA 94025

### Carolina

William R. Nicholson  
NOAA-NMFS  
Beaufort Laboratory  
Beaufort, NC 28516

### Florida

Joan A. Browder\*  
NOAA-NMFS  
75 Virginia Beach Drive  
Miami, FL 33149

### Great Lakes, South-Central

Charles R. Liston\*  
Michigan State University  
East Lansing, MI 48824-1222

### Gulf of Mexico, Northeastern

Thomas W. Duke  
EPA  
Sabine Island  
Gulf Breeze, FL 32561

### New York - New Jersey

Phyllis H. Cahn\*  
C.W. Post  
Long Island University  
Greenvale, NY 11548

### Oregon-Southwest Washington

Howard F. Horton  
Oregon State University  
Corvallis, OR 97331

### Texas

Robert R. Stickney  
Texas A & M University  
College Station, TX 77843

### Washington DC Metro

Aven M. Andersen, Jr.  
NOAA-NMFS  
8717 Graystone Lane  
Laurel, MD 20811

### Washington, Northwest

John S. Isakson\*  
Dames and Moore  
155 NE 100th St.  
Seattle, WA 98109

\*Regional Director in 1983

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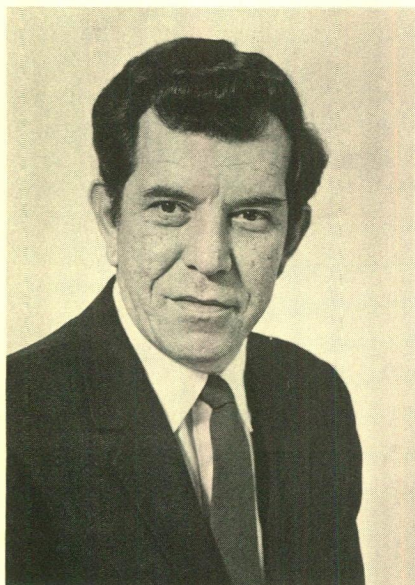
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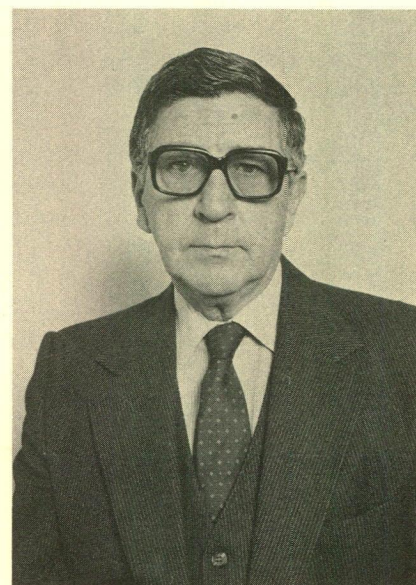
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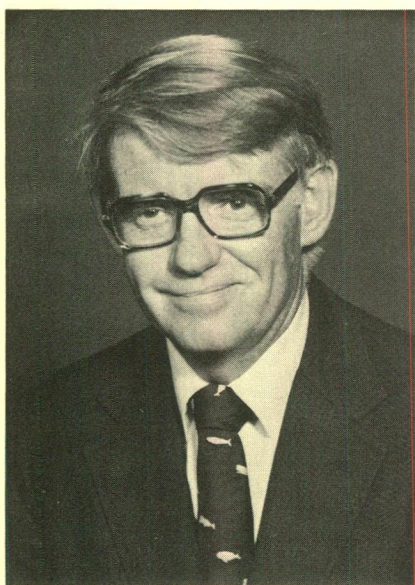
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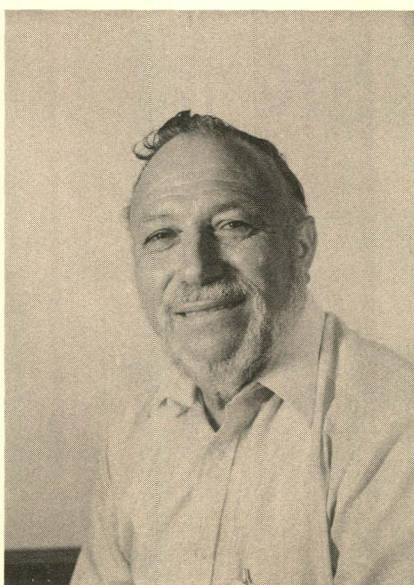
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*Past President*



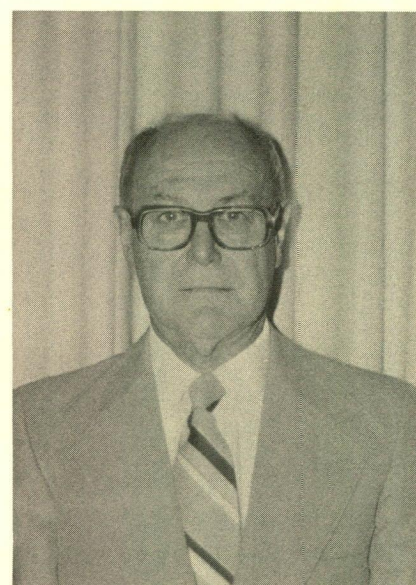
**G. Herbert Lawler**  
*Secretary*



**Charles F. Cole**  
*Treasurer*



**Sammy M. Ray**  
*Chm., Membership Review*



**Oliver B. Cope**  
*BRIEFS Editor*



## In Memoriam

Dr. Ted S. Y. Koo of Mountain View, California passed away earlier this year. He was born February 4, 1910 and died January 18, 1983. A long-time AIFRB biologist, Dr. Koo became a Member in 1959, a Fellow in 1971, and an Emeritus Fellow in 1979. He was a former Board of Control member, and was also chairman of the committee that in 1972 recommended establishment of the AIFRB Outstanding Achievement Award and formulated criteria for the selection of candidates.

## AIFRB Awards, 1982 and 1983

An Announcement in the recent issue of the Canadian Journal of Fisheries and Aquatic Sciences (April 1983, Volume 40, No. 4: 393-397) refers to the AIFRB Special Group Award of Excellence which was given to the Journal last year. The formal presentation was made by President Skud in January at the Canadian Conference For Fisheries Research which was held in Winnipeg, Manitoba. Skud's remarks during the presentation, Jeffrey Watson's (Editor-in-Chief) acceptance on behalf of the Journal and the Certificate are reproduced in the Announcement.



January 3, 1983 Canadian Conference For Fisheries Research, Winnipeg, Manitoba. Bernard E. Skud, President, presenting AIFRB Special Group Award of Excellence for the Canadian Journal of Fisheries and Aquatic Sciences to Jeffrey Watson, Editor-in-Chief and Director of the Scientific Information and Publication Branch, Fisheries and Oceans, Canada.

Nominations for the 1983 awards for individual Outstanding Achievement and for the Special Group Award of Excellence are being opened to the entire membership of the Institute. The criteria for the selection of nominees for Outstanding Achievement were formulated by a Committee chaired by Ted S. Y. Koo in 1972. (Other committee members were R. E. Andrews, I. Barrett, R. L. Borovicka, E. S. Iversen, S. H. Smith, and R. R. Whitney.) These criteria also are applicable to the Group Award: significant publications, exceptional service records, outstanding teaching or training of

students, important discoveries or inventions, and other major contributions to the advancement of Fishery Science. Selection of a candidate will be based on one of these criteria or a combination thereof.

Members who wish to nominate candidates for these awards should submit the name of the individual or group, along with a 1-page summary of the particular attributes that qualify the candidate. The nominations should be submitted by July 15, 1983 to Dr. Fred P. Meyer, National Fishery Laboratory, P.O. Box 818, La Crosse, Wisconsin 54601. Dr. Meyer is the chairman of this Awards Committee. The selections for the two awards will be considered for approval by the Board of Control at its annual business meeting, which will be held on August 14-17 in Milwaukee, Wisconsin in conjunction with the annual meeting of the American Fisheries Society.

As announced in the April issue of BRIEFS, nominations for the W. F. Thompson Award for the best student paper should be submitted by July 15 to Dr. John B. Pearce, NOAA/NMFS, Sandy Hook Laboratory, Highlands, New Jersey 07732. The author(s) of the best student paper will receive a \$750 award as well as a certificate.

## AIFRB Board of Control Meeting

The annual business meeting of AIFRB's Board of Control will be held, as usual, in conjunction with the annual meeting of the American Fisheries Society at the University of Wisconsin-Milwaukee in Milwaukee, Wisconsin. AIFRB's Board of Control will begin its meeting on Sunday, August 14 at 8 PM to approve the agenda and organize special study groups and will continue through August 15 and 16. Any AIFRB members are welcome to attend these sessions. The meeting arrangements are being handled by the District Director, Dr. Charles R. Liston, of the Great Lakes, South Central District.

Any AIFRB member having suggestions for the agenda should submit them to Secretary G. H. "Herb" Lawler, 501 University Crescent, Winnipeg, Manitoba R3T 2N6, by July 10, 1983.

The agenda of the Board of Control Meeting and other pertinent details will be published in the August issue of BRIEFS.

## Western Groundfish Workshop

The second Western Groundfish Workshop, organized by Francis Henry (Calif. Dept. of Fish and Game, CDFG), Bill Lenarz (NMFS), and Milton Love (Occidental College) was held at Asilomar, Pacific Grove, California. The workshop was patterned after that of California Cooperative Fisheries Investigations, CALCOFI, and dealt with groundfish rather than pelagic fish.



The 130 registrants came from the Pacific states, Hawaii, and the east coast. Over 50 papers were presented on economics and modelling, rockfish biology and management, fishery monitoring and assessments, distribution and community structure, food habits, life history, and elasmobranch fisheries, biology and management.

The large number of papers and attendance reflect the recent direction of effort by government and academia to research and management of groundfish. A highlight of the meeting was the attendance of Julius P. Phillips (CDFG retired) a mentor, associate, and friend who was a pioneer in rockfish research.

The next workshop is scheduled for 1985 in British Columbia, Canada.

Tom Jow, Calif. Dept. Fish and Game, Menlo Park, CA

## FAO Meeting on Neritic Fishes, Costa Rica

The Food and Agriculture Organization (FAO) of the United Nations sponsored the *Expert Consultation to Examine Changes in Abundance and Species Composition of Neritic Fish Stocks* held in San Jose, Costa Rica April 18-29, 1983. Twenty-one countries were represented (68 participants). Most of the papers, presented in English and Spanish with simultaneous translation, concerned pelagic species and the greatest emphasis was on sardines and anchovies, but other species, including those in the Great Lakes, were discussed. The paper on this latter topic was presented by John H. Magnuson (University of Wisconsin) and in addition to reviewing the changes in species composition in the Great lakes during the past 30 years, he discussed the interactions (competition and predation) between the introduced and native species. My paper also concerned the interactions of fishes, marine pelagics, and the relation of their abundance to environmental factors. My thesis was that the "failure" of long-term significant correlations between these factors is sometimes caused by a change in dominance, i.e. the response to fluctuations in the environment is dependent on whether the species is dominant (more abundant) or subordinate.

The pelagic fishes off the western coast of South America received the greatest attention at the meeting and emphasized the multiple effects of El Niño on fish and bird populations as well as on climatic changes. I was particularly impressed by the caliber and thoroughness of research by biologists and oceanographers from Chile, Ecuador, and Peru. Papers on other fisheries also were very informative, including those of Japan, Africa, Europe, and North America. The particular problems of studying tropical fishes were also discussed.

In addition to these technical papers, there was a session on the impact of environmental and resources variability on human communities. One of these papers concerned the provision of scientific advice to decision-

making and was presented by Ray Beverton, who is again involved directly with fisheries after a decade or so of serving as the Secretary of the National Environmental Research Council in England. Beverton's contributions in the sessions concerning assessments and stock and recruitment were of special interest, as these discussions often referred to his classic work with Sidney Holt on population dynamics. Beverton has recently accepted the position of Editor of the scientific journal of the International Council for the Exploration of the Sea.

The final paper of the meeting was entitled "*Modelling Fisheries: What was the question?*" by Sharp, Csirke and Garcia. The concluding sentence of this paper was: "If it is recognized that the equilibrium or averaging concepts have proven to hinder rather than help in facing the problem of variations in climate-ocean processes, and their products, fishery potential, and if it is also recognized that the fishery is just one of the many elements to be considered in modelling fisheries, then we may find this to be the age of rediscovery in fishery science."

The papers and a report of the results of discussions from this meeting will be published by FAO at a later date.

Bernard E. Skud, Narragansett, RI

## ✓ Trophic Relationships Between Tunas and Their Prey

During recent years studies have been conducted jointly by the Inter-American Tropical Tuna Commission, La Jolla, CA, the Southern California Coastal Water Research Project, Long Beach, CA, and NASA-Ames Research Center, Moffett Field, CA, to gain a better understanding of the trophic structure of the pelagic food web in the eastern Pacific Ocean and the role and position of yellowfin and skipjack tuna in that ecosystem. Two approaches have proven valuable for determining food web linkages in the eastern Pacific by means of natural tracers. The methods involved coupling information on stomach contents with data on the cesium-potassium ratios (Cs/K) and stable carbon isotope ratios ( $^{13}\text{C}/^{12}\text{C}$ ) of principal component species of the ecosystem.

It has been shown that under equilibrium conditions food appears to be the major source of Cs and K for marine fish. In animal tissues, the biological half-life of Cs is two to three times that of K. Tissue concentrations of Cs (normalized to K) are well known to biomagnify two to three times with each step in linear food chains, thus providing a tool for determining trophic structure.

Staple carbon isotope ratios in organic material have been used as natural tracers to (1) identify sources of organic carbon in the environment (i.e. different producer communities) and (2) to delineate flow pathways of carbon up the food chain. The first is possible

## Tunas and Their Prey cont.

because individual plant species or groups possess unique  $^{13}\text{C}/^{12}\text{C}$  values, due to the differential biochemistry of photosynthetic fixation of carbon dioxide by different plants. The second application provided the basis for a study in the eastern Pacific. While the  $^{13}\text{C}/^{12}\text{C}$  of animal tissue closely resembles the  $^{13}\text{C}/^{12}\text{C}$  of the animal's diet, a small but significant elevation in animal  $^{13}\text{C}/^{12}\text{C}$  relative to that of the available food has been observed.

The application of the CsK and  $^{13}\text{C}/^{12}\text{C}$  methods in pelagic ecosystems was substantiated by identifying trophic levels of prominent organisms in the eastern Pacific via their feeding habits, and comparing trophic level assignments with tissue concentrations of these elements and isotopes.

Most of the samples for the analyses were collected off the coast of Central America during April 1980. Muscle tissue samples and stomachs were taken from 4 silky sharks (*Carcharhinus falciformis*), 36 yellowfin, and 44 skipjack. Several samples of zooplankton and some of the major tuna prey species, including frigate tunas (*Auxis thazard*), flyingfishes (*Oxyporhamphus micropterus* and *Exocoetus* sp.), and squid (*Symplectoteuthis oualaniensis*), were also collected.

In contrast to some nearshore marine ecosystems, the CsK and  $^{13}\text{C}/^{12}\text{C}$  values for the pelagic eastern Pacific consumers analyzed were highly correlated with estimated trophic level. The CsK ratio increased by a factor of 2.4 per trophic step. The average increase in  $^{13}\text{C}/^{12}\text{C}$  (normalized by the  $^{13}\text{C}/^{12}\text{C}$  of the PDA belemnite carbonate standard) per trophic level was 0.84 parts per thousand. The results indicate a systematic increase in trophic position of squid, flyingfish, frigate tuna, skipjack and yellowfin, and silky sharks, respectively, in the eastern Pacific. Although the mean  $^{13}\text{C}/^{12}\text{C}$  values for yellowfin and skipjack are almost identical, the CsK values indicate that yellowfin occupy a considerably higher position in the food web than skipjack. This is also supported by food habit studies.

These results refute the idea previously held that marine food webs are largely unstructured.

Robert J. Olson, IATTC, La Jolla, CA

## Atlantic Shark Tagging

In 1982 a total of 4,553 sharks and teleosts were tagged under the NMFS Cooperative Shark Tagging Program. These represented 36 species of sharks and 7 species of teleosts. Of the total number of fish tagged, rod and reel fishermen accounted for 44%; U.S. longline fishermen, 11%; U.S. Fishery Observers on foreign vessels, 17%; U.S. Research Vessel *Geronimo*, 15%; Polish Research Vessel *Wieczno*, 10%; and the remaining 3% were released by NMFS biologists.

A total of 139 tags from 18 species were returned in 1982. These came from blue (66), mako (15), sandbar

(10), tiger (9), lemon (8), dusky (6), other sharks (20), and teleosts (5). The categories of fishermen who returned tags in 1982 were: U.S. sportsmen (41%), U.S. longliners (24%), other U.S. fishermen (5%), foreign longliners (21%), and other foreign fishermen (9%). In the latter categories, tags were returned by fishermen from 15 countries including Japan (11), Mexico (5), Korea (5), Cuba (5), Spain (3), Taiwan (2), Canary Is. (2), Canada (1), West Indies, Bermuda and Bahama Is. (5), and others (3).

The 139 fish that were recaptured in 1982 were originally tagged by: U.S. sportsmen (52%), U.S. longliners (9%), U.S. fishery observers aboard foreign longliners (11%), R/V *Geronimo* (17%), R/V *Wieczno* (9%), NMFS biologists and others (2%). These figures reflect the diversity of people who participate in the tagging program. They also show the types of fisheries that are (or can be) directed toward sharks. Any attempt to manage sharks as a resource will, depending on the species, have to consider several different international and U.S. interests.

In 1982, both the number of fish tagged and recaptured was slightly lower than in 1981 (826 fewer tagged, 14 fewer recaptures). The difference is largely explained by fewer blue sharks being tagged and recaptured in June of 1982. Poor weather conditions last spring resulted in reduced fishing effort when blue sharks are normally most abundant off New York and New Jersey. Our data from tournaments and results of tagging efforts later in the summer did not indicate any decline in the shark population.

Jack Casey, Narragansett, RI

## ✓ The International Skipjack Year Program

In June 1983, a conference will be held at the Laboratory of the Oceanographic Institute of Spain at Santa Cruz, Island of Tenerife, Spain. The conference will draw together a world-wide group of scientists and culminate a 4-year international research program to gather information for expanding and managing fisheries on skipjack tuna (*Katsuwonus pelamis*). Results from research from the 13 countries (Brazil, Cape Verde, Cuba, France, Ghana, Ivory Coast, Japan, Korea, Portugal, Senegal, Spain, USA, and USSR) which actively participated in the program will be presented and published in a proceedings volume.

The program started in 1975. The International Commission for the Conservation of Atlantic Tunas (ICCAT), chartered to maintain the Atlantic tuna stocks, took note of a growing tuna fleet, particularly large purse seiners, and a sharp decline of skipjack catch that year, and immediately began an investigation of the condition of the stocks. However, there was insufficient information for an adequate assessment although the scientists felt that the stocks remained underexploited.

## **Skipjack** cont.

To remedy the situation, ICCAT's Standing Committee on Research and Statistics (SCRS) recommended in November 1976 that an International Skipjack Year Program (ISYP) be planned, funded, and carried out.

The goal of the international investigations was to answer four questions: (1) Can catches be increased by fishing new areas and new stocks, especially in the western Atlantic? (2) Can catches be increased by fishing larger fish, especially those over 5 kg? (3) What could be the effects of the above increased fishing on the existing fisheries? and (4) How can better assessments of the stocks be obtained by using information from existing fisheries? The plan was approved and funded in 1978 and the program began in 1979. Dr. Philip Symons was hired as a coordinator and he and the SCRS through a Subcommittee on Skipjack Tuna has executed the plan.

In support of the ISYP, scientists from the Southwest Fisheries Center at La Jolla conducted studies in three broad areas: port sampling, dart tagging and exploratory fishing, and biology. The major effort consisted of sampling the catch of the U.S. purse seiners fishing in the Atlantic Ocean and landing at Mayaguez and Ponce in Puerto Rico. In general, these large purse seine vessels fish the Atlantic after the close of the IATTC Commission Yellowfin Regulatory Area (CYRA) in the eastern Pacific. Usually closure occurs sometime in the early summer (depending upon catch), but may occur as early as April or as late as September. Some of the vessels then move to the Atlantic and fish until December. Samples were also collected from the catch of foreign-flag vessels which transship Atlantic tunas to Ponce and Mayaguez, Puerto Rico.

In addition, U.S. scientists undertook a number of analytical studies including research on feeding habits, maturity and fecundity, stock identification and relation of environmental variables to fish distribution. In 1981, a baitboat was chartered to conduct dart tagging and exploratory fishing in the tropical western Atlantic Ocean.

Participants in the U.S. studies were Lisa Ankenbrandt, David Au, Atilio Coan, Andrew Dizon, Richard Evans, John Graves, Samuel Herrick, Eugene Holzapfel, Wesley Parks, Ronald Rinaldo, and Gary Sakagawa.

Andrew E. Dizon, U.S. NMFS, La Jolla, CA

## ✓ **More El Niño**

Periodically a large part of the surface layer of the eastern tropical Pacific Ocean warms up abnormally. This is known as the El Niño phenomenon. El Niño is a colloquial term with a religious connotation, possibly referring to the Christ child because of the culmination of this phenomenon around Christmas. The anomalously warm sea-surface temperatures (SST) appear initially several hundred miles off the west coast of Peru and

subsequently spread along and away from the equator and toward the coast of Peru, where normal upwelling is greatly diminished. The rapid warming of tropical waters occurs most often when the atmospheric and oceanic circulations are displaced from their seasonal positions for periods in excess of 6 months. When this occurs, especially in the tropics, surface winds decrease, *in situ* heating of the ocean surface increases, and upwelling in the Peru Current along the coast is reduced markedly. Subsequently, nutrient enrichment decreases along the equator and in coastal regions due to weak upwelling. Apparently, ocean currents are modified also. As a result, there are changes in the distribution and abundance of food organisms which normally sustain the stocks of many commercially important fishes.

To fisherman and coastal villagers of South America, notably Ecuador and Peru, El Niño has meant unusually warm coastal waters, red tide, poor fishing, and frequent torrential rains, all reaching peak intensities in December. Seafarers have often experienced a southward moving current along Ecuador and northern Peru during El Niño. The current flows counter to the Peru Current, which becomes much weaker than normal, and this "Corriente del Niño" may be an eastern extension of the North and/or South Equatorial Countercurrent.

During July and August 1982 in the eastern tropical Pacific, SSTs increased rapidly to more than 1 °C above normal over a large part of the equatorial Pacific between 85°W and 160°W. During September SSTs continued to increase at greater than seasonal rates, and by October 1982 the warm water reached the coast of Peru, where SSTs were 3°-4°C above normal. A large area along the equator between 120°W and 140°W also experienced SSTs more than 4°C above normal at this time. From November through December 1982 SSTs continued to increase, becoming 5°-6°C above normal along the coast of Peru and along the equator centered at 130°W. During the first quarter of 1983 SSTs remained 5°-6°C above normal along the coast of Peru. However, along the equator SST anomalies were gradually reduced to 2°-3°C above normal. The SSTs along the coast of Peru have been some of the highest on record for an austral summer, and they indicate an absence of any significant coastal upwelling.

The impact of the 1982-83 El Niño on the oceanography and fisheries in the eastern tropical Pacific remains to be determined. However, catches of tunas along the coast of Ecuador dropped dramatically after the El Niño set in along the coast. Anchovy catches along Peru were markedly reduced also after mid-1982, whereas they had been good during the first half of the year. By the end of March 1983 there was an indication that this extensive and unusually warm El Niño may abate somewhat by mid-winter in the southern hemisphere. However, if the ocean and atmosphere circulations do not return to near-normal conditions by mid-1983, the El Niño of 1982-83 may have a more severe effect on the fisheries in the eastern

## El Niño cont.

tropical Pacific than did the El Niño of 1972-73. Ecuador and northern Peru have had torrential rains periodically which set new records covering the past 100 years as a result of El Niño.

Forrest R. Miller, IATTC, La Jolla, CA

## AIFRB District Activities

### CENTRAL CALIFORNIA

Tom Jow, Director

The March 10, 1983 dinner meeting of the District was held in Palo Alto, California and 24 members and guests were in attendance. Dr. Leonard Campagno, California State University San Francisco, presented an extremely interesting talk on sharks. He covered systematics, biology, and distribution as well as the recent discovery of a new species, the megamouth shark.

Sharks are cosmopolitan in distribution, range in size from under a foot to over 40 feet, and have diverse life histories. Large sharks have received the most attention due to shark attacks on humans by the great white shark; however, most sharks are relatively small with lengths under 2 meters.

Megamouth was entangled in the sea anchor of a navy ship over deep water off Hawaii in 1976. It is a large shark with a big mouth. It apparently is a deep dwelling shark that feeds on plankton and may have followed movement of its prey when entangled.

The District's next meeting is scheduled for May 19, 1983 in Vallejo. Dr. Perry Herrgesell, California Department of Fish and Game's Bay Delta Study will describe his San Francisco Bay Study.

### FLORIDA

Joan A. Browder, Director

In a seminar meeting of the Florida District on March 10, Dr. Grant Gilmore of the Harbor Branch Institute spoke on "East Central Florida Fish Communities and Habitat Associations."

Dr. Rezneat Darnell of Texas A & M University was speaker at a seminar meeting of the Florida District in Miami on April 7. Dr. Darnell, a fishery ecologist, gave two lectures. The title of the first was "*Biological Resources of the Northwestern Gulf of Mexico Continental Shelf: A New Look.*" It covered work recently performed for the U.S. Minerals Management Services. The second lecture, which covered results of genetic work on a poeciliid, was entitled "*Studies on an All-Female Species of Fish from Eastern Mexico.*"

The Florida District held its annual dinner banquet in Miami on May 12. Dr. James Kushlan, leader of the Wildlife Research Team at Everglades National Park, discussed the Park's research on alligators, wading birds, and freshwater fish in ecological studies aimed at "Building an Ecological Perspective on Water Management in the Everglades."

### GULF OF MEXICO, NE

Thomas W. Duke, Director

The Gulf of Mexico Northeast District of the American Institute of Fishery Research Biologists held its Spring meeting at the National Marine Fisheries Service Pascagoula Laboratory on April 15th. Twelve members of AIFRB and three visitors were present. Gilmore Pellegrin acted as host for the Pascagoula Laboratory and Dr. Andrew Kemmerer, Laboratory Director, presented the program and talked about activities at the Pascagoula Laboratory. Recent activities include a program to improve the efficiency of the Gulf shrimp fishery. It was determined that 33 % of the diesel fuel used by the fishing industry was used by shrimpers. This laboratory has conducted tests to determine the best types of nets to use and the most efficient use of diesel fuel by the shrimping boats. The National Space Technology Laboratory at the Mississippi Test Facility is also under Dr. Kemmerer's direction, and this laboratory has been involved in launching satellites to make fishery-related observations. For example, satellite pictures indicate that combinations of temperature and chlorophyll in surface waters may be related to oxygen-deficient water masses found in the Gulf of Mexico. After Dr. Kemmerer's interesting presentation, the group visited the stern trawler, Delaware II, that was docked nearby. The operation of the trawler and its uses in fishery research were explained by Gilmore Pellegrin.

A short business meeting was held in which Dr. Nakamura reported on the last Board of Control meeting and discussed changes in bylaws of the organization. The group set the date of the next meeting for early Fall 1983 and will hold the meeting in the Mississippi area.

### NORTHWEST WASHINGTON

John S. Isakson, Director

Forty-five members and guests attended the March 15, 1983 Annual Dinner meeting held at the Chinese Palace Restaurant in White Center. Thanks again to Ken Chew for being a good, if not prompt, host this year.

Our guests were Dr. and Mrs. Aron. After a long absence (15 years!) Bill recently returned to Seattle as Director of the Northwest and Alaska Fisheries Center. He treated us with a brief but provoking discussion, "Musings of a Meandering Bureaucrat," contrasting his vision of growing northwest fisheries with the elements and activities of the D.C. bureaucrats 3,000 miles to the east. He views marketing as a central and, for those involved, exciting force of activity in the coming years. He argues, further, that scientists need to understand user needs a lot better and that they must enter the political arena. He suggested that the eastern bureaucrats view fisheries scientists as people who enjoy doing their hobby, and that we must work to replace this image with one of concern about societal payoffs.



Bill also related his experiences with various lobbyists during his execution of marine mammal regulations, noting environmentalists and conservationists are armed with an articulate legal verve that contrasts markedly with the weak efforts of the fishermen's lobby. It has not been a "fishermen's Congress."

His final word of wisdom: Go east—at least for a while—if you want to make an impact.

## New Publications and Announcements

### Identification of Larval Fishes of the Great Lakes Basin with Emphasis on the Lake Michigan Drainage

Under the editorship of Nancy A. Auer, five authors, Nancy A. Auer, Lee A. Fuiman, George R. Heufelder, David J. Jude, and Heang T. Tin, of the University of Michigan's Great Lakes Research Division, have compiled an atlas of larval fish of the Great Lakes sponsored by the Great Lakes Fishery Commission, Ann Arbor, Michigan and Consumers Power Company, Environmental Division, Jackson, Michigan. The atlas combines existing literature with original work and illustrations of 148 species, many previously undescribed. In addition to a key to the families, accounts include diagnostic characters, meristics, and descriptions of ecology and reproductive biology of adults. A description of the egg is given, as are morphometric, morphological, and pigmentation characteristics of yolk-sac larvae, larvae and juveniles. Wherever possible, illustrations of yolk-sac larvae and larvae have been included. The atlas has 744 pages, and over 200 figures. Copy is three-hole punched, wrapped in plastic, ready for insertion in your three-ring binder. Copies are available from the Great Lakes Fishery Commission for \$10.50 U.S. funds or \$12.50 Canadian.

### The Best Management Practices for the Management & Protection of Western Riparian Stream Ecosystems.

This report is the product of a 2-year effort by the Riparian Habitat Committee of the Western Division of the American Fisheries Society. It is designed to serve as a guide in the management of western riparian stream ecosystems. Chapters focus on livestock grazing, mining, water development and irrigation, road construction, agriculture and urbanization, and timber harvest. The 45-page book is available for \$5.00 from: Riparian—BMP's, 21543 Southwest 98, Tualatin, OR 97062.

### Recent Springer-Verlag Books

The following recent publications can be obtained from Springer-Verlag New York Inc., P.O. Box 2485, Secaucus, NJ 07094.

#### *Global Fisheries: Perspectives for the 1980's.*

Twelve experts in marine policy have joined together in this book to provide a broad examination of the management of global fisheries. The past and present status of fisheries management as well as insights into the future are given with particular regard to the effects of the changing law of the sea. This timely, multidisciplinary overview offers guidance toward solving contemporary problems in fisheries and will be of interest to fisheries experts, biologists, policy scientists, legal experts, political experts, and economists. Edited by B.J. Rothschild, University of Maryland. Price \$34.80.

#### *Oceanography: The Present and Future*

Presenting the views of leading marine scientists, *Oceanography: The Present and Future* describes the current status of research on the waters of the ocean and offers insights into what lies ahead. Approaching this theme from biological, chemical, physical, and geological perspectives, the contributors detail the outstanding accomplishments — and the unanswered questions — of the present. Important problems of marine policy concerning the use and protection of marine

and coastal environments are discussed, emphasizing the immediate practical importance of fundamental ocean research.

A companion volume to *Oceanography: The Past*, this book is derived from presentations made at Woods Hole on the occasion of the 50th anniversary of the founding of the Woods Hole Oceanographic Institution. This volume gives all those with an interest in oceanography the opportunity to read what eminent leaders in the field view as today's and tomorrow's problems and opportunities. Edited by P.G. Brewer, Woods Hole. Price \$39.80.

#### *Oceanography: The Past*

This book includes 69 papers that record many of the diverse events in oceanography which have led to the present status of this science. A number of the authors were major figures in shaping these events, and their contributions provide unique insights into their roles and those of their associates and predecessors. Oceanographers and historians of science are provided with new perspectives and much original source material with extensive bibliographies. Students and teachers will find a wealth of information about the challenges and problems faced by ancient and modern pioneers in oceanography. Edited by M. Sears, Woods Hole, and D. Merriman, Yale University. Price \$39.80.

#### *Applied Ocean Research, Volume 5 (4 issues)*

Offshore engineering is a rapidly developing field that is having, and will continue to have, an enormous impact on our ability to use the oceans' resources and to protect the oceans' environment. This is a formidable responsibility faced by engineers from a variety of disciplines as they merge their skills into the modern ocean industry. New advances in technology, a greater understanding of mechanics, geophysics, sedimentology, structural mechanics, seismic effects, and other developing subjects all concern these engineers.

*Applied Ocean Research* brings together expert writings on these subjects that have engineering applications and relevance. No other publication presents such an outstanding array of articles for the immediate benefit of marine engineers, offshore technologists, civil engineers, naval engineers and architects, and mechanical engineers.

Engineers, researchers, and technologists interested in offshore engineering-related work being done in fluid mechanics, oceanography, ocean geology, and applied mathematics should subscribe to this journal. Scientists working on problems related to ocean pollution and the ocean environment will come to depend on this journal's high level of reporting of advances as they occur.

The offshore engineering community and the scientists working with them have an enormous role to play in the future of ocean resource development. *Applied Ocean Research* is the one journal they need to keep them abreast of every aspect of this dynamic and important field of study. Price \$131.00.

#### *Managing the Ocean Resources of the United States*

Written by a noted authority in the field, this monograph analyzes the interaction of major federal marine management programs and their potential for effective maritime resources and activities control. Emphasis is placed upon these programs' ability to provide consistent and comprehensive results. After discussing the fragmented mechanisms within the federal agencies structure, including their functioning and possible changes in the future, the marine sanctuaries program, established under Title III of the Marine Protection, Research and Sanctuaries Act, 1972, is discussed at length. Designed to coordinate the federal marine management effort of our most valuable and fragile marine areas, this bill's ability to effect change as well as its future implementation are detailed. D.P. Finn, Woods Hole. Price \$16.00.

### Tropical Fishery Scientists

The International Center for Living Aquatic Resources Management (ICLARM) is initiating an international network of tropical fishery scientists to enhance communication between fishery scientists working on aspects of management-oriented research. The network would include individuals engaged in studies of the scientific aspect of



### Tropical Fishery Scientists cont.

assessment, conservation, and management of tropical stocks. It would include anyone with an interest in estimating the various biological, fishery, and socio-economic parameters which determine the magnitude of harvests and in the application of those parameters to models, with the final objective of arriving at scientifically sound management measures for tropical stocks.

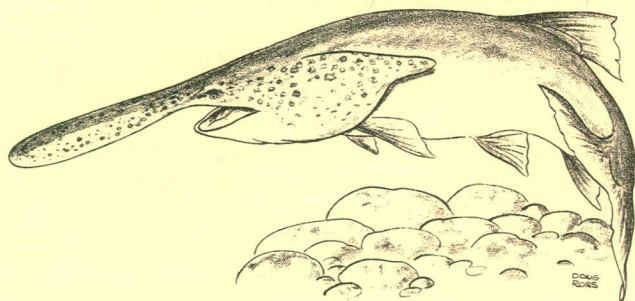
If the idea sounds interesting and you feel you could benefit from membership, write to the Director, Resource Development and Management Program, ICLARM, MCC P.O. Box 1501, Makati, Metro Manila, Philippines, outlining your scientific background, publications, and current research program. Membership is free. The only expectation is that members should be willing to discuss their work and respond to inquiries from fellow scientists.

### Paddlefish—A Threatened Resource

This symposium, sponsored by the North Central Division of the American Fisheries Society, is scheduled as a special half-day session (1:00-5:30 p.m. on Tuesday, December 6, 1983, in an unopposed time slot) during the 45th Midwest Fish and Wildlife Conference in St. Louis, Missouri. The symposium will present current life history, distribution, threats, current management practices, and future needs for paddlefish in the United States.

Our invited speakers are recognized experts on the biology, culture, and management of paddlefish, and they will address the question posed in the symposium title. We intend to publish a proceedings of the symposium featuring a special section entitled "An Indexed Bibliography of the Paddlefish (*Polyodon spathula*)" which will provide easy access to most of the published reports regarding this species.

More information is available from Joe G. Dillard, Missouri Department of Conservation, 1110 College Avenue, Columbia, Missouri 65201 (314/449-3761).



### Southeastern Association of Fish and Wildlife Agencies

The 37th Annual Conference of the Southeastern Association of Fish and Wildlife Agencies will be held at the Inn on the Plaza, One Thomas Wolfe Plaza, Asheville, North Carolina, November 6-9, 1983.

Manuscripts for papers must follow guidelines in the "Instructions for Manuscript Preparation" published by the Southeastern Association which are found on the inside cover of the 34th Southeastern Proceedings (1980). The deadline for submitting papers to the appropriate program committee is June 15, 1983. Papers received after this deadline will not be considered. All authors are requested to submit five copies of their paper in final form to Dr. Larry Wilson, University of Tennessee, P.O. Box 1071, Knoxville, TN. 37901.

### Symposium—Forecasting in Water Resources Management

The American Water Resources Association is holding its 1984 Spring Symposium at the Downtown Sheraton Hotel in Seattle, Washington on June 11-13, 1984. The Symposium is entitled "A critical assessment of forecasting in Western water resources management".

The general theme is the science of water supply and demand-forecasting and its significance to policy and planning by local, state, and federal agencies. Parallel sessions are planned for those who develop forecasts and forecast techniques and for those who use forecasts in decision-making and management.

Dr. Gary R. Minton, Resource Planning Association, Seattle, Washington, is general chairman (206-282-1681).

### Mackerel Symposium

Five years have passed since the colloquium on Spanish and king mackerel was held in Brownsville, Texas. Much has been learned since then. New mackerel fisheries have developed. The Florida Department of Natural Resources and the Southeast Fisheries Center of NOAA, NMFS are planning another mackerel symposium to discuss recent developments and new information about these resources. The symposium is scheduled for November 4-5, 1983 in Orlando, Florida. Species of interest will be fishes of the genus *Scomberomorus* in the western Atlantic. Topics will include management, fisheries, biology, stock assessment, and socio-economics.

If you or anyone on your staff is interested in participating in this symposium, let one of the following know at your earliest convenience: Roy O. Williams, Florida Dept. Natural Resources, 100 Eighth Ave., SE, St. Petersburg, FL 33701; Eugene L. Nakamura, NOAA/NMFS, 3500 Delwood Beach Road, Panama City, FL 32407-7499.

### Symposium—North American Lake Management Society

The North American Lake management society will sponsor an international symposium in Knoxville, Tennessee on October 18-20, 1983. The symposium will center on lake and reservoir management, emphasizing techniques and research oriented toward management goals. Because of the international coverage, those attending will experience a unique opportunity to exchange information.

Symposium information is available from Wayne Poppe, TVA, 248 401 Bldg., Chattanooga, TN 37401.

### Reservoir Fisheries Management Symposium

A national symposium on managing reservoir fishery resources will be sponsored by the Reservoir Committee, Southern Division, American Fisheries Society and Federal Assistance, Region 4, U.S. Fish and Wildlife Service, in Lexington, Kentucky on June 13-16, 1983.

High angling demand and a decline in the rate at which new impoundments are being constructed will require a shift in emphasis toward management of aging reservoirs. A reassessment of sampling methods, effects of chemical and physical factors, predator-prey interactions, and influences of harvest on fish populations is needed to maintain effective and predictable management programs. This will require communication and integration of knowledge among anglers, economists, engineers, biologists, and agencies which have regulatory control of reservoir operation and fishery concerns. The symposium will provide a comprehensive assessment of the state-of-the-art of reservoir fishery management that will provide direction for the future as well as summarize the past.

For information, contact Benjy Kinman, Kentucky Department of Fish and Wildlife Resources, No. 1 Game Farm, Frankfort, KY 40601.

## Correction

Leo Shapovalov reminds us of a spelling error on page 3 of the AIFRB Articles of Incorporation published in February 1983 and distributed to the membership in April. James W. Moffett's name was misspelled, and holders of the booklet can make the correction.

# Thesis and Dissertation Abstracts

## Fish Assemblages in Wisconsin Bog Lakes

Frank John Rahel, Ph. D. 1982,  
University of Wisconsin - Madison

I examined fish assemblages in naturally acidic Wisconsin lakes to 1) determine factors influencing community structure, 2) compare acid tolerance of yellow perch (*Perca flavescens*) from acidic and alkaline lakes, and 3) compare species distributions in naturally acid lakes to those in lakes affected by acid precipitation. Three distinct fish assemblages were identified in 43 lakes encompassing a gradient from bog ponds to small, oligotrophic lakes with little bog character. Maintenance of assemblage type depends on both abiotic factors (particularly pH and winter oxygen concentrations) and biotic factors (exclusion of cyprinids by centrarchids).

The centrarchid assemblage dominates lakes across a wide pH range, providing winter anoxia does not occur. Lakes with low winter oxygen concentrations harbor a cyprinid assemblage if the pH is above 5.2. Acidic lakes which winterkill contain the *Umbra-Perca* assemblage (central mudminnows, *Umbra limi*, yellow perch, and bullheads, *Ictalurus* spp.). Five fishless lakes had physical and chemical characteristics similar to *Umbra-Perca* lakes. Community expansion was by species additions for the centrarchid assemblage. However, no environmental differences between lakes with and without common species were found for centrarchid or *Umbra-Perca* lakes.

Multivariate analysis of physical/chemical variables identified three general environmental gradients influencing community type and species richness: 1) habitat size and littoral development, 2) lake productivity, and 3) depth.

Yellow perch from naturally acidic lakes survived longer than alkaline lake perch when exposed to a lethal low pH. Acclimation did not eliminate differences in acid tolerance, suggesting they are genetically based. Acid-lake perch had slightly lower whole-body concentrations of sodium and potassium than alkaline-lake fish. Perch from both types of lakes were equally susceptible to high pH stress, but acid-lake fish survived longer during exposure to a lethal high temperature.

Differences were evident in the lowest pH at which 31 fish species occurred in 138 lakes. The central mudminnow, yellow perch, and various centrarchids occurred below pH 5.0, while many cyprinids and darters were only found above pH 6.2. Species occurrence in relation to pH was similar to that in lakes affected by acid precipitation. In laboratory tests, the relative acid tolerance of 12 fish species was similar to tolerance rankings based on species' distributions in naturally and culturally acidified waters. Young of several species survived longer than the cyprinids tested, indicating that the acid-sensitivity of these cyprinids was not merely due to small size. Wisconsin lakes susceptible to acid precipitation typically lack many fish species sensitive to low pH, even when lake pH is circumneutral. Species interactions and biogeographic factors, not recent acidification, are probably responsible for species absences in these lakes.

## An Analysis of Factors Affecting the Production of Coho Salmon (*Oncorhynchus kisutch*) in the Columbia River

Percy Matthieu Washington, Jr., Ph. D. 1982,  
University of Washington

The production of coho salmon in the Oregon Production Index area from 1960 to 1980 was primarily the result of enhancement programs at Columbia River hatcheries. During that period, the numbers of adults produced increased as the numbers and average size of yearlings increased from 1960 to 1971. Adult production peaked in 1971 and then decreased to disastrous levels after 1976. The objective of this paper was to investigate why increases in the numbers and the average individual weight of yearlings released did not result in

expected production increases. Environmental degradation, predation, loss of wild runs, ocean density-related phenomena, and factors related to the quality of releases are the hypotheses examined that could explain the collapse in production.

Some of those hypotheses were tested in this paper. One of the more plausible hypotheses relating to quality of releases was that increased rearing densities tended to increase stress, particularly among smaller individuals; these stressed fish could be less physiologically capable of successfully outmigrating, resulting in reduced survival rates from release to adulthood. It was further hypothesized that the mortalities among yearlings during the first 6 months after release were the result of various discrete and discontinuous forces during substantial portions of life history which were bounded by challenge points.

Through analysis of adult sex ratios and jack return data, it was shown that most of the mortalities occurred (92-99%) during the first 6 months after release. An analysis of migration timing and in-river survival was made to evaluate the above hypotheses. A size dichotomy method, which compares length-frequency distributions of release groups of tagged fish with length distributions of the same tagged fish groups recovered in experimental seining immediately above tidewater, was made. Critical to this method was the assumption that the change in size distribution from release to recovery above tidewater was due to size selectivity mortality, and not growth, as has been assumed in other approaches; this assumption was tested, and it was found that growth cannot account for the change in size frequencies. Furthermore, most of this mortality ( $\times = 74\%$ ) was shown to occur before the fish even entered saltwater.

Multiple regression techniques were used to determine the effects of various hatchery practices on adult production. Adult production was found to be best measured in terms of jack returns. Among these hatchery related factors, pond loading densities was a statistically significant factor negatively affecting the survival of coho to adulthood. Hatchery rearing densities have increased over the past 20 years; however, density accounted for only 5% of the variation in returns. Part of the variation may be due to difficulty in measuring the true density.

An experiment is suggested to better measure the effects of density on survival of coho to adulthood.

## A Model of Fish Bioenergetics and Growth at the Organismal and Population Levels in Laboratory and Pond Environments

Michael Lesaca Cuenca, Ph. D. 1982,  
Texas A & M University

A dynamic model of fish bioenergetics and growth at the organismal and population levels was developed as a tool to study, evaluate, and improve the management of fishpond grow-out systems. The model is applicable to freshwater species of fish under laboratory and pond environments.

The organismal model incorporated five key variables (body size, temperature, dissolved oxygen, unionized ammonia, and amount of food) and 17 growth parameters which define the species of fish used. Fixed and cyclic levels of temperature and dissolved oxygen were considered. Model behavior agreed well with data on the effect of each factor taken singly and data on the combined effects of size and temperature, size and food, temperature and food, and dissolved oxygen and food. To develop a population model, the effects of food distribution and competition were included in the organismal model.

Simple model of pond environment linking management variables (stocking rate, feeding rate, initial size distribution) to environmental factors was developed. The pond environment model was linked with the population growth model to develop a fishpond culture model which was validated with pond data for channel catfish. The fishpond culture model was used to address important questions on aquaculture management.

The model predicted a growing season of 230 days from April 10 through November 27 for channel catfish raised in College Station,



Texas. Feeding fish as a function of appetite was superior to feeding fish a fixed fraction of body weight.

Under the regime of food competition, fish weights were more variable, yield was less, and the culture period was longer compared to the regime of no food competition. Increasingly higher yields were produced by successively optimizing growth factors as they became limiting at certain levels of production.

A factorial experiment involving stocking rate, initial size, and feeding rate was simulated using the model. The relationship of market yield to stock rate, for any given feeding rate or input size, was described by a downward opening parabola. Hence, an optimum stocking rate exists, above and below which yields are less.

### **Aggressive Behavior and Social Structure in the Guppy (*Poecilia reticulata*). a Teleost**

K.D. Brown, Ph. D. 1981 (C.N.A.A.),  
Polytechnic of Central London

Preliminary observations found that agonistic interactions were rare in established communities of male and female guppies, and where aggression was observed it consisted of just nips and chases. However, when two individuals, each from a different population, were placed together after a short period (3 days) of social isolation, they typically proceeded through four stages of agonistic interaction. This led to the formation of dominant-subordinate relationship in terms of priority of access to space.

The four stages of a 'dominance contest' were as follows:

1. **Orientation and Approach:** Movement towards an opponent in a dominant display posture and ending with a lateral 'threat' display ('initial challenge').
2. **Spar:** Mutual lateral displays, 0.5 cm apart, in a parallel or antiparallel formation, with tail beats directed at the other contestant.
3. **Fight:** Involving mutual combat displays and reciprocal physical assault (approximately one nip per second), which ends with one combatant fleeing in a fins-folded submissive posture.
4. **Chase:** A clear status relationship is visible, with attacking behaviour from the dominant individual (winner), and fleeing behaviour from the submissive individual (loser of the fight).

It was noteworthy that these aggressive interactions did not result in any visible damage to the fish concerned.

As in many other Teleosts, a general darkening of the body was associated with sparring and fighting fish. After a fight, the dark body colouration was immediately lost in a fleeing submissive fish and was replaced by a pale body colour, while the dominant individual maintained the dark body colour for a short period, before returning to the normal olive colouration.

### **Growth and Behavior of Juvenile *Salmo salar* and *Salvelinus fontinalis* in Allopatry and Sympatry**

Thomas A. Dickson, M.Sc. 1980, University of Guelph

The juvenile Atlantic salmon (*Salmo salar*) are smaller, both in length and weight, than equivalent age-class brook trout (*Salvelinus fontinalis*) in the Matamek River, Quebec. This study was undertaken to investigate the biological importance of this differential growth, and the causative mechanisms involved. The research was conducted at Matamek Research Station, Quebec and Woods Hole Oceanographic Institution, Massachusetts, from 1977 to 1979.

Growth rates for allopatric populations of salmon and trout were not statistically different when tested in a stream tank, simulating natural environmental conditions, by the Matamek River. Under all conditions, the behavioral repertoires were the same, but both species employed a different proportion of each display. It is concluded that a lack of preferred salmon habitat reduced the possibility for habitat separation by sympatric salmon and trout in the stream tank, and

resulted in an overlap in distribution of subordinate members of each species. The situation in the Matamek River was postulated to be similar to that observed in the stream tank. Photoperiod, water temperature, and water velocity, which varied seasonally in the Matamek stream tank, were considered to be proximate controlling factors to the seasonally varying rates of growth and interaction.

When the population density was increased to the point that territoriality broke down, the mean growth rate did not increase significantly for either species in either the Matamek stream tank or an environmentally-controlled facility at Woods Hole.

A comparison of hatchery-reared versus wild  $O^+$  year-class salmon in the Matamek stream tank revealed that the hatchery fish maintained a position just off the substrate, which was intermediate to the position occupied by the wild salmon (bottom) and the trout (mid-water). However, the growth rates of hatchery-reared and wild salmon were not statistically different, neither variety having an advantage in intervariety interactions. It is contended that hatchery-reared salmon were behaviorally intermediate to wild salmon and trout, and that aquacultural procedures should be reevaluated since the behavioral shift shown by hatchery-reared salmon may account for poor survivals of planted Atlantic salmon juveniles in management programmes.

In test populations located in restricted areas of Trappers Cabin Creek, a tributary of the Matamek River, trout grew better in sympatric populations while salmon grew better in allopatric populations. The trout were larger (fork length) than the salmon at the start of each experiment, thus reflecting the interspecific size distribution in the Matamek River, where trout emerge approximately 1 month before the salmon. However, in the Matamek stream tank, where underyearlings, were approximately equal in starting fork lengths, neither had an advantage in growth or behavior. It is concluded that the brook trout gained a competitive advantage over the salmon by emerging at an earlier date.

In the Matamek River, the earlier emergence of brook trout gives a growth advantage over the Atlantic salmon. However, the  $I^+$  brook trout are just smaller than  $2^+$  salmon and are displaced by the salmon from the region of habitat overlap. The growth advantage from the  $O^+$  year-class is enough to maintain the growth differential in favour of the brook trout for the rest of the time the two species cohabit the river.

### **American Plaice, *Hippoglossoides platessoides*, in the Gulf of Maine**

#### **I. The Fishery. II. Age and Growth. III. Spawning and Larval Distribution.**

Loretta Frances Sullivan, M.S. 1981,  
University of Rhode Island

During the past 5 years, a fishery for the American plaice (*Hippoglossoides platessoides*) has been developing in the Gulf of Maine. Historical commercial landings and research vessel data were examined to describe the fishery. In addition, 1,681 fish were aged from otolith samples to determine growth parameters, which were used in yield-per-recruit calculations. Age structure of the 1980 population was determined from age-length keys and length-frequency data. Finally, maturity stages and larval distributions were summarized.

Landings of American plaice have risen dramatically since 1973, from 1,603 mt to 12,672 mt in 1980. The source of 81% of 1980 landings was the Gulf of Maine. The ports of Gloucester, Massachusetts and Portland, Maine recorded the majority of these landings. Catch-per-unit-effort (CPUE) for Class 2 (23-50 GRT) vessels involved in directed fishing for American plaice averaged 4,790 lbs per day fished between 1977 and 1980, more than double the pre-1977 CPUE. The length-frequency data for 1980 commercial landings showed the 1974 and 1975 year-classes dominating the catch. Maximum yield per recruit was attained at relatively low levels of  $F$ . Calculations for plaice recruited to 130 mm-mesh nets, assuming natural mortality of 0.10 for female fish, yielded 375 g at  $F = 0.16$ .



Von Bertalanffy growth equations were calculated from age-at-length data for males and females. Gulf of Maine growth rates were faster than those of plaice in more northern populations. The age structure of the 1980 population showed strong representation by year-classes 1973 to 1978. Inshore populations were largely 1- and 2-year-old fish.

Age and length at 50% maturity were 3.2 years, 25.6 cm for males, and 3.8 years, 29.7 cm for females. The female-to-male catch ratio was 1.5 to 1. Eggs and larvae were found along the 100-m contour from Cape Cod north, and also in shoal areas of Georges Bank.

### **The Cisco, *Corogonus artedii*, in Wisconsin Lakes: Long Term Comparison of Population Structure and an Analysis of their Vertical Distribution**

Lars G. Rudstam, M.S. 1982.

University of Wisconsin - Madison

Hile's (1936) study of the cisco populations in three northern Wisconsin lakes in 1928-32 provided a base to investigate eventual long-term changes in the structure of essentially unexploited cisco populations. Comparisons with data collected in 1981-82 revealed that growth had increased substantially in two lakes. Possible explanations for this increase are discussed. Catch-per-unit-effort in gill nets varied more within each time period than between time periods. Year-class strength was variable and asynchronous among lakes both in the 1930's and in the 1980's. The persistent asynchrony of strong year-classes supports Hile's suggestion that year-class strength in cisco depends primarily on local conditions within each lake.

During summer stratification, cisco have restricted vertical distribution, generally believed to be caused by high temperatures and low oxygen concentrations. To investigate whether responses to these factors are sufficient to account for observed distributions, a quantitative model of the vertical distribution of a fish population was developed. This model was based on behavior of fish in laboratory gradients reported in the literature. A series of successively more complex hypotheses was incorporated in this model: 1) cisco are distributed around their preferred temperature, 2) cisco are also responding to low oxygen concentrations, and 3) cisco are distributed in response to temperature and oxygen, but at a temperature where growth is optimized, given lower food rations. These temperatures were calculated from a bioenergetic model.

Predictions from these hypotheses were tested against observations, using a standard chi-square test. Hypotheses 2 or 3 could not be rejected in three of the four lakes investigated. Cisco were, however, distributed at different temperatures in different lakes. These differences cannot be attributed to inter-specific segregation between the other common planktivore (yellow perch) and cisco. Other possible explanations for the differences in vertical distribution among lakes are discussed.

Observations on habitat segregation between young-of-year and adult cisco and on their diel migration are also presented.

### **Effects of Temperature and Salinity on Growth, Survival, Metamorphosis, and Shell Deposition of Tropical Mussel Larvae (*Perna perna* and *P. viridis*).**

Scott E. Siddall, Ph. D. 1980, University of Miami

The objective of this study was to determine effects of temperature and salinity stress on responses of larvae which affect recruitment and dispersal of two tropical mussels, *Perna perna* found in South America and Africa and *P. viridis* distributed throughout the Indo-Pacific. Multifactor experiments were used to estimate effects of temperature and salinity on fertilization, survival of embryos and growth and survival of larvae through metamorphosis. Data collected before and during metamorphosis were used to estimate effects of temperature and salinity on the onset of metamorphosis, resorption of the velum and on morphological and mineralogical aspects of larval shell deposition.

Cleavage and early larval development of these species was similar to that of other mytilids. The prodissoconch I stage was reached 15-18 hours after fertilization. Larvae could metamorphose 11 days after fertilization at mean shell lengths of 253-263 microns. Fertilization of *P. perna* gametes was possible over a wide range of temperatures and salinities centered at 23.1 °C and 34.5 ppt. Normal embryogenesis of *P. perna* gametes was maximal at 23.3 °C and 36.4 ppt but possible over a narrower range of temperatures and salinities than fertilization.

Survival rates through metamorphosis were higher for *P. perna* than for *P. viridis*. Larvae of both species survived over a wider range of temperatures and salinities than did the embryos. Increased mortalities were associated with the transition of planktotrophy 28-48 hours after fertilization and again at onset of metamorphosis. Metamorphosis was a critical period for survival of stressed larvae which were unable to feed efficiently. Maximal growth rates were higher for *P. perna* (10.5 microns per day) than for *P. viridis* (8.5 microns per day). Brody growth coefficients were 52-71% higher for *Perna* larvae than those reported for the temperate mussel, *Mytilus edulis*. In both species of *Perna*, optimal conditions for growth rates were at higher temperatures than optimal conditions for survival rates. Responses of these larvae to temperature and salinity varied with the stage of development rather than simply age.

If the opportunity to feed was abbreviated by sublethal temperatures or salinities or by thermally enhanced rates of larval development, maximum shell lengths at metamorphosis were reduced. Temperature and salinity stress caused the pediveligers to resorb the velum and cease feeding soon after onset of metamorphosis. The inability to feed places a limit on substrate selectivity and on duration of delay of metamorphosis.

Temperature and salinity did not affect the number of hinge teeth or shell-length-to-height ratios. Veligers with deformed shells were most common at low salinities combined with high temperatures. Shells deposited at 14 ppt were significantly thinner than those deposited at higher salinities. Growth ridges were produced twice a day regardless of temperature or salinity. Closely spaced ridges occurring at low growth rates probably reinforce the shell more than widely spaced ridges observed at high growth rates. Magnesium content was highest in larval shells deposited above 24 °C and lowest in those deposited at 14 ppt. Strontium content of the shells ranged from 0.0 to 0.8% and was unaffected by temperature or salinity.

Variations of temperature and salinity can affect the susceptibility of these larvae to planktonic or benthic predation, the duration of planktonic stages during which the larvae may be dispersed, and features of the larval shells on which the survival of postlarvae may depend. The ability to tolerate sublethal temperatures and salinities is an adaptation for survival in variable environments. These adaptations enable the larvae to tolerate temperature and salinity variations which diversify their patterns of dispersal and capabilities to survive in habitats which may differ from those of the parent population.

### **Population Age Structure and Mortality Determination for the Sea Scallop (*Placopecten magellanicus*)**

Karen A. Marti, M.S. 1982, University of Rhode Island

Under the assumption of a "stationary" population with stable age distribution, the results obtained from various methods of estimating mortality rates from sea scallop length data were compared to those obtained from a method using age data. The indirect length-based estimates varied to some degree, depending on the method used and whether the data were from a composition length distribution derived over time or from a single sample taken at one point in time. All of the mortality estimates, regardless of method of estimation, were higher than previously reported for this species. The use of a composite length distribution collected over time will correct for seasonal variations in growth and mortality. The "stationarity" assumption may even be relaxed to some extent if the time frame over which the data are collected is long enough to encompass and average the affects of variations in year-class strength.

**Age, Growth, and Mortality of Spotted Seatrout,  
*Cynoscion nebulosus*, in Everglades National Park,  
Florida**

Edward S. Rutherford, M.S. 1982, University of Miami

Age, growth, and mortality were studied of 570 spotted seatrout taken from sportfishermen catches in Everglades National Park from November 1978 to January 1980. Fish ranged in length from 220 to 680 mm and in weight from .10 to 2.24 kg. Ages of the catch, determined from scale readings, were mainly 3- and 4-year-olds. Males lived to at least 6 years, and females to at least 7 years. The sex ratio favored females (1.67/1).

Fish lengths at age were back calculated from scale annuli. Fish length varied between sexes and among areas of capture. Males were larger than females at age I but smaller at ages III-VI. Calculated fish length and length at capture were largest in seasonally brackish areas and smallest in a hypersaline area of the Park. There was no significant difference in length-weight relationship between sexes or among areas of capture.

Annual mortality rate of all fish was 77%. Male spotted seatrout had higher annual mortality and conditional fishing mortality than females. Conditional natural mortalities were the same for both sexes. Exploitation ratio was higher for males than for females.

Yield per recruit for both male and female spotted seatrout was at or near maximum given the 12-inch minimum size limit.

Comparison of the results of this study with an earlier study (Stewart, 1961) of Park spotted seatrout showed apparent changes in age distribution, age at full recruitment, and mortality since 1959, although yield per recruit and mean sizes at age of fish have not changed. Dominant ages shifted from 2- and 3-year-old, to 3- and 4-year-old fish. Age at full recruitment shifted from age III to age IV. Annual mortality of all fish increased slightly since 1959.

*American Institute of Fishery  
Research Biologists*

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Address Correction Requested

**Membership Report**

**New ASSOCIATES:**

Ronald G. Howey	PA
Phillip L. Dunn	CA
Scott A. Voorhees	FL
Donald L. Pereira	MN
Nancy E. Kohler	RI
Richard V. Frie	MN
Kurt D. Buchanan	WA
Gregory J. Thomason	AK
Dr. William A. Karp	WA
Janet E. Smoker	AK

**New MEMBERS**

Dr. John W. Hitron	FL
Jesse D. Jones	AK
Dr. Gregor Cailliet	CA

**Promotion to MEMBER**

Dr. J.M. Kapetsky	Italy
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**New FELLOW**

Dr. Richard J. Beamish	Ont.
------------------------	------

**EMERITUS**

Harry D. Van Meter	AR
Dr. Wilbur P. Breese	OR
J.P. Cuerrier	Ont.
Alfred H. Berst	Ont.
Douglas E. Ritchie, Jr.	MD
A.J. Ross	WA
Dr. W.E. Barraclough	BC
Dr. David A. Farris	CA
Dr. Stanislas F. Snieszko	WV
Henry A. Podoliak	NY

Sammy M. Ray, *Membership Chairperson*

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# *American Institute of Fishery Research Biologists*

## **. . . BRIEFS . . .**

VOL. 12, NO. 4

AUGUST, 1983

### **ANNUAL MEETING of AMERICAN INSTITUTE OF FISHERY RESEARCH BIOLOGISTS held at**

**The University of Wisconsin-Milwaukee in Milwaukee  
August 15 & 16, 1983**

#### **1. CALL TO ORDER & ADOPTION OF AGENDA**

#### **2. REPORTS —**

##### **i) Treasurer**

- Review of assets and investments (additions/changes FY '83)
- Review of tax-exempt status
- Need for professional audit and review of FY '82 audit
- Suggested billing format FY '84
- Budget '84 and dues increase for FY '84
- IRS 990 authorization
- Mailing list status

##### **ii) Membership**

- New members
- Delinquent member status
- Application processing
- Other items

##### **iii) Publications**

- BRIEFS
- Membership list
- Bylaws
- Annual "Perspectives" — 1983 and 1984

#### **3. AWARDS —**

- Best Student Paper 1983
- Outstanding Achievement Award 1983 and report on 1982
- Group Award 1983
- Report on "Awards" by Nakamura Committee

#### **4. DISTRICT ACTIVITIES —**

- Directors' reports including special problems
- Discussion of existing districts and possible establishment of new ones

#### **5. BYLAWS —**

- General review of acceptance of bylaws changes

#### **6. OTHER ITEMS —**

- Interaction with American Fisheries Society
- Approval of Emeritus status candidates
- Other issues.

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

Herb Lawler, Secretary of AIFRB, will not be attending the annual meeting as he is one of two non-Nordic participants invited to attend the formal opening of the Fish Research Station of the National Board of Fisheries of Sweden, in Kälmarne. The facility will formally be opened by the King of Sweden.

We wish Herb a good trip and hope that he will report on his trip in a subsequent issue of BRIEFS.

### **Legislative Activities**

The following summaries of Public Laws pertaining to fisheries were enacted during the 97th Congress, 2nd Session (Calendar Year 1982).

**Protocol for the North Pacific Halibut Fishery** (S. 2244), P.L. 97-176 (May 17, 1982). The Act gives effect to the Protocol amending the Convention for the Preservation of the Halibut Fishery of the North Pacific Ocean and Bering Sea, signed in March 1979. The primary objective of the Protocol is to conform the 1953 Halibut Convention between the United States and Canada with provisions of the Magnuson Fishery Conservation and Management Act (MFCMA). The law provides authority to the Secretary of Commerce and the North Pacific Fishery Management Council to establish a system of limited access to the halibut fishery resources, provided that such a system comports with all of the requirements of the MFCMA. The law also provides for U.S. Commissioners to the International Pacific Halibut Commission, of which one shall be an official of NOAA; and grants rural coastal villages in Alaska the opportunity to establish a commercial halibut fishery.

**Endangered Species Act Amendments** (H.R. 6133), P.L. 97-304 (October 13, 1982). The Act (1) sets a 1-year deadline for the Interior Department to decide whether to list or delist a species after receiving a petition containing substantial evidence on such questions; (2) sets a similar 1-year deadline for decisions on petitions to revise a designation of critical habitat; (3) requires listing decisions to be made solely on the biological question of whether the species is endangered or

## Legislative Activities cont.

threatened; (4) streamlines the exemption mechanism to reduce the maximum processing time from 360 days to 190 days; (5) eliminates the threat of criminal penalty or project shutdown for industries that incidentally take endangered species in the course of their activities; (6) increases the maximum share of costs for which states may receive grants under the Act from 66.7 percent to 75 percent for single state projects and from 75 percent to 90 percent for multi-state projects; and (7) authorizes appropriations of \$3.5 million for the Department of Commerce for each of fiscal years 1983, and 1985.

**Coastal Barrier Resources Act** (S. 1018), P.L. 97-348 (October 18, 1982). The Act prohibits the Federal Government from funding commercial and residential growth on undeveloped barrier beaches and islands. The Act contains exceptions that allow for Federal activities in support of certain energy development activities, as well as maintenance of existing channel improvements and related structures and projects for the conservation of fish and wildlife resources and habitats.

**Sikes Act** (H.R. 1952), P.L. 97-396 (December 31, 1982). The Act authorizes appropriations to carry out conservation programs on military reservations and public lands during FY 83 and 84. The Act also authorizes Department of Commerce enforcement agents to participate in undercover wildlife enforcement activities; and designates two areas in Texas as "developed," thereby excluding them from the coverage of the Coastal Barrier Resources Act.

**Surface Transportation Act** (H.R. 6211), P.L. 97-424 (January 6, 1983). This is the new "gas tax" legislation. The Act expands the existing exemption for farmers and commercial fishermen to cover the entire 9 cents a gallon tax on gas and diesel fuel.

The Act also amends the Saltonstall-Kennedy Act to require that all money in the S-K Fund be used in support of the U.S. fishing industry (up to 40% of the Fund could be used to support NMFS fisheries development programs and at least 60% of the Fund would have to go directly for industry grants). It also amends the Merchant Marine Act to provide that no ceiling be imposed by authorizing legislation.

The Act also amends the Marine Protection, Research, and Sanctuaries Act to preclude issuance of permits, for a 2-year period following enactment, which would authorize the dumping of any low-level radioactive wastes unless certain determinations are made by the Administrator of the Environmental Protection Agency.

**Magnuson Fishery Conservation and Management Act Amendments** (H.R. 5002) P.L. 97-453 (January 12, 1983). The Act changes the provisions concerning foreign allocations in a number of respects to enhance the negotiating strength of the Secretary of State in furtherance of the Department of Commerce's "fish and chips" policy. It requires 100% observer coverage on

board foreign fishing vessels at the vessel owner or operator's expense. It grants an exemption from the requirements of having a GIFA, an allocation, and a foreign fishing permit to allow foreign non-commercial vessels to engage in recreational fishing in U.S. territorial waters or in the fishery conservation zone. It also streamlines the procedures for issuing foreign fishing permits by deleting certain advance clearance procedures.

It incorporates in statutory language the Department's administrative interpretation that fishery management plans (FMPs) need not be prepared for fisheries that are not in need of conservation and management. It also adds additional authority that FMPs may address the effects that management measures will have on natural runs of anadromous fish; requires that Councils prepare draft regulations to implement each FMP or amendment; provides a limited addition to the Federal authority to collect pertinent information concerning the need for FMPs; and shortens the procedures for review of FMPs by consolidating the Secretarial review period with the public comment period on implementing regulations and imposes new time limits within which Secretarial review must be completed.

The Act also authorizes appropriations at a level of \$59 million for FY 83, \$64 million for FY 84, and \$69 million for FY 85 for the MFCMA. It authorizes appropriations at a level of \$7.5 million for each of FYs 83, 84, and 85 for the State grants programs under the Anadromous Fish Conservation Act and mandates a 90 percent Federal share of each grant to States that have implemented an interstate fisheries management plan for anadromous fishery resources; and authorizes funds for the Section 7 emergency striped bass study at a level of \$1 million for FYs 83 and 84. It also authorizes appropriations for the Central, Western, and South Pacific Fisheries Development Act at a level of \$5 million for FYs 83, 84, and 85.

J. Marilee Bright  
NMFS, Washington, D.C.

## Forage Fish Biomass Studies In Western Lake Erie

The availability of forage fish in western Lake Erie is a vitally important factor in sustaining abundance and growth of important commercial and sport fishery species such as walleye, yellow perch, and white bass. While all three species are piscivorous to some degree, walleye are the dominant predator and their dependency on forage fish as a food supply is established within a few months after hatching.

In recent years, walleye abundance has increased dramatically as the result of an interagency walleye catch quota management strategy which was initiated in 1976. Presumably predatory pressure on the forage fish community is much greater now than in the 1960's when



## **Forage Fish Biomass Studies** cont.

walleye abundance was very low and the forage availability may be insufficient to meet further increases in predator demand without sacrificing growth or mortality rates.

In 1979, U.S. Fish and Wildlife Service personnel of the Sandusky Biological Station (a field station of the Great Lakes Fishery Laboratory) initiated a 3-year forage fish study designed to define the current relative availability of forage fish in western Lake Erie. While all species of fish may contribute to the forage base to some greater or lesser degree, especially during their juvenile stages, it was not possible to study the forage fish role of the entire spectrum of species in the fish community. Instead, emerald and spottail shiners, trout-perch, YOY gizzard shad, and YOY alewife were selected as representative forage fish species for the study because prior analyses of predator food habits suggested these species were common items in their diets.

The sampling strategy adopted for this study was dictated by several factors. Shiners and trout-perch in western Lake Erie have short life spans (2-3 years) and the rapid growth rate of YOY gizzard shad and alewife reduces the time these species are components of the forage fish populations. As a result of these factors, cohort turnover time for these forage fishes is relatively fast and changes in forage availability can occur quickly. Therefore, we concluded that intensive sampling at a limited number of stations, representative of the general habitat in western Lake Erie would provide the best data to identify changes in forage availability. Two primary stations were sampled tri-weekly from April through November with a 7.9-m (headrope) semi-balloon bottom trawl with trawling at 10-, 15-, and 20-foot (3.0, 4.6, and 6.1 meter) depths each morning, afternoon, and night of each sampling day. Randomly collected data from ten geographically dispersed stations were used to supplement the primary data.

Forage fish catches were sorted into three age-groups (young-of-the-year, yearling, and age II and older), counted, and subsamples measured for length and weight information. Catch-per-unit-effort values were calculated, where a unit of effort was defined as 1 hour of trawling, and abundance estimates for each age-group of each forage fish species were derived by multiplying the CPUE's by the total number of trawling hours required to sample the entire area of the western basin. We assumed catches were representative of the species distribution throughout the basin. Finally, abundance estimates were converted to seasonal biomass estimates (metric tons) by using appropriate length-weight regression data for the spring, summer, and fall periods. Because we have no data on forage fish abundance in the upper water strata that are not sampled by the bottom trawl, biomass estimates are relative values that underestimate actual forage biomass available for predator utilization.

Forage biomass availability during the 1979-1981 period was strongly influenced by the very high recruitment of YOY gizzard shad and alewife during the summer and fall seasons. Shiner abundance during these years was depressed, so we had low forage biomass available to the predators in the spring followed by increased forage biomass in the summer, largely due to clupeid recruitment, and a large forage biomass available in the fall because of rapid clupeid growth.

Forage-fish data from western Lake Erie, collected from 1969 to 1971, were analyzed using the same procedures previously described to compare past and present condition. Walleye abundance, and presumably predatory pressure on the forage fish populations, was very low during those years.

Forage availability in the 1969-1971 differs from the 1979-1981 period in several ways. Spottail and emerald shiners were the most abundant species during all seasons and there were more older and larger shiners present in the populations during the 1969-1971 period. Recruitment of YOY clupeids was low and these species provided only limited forage biomass each summer and fall. As a result of these changes in species composition, YOY clupeid recruitment, and age composition of shiner populations, seasonal patterns of forage biomass availability changed. Forage-fish biomass was high in the spring, followed by a general decrease in the summer and fall as post-spawning mortality and slower growth of recruits associated with the shiner populations affected forage biomass production.

Results of the forage fish study suggest that predator populations, and particularly walleye, in western Lake Erie are currently much more dependent on YOY clupeids as a food supply than they were a decade ago. With clupeids providing forage only during the summer and fall seasons, predator food requirements may exceed supply in the spring. If low recruitment of all forage species occurs simultaneously in any given year, food requirements of the increasing predator populations may not be met without sacrificing predator growth and/or mortality.

*Kenneth M. Muth, USFWS, Sandusky, Ohio*

## **Alaska Halibut Fishery Limited Entry and Moratorium**

The number of vessels in the halibut fishery in Alaskan waters has increased substantially in recent years. Consequently, the number of fishing days required to take the catch limit has markedly decreased in some areas. The short fishing seasons have caused considerable distress to the fishermen and processors, and some groups of halibut fishermen have requested relief in the form of limited entry. While the International Pacific Halibut Commission has authority to manage the halibut fishery, it lacks authority to control entry. On the other hand, the Northern Pacific Halibut Act of

### **Alaska Halibut Fishery Limited** *cont.*

1982 provides authority for the North Pacific Fishery Management Council (NPFMC) to develop regulations for limiting access to the fishery with the approval of the Secretary of Commerce.

The NPFMC contracted for a study of limited entry and an evaluation of various options, with particular emphasis on an individual quota system. A final draft of the study was presented to the Council at its March meeting, and is now being evaluated. The Council expects to draft a limited entry program for the halibut fishery in Alaska which will be circulated to the fishermen for comments. While some fishermen will support limited entry, others are adamantly opposed.

In the meantime, the Council has adopted a moratorium on entry into the fishery until 1985, when the limited entry program is expected to be adopted if there is sufficient support from fishermen. The moratorium sets qualifying criteria for entry into the Pacific halibut fishery on individual vessel operators and on vessels 5 net tons and over. Qualification requires participation in the halibut fishery on individual vessel operators and on vessels 5 net tons and over. Qualification requires participation in the halibut fishery during the period from January 1, 1978 through December 31, 1982. The moratorium allows non-qualifying individuals to be named as substitutes for qualifying individuals due to death, injury, disease, or age. Residents of rural coastal villages of Alaska west of 156° W longitude may harvest halibut in areas of the Bering Sea north of 56° N latitude, irrespective of the moratorium.

The moratorium proposal is now (5/17/83) in the hands of the Secretary of Commerce and it must be approved by the Secretary of Commerce prior to the opening of the halibut fishing season in Alaska on June 16 if it is to be in effect for the 1983 halibut fishery.

### **Atlantic Ocean Monitoring and Research**

During the past 3 years, the Ocean Pulse and Northeast Monitoring Programs (NMFS/NOAA) have been conducting monitoring and research at sampling sites located between the Canadian boundary and Cape Hatteras. The results continue to show that the New York Bight and its associated estuaries remain among the most highly contaminated regions of the northeast coast. As has been shown with past research, there are numerous examples of biological effects which affect estuarine and marine shellfish and finfish resources.

Studies done during the past year indicate that estuaries such as Casco and Penobscot Bays have become contaminated to a degree that warrants concern. Levels of petroleum hydrocarbons and trace metals in the inner portions of these estuaries are of the same order of magnitude as those reported in the New

York Bight area. The levels of petroleum hydrocarbons are probably similar to those found in Newark Bay almost a century ago, when fishermen reported that they were no longer able to sell shellfish and finfish from Newark Bay because they were tainted with kerosene. People responsible for environmental management and fisheries habitats should be concerned with such early warning signs since inevitably pollution effects have increased with time, wherever they have been first noted.

Research and long-term temporal and spatial monitoring is continuing in the areas of interest.

*John B. Pearce, NMFS, Highlands, NJ*

### **30-Year Drift-bottle Recovery**

On April 4, 1983, fisherman Chet Westcott of Narragansett, RI recovered a barnacled drift-bottle in his bottom trawl. Inside the bottle was a 3-cent postcard addressed to the Woods Hole Oceanographic Institution (WHOI), advertising a \$1.00 reward for recovery information. The bottle was released on the southwestern part of Georges Bank (40° 28' N; 68° 58' W) on June 1, 1953 on a U.S. Fish and Wildlife Service cruise with the Albatross III. Jack Colton, now with the National Marine Fisheries Service, was the investigator in charge of this cruise (no. 50). The recovery—30 years later—was made 20 miles south southeast of Block Island (40° 51' N; 71° 27' W) in 34 fathoms. Mr. Westcott spent 17 cents to mail the card to WHOI for his reward. WHOI was coordinating all drift-bottle recovery data in the 1950's and said that this recovery was for the longest period ever reported. The bottle was recovered a distance of 175 miles west of its release site. The bottle (no. 14351) was weighted with sand and was designed to move with currents just below the sea surface—when it sank; whether it moved with bottom currents, etc. will remain a mystery.

*Lou Stringer, Narragansett, RI*

### **Effects of Toxic Trace Metals on the Marine Environment**

As human density in coastal zones increases and oceans become increasingly attractive as dump sites for hazardous wastes, pollution of the marine environment also increases. Many of the effects of pollution are obvious, such as the closing of areas to shellfish harvest or restrictions on recreational use. Other effects, perhaps more pervasive and threatening, are more subtle and less easily recognized. One is the influence of toxic trace metals on abundance and species composition of plankton communities, which constitute the base of the food web in marine ecosystems. In the Gulf of Mexico, larvae of spot and Atlantic croaker feed selectively on zooplankton, and larvae of gulf menhaden feed on

## Effects of Toxic Trace Metals *cont.*

dinoflagellates in addition to zooplankton. Increases in heavy metals could effect changes in plankton abundance or in species composition of plankton communities that in turn could affect growth and survival of fish larvae. Small changes in availability of copper, zinc, and manganese have altered species composition and productivity of microorganisms. Copper, in concentrations as low as 0.2 ppb in the ocean, has been shown to be toxic to bacteria and phytoplankton, and its toxicity has been shown to be influenced by interaction with manganese. Organic matter, which occurs naturally in sea water, may mitigate the effects of toxic trace metals by binding them. It also helps to dissolve manganese, a trace element essential to plant growth. Marine shellfish contain specific metal-binding proteins that complex, and thereby detoxify, copper, cadmium, and zinc. As ocean dumping of human and industrial wastes accelerates, the threat of toxic trace metals increases. Scientists at the National Marine Fisheries Service, Southeast Fisheries Center, Beaufort Laboratory, are studying the effects of these metals on the marine environment.

*William Nicholson, NMFS, Beaufort, SC*

## Organic Contaminants Baseline Data

Since 1979, the National Microconstituents Program of the National Marine Fisheries Service has been collecting baseline data on the occurrence and amounts of petroleum hydrocarbons and synthetic organic contaminants such as PCB in fish from the coastal waters of the U.S. Sampling sites have included estuarine, near-shore, and shelf locations along all coasts, but with emphasis on the Atlantic and Gulf of Mexico. This program is managed by the Southeast Fisheries Center's Charleston Laboratory.

A study during 1979-80 of a number of estuarine and nearshore sites for PCB contamination in fish revealed some examples of rather high levels in the northeast near industrial areas and moderate levels on the Pacific and Gulf Coasts. Only in the northeast did PCB content in any samples exceed the FDA tolerance of 5 ppm in the edible portion. Subsequent analysis of some of these samples for petroleum hydrocarbons revealed considerably more petroleum than PCB contamination in the Gulf.

In 1980, in cooperation with the Northeast Fisheries Center, a survey of shelf waters from the Gulf of Maine to the Mexican border was undertaken. Fish collected in this survey were analyzed for petroleum hydrocarbons, PCB, and DDT-type compounds. The results of these analyses have been published as a NOAA Technical Memorandum entitled "Gulf and Atlantic Survey for Selected Organic Pollutants in Finfish." Again, we found evidence of generally higher concentrations of

these organic contaminants in the northeast as compared to the southeast and Gulf coasts. In another study, the occurrence and concentrations of the nitrogen and sulfur containing heterocyclic polynuclear aromatic compounds, which are generally more toxic than the parent hydrocarbons, are being determined in samples taken from areas of known petroleum contamination. In the surveys discussed thus far, samples were collected by methods designed to minimize contamination by handling. Another survey was conducted using fish collected through normal commercial channels. Analysis of these fish gave results differing little from previous results from the same region.

Manuscripts on the data accumulated are in preparation. Meanwhile, work is continuing to fill in gaps in our coverage and to more intensely study areas of concern. Although our work is based on a concern for seafood safety, with edible tissues being emphasized, liver tissues have been analyzed as well. Requests for specific data will be considered if addressed to: Charleston Laboratory, P.O. Box 12607, Charleston, SC 29412.

*John Wells, NMFS, Charleston, SC*

## AIFRB District Activities

### CENTRAL CALIFORNIA

*Tom Jow, Director*

Dr. Perry Hargessell, California Department of Fish and Game (CDFG) Bay-Delta Fisheries Project, was the dinner speaker at the Central California District's meeting at the Harbor House, Vallejo on May 19. Thirteen members and guests heard an informative talk on the Delta Outflow/San Francisco Bay Study carried out by Perry and his staff.

Objectives of the study are to determine the distribution and abundance of important resources in San Francisco Bay and to determine the impacts of future hydrology on them. Water diversions have reduced the outflow of fresh water into the Bay to about half of the historical level. The seasonal pattern of outflows has been changed from high winter-spring flows and low summer-fall flows to lower winter-spring flows and higher-than-previous summer-fall flows. Currently, in normal and wet years seasonal surges in outflows that persist for varying periods of time occur while in dry years (eg. 1976-1977) outflows are uniformly low throughout the year. Perry believes that these surges of the wetter years have significance for Bay resources.

Biological sampling with bottom and midwater trawls and with plankton nets are carried out monthly at 35 stations throughout the year, while shorelines are sampled by seine at 30 stations. Sampling during the past 3 years has produced a data series taken during extreme environmental conditions during wet and dry years. Pacific herring, northern anchovy, English sole, gobies, bay shrimp, and Oriental shrimp are the

## District Activities cont.

predominant species in samples. Daily midwater trawl samples of salmon migrating to the ocean are now also taken.

Further collection and analyses will provide bases for determining outflow impacts, and recommendations can be made to mitigate adverse effects of future outflows.

## NORTHWEST WASHINGTON John S. Isakson, Director

At our May 17 meeting at NWAFC, Dr. Ernie Salo led a panel presentation focusing on the status of knowledge about juvenile salmonid growth and survival in Puget Sound. Panelists included Curt Fresh (Envirosphere Company), Charles (Si) Simenstad (UW), Dr. Don Weitkamp (Parametrix), Nick Bax (NMFS), and Cliff Whitonus (UW). The two major questions were (1) What are we learning from and about juvenile salmonid sampling that is required of many impact studies, and (2) What are the impacts of human activities (construction, dredging, pollution)? Several panelists expressed concerns about sampling biases and their effects on misinterpreting abundance, migration patterns, and size distributions. Others focused on their understanding of feeding ecology and dependence on "estuarine" habitat and estuarine food sources. The complex permit process, including mitigation for last habitat, was debated. A major conclusion resulting from this "mini-conference" was a need to centralize data so someone can synthesize them in an orderly manner.

We sincerely thank Dr. Salo for taking charge of the meeting, Davy Weber for arranging facilities and refreshments, and all the panelists for their timely contributions.

## TEXAS

Robert R. Stickney, Director

The Texas Division AIFRB met on March 11, 1983 in Galveston, Texas at the National Marine Fisheries Service Laboratory. Eight of the 23 members were in attendance. Decisions were made to make the presence of the AIFRB known to Texas Fisheries Scientists by increasing our visibility at in-state meetings and by co-hosting symposia. To the latter end, a 2-day workshop on Prediction of Shrimp Yield is planned for early November 1983. The workshop is being planned by Ed Klima and Andy Landry and will be co-hosted by AIFRB, NMFS, and Texas A&M University Sea Grant. Recruiting literature is being sent out by the Director of the Texas District and a push will be made to attract graduate students into our organization.

## New Publications and Announcements

### Modern Methods of Aquaculture in Japan

This is Volume 11 in the Elsevier series in aquaculture and fisheries science. Edited by T. Kafuku, Overseas Fishery Cooperation Founda-

tion, Tokyo, and H. Ikenoue, Fisheries and Aquaculture International Co. Ltd., Tokyo, Japan, this is the first detailed introduction—in English—to modern aquacultural methods in Japan. As many as 210 explanatory figures and 35 tables are provided to make its contents easily understood by the widest possible range of readers.

Part I introduces the environmental conditions and current status of Japanese aquaculture and the Japanese fisheries industry. The second part deals with freshwater aquaculture and includes: chum salmon, rainbow trout, eel, ayu, common carp, grass carp, silver carp, goldfish, freshwater fish, pearl mussel, and terrapin. Part III then deals with marine aquaculture, including: red sea bream, yellowtail, kuruma prawn, scallop, oyster, pearl oyster, abalone, green turtle, nori and wakame. An appendix describes rotifer culture techniques as rotifer is a very important feed for the seed production of fish and prawn larvae.

Each chapter covers its subject matter in depth by describing fully such aspects as: characteristics of each species (taxonomy, maximum size, color, external characteristics, life cycle and ecology), the present status of culture in Japan, culture techniques, process of culture, culture facilities, food collection, selection of spawner, collection of natural seeds, artificial seed production, management of eggs, rearing of fingerlings, growing to market size, diseases and treatment, harvesting, shipping to market, utilization etc.

This comprehensive, easy-to-understand introduction to up-to-date culture techniques for both freshwater and seawater organisms in Japan will be of great value to advanced undergraduate/graduate students and researchers in fisheries and aquaculture. Practising culturists will also find a wealth of practical information in this book, as will administrators, resource planners and others involved in the management of aquatic resources.

This 1983 book (xii + 216 pages) can be purchased from Elsevier Science Publishing Co., 52 Vanderbilt Ave., New York, NY 10017 for \$59.50 U.S.

### Recent Academic Press Books

The following publications can be obtained from Academic Press, Inc., P.O. Box 733, Old Chelsea Station, New York, NY 10113.

#### *Experimental Biology at Sea*

Marine biology often involves experiments that have either to be carried out on organisms in their natural environment, or in such a swift sequence that they must be performed near the natural environment. As the conditions of the sea are difficult to reproduce in a laboratory, advances have had to be made in overcoming the difficulties of conducting biological experiments at sea. This book grew out of a meeting of the Society of Experimental Biology held in Aberdeen in 1980 to discuss the problem, although it has been supplemented by papers from others in the field. It brings together a diverse group of scientists, experts in the difficult aspects of the field. They show that the difficulties can be overcome and demonstrate the distinctive and progressive nature of the subject.

Advances in scientific instrumentation, and in solid state electronics in particular, have produced instruments that have low power consumption, are robust, and immune to vibration — all essentials for use in a ship's laboratory or in the sea. Marine technology in the form, for example, of submersibles, and underwater television and sonars, has progressed significantly. Four sections cover the techniques used for the study of organisms in the sea, including satellites and remote sensing, the physiology of such organisms and how they are studied at sea, the "metabolism" of the sea and, finally, the role that surface ships, manned submersibles, and divers have in experimental biology. Edited by A.G. MacDonald and I.G. Priede, University of Aberdeen, U.K. 1983. Price \$55.00.

#### *Estuarine Comparisons*

Proceedings of the Sixth Biennial International Estuarine Research Conference, Gleneden Beach, Oregon, November 1-6, 1981. This volume presents over forty original and review papers by international contributors that cover a wide variety of estuarine-related topics. With



## New Publication & Announcements cont.

an emphasis on comparisons among species, habitats, and ecosystems around the world, this work represents the first real effort to compare what is known about different estuaries. Individual sections of the book consider such topics as ecodynamic comparisons among estuarine systems, chemical and microbial dynamics in marsh soils; salmonid ecology; larval retention in estuaries; estuarine sedimentation and its control, and the Yangtze estuary of China. Contents: Ecodynamic Comparisons Among Estuaries; Dynamics Beneath The Marsh Soil Surface; Comparisons Of Anadromous Fishes In Estuaries; Larval Retention In Estuaries; Estuarine Sediment Dynamics And Sedimentation Control. Edited by Victor S. Kennedy, University of Maryland. 1982. Price \$37.00.

## Urban Fishing Symposium

This symposium, sponsored by American Fishing Tackle Manufacturers Association, Great Lakes Fishery Commission, National Marine Fisheries Service, U.S. Fish and Wildlife Service, and Allen Press, Inc., will be held October 5-8 at the Amway Grand Plaza Hotel-Grand Center, Grand Rapids, Michigan, 1983. The objectives of the symposium are to (1) Summarize current state-of-the-art of enhancing urban recreational fishing opportunities and programs, (2) identify methods to fund programs and review socio-economic implications of developing urban fisheries, (3) review means of improving liaison among urban development, environmental, and recreational fishing interests, and (4) identify areas needing further study to improve urban fishing opportunities.

The symposium will address planning, development, and maintenance of urban recreational fishing programs. The programs will present keynote speakers, four technical sessions, a poster session, and a symposium summary. Three of the technical sessions will include review papers and a panel discussion with audience participation. Review papers will address a wide range of topics dealing with the planning, implementation, and promotion of urban fishing programs. Case histories will be presented in a fourth session to address specific planning and management techniques. The highlights of the meeting and a general evaluation of the current status and future of urban fishing programs will be capsulized at the end of the symposium. All papers, panel discussions, poster abstracts, and a summary will be published in the symposium proceedings.

## Thesis and Dissertation Abstracts

### Estimating Total Mortality Rate from Longevity Data

John M. Hoenig, Ph.D. 1983,  
University of Rhode Island  
Co-author of publication: William D. Lawing,  
University of Rhode Island

Methods of estimating the total mortality rate have been developed by examining the relationship between the mortality rate and the maximum ages in a sample. A plot of the logarithm of the total mortality rate against the logarithm of the maximum reported age for a wide variety of fish, mollusks, and cetaceans produced a strongly linear relationship with a coefficient of determination ( $r^2$ ) of 0.82. The total mortality rate can thus be estimated from the maximum age using the following regression equation:

$$\ln(Z) = 1.44 - 0.982 \times \ln(t_{\max}).$$

The procedure does not take the sample size into consideration and therefore cannot be used in critical comparisons. In order to take sample size into consideration, the oldest ages in a sample were considered as order statistics from an exponential population. The expected values of the reciprocals of the order statistics are linear functions of the mortality rate  $Z$ . An unbiased estimator of the mortality rate was derived by minimizing the variance of a linear combination of the

reciprocals of the order statistics while constraining the expected value to be equal to the mortality rate. Estimates are easily computed with the aid of supplied tables. These techniques should find greatest use in situations where age determinations are tedious and must be kept to a minimum.

## The Pathological and Growth Effects of Dried Hatchery Waste Fed to Brown Trout

John Joseph DuPree, M.S. 1981  
The Pennsylvania State University

Increased feed costs and disposal of metabolic wastes are ever-increasing concerns of our agricultural community. The objective of this thesis was to examine the possibility of recycling fish-hatchery waste as a component of the feed for brown trout and to examine its subsequent effect on growth and disease.

Methods for preparation, analysis, and incorporation of hatchery waste into pellets were developed.

Approximately 8,000 brown trout from the same test lot were split into eight groups of approximately 1,000 fish each and fed one of four experimental diets. The experiment began 5 weeks after the swim-up stage and continued for 14 weeks. The experimental diets consisted of a commercially prepared fish feed mixed with varying amounts of dried hatchery waste (DHW). The actual amounts of DHW in the diets were as follows: Diet #1—0% DHW (control), Diet #2—25% DHW, Diet #3—50% DHW, and Diet #4—75% DHW.

Growth for the 14-week test period was measured by increase in total body weight. Absolute growth and feed intake were highest in the control group and lowest in the 75% DHW group. Mortality was high in the 75% DHW and significantly lower in the 50%, 25% and control groups.

Gross and histopathological analysis revealed evidence of increasing malnutrition as the amount of DHW in the diet increased. Liver energy storage components decreased, as did insulin-producing cells in the pancreas. Stomach size and amounts of undigestible debris also increased as the amount of DHW in the diet increased.

At low levels of supplementation with DHW only a slight depression in weight gain and feed intake occurred. At high DHW supplementation mortality was also high. Combining feed conversion ratios with current prices to calculate production costs reveals no economic advantage from DHW substitution. Additionally, this study shows the safety of fish-hatchery waste for recycling and presents the methodology for large-scale processing of this waste. It points the way to possible future uses of a waste product as a feed supplement for any fish species better equipped to handle a high-fiber, low-protein diet.

## Incorporating Frequency Distribution of Catch Per Unit of Effort Into Recreational and Other Fishery Statistics

Scott P. Bannerot, M.S. 1982, University of Miami

Mean catch per unit effort ( $\bar{C}/f$ ) is often used as an index of fish abundance ( $N$ ) in fishery research for estimation of changing stock sizes. This index is often biased. Analysis of catch per unit effort ( $\bar{C}/f$ ) frequency distributions and independent estimates of  $N$  from a head-boat sport fishery for yellowtail snappers, *Ocyurus chrysurus*, in Islamorada, Florida indicated that  $\bar{C}/f$  underestimated changing  $N$ . The  $\bar{C}/f$  frequency distributions were skewed. Characteristics of the distributions were systematically related to  $N$ . This relationship was used to derive an index of  $N$  less biased than  $\bar{C}/f$ . The new index, square root of relative frequency of zero  $\bar{C}/f$ , should be applicable to any recreational, scientific, or commercial fishing activity where  $\bar{C}/f$  distributions are available and skewed due to spatial dispersion of the fish population or skill gradient among fishing units or both. Where  $\bar{C}/f$  must be estimated by dividing total catch by estimated total effort, catchability coefficient  $q$  may be adjusted to alleviate bias in  $\bar{C}/f$ . Data showed an inverse relationship between  $q$  and  $N$ .

**Relation of Gravel Size to Spawning Site Selection  
and Alevin Production by  
*Salvelinus fontinalis* and *Salmo trutta***

Larry D. Witzel, M.Sc. 1980, University of Guelph

Examination of the environmental characteristics of brook charr (*Salvelinus fontinalis*) and brown trout (*Salmo trutta*) redds in selected southern Ontario streams show similar ranges of specific conductance (225-810  $\mu\text{mhos/cm}$ ), pH (7.0-8.2), dissolved oxygen (83% of saturation and higher), and stream gradient (0.2-2.3%) for both species. While each spawned in streamflows as low as 21.2 l/sec, trout typically used lower stream sections with flows to 600 l/sec, whereas charr spawned closer to headwater areas with flows not exceeding 177.4 l/sec. Spawning by charr usually began by the second week of October, and by trout a week latter. Local charr spawning extended from 3 to 5 weeks, trout from 2 to 4 weeks, with spawning period between species overlapping as much as 3 weeks in sympatric populations. Both species spawned at water temperatures of 4-11°C, and most frequently at 6-8°C. Charr matured earlier and were significantly smaller (8.4-29.0 cm fork length) than trout (18.0-54.5 cm fork length) at all age-classes. Sharing and re-use of redds occurred largely within species with between-species interaction being limited largely to smaller brown trout competing with brook charr below stream barriers.

Although mean water depth of redds was similar (24.0-25.5 cm), charr spawned in current significantly slower ( $\bar{X} = 17.64$  cm/sec) than did the trout ( $\bar{X} = 46.67$  cm/sec). The mean geometric gravel size (Mg) of charr redds ( $\bar{X} = 4.49$  mm, range = 1.40-8.78 mm) was significantly smaller ( $P < 0.01$ ) than the mean Mg of trout redds ( $\bar{X} = 5.66$  mm, range = 2.49-13.96 mm). The latter were better sorted ( $P < 0.05$ ) ( $\bar{X} \text{ Sg} = 4.934$ ) than charr redds ( $\bar{X} \text{ Sg} = 5.448$ ). Differences are explained by a smaller proportion of the finer grain sizes in trout redds than in charr redds, which were significant for sizes between 0.250 and 2.0 mm. The average trout and charr redd contained 25.53% and 30.15% of gravel finer than 2.0 mm, with 50% of gravel (Md) being finer than 9.93 mm and 9.22 mm, respectively.

Brook charr spawned exclusively in areas of groundwater seepage, thus segregating charr and trout redd sites which, in combination with differences in water velocity and substrate composition, minimized spawning interactions between species. The faster stream velocity and larger mean gravel size selected by trout during spawning, compared to the charr, may be partly related to the larger body size of the adult trout. Differences in the hydraulic characteristics occurring between the headwater sections where charr typically spawned and lower stream sections used frequently by trout could also explain interspecific differences observed in the gravel composition and stream velocity of charr and trout redds.

Laboratory-simulated redds had poor emergent survival of both charr and trout because of insufficient void space (entrapment) in fine gravels (2-4 mm) or gravels containing 60-80% 1-2 mm sand. Time to first and 50% alevin emergence varied directly with gravel size and inversely with sand concentrations. Duration of trout alevin emergence was significantly shorter in 2 mm than in coarser gravels. Premature emergence of free embryos or shortening of the alevin emergence period in 2.0 mm gravel and 80% sand-gravel mixture is identified as a stress response. Trout and charr alevins emerged significantly later from 10-cm than from 5-cm ova burial depth, but survival and time to first emergence and duration of alevin emergence were similar at both burial depths. In general, charr and trout alevins emerged larger in size and were better developed in the coarse than in fine gravels, and was the result of later alevin emergence from the coarse gravels.

Average survival of charr from ova deposition to emergence from field incubators was 25.5% (0-68%), and for trout was 22.1% (0-64%). Although smaller at emergence, the charr ( $\bar{X}$  length = 1.88 cm,  $\bar{X}$  weight = 65.4 mg) emerged from field incubators approximately 2 weeks earlier than did the trout alevins ( $\bar{X}$  length = 2.06 cm,  $\bar{X}$  weight = 119.4 mg), with emergence beginning, on the average, 162

days after ova burial, in contrast to a mean of 175 days for trout. The earlier emergence of charr than trout in stream redds is associated with earlier adult spawning and more rapid embryonal development in warmer headwaters during the fall and winter months.

**The Effects of Eutrophication on the White Sucker  
(*Catostomus commersoni* Lacepede) in Spring Creek**

Regan Sigfrid Williams, M.S. 1981

The Pennsylvania State University

Three stations were selected; a clean stream station, Neidigh's Quarry, and two enriched stations, Houserville and Rock. Samples of fish populations were collected by electrofishing. Quantitative analysis of the samples made possible comparisons of population density, growth, survival, age at sexual maturity, fecundity, and net annual production rate.

The enriched stations (Houserville, 2795/ha; and Rock, 2564/ha) have adult population densities more than twice as high as Neidigh's Quarry (1207/ha). Suckers in the clean stream station are smaller at early ages (up to III) but grow faster and are larger by age IV. Annual survival rate is also higher at Neidigh's Quarry (0.483) than Houserville (0.323) and Rock (0.368). Survival and growth rates appear to be related to population density, declining with increasing density. Females grow faster than males after sexual maturity and they live about 1 year longer up to age VII.

Males attain sexual maturity about 1 year earlier (most by age III) than females (most by age IV) and both sexes mature earlier in the enriched areas. Total egg production is very high at all stations (N,  $5 \times 10^6$ /ha; H,  $7.5 \times 10^6$ /ha; R,  $9 \times 10^6$ /ha).

Net annual production (I through VII) rate is higher in the polluted areas (N, 298.7 kg/ha; H, 455.3 kg/ha; R, 534.0 kg/ha). The difference in production rate is attributable to much higher population densities in the pollution areas. It is hypothesized that conditions there are more favorable for survival and growth of larvae and fry; this results in a greater adult population density. The conditions which favor early survival and growth may be greater food supply for the fry and the drastic reduction in predator fish populations (especially brown trout) in the polluted areas.

An attempt was made to evaluate the contribution of the younger age-groups to the net annual production rate. Empirical data from Houserville and Rock combined with values from the literature were used to make a best estimate of the production rate. A conservative estimate is 547.7 kg/ha/yr. This is most likely an underestimate but since very little is known about the growth and mortality relationships of suckers during the first year it was not possible to accurately evaluate the first-year production rate.

**Genetic and Morphometric Variation and the  
Systematic Relationships of Eastern North American  
Sculpins (Pisces: Cottidae)**

Richard E. Strauss, Ph.D. 1980

The Pennsylvania State University

A study was conducted of allozyme and morphometric variation within and between eight recognized species and subspecies of eastern North American freshwater sculpins (*Cottus*), in order to (1) examine patterns of variation and differentiation among populations and species; (2) reevaluate and clarify the systematic and evolutionary relationships of the group; (3) compare the resulting relationships with those proposed on the basis of traditional taxonomic criteria; and (4) measure the concordance of genetic and morphometric data in establishing systematic relationships. Allele frequencies at 23 enzyme loci were estimated for 32 samples of the eight taxa by means of protein electrophoresis. Patterns of morphologic variation were summarized by multivariate analyses of 30 quantitative characters of individuals in 44 samples.

Amounts of genic differentiation within species vary considerably but can largely be accounted for by the ranges of geographic disper-

## Thesis and Dissertation Abstracts cont.

sion of the samples examined. Taxa that are widely distributed across drainages generally exhibit more intraspecific differentiation than those of restricted distribution. Levels of genetic heterozygosity (0 - 8.3%) and polymorphism (0 - 52.4%) are equivalent in magnitude to those in other vertebrates. With a few exceptions, levels of genetic heterozygosity within populations are highly correlated with the amounts of morphological variability. Degree of genetic polymorphism is also significantly correlated with morphological variation, but to a lesser extent, and seems to be proportional to population size. Each of the species studied is distinguished by at least one locus which differentiates it from the others.

Amounts of morphologic differentiation within species also vary but display no consistent pattern among taxa. Distinct morphotypes are evident in *Cottus cognatus*, *C. c. carolinae*, and *C. girardi*. Those of *C. cognatus* have been identified as lake forms and stream forms, but ecological correlates of other morphotypes are not evident.

Genetic and morphometric data are not concordant in their descriptions of patterns of interspecific relationships. However, both fail to verify the presence of two discrete species clusters corresponding to the previously hypothesized *C. bairdi* and *C. carolinae* groups. A hypothesized phylogenetic tree based on genetic affinities reveals that *C. baileyi* and two subspecies *C. c. carolinae* and *C. c. zopherus* together form a common lineage. A previously undescribed species from the Potomac drainage has apparently been derived from *C. girardi*, and these two species, together with the members of the *C. carolinae* lineage, share a common ancestor with *C. bairdi*. All of these extant taxa are more closely related to one another than any is to *C. cognatus*. *Cottus pygmaeus*, the remaining species examined, is a highly differentiated spring-inhabiting form whose evolutionary position among the others is uncertain. Evolutionary convergence of derived taxa away from the body form of *C. c. carolinae* toward that of *C. bairdi* is suggested to account for incongruities between patterns of genic and morphometric similarity.

## Conservation Measures in the Interim Groundfish Plan

Andrew P. Matykiewicz, M.S. 1982, Dept. of Marine Affairs, University of Rhode Island

The conservation measures used in the Interim Fishery Management Plan for Atlantic Groundfish (IFMP) were analyzed. The management techniques used include a minimum mesh size, minimum fish size, and haddock spawning area closure. A minimum mesh size of 5 1/8 inches during the first year of the IFMP and 5 1/2 inches thereafter should lead to reduced fishing mortality on juvenile groundfish. However the mesh regulation does not adequately address the IFMP conservation objectives. The reason is that the selection coefficient for a 5 1/2-inch mesh size is significantly below that which corresponds to the 50% retention lengths of mature cod, haddock, and yellowtail flounder. The minimum size regulation will impact the resource only to a small degree since it is used exclusively to support the mesh regulation. The haddock spawning area closure, in effect since 1970, may have contributed to the substantial improvement of the haddock spawning stock since the early 1970's. However, at average spawning stock sizes the haddock spawning area closure has little relationship to enhancing future haddock recruitment. Nevertheless, because it is a closure, the haddock spawning closure prevents high fishing mortality during the time when haddock congregate and may help reduce annual fishing mortality in the short term.

Without amendment, the IFMP cannot prevent overfishing as it is required to do by the Magnuson Fishery Conservation and Management Act (MFCMA). The use of a non-numeric Optimum Yield (OY) for groundfish is inappropriate without a definition of overfishing and without a contingency plan to prevent overfishing. The IFMP reduces fishery regulations in an attempt to enlist the cooperation of participants in the fishery in providing accurate fishery data. While the regulatory program of the IFMP may compromise the conservation requirements of the MFCMA, there is no assurance that accurate data will be obtained from the fishery.

## News Release

### University of Minnesota College of Forestry Adds Fisheries and Wildlife Program

The College of Forestry, University of Minnesota, added a new Department of Fisheries and Wildlife to its existing Departments of Forest Resources and Forest Products on July 1, 1983. The expansion was the result of the split of the Department of Entomology, Fisheries, and Wildlife in the University's College of Agriculture and the subsequent transfer of the fisheries and wildlife portion of that department to the College of Forestry.

Like the College's other two departments, Fisheries and Wildlife offers an integrated program of undergraduate and graduate education, research, and Agricultural Extension education. It is the only unit in the state that offers bachelor's and advanced degrees in fisheries and wildlife and currently enrolls about 100 undergraduates and 30 graduate students. Its research and Extension education programs are equally important to this state, which ranks second in the percentage of residents who fish and fourth in the percentage who fish or hunt.

The Department of Fisheries and Wildlife is recognized as a leader in the development of computer use for research and teaching in this field, and its fisheries wet laboratory is regarded as one of the finest at any United States university.

With the addition of the new department, the College of Forestry has about 50 faculty and professional staff, 400 undergraduates, and 90 graduate students.

The College of Forestry is located at the St. Paul branch of the University's Twin Cities campus.

## Students Win NOAA Junior Fellowships

Marlene A. Johnson and John Michno, III, both of San Diego and Teresa Villanueva of Honolulu, Hawaii, have been selected as the 1983 National Oceanic and Atmospheric Administration (NOAA) Junior Fellows for the National Marine Fisheries Service, Southwest Fisheries Center in La Jolla, California, an agency in NOAA, it was announced today by Dr. Izadore Barrett, Center Director.

According to Dr. Barrett, 1983 marks the 11th year of the Southwest Fisheries Center's participation in the NOAA Junior Fellowship Program. Each summer since 1972, one or more outstanding graduating high school students have been selected to work at the Southwest Fisheries Center's laboratories in La Jolla and Tiburon, California, and Honolulu, Hawaii, where they gain valuable practical experience in marine sciences research. The NOAA Junior Fellows return to work each summer and during extended holiday breaks throughout their college years. Upon graduation from college, they are eligible for positions with NOAA without further competition.

## Student Travel Raffle

All AIFRB Associates who are graduate students are eligible to compete in the 1984 raffle for ten grants of \$250 each to attend a national or regional scientific meeting of their choice. The first drawing for five of the grants will be held in January and all students who wish to participate should submit their name, university affiliation, major professor and the meeting and its location to: Treasurer C. F. Cole, 2021 Coffey Road, Ohio State University, Columbus, Ohio 43210 by January 1, 1984. Winners of the drawing will be notified immediately and announced in the February issue of BRIEFS. A check will be mailed to the winner 30 days in advance of the scheduled 1984 meeting. The second drawing will take place in June for five additional grants of \$250 each.

The purpose of these grants is to assist students to attend scientific meetings, where they will not only gain additional knowledge but may also make contacts regarding future employment. Students are not required to present papers at these meeting, but are encouraged to do so. Winners will be expected to prepare a short resumé of the meeting for BRIEFS.

## Membership Report

### New ASSOCIATES

Jill E. Follett	AK
Michael H. Prager	RI
John J. Hoey	RI
Dr. Jeffrey B. Waxman	NY
Kurt M. Schaefer	CA
Paget Leh	CA

### New MEMBERS

Dr. Robert R. Rofen	CA
Dr. David G. Hankin	CA
W. F. Skinner	PA
Dr. John P. Giesy	MI
Dr. William W. Taylor	MI

### Promotion to FELLOW

Dr. Robert R. Stickney	TX
Dr. Robert H. Gray	WA
Dr. Fred M. Utter	WA
John W. Ropes	MA

### EMERITUS

Joseph H. Rose	ID
Richard S. Croker	CA
Leo Pinkas	CA
Dr. Frances N. Clark	CA
Dr. H. G. Orcutt	CA
Dr. Allyn H. Seymour	WA

**Sammy M. Ray, Membership Chairperson**  
Texas A & M University  
Building 311, Fort Crockett  
Galveston, Texas 77550

Resumés should be forwarded for candidates for membership.

**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. 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.

*American Institute of Fishery  
Research Biologists*

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**. . . BRIEFS . . .**

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OCTOBER, 1983



*Participants in the 1983 AIFRB Board of Control meeting at Milwaukee, August 14-17: Front row—John Isakson, NW Washington District Director; Pete Cole, Treasurer; Gene Nakamura, Past President; Bernie Skud, President; John Helle, Alaska District Director; Bob Stickney, Texas District Director, Back row—Charles Liston, Great Lakes, South Central District Director; Joan Browder, Florida District Director; Ollie Cope, BRIEFS Editor; Sammy Ray, Membership Chairperson.*

### **The Board of Control Meeting**

The annual meeting of AIFRB's 1983 Board of Control was held in Milwaukee, WI, August 14-17. (As in the past, this meeting was held at the same time as the annual meeting of the American Fisheries Society; next year the meetings will be held August 12-15 at Cornell University in Ithaca, NY.) Those present were Bernard E. Skud, President; Eugene L. Nakamura, Past-President; Charles F. Cole, Treasurer and acting-Secretary at the meeting; Sammy Ray, Membership Chairperson; Oliver B. Cope, BRIEFS Editor; and District Directors: Joan A. Browder (Florida), Jack H. Helle (Alaska), John S. Isakson (Washington NW), Charles R. Liston (Great Lakes), and Robert R. Stickney (Texas).

The Board agreed on two changes in the Bylaws. Article III, Section 4, now states that the accounts of the Treasurer will be audited annually (instead of bi-annually) by a committee of two members or by an accounting firm. Article III, Section 8, now states that the Districts shall prepare a slate of one or more (instead of two or more) for District Director and that the ballots for this slate shall be returned to the Chairperson of the District's nominating body (rather than to the Secretary of AIFRB). This change was made to conform with existing practices in most Districts.

The Board announced that Dr. Kenneth D. Carlander would be the recipient of the Outstanding Achievement Award in 1983 (see BRIEFS notice in this issue). The Committee for the W.F. Thompson Best Student Paper Award did not make an award this year. The Special

cont. on page 2



## **Board of Control** cont.

Group Award of Excellence will be announced later this year. The Board approved a new program of grants for attendance at scientific meetings. Only AIFRB Associates who are students in good standing are eligible for these grants (see BRIEFS notice).

The list of AIFRB members and their addresses was updated and will be distributed to all members during the coming fiscal year. Current membership is 198 Associates, 622 Members, 247 Fellows, and 106 in Emeritus status — a total of 1,173. Seventy new applicants were approved for membership in 1983 and there were 5 promotions to Member, 7 promotions to Fellow, and 21 approvals as Emeritus. About 160 delinquents, some of whom had been carried on the books for as long as 5 years, were deleted from the roles.

The President appointed Past-President Nakamura to chair the Nominating Committee for President-Elect; the slate of nominees and ballots will be presented to the AIFRB Members and Fellows early next year. Past-President Nakamura also is undertaking a review of AIFRB's Policy Statements on Professional Conduct, Criteria for Membership, and Educational Standards.

The Treasurer reported that the IRS had approved AIFRB for tax-exempt status early in 1983. The Treasurer's accounts were audited by a financial committee appointed by the President. (The full report of the fiscal year will appear in BRIEFS.) Because of comments concerning the types of investments used by AIFRB, a committee was appointed to establish a policy statement and guidelines for all future investments of the Institute. The Board also approved the prudent use of AIFRB's borrowing power in our securities account.

District activities, especially those concerning symposia or white papers, in Alaska, Florida, Texas, and NW Washington were discussed. Howard F. Horton will assume the Directorship of the Oregon/SW Washington District immediately after this annual meeting, as will Ed A. Best in the NW Washington District. Elections for District Directors are scheduled this fall in the following Districts: Alaska, California Central, California Southern, Florida, Great Lakes, Gulf of Mexico, and Washington Metro. (Since the annual meeting, Ronald G. Rinaldo has been elected as the Director of the Southern California District.)

A preliminary list of guidelines for the annual meeting and detailed descriptions of the duties of AIFRB officers were submitted to the Board of Control for review.

## **AIFRB President's Report — 1983**

My first function as AIFRB President in 1983 was the presentation of the 1982 Special Group Award of Excellence to the Canadian Journal of Fisheries and Aquatic Sciences (CJFAS). The presentation was made

at the annual Canadian Conference For Fisheries Research in Winnipeg, Manitoba on January 3. Jeff Watson, Director of the Information Branch of Canadian Fisheries and Oceans and Editor-in-chief of the Journal, accepted the award on behalf of the staff. The announcement of the Award was carried in BRIEFS, CJFAS (Vol. 40, No. 4), PISCES (the newsletter of Canada Fisheries and Oceans), and in FISHERIES (a bulletin of AFS). I was pleased with the publicity AIFRB received as a result of this award, but think that even more should be done to publicize the Award and AIFRB's activities.

I think that BRIEFS, with its new features, increased pagination, and two additional issues annually, is helping to improve communication among AIFRB members. I have received a number of favorable comments concerning BRIEFS and was pleased to receive correspondence from members who raised questions or sent comments about specific articles. One specifically praised the practice of publishing the Treasurer's Report, and the same individual questioned the type of our investments—a matter for discussion at our 1983 meeting. Although the number of contributions to BRIEFS has increased substantially, there is need for more submissions, particularly concerning research results, reports on special scientific meetings, and activities in the inland provinces and states. Articles reporting on political and economic aspects that influence fishery research are also encouraged. The new Editor, Oliver B. Cope, and the Production Editor, John Reintjes, have done an excellent job and the best recognition of their efforts would be support by the members in submitting more material.

Revisions of the Bylaws were approved by the Board of Control early in the year and copies were distributed to the members. I think the changes have helped the routine operations, simplified voting procedures, encouraged more students to apply for Associate membership, and clarified special aspects such as appointments when officers cannot fill their scheduled terms of office. Past President Eugene L. Nakamura is to be commended for overseeing the revisions of the Bylaws and their subsequent printing. Gene has also been helpful in chairing a committee to review AIFRB awards program, assisting in other duties, and providing invaluable advice on a number of special issues that arose during the year.

Dr. Sammy Ray, Membership Chairman, now has the Membership Committee and its operations well organized and has shown that this body can function with Committee members distributed from Maine to California. The time and effort of this Committee are greatly appreciated. Dr. Ray's office assistant, Judy Wern, has provided several special services concerning the membership and has helped to improve the system of handling and distributing certificates. The percentage of new members in the Associate category has increased

## **AIFRB President's Report** cont.

dramatically since the 1982 change in the Bylaws which opened this category to graduate students.

The Internal Revenue Service approved the tax-exempt status of AIFRB early in 1983, thanks to the diligence and patience of our Treasurer, Charles F. Cole, in wading through the frustrating paperwork. Among other things, this action helps us reduce our mailing costs. Cole's arrangements with professional accounting and investment firms have been very helpful in the establishment of a sound financial system. His patience in updating and automating the mailing list for the membership to incorporate the billing of dues will ease the future workload and provide a more systematic record of each member's year of joining, promotions, etc. We will be able to provide Regions and Districts with lists of their membership and mailing labels.

Although these "housekeeping chores" have been time-consuming for officers and committees, I think they were essential to our operation and, along with other changes such as the Annual Meeting Briefing Book, will provide a continuity and history that has not been readily available in the past. More importantly, I think it will allow and help us to concentrate future efforts on the professional goals of the Institute.

My contacts with other organizations and agencies this year included a number of new ones such as the Eisenhower Exchange Fellowship, People to People Program, International Association of Fish Ethologists, Careers Inc., and the Marine Sanctuary Program. I was also invited to a luncheon by the Secretary of the Interior; attendees included officers of AFS, Sport Fishing Institute, the International Association of Fish and Wildlife Agencies, and representatives of sport fishing groups and tackle manufacturers. Secretary Watt talked about his concept of progress in the Department, which was mainly based on economic considerations, particularly of gas and oil leases. I continued to serve on the AFS Subcommittee for Liaison with AIFRB and had contact with the President of AFS's Marine Section concerning the joint session at this year's AFS meeting. I appointed Richard E. Cutting (Nova Scotia) to serve as AIFRB's Co-chairman of the planned session: Strategies for Management of North American Salmonid Stocks (*see article in this issue*).

Secretary Herb Lawler has handled numerous requests about AIFRB as well as for information on fishery biology in general. He, of course, has been responsible for tallying votes from the Districts and has prepared the agenda for this meeting. I find his thorough minutes from the 1982 meeting very useful and recommend that they be used as a guide for recording minutes of future meetings.

Jack B. Pearce and Fred P. Meyer chaired the Committees for the Best Student Paper Award and for the Outstanding Achievement Award and I am grateful to them and their Committee members for their willingness

to participate. I would also like to acknowledge the meeting arrangements that were handled by William R. Nicholson for the 1982 meeting and Charles R. Liston for the 1983 meeting.

Although the problems of inactivity in certain Districts still persist, we have signs of improved communication in the Great Lakes, New York, and the Texas Districts. Regular attendance at meetings is difficult in those Districts with few members or with members located long distances apart. In these cases I would urge the Directors to gear their operation for a single or quarterly special meeting or symposium. I also would suggest that in these Districts the Director send a brief communique to the membership once or twice a year, either about AIFRB or about some aspect of fishery research in the local area. There has been some confusion about the term of office and the voting procedures for District Directors, and I hope this will be clarified at the 1983 meeting. Publication of the papers from the 1982 symposium, "Old Growth Forests: Fishery and Wildlife Relationships", held by the Alaska District and the Alaska Chapter of the Wildlife Society has been delayed, but is expected to be ready for the printer this fall.

As will be noted in the Treasurer's Report (to be published in BRIEFS), our financial condition is sound and we retain an income-producing reserve of approximately \$40,000. Expenditures in 1982-1983 will be higher than usual, mainly because we are holding two annual business meetings during the year (AFS shifted from a September to an August session)—this will be offset in the future when the meeting is shifted back to September. Revenues for the 1983 year are still expected to exceed expenditures.

Again, I thank all of the AIFRB officers for their cooperation and assistance during the past year and seek their continued support and enthusiasm in the coming year.

Respectfully submitted,  
**Bernard E. Skud, President**

## **Outstanding Achievement Award**

The American Institute of Fishery Research Biologists annually recognizes outstanding contributions to the field of fisheries or fishery resources by individuals or agencies. This year, the Institute recognizes Kenneth D. Carlander of Iowa State University for his outstanding contributions to the field of fisheries science.

Dr. Carlander has had a long and distinguished career as a researcher and educator in his field. His studies made pioneering contributions to fish population dynamics and to the use of age and growth information in the management of fisheries. His "Handbook of Freshwater Fishery Biology," now in its third edition,



## **Achievement Award** cont.

has become an indispensable reference for freshwater fishery biologists throughout the world. To this scientific bibliography may be added nearly 250 technical and popular communications, 8 book chapters, 12 scholarly book reviews, and numerous miscellaneous reports.

Dr. Carlander holds a Ph.D. from the University of Minnesota; he began his career in 1938 as an aquatic biologist for the Minnesota Department of Conservation. That employment was interrupted by military service in World War II; upon his return, he accepted a position as an Assistant Professor at Iowa State University. In 1946, he was named Leader of the Iowa Cooperative Fishery Research Unit, a position he held until 1966. From 1960 to 1964, he served as Chairman of the Committee in charge of the Fisheries and Wildlife Section in the Department of Zoology and Entomology at Iowa State. In 1974, his rise through professorial ranks was culminated by being named Charles F. Curtiss Distinguished Professor at the University.

During his teaching career, Dr. Carlander trained over 90 graduate students, including many from abroad. He directed the studies of 58 M.S. and 32 Ph.D. students, many of whom have become recognized as fisheries authorities in their own right.

Dr. Carlander has had a special interest in promoting fishery science and management in protein-deficient nations. To this end, he has trained many international graduate students at Iowa State and has carried out several foreign assignments. During 1965-1966 he served with The Ford Foundation Fisheries Training Program based at Alexandria University, Egypt. In 1977-1978, the National Science Foundation sponsored him as a Visiting Professor to Satya Wacana Christian University, Indonesia, where he assisted in establishing a fishery education and research program. During this assignment, he also supervised Iowa State student participants in the SPAN program.

Throughout the years, Dr. Carlander's expertise has been frequently sought for scientific panels, committees, etc. An AIFRB Fellow since 1956, he has served as District Director and a member of the AIFRB Board of Control from 1957 to 1961 and was on the Nomination Committee for President-Elect in 1970, and on the Committee for Educational Standards in 1961 and 1969. He has served as President of the American Fisheries Society (1960-1961) and of the Iowa Academy of Sciences (1968-1969) as well as numerous service roles in scientific societies. His many contributions as fishery researcher and educator have been recognized through receipt of publication awards, conservation citations, and other honors. In 1979, he was awarded the American Fisheries Society Award of Excellence.

The American Institute of Fishery Research Biologists is pleased to recognize Kenneth D. Carlander for his professional leadership, research, and contributions to the academic community in the field of fishery sciences.

## **AFS/AIFRB Session on Salmonid Stocks**

The Marine Fisheries Section of the American Fisheries Society and the American Institute of Fishery Research Biologists co-sponsored a technical session at the recent annual meeting of AFS in Milwaukee. The title of the session was *Strategies of Management of North American Salmonid Stocks*. Kirk T. Beiningen (Oregon) was the co-covenor representing the Marine Section and Dick E. Cutting (Nova Scotia) was the co-convenor representing AIFRB.

Dave A. Allen of the U.S. Fish and Wildlife Service reviewed the restoration programs for salmonids in the U.S. and discussed the research needs for Atlantic salmon. Dick E. Cutting, Canadian Department of Fisheries and Oceans, summarized management and research efforts on Atlantic salmon in the Canadian Maritime Provinces and discussed trends in abundance and importance of different user groups. He also described the recently established policies and priorities to rehabilitate the stocks. Michael Hunter, Canadian Department of Fisheries and Oceans, Ottawa, reviewed the early history of the British Columbia salmon fishery and iterated the principle of abstention established for the high seas fishery. He also gave an open and frank discussion on the international negotiations and problems experienced by Canada and the United States. Kirk T. Beiningen, Oregon Department of Fish and Wildlife, talked about general problems associated with common property resources, and their allocation. He concurred with Hunter concerning the need for international agreements on Pacific salmon and was optimistic that an accord would be reached. Lee T. Kernan, Wisconsin Department of Natural Resources, spoke about the changes in salmonid populations in the Great Lakes and the effects of the sea lamprey. He summarized the introductions of salmonids since the 1960's and gave a detailed account of efforts by the State of Wisconsin in Lake Michigan and Lake Superior on coho salmon and lake trout. R.M. McDowall, New Zealand Fisheries Research Division, described the salmonid sport fisheries in New Zealand and their management. He pointed out that there is no authorized commercial fishery and that angler groups regulate and manage the sport fishery.

After the morning session, when the above presentations were made, a panel discussion was held, with active participation by the audience.

## **NMFS Hosts Symposium on Fish Evolution**

Fishery biologists from 10 countries gathered in La Jolla on August 15-18 for the international symposium, "Ontogeny and Systematics of Fishes," at the Third



## Symposium on Fish Evolution *cont.*

College Lecture Hall, University of California, San Diego. The symposium was sponsored by the National Marine Fisheries Services, an agency in the U.S. Department of Commerce, National Oceanic and Atmospheric Administration.

The four-day Symposium was dedicated to the late Dr. Elbert H. Ahlstrom, an ichthyologist and fishery biologist at the Southwest Fisheries Center in La Jolla whose 40-year career in the federal government focused on studies of the early life history of fishes and assessment of the role of developmental (ontogeny) characters in fish systematics. Dr. Ahlstrom, who died 4 years ago, evolved methods and techniques for embryonic and larval fish identification and for utilizing information derived from larval fish surveys for assessing the potential biomass of fisheries resources. Through Dr. Ahlstrom's efforts, the NMFS Laboratory in La Jolla has built up the most extensive larval fish reference collection in the United States, and is a center of research and study for fish systematists from around the world.

The meeting began on August 15 with the presentation of two major papers, one reviewing the interrelationship of early life history studies and systematics of fisheries, and the other assessing the role of ontogenetic characters in fish systematics. Following this was a paper defining ontogenetic stages of fishes and an extensive poster session illustrating the techniques and approaches used in this field. Three days were devoted to a review of the major fish groups and their developmental characters. A major summary paper concluded the Symposium. Dr. Reuben Lasker, a division chief at the Southwest Fisheries Center, was convener of the Symposium.

*Izadore Barrett, Director  
SW Fisheries Center, La Jolla, CA*

## "Gene Banks" for Wild Fish Stocks

Wild stocks of fish are declining. Wild stocks of fish, as well as other wild animals and plants, represent a great source of genetic variability. This diversity is essential not only for their own survival, but also because it provides a source of genes for known and unknown needs in the future. The present rate of decline in abundance of wild stocks of fish, if allowed to continue, will result in a serious loss of genetic variability.

Domestic animals and food crops have undergone intensive inbreeding and genetic selection. Consequently, genetic variability has been reduced and original wild strains, which could have provided the needed genetic material for outbreeding, have been lost. For these reasons "gene banks" have been established in North America and the USSR to preserve wild sources of seed. An analogous situation exists between wild stocks of fish and hatchery fish and stocking and planting prac-

tices. The genetic integrity of wild stocks of fish is endangered by these practices. Watersheds need to be designated where hatcheries and stocking are not allowed and the wild stocks of fish would be subjected only to natural selection. These watersheds would be "gene banks" for wild stocks of fish.

Our National Parks have goals that are consistent with the idea of preserving the integrity of stocks of fish. Designated watersheds within the National Parks could receive the protection necessary to qualify as "gene banks".

*John H. Helle, Director, Alaska District, AIFRB*

## Monitoring the Infrastructure of Fisheries Habitats

Since 1976, the Ocean Pulse Program and later the Northeast Monitoring Program (NEMP) have been monitoring the relative health of fisheries habitats between the Canadian border and Cape Hatteras. The majority of the monitoring activities have been performed by personnel of the National Marine Fisheries Service (NMFS), Northeast Fisheries Center (NEFC). However, sizeable portions of the monitoring and research were accomplished through contracts with various academic and consulting institutions. Some of the recent findings have considerable significance to marine fisheries in the northeast. For instance, recent cruises have indicated that most species of fish, whether taken inshore or near the shelf edge, have had detectable levels of PCBs and petroleum hydrocarbons in their muscle tissue. In certain species, i.e., silver hake, the levels of PCBs have been of the same order of magnitude as the so-called action limits (5 ppm) established by federal agencies. The vast majority of fish would be deemed suitable for human consumption given the existing action limits. The more important problem is that there is very little known about how such levels of PCBs might affect the reproduction and well-being of the fish themselves.

At the same time that we are looking for a range of contaminants in the tissues of fish and shellfish we have also been examining the physical compartments of the ecosystem to determine the degree to which contaminants are sequestered in sediments and waters. High levels of trace metals have been found in sediments from all principal estuaries. Offshore areas that received dumped wastes have also been found to be characterized by very high levels of trace metals, as well as a range of organic contaminants. Even areas formally regarded as pristine, i.e., Casco and Penobscot Bays (Maine), have been found to have high levels of trace metals in sediments of the inner estuaries in principal harbors. Gradients of heavy metals from inner harbor seaward have shown that metals and other contaminants do move from principal areas of accumulation.

Our long-term monitoring activities suggest that the large amounts of waste disposed at the New York Bight

## Fisheries Habitats cont.

dumpsite do not necessarily accumulate in great amounts; this leads to speculation that the solid wastes and associated contaminants are being carried considerable distances from dumpsites. Preliminary information on indicator contaminants tends to verify this speculation.

If the goals of our Administration are to be achieved, that is to have a significant increase in fisheries yield and fisheries product exports, then it is essential that the habitats necessary to the production of seafoods be upgraded and maintained at a level of health such that adequate levels of production can be maintained and the public perception of the quality of seafood is positive.

*John B. Pearce, NMFS, Highlands, NJ*

## Legislative Activities

### Section 404 of the Clean Water Act

Section 404 of the Clean Water Act requires developers to obtain U.S. Army Corps of Engineers permits for disposal of dredges or fill materials into waters of the United States. Development activities regulated under Section 404 can have major impacts on fisheries resources. Projects must comply with guidelines developed by the Environmental Protection Agency (the Section 404(b) Guidelines). Federal resources agencies (Fish and Wildlife Service, National Marine Fisheries Service, EPA) review and comment on most permit applications.

#### *Administrative Action*

Since July 1982, Assistant Secretary of the Army, William Gianelli, has been introducing administrative and regulatory changes to the Section 404 permit process that severely limit environmental protection of this nation's wetlands and waterways:

- redesigning the interagency agreements between the Corps and federal resources agencies, giving the Corps full veto power over agency requests to mitigate impacts of proposed projects or requests to elevate permits to a higher level of authority for additional review of unresolved environmental issues.
- modifying general permits to allow issuance of blanket general permits to states, which make dredge or fill activities subject only to state agency oversight, regardless of environmental impacts.
- issuing 25 and proposing 2 new nationwide general permits that cover broad categories of projects in waters throughout the U.S. and circumventing public participation and environmental review of individual projects. The National Wildlife Federation and 15 other conservation organizations have sued the Department of the Army and EPA to rescind the state program

general permits and 6 of the 25 nationwide permits; the American Fisheries Society and International Association of Fish and Wildlife Agencies have filed an *amicus* brief in the suit. Six of the permits would allow unregulated development in the following areas:

1. Projects in headwaters of our nation's streams and rivers.
  2. Projects in all isolated lakes and wetlands.
  3. Activities associated with construction of small-scale hydroelectric projects.
  4. Disposal of dredge or fill material associated with surface coal mining.
  5. Construction of intake and outfall structures in any body of water.
  6. Activities excluded from requirements of the National Environmental Policy Act.
- reverse the procedure for determining whether issuance of a permit is in the public interest, placing the burden of proof on the government to determine a project is not in the public interest.
  - allow any federal agency to self-determine 404 consistency on projects undertaken, funded, or authorized by that agency.
  - proposing definitions for terms within the regulatory definition of wetlands that would eliminate from individual permit review vast acreages of wetlands currently protected (bottomland hardwoods, bogs, pocosin wetlands).
  - requesting that the environmental guidelines (Section 404(b)) become advisory instead of mandatory, which would allow the Corps to ignore compliance with environmental safeguards during a permit review. The EPA, under Administrator Ruckelshaus, has maintained that the Section 404(b) guidelines are binding on the Corps. EPA, however, has been directed to revise and simplify these environmental guidelines. The revisions may be proposed later this year.

The Army Corps of Engineers accepted public comment on the proposed nationwide permits and the proposed changes in the wetlands definition until 31 August 1983.

#### *Legislative Action*

In February 1983, Rep. Hall (TX) introduced H.R. 1570 to restrict the applicability of the Section 404 program to navigable waters. H.R. 1570 would eliminate wetlands from coverage under Section 404 and turn Section 404 of the Clean Water Act into a navigation law instead of a water pollution control tool.

Rep. Howard (NJ) introduced legislation (H.R. 3282) to negate some of the impacts of the regulatory changes imposed by the Army since 1982. H.R. 3282 amends Section 404 to ensure that the Department of Army must deny permits if there are practicable alternatives available that have less environmental impact or if unacceptable environmental impacts will occur. These

## Legislative Activities cont.

criteria are currently contained in the Section 404(b) guidelines but are not required by law and could be dropped in upcoming revisions or ignored if the guidelines become advisory. H.R. 3282 makes these criteria *legally* binding.

H.R. 3282 also eliminates Army's veto power over resource agency requests to provide mitigating measures in a permit or to re-evaluate a permit at a higher level of authority within the Corps or Department of the Army.

No companion bill has been introduced in the Senate for Rep. Howard's bill, but amendments are under consideration in the Senate Environment and Public Works Committee that likely will be included with the package of Clean Water Act amendments (S. 431) introduced by Sen. Chafee.

Initial hearings have been held on H.R. 3282 by the House Public Works and Transportation Committee. Further hearings were to be held in late September with House floor action expected later this year or early next year. H.R. 1570 is in the same House Committee but no action has been taken, to date.

### Dingell-Johnson Expansion—H.R. 2163

Legislation (H.R. 2163) adding well over \$100 million to state sport fisheries and recreational boating programs got unanimous approval July 12 from the House of Representatives.

H.R. 2163 would establish an Aquatic Resources Trust Fund consisting of a Sport Fish Restoration Account and a Boat Safety Account. The boat safety account for state and Coast Guard recreational boating safety programs would receive up to, but no more than, \$45 million yearly of the nearly \$100 million collected presently in motorboat fuels taxes. Over \$80 million annually would be added to the present \$35 million D-J program in the new Sport Fish Restoration Account. New money would come from expanding the present excise tax on rods, reels, and lures to additional sport fishing equipment (\$10 million), earmaking present duties on imported boats and tackle (\$20 million), and capturing the remaining motorboat fuels tax collections (\$50 million).

The Senate Finance Committee held hearings 3 August 1983 and was expected to vote on H.R. 2163 in late September or early October. A vote on the Senate floor is expected shortly thereafter. Members wishing to contact their Senators to urge support of H.R. 2163 when it comes to a vote on the Senate floor may do so by writing

The Honorable \_\_\_\_\_ (your Senator)  
U.S. Senate

Washington, D.C. 20510

or by calling (202)224-3121.

National Wildlife Federation, Washington, DC

## AIFRB District Activities

### ALASKA

John H. Helle, *Director*

Coordination of editing activities for the proceedings of the symposium, *Old Growth Forests—Fish and Wildlife Relationships* has been a major activity of the Alaska District for the past several months. A deadline for final author's corrections was set for August 15, 1983.

The District sponsored a debate in October between two of the key people involved on opposite sides of the emotional issue of attempts to repeal the Alaska Fish and Wildlife Subsistence Law.

A dinner meeting was held in February to discuss the proposed logging of the Kadashan watershed. The Kadashan River is the third largest pink salmon producer in southeast Alaska, and it also produces many steelhead and chum and coho salmon. The Southeast Alaska Conservation Council presented the conservationist's viewpoint, and a lively debate followed.

Letters were written to the following;

- (1) *Regional Forester* — presenting our viewpoint on logging the Kadashan watershed.
- (2) *Governor* — lending our support to proposed state funding of Forestry Sciences Laboratory building at the University of Alaska - Juneau.
- (3) *Governor* — expression of our support for the proposed Alaska Fisheries Research Center. We participated actively in this issue last year.

Director Helle was invited to present a paper at the Olympic Wild Fish Conference at Port Angeles, Washington during March. This conference was sponsored by the National Park Service and Peninsula College at Port Angeles. He could not attend the meeting, but wrote a paper and had someone read it for him. The proceedings of the conference will be published and the paper "*Gene Banks*" for Wild Fish Stocks, will be published with the affiliation being Director, Alaska District, AIFRB.

### OREGON-SOUTHWEST WASHINGTON

Howard F. Horton, *Director*

#### NORTHWEST WASHINGTON

Ed A. Best, *Director*

The two Districts held a joint business meeting in August in Olympia, Washington.

Over 30 people from Oregon and Washington joined guests Pat and Dick Noble at this final and very pleasant dinner meeting, chaired by Howard Horton from Oregon State University.

Following a fine dinner, Director Horton called for a brief discussion of the proposed AIFRB raffle for 10 grants to lucky fishery students. The discussion quickly focused on whether such an activity was really in line with the goals of AIFRB. While the proposal was generally supported, there was also clear opposition.

## District Activities cont.

Dr. Horton then introduced guests Pat and Dick Noble. Dick's presentation focused on a review of the successful introduction of Pacific salmon to the Southern Hemisphere. Although his focus was on work in Chile, Dick gave an excellent historical review of salmonid experiences in New Zealand, Australia, and South America. His comments and excellent slides on Chile focused on the basic tasks of coordinating egg shipments, hatching and release facilities, and the tracking and spawning returning fish. By our standards, the facilities in Chile are minimal but the dedication of the native staff overcame many of the difficulties. The audience was asked to consider the many marked geographical similarities between the Pacific Northwest and Southern Chile. A lively discussion followed.

## SOUTHERN CALIFORNIA Ronald G. Rinaldo, Director

The membership has elected Ronald G. Rinaldo as District Director, succeeding Norman W. Bartoo, for the next 2 years. Peter L. Haaker was elected Vice-Director, and Ann F. Brierton was named Secretary-Treasurer.

## New Publications and Announcements

### Fishes of Wisconsin

The University of Wisconsin Press announces the 1983 publication of *Fishes of Wisconsin*, by George C. Becker. That *Fishes of Wisconsin* will take its place as an instant classic will not be disputed by those who know Professor Becker and the work he has been doing for the past quarter of a century. This book, a happy product of those years, will at once be the most comprehensive and dependable guide to freshwater fish for this part of the country.

This is a massive volume, comprising more than 1,000 pages, 600 black-and-white illustrations, 170 color illustrations, and 325 maps. It is a large-format book weighing more than eight pounds, sturdily bound for a lifetime of use. The price of *Fishes of Wisconsin* is \$75.00. It can be ordered from University of Wisconsin Press, 114 North Murray Street, Madison, WI 53715.

### The American Darters

This 1983 book by Robert A. Kuehne and Roger W. Barbour is the most comprehensive and current account of these tiny North American fishes whose jewel-like colors rival those of the tropical fishes beloved of hobbyists. Though originally widespread in occurrence, many darters are now rare or endangered.

This book covers all 132 recognized species plus 8 distinct forms that have not yet been officially described. Each species account contains a synoptic description to aid in the separation of similar species and subspecies; a range map; and full discussion of the species' distribution, abundance, and life history. The

life histories survey the data from all the published literature.

The living essence of these delightful fish is vividly revealed in the series of stunning color photographic plates that display their brilliant coloration against a glossy black background.

Identification for scientists and laymen is made easy by a key abundantly illustrated with black and white photographs and by a glossary of technical terms.

*The American Darters* will be an invaluable source book and a pleasure to own. It belongs in every scientific library and will be a welcome companion for the individual biologist and hobbyist.

This book has 144 color photographs, 64 black-and-white photographs, 138 range maps, an illustrated key, and 216 pages. *The American Darters* will be published at \$45.00, with a \$36.00 price before Nov. 1, 1983. Order from The University Press of Kentucky, Lexington, KY 40506.

### A Field Guide to Pacific Coast Fishes of North America

This volume, part of the Peterson Field Guide Series sponsored by the National Audubon Society, is authored by Eschmeyer, Herald, and Hammann. It covers over 600 species from the Gulf of Alaska to Baja California, including all found to 650 feet and many deepsea ones. The book has over 525 illustrations, with 211 in color, and has up-to-date information on size, range, habitat, and importance. It is available at \$19.95 in cloth cover and \$11.95 in softcover. Order from: Field Guide, California Academy of Sciences, Golden Gate Park, San Francisco, CA 94118.

### Recent Elsevier Science Publishing Co. Books

The following publications can be obtained from Elsevier Science Publishing Co. 52 Vanderbilt Avenue, New York, NY 10017:

#### *Genetics In Aquaculture*

This volume is the Proceedings of an International Symposium held in University College, Galway, Ireland, March-April 1982, and is edited by N.P. Wilkins and E.M. Gosling. It is an up-to-date review of all the major aspects of genetics applied to aquaculture. The book comprises papers on such topics as population genetics, genetic markers, hybrids and hybridization, quantitative genetics, inbreeding, sex reversal, cytogenetics and domestication. Progress in these areas is also assessed in the reports of three workshop sessions devoted to genetic research in fishes, molluscs and crustaceans. Each topic is introduced by a major review paper presented by an invited author. The book provides a broad overview of recent developments in this rapidly expanding field, that will be useful not only to geneticists entering the field but also to aquaculturists, physiologists and others with academic or commercial interest in cultivable aquatic organisms. The price is \$91.50 in the U.S. and Canada.



## **New Publications and Announcements** cont.

### ***Water Quality Management for Pond Fish Culture***

This 1982 volume by Claude E. Boyd is the first complete and up-to-date account of the theory and practice of water quality management for pond fish culture. The coverage is comprehensive and, while practical application is stressed, the theoretical basis for each management procedure is carefully developed. Chapters cover water quality, fertilization, liming, dynamics of dissolved oxygen, feeding, aeration, aquatic plant control, miscellaneous treatments, and hydrology of ponds.

The book has 318 pages and costs \$63.75.

### **Recent Springer-Verlag Books**

These books can be obtained from Springer-Verlag New York Inc., P.O. Box 2485, Secaucus, NJ 07094.

### ***Olfactory Imprinting and Homing in Salmon***

Written by Arthur D. Hasler and Allan T. Scholz, this 150-page monograph in the *Zoophysiology* series provides an account of the authors' experimental and analytical results in the study of olfactory imprinting and homing in salmon, and an illustration of the evolution of a biological investigation. The value of rigorous field testing and the importance of basic information about fish behavior and physiology for managing the world's dwindling salmon population become evident.

Organized into two parts, *Olfactory Imprinting and Homing in Salmon* first covers general information about the life history of salmon, the olfactory hypothesis, and descriptions of the authors' recent work on artificial imprinting of salmon with synthetic chemicals. Part Two examines hormonal regulation of smolt transformation and olfactory imprinting in salmonids and other factors controlling salmon migrations. In addition, this volume presents a collection of general impressions formed by the authors about the life history, behavior, physiology, and ecology of salmon, based on extensive world-wide studies.

The book costs \$26.50.

### ***Coral Reefs***

This serial, with D.R. Stoddart, P.S. Davies, I.G. Macintyre, and Y. Loya as editors, offers Volume 2 (4 issues) in 1983. It is a joint venture of Springer-Verlag and the International Society for Reef Studies, and assembles the latest analytical and theoretical research results on both ancient and modern reefs. It encourages the search for generalizations about reef structure and dynamics, while emphasizing experimentation, modeling, and quantification. Its special goal is to bridge the gap between physical and biological sciences concerned with reef studies.

The subscription price for Volume 2 is \$58.00.

### **Recent World Mariculture Society Books**

The following publications are available from World

Mariculture Society, Division of Continuing Education, Pleasant Hall, Louisiana State University, Baton Rouge, LA 70803.

*Proceedings of the North American Oyster Workshop.* WMS Special Publication No. 1. 300 pages. Price \$25.00.

*Proceedings of the Second International Conference on Aquaculture Nutrition: Biochemical and Physiological Approaches to Shellfish Nutrition.* WMS Special Publication No. 2. 550 pages. Price \$35.00.

### **Re:Sources**

This tabloid publication, produced quarterly by The Environmental Task Force, Inc., was created in 1980 to strengthen the environmental movement through cooperative action. The Summer 1983 issue (Vol. 3, No. 2, 16 pages) contains articles on nuclear waste, grass roots items on pesticides, a special section on environmental education (including local groups involved in environmental education issues, college public interest research groups, and a resources/directory of environmental education projects, courses, and resources), a national focus section, and a calendar of conferences and other activities. Subscriptions to RE:SOURCES are available to individuals and non-profit organizations (\$12.00/year) from Environmental Task Force, 1346 Connecticut Ave., N.W., Washington, DC 20036.

### **Coastal Oceanography and Climatology News**

The Center for Ocean Management Studies, University of Rhode Island, has been publishing a high-quality newsletter, *Coastal Oceanography and Climatology News*, for several years. This publication, covering recent events in U.S. coastal waters, is unfortunately losing its financial support after the appearance of the November 1983 issue. Because many of the interests of the Center and the content of the *News* are similar to the focus of AIFRB and BRIEFS, AIFRB has invited the many *News* correspondents to contribute items for possible publication in BRIEFS. AIFRB hopes for strong participation of *Coastal Oceanography and Climatology News* correspondents so they can continue their good work in timely dissemination of information concerning environmental events and research activities in U.S. coastal waters.

### **New Computer Program**

DISBCAL for the IBM PC: A program originally written by Richard V. Frie for the Apple II (AIFRB BRIEFS, June 1982; Fisheries 7(5):5-8, (1982)) has been converted for use on the IBM PC by Sherry Middlemis of Voyageur Fisheries Consulting (Rt. 1, Box 128A, Somerset, WI 54025). The program enables the user to digitize annulus measurements that are projected onto a Houston Digitizer pad (HSTI-DT11) and perform back-

## New Publications and Announcements cont.

calculations. The program and documentation can be obtained by sending a 5¼" floppy diskette to John Hoenig, MN Dept. Nat. Res., Box 25 Centennial Office Building, St. Paul, MN 55155-1679.

### Pacific Fishery Biologists 1984

All members and person interested in membership in PFB should note on their calendars that the next annual meeting will be at Ocean Shores, Washington (the state), March 19, 20, and 21, 1984. The program is presently evolving, so any persons with papers on themes for sessions should contact: Dr. Robert Donnelly, 260 Fisheries Center WH-10, University of Washington, Seattle, WA 98195.

The call for papers and formal meeting notification will go out in December 1983. We would like to hear from you early so that programs can include topics of interest to all. We are also seeking donations of sporting goods or other items which can be a part of the student scholarship raffle. If any members have close contacts with manufacturers, wholesalers, etc., see what you can come up with. All contributions go toward this scholarship fund and would be greatly appreciated by PFB.

### Shrimp Yield Workshop

Anyone interested in attending the Shrimp Yield Prediction Workshop sponsored by AIFRB, NMFS, and TAMU Sea Grant in Galveston, Texas, on November 16 and 17, 1983, should contact Dr. Andre M. Landry at Texas A&M University at Galveston, P.O. Box 1675, Galveston, TX 77553.

**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. 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.

## *American Institute of Fishery Research Biologists*

Route 4 Box 85 • Morehead City, NC 28557

Address Correction Requested

## Membership Report

### NEW ASSOCIATES

Edward Louis Dean	Sask.
Steven K. Davis	AK
Travis Carl Coley	OR
Daniel C. Josephson	VA
Gary Steven Comp	FL
Robert Francis Sewak	TX
Malcom C. Johnson, III	TX
John M. Mitchell	TX
Kenneth K. Sellers	TX
Brian Lee Brawner	TX
Timothy K. Cross	MS
Phillip Roberts Moore	SC
Ernest Alan McCune, III	TX

### NEW MEMBERS

Harry L. Cook	Malaysia
Dr. James A. Bohnsack	FL
Dr. Roger A. Rulifson	ME

### EMERITUS

John I. Hodges	OR
Dr. Richard A. Wade	NM
Albert C. Jensen	FL
Donald T. Montgomery	WA

**Sammy M. Ray**, *Membership Chairperson*  
Texas A & M University  
Building 311, Fort Crockett  
Galveston, Texas 77550

## Student Raffle Reminder

An item on page 10 in the last BRIEFS (Vol. 12, No. 4) announced the inauguration of an AIFRB program featuring student travel raffles. This a reminder that Associate Members who are graduate students are eligible to participate in this \$250 grant program to assist students in travel to scientific meetings. A student may submit his name, university affiliation, name of major professor, and the meeting and its location to: AIFRB Treasurer C.F. Cole, 365 Kottman Hall, 2021 Coffey Road, Ohio State University, Columbus, Ohio 43210 by the deadline, January 1, 1984.

## Have You Moved?

Whenever you move, be sure to let AIFRB know so there will be as little delay as possible in your receipt of BRIEFS. Change-of-address notices should go to Dr. C.F. Cole, AIFRB Treasurer, 365 Kottman Hall, 2021 Coffey Road, Columbus Ohio 43210.

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## . . . BRIEFS . . .

VOL. 12, NO. 6

DECEMBER, 1983

### 1983 AIFRB Awards

It was announced in the last issue of BRIEFS (Vol. 12, No. 5, page 3) that the Institute's **Outstanding Achievement Award** for an individual goes to Kenneth D. Carlander, a most worthy recipient. The Board of Control now announces its 1983 selection for another AIFRB award, the **Special Group Award of Merit**.

The 1983 AIFRB Group Award of Merit recognizes the successful control of the sea lamprey, *Petromyzon marinus*, in the Great Lakes as an achievement that has made possible the revitalization of existing fisheries and the successful introduction of new species that have resulted in a major expansion of recreational angling. The participants in the Award include the State of Illinois, Indiana, Michigan, Minnesota, New York, Ohio, Pennsylvania, and Wisconsin, the Province of Ontario, the Canadian Department of Fisheries and Oceans, the United States Fish and Wildlife Service, and the Great Lakes Fishery Commission. All agencies involved will receive Award Certificates, but the formal presentation of the Award will be to the Great Lakes Fishery Commission, on behalf of all the former and present cooperating agencies, and for its own role of leadership and coordination of the sea lamprey control program.

The collapse and subsequent re-establishment of recreational and commercial fisheries in the Great Lakes represents a historic chapter in fishery management. The 1940's and 1950's marked the virtual elimination of salmonids from Lakes Michigan and Huron and a drastic reduction in Lake Superior. While the sea lamprey may not have been the sole factor, there is little doubt that it was the primary cause of these declines.

The restoration of these fisheries in the upper Great Lakes has been built upon the cornerstone of sea lamprey control. Early efforts to control the sea lamprey



Kenneth D. Carlander, recipient of the 1983 AIFRB Outstanding Achievement Award.

reflected geographic concerns about the threat the invader presented to fishery stocks. Michigan, Ontario, Wisconsin, and the U.S. Fish and Wildlife Service were among the first to initiate studies of sea lamprey biology and migrations in the late 1940's. Mechanical and electrical barriers were installed in the early 1950's in an attempt to control the sea lamprey. In 1953, under the direction of Dr. Vernon C. Applegate, the U.S. Fish and Wildlife Service began screening chemical compounds at its Hammond Bay Biological Station in search of a selective lampricide. In 1956, Dr. Applegate announced the discovery that TFM (3-trifluoromethyl-4-nitrophenol) was an effective and selective lampricide.

While there were many researchers who had conducted research on the sea lamprey problem, and whose work contributed significantly, none of their agencies alone had the resources to attack the problem that had become basin-wide and pervaded all of the Great Lakes. If control was to be achieved, a program had to be developed that would build on the data provided by others, that would transcend state and national boundaries, that could be uniformly applied over a variety of geographic areas, and that would be acceptable from the standpoint of human and environmental safety. Initially, this was the task of the Great Lakes Sea Lamprey Committee formed in 1946 under the guidance of Dr. John Van Oosten with representation from the U.S. Fish and Wildlife Service, Ontario, and the Great Lakes states. Leadership of the group was assigned to Dr. James W. Moffett in 1950. In 1953, Canada also established the Federal/Provincial Great Lakes Fisheries Research Committee which was co-directed by Drs. F. E. J. Fry and William M. Sprules. With funds available from both federal governments in 1953, a joint project was established in Lake Superior, marking the beginning of the international lamprey control program.

cont. on page 2



## 1983 AIFRB Awards cont.

Finally, in 1955 the governments of Canada and the United States entered into a Convention to establish a Great Lakes Fishery Commission, "taking note of the interrelationships of fishery conservation problems and of the desirability of advancing fishery research in the Great Lakes; being aware of the decline of some of the Great lakes fisheries; being concerned over the serious damage to some of these fisheries caused by the parasitic sea lamprey and the continuing threat this lamprey constitutes to other fisheries; recognizing that joint and coordinated efforts by the United States and Canada are essential to determine the need for the type of measures that will make possible maximum sustained productivity in Great Lakes fisheries of common concern".

The newly-formed Commission promptly used its resources and influence to consolidate and coordinate control efforts and to expedite research on the sea lamprey. The Commission worked closely with federal, provincial, and state agencies in installing and evaluating physical, mechanical, and electrical barriers to upstream migrations of spawning adult lampreys. In 1958, the research program of the U.S. Fish and Wildlife Service, funded by the Commission, conducted the first field test of TFM as a lampricide. By 1960, the Commission, had concluded that chemical control was superior to barriers and began development of a comprehensive program for chemical treatment of lamprey-producing streams in both Canada and the United States. The Commission contracted for the production of sufficient quantities of TFM, and under the memoranda of agreement previously developed with the U.S. Fish and Wildlife Service and the Fishery Research Board of Canada for barrier control, coordinated treatment of tributary streams to the Great Lakes in their respective countries. The success of the control program was soon evident in the reduction of the numbers of migrating adult sea lampreys, the reduction of wounds on fish, and increased survival of lake trout. As the control program expanded to encompass all known lamprey-producing streams tributary to the Great Lakes, the cooperating agencies were able to re-introduce the endemic lake trout and to stock other large salmonids and successfully establish new fisheries.

The American Institute of Fishery Research Biologists recognizes the Sea Lamprey Control Program as one of the outstanding successes of fishery research and management and commends all of the cooperating individuals and agencies for their contributions.

## ✓ Environmental Influences on Tuna Catches in the Gulf of Guinea

Environmental influences on fish population dynamics increasingly are being considered important

features to understand and to integrate into fisheries management models. One approach for developing the basic understanding of how the environment affects fish populations is to study the dynamic relationships between oceanographic and meteorological patterns in time and space and those of catch-per-unit-effort (CPUE) of a particular fishery. Any such analysis assumes that CPUE is an accurate reflection of relative abundance of the fish, which may not in fact be the case. Evidence from our study suggests that a considerable part of the space-time variation in CPUE is due to effort dynamics in time and space and therefore CPUE may not be a good measure of relative abundance.

Using the data from the French, Ivory Coast, Senegalese, and Moroccan tuna fleets, the Gulf of Guinea was divided into eleven areas which correspond to a typical catch or environmental process. Within each area, we have fortnightly CPUE data of purse seining for yellowfin and shipjack tuna, as well as fortnightly means of sea-surface temperature and the east and north components of wind velocity; however; each of these series contains missing values. We estimate local models that "complete" the series in each subarea, as well as provide predictive models of CPUE based on the environmental series. Next, spectral density matrices are calculated using the completed data set, and Principal Components in the Frequency Domain (PCFD), calculated from the spectral density matrices, are used to examine the dominant modes of variability of each variable and between variables in both time and space by frequency. This analysis allow us to investigate the spatial and temporal evolution of both the environment and the fishery data as well as the relationships between these two sets of data.

Autoregressive models of order 2 (AR(2)) are used to estimate the CPUE data when they are missing, using a newly developed algorithm for maximum likelihood estimation when there are missing data. A separate AR(2) model is estimated for each local area which has as its variables the CPUE data for the two tuna species and the three environmental series which characterize a part of the meteorological and oceanographical environment of the Gulf of Guinea. The comparison between the observed data, when they exist, and the estimates produced by the model, shows that the local AR(2) models are able to provide a good approximation to the CPUE data. When CPUE data are missing, the model estimates of CPUE are consistent with what we know about the fishery. Positive values for CPUE are estimated by the models in some oceanic areas where our data set contains no data; these estimates agree with the data from more recent years (not used in estimating the local models) which show positive CPUE at the same time of the year as do the models. The model was also run on a data set where a part of the CPUE data was removed; the values of CPUE predicted by the model are very close to the observed data which were



removed. A detailed study of the contribution of each variable to the models' estimates of CPUE shows that CPUE is mainly estimated by the evolution of the environmental parameters rather than from the persistence of CPUE. In some areas, the "scenario" used by the models to estimate CPUE is consistent with direct observations at sea, which have shown that tuna concentrations are most likely to be found in areas where there is cold water found 1 month before the catches followed by warm water more favorable to tuna concentrations.

The analysis of the space and time relationships between the environmental and the fishery data shows a close relationship between propagation of the SST signal and the evolution of a part of the CPUE data. The theory of the dynamics of the eastern part of the tropical Atlantic predicts that the SST signal associated with upwelling should propagate poleward from the equator along the east and north coast of the Gulf of Guinea. This analysis shows, when the environmental and fishery data are analysed together, this same propagation along the coast for both CPUE and SST. This result is not surprising when viewed in the light of previous studies which have shown that tuna concentrations tend to be associated with high levels of nutrients and with thermal fronts, and such properties of the environment are characteristic of an upwelling process. These results provide strong evidence that the success of the tuna fishery of the eastern part of the tropical Atlantic is related to the evolution of the environment.

When only the CPUE data are examined, the space and time relationships between the different areas appear to reflect more the dynamics of the fishing fleet rather than particular properties of the environment or of fish abundance. These results suggest that CPUE as an index of relative abundance should be used with caution. In addition, for this particular fishery, where the same measure of effort is used to calculate CPUE for two different species, CPUE may not always be representative of single species abundance.

Classical studies which associate fish distributions with environmental properties only at the time and place where tuna are caught can be very useful for determining the mean spatial habitat of the ocean where tuna may be available to a fishery. When this mean habitat has been defined, the use of time series analysis methods, which attempt to relate the evolution of CPUE to environmental variations in time and space, are necessary to understand why tuna concentrations are found in some particular locations within the mean spatial habitat and not in others.

Claude Roy, *Centre Ocean. de Bretagne,  
Brest Cedex, France*

Roy Mendelssohn, *S. W. Fisheries Center,  
Monterey, CA*

### Dues Are Due

The dues notices for 1984 were mailed with the last issue of BRIEFS. Some people did not realize the two were in the same envelope, and dues notices were discarded. **Do not wait** for another notice—new notices will not be sent.

**Send \$10 for your 1984 dues to**

Dr. C.F. Cole, AIFRB Treasurer

Ohio State University

2021 Coffey Road, Columbus, Ohio 43210

## The Antarctica Project

The Antarctica Project is non-profit organization dedicated to helping protect Antarctica and its surrounding oceans. The organization has a variety of material on the Antarctic for sale, including bumper stickers, pins, documents, and newsletters, and is soliciting for new members.

The Antarctica Project is organizing a *Conference on Management of Antarctic Marine Living Resources*. The purpose of the Conference is to have top scientists from governments, inter-governmental organizations, and non-governmental organizations discuss and plan the implementation of the "ecosystem as a whole" concept. This concept, which is contained in Article II of the Convention on Conservation of Antarctic Marine Living resources (CCAMLR), provides an innovative conservation standard: that management of target species must take into account the impacts on dependent and related species, and on the *ecosystem as a whole*. There are some ambiguities as to what this concept means and many "gaps" in terms of conservation measures and research programs needed for it to be put into practice. One key area of concern is whether krill fishing poses any harm to the recovery of threatened and endangered whales. Another area for discussion will be the theory of a "krill surplus." Russian and Japanese scientists have hypothesized that there exists a "surplus" of krill, due to the decline in whale populations of the Southern Ocean. However, no one knows exactly how this "excess" krill has been utilized by other components of the Southern Ocean ecosystem. This is crucial if proper quotas for krill fishing are to be established.

Individuals interested in the Project or its activities can send their inquiries to: The Antarctica Project, 624 9th Street, N.W., 5th Floor, Washington DC 20001

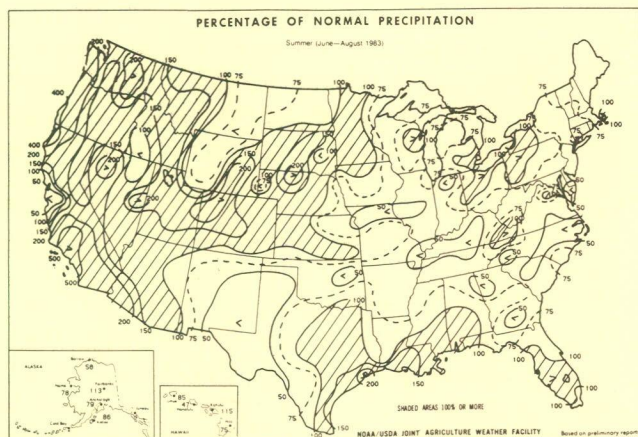
## Summer Coastal Climate Review—1983

Record high streamflows at the start of the summer, followed by above-normal rainfall, made for wet condi-



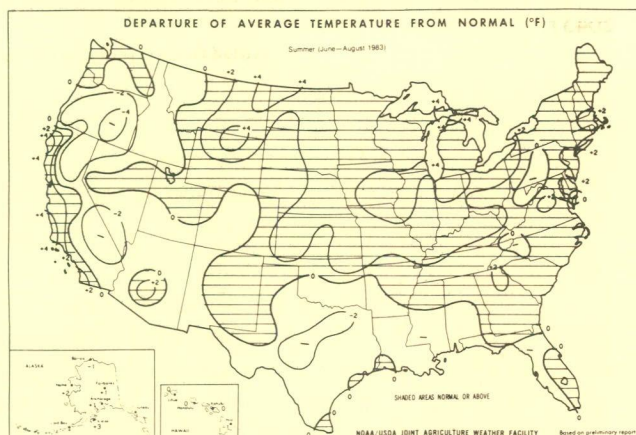
## Climate Review - 1983 cont.

tions along the West Coast. Tropical storms inundated areas along the Gulf at the season's close. Much of the East Coast was extremely dry (Fig. 1). The alternating



**Figure 1.** Percentage of normal precipitation, June-August 1983 (shaded areas 100% or more) (U.S. Department of Commerce and U.S. Department of Agriculture, 1983).

cool and warm periods of summer temperatures were associated with fluctuations of a low pressure center between the Gulf of Alaska and the Pacific Northwest. East of the Rockies a heat wave enveloped the Northeast and later spread southward (Fig. 2).



**Figure 2.** Temperature departure (°F), June-August 1983 (shaded areas normal or above) (U.S. Department of Commerce and U.S. Department of Agriculture, 1983).

**June.** Coastal areas began the summer characteristically—wet. Except for lower California, southeastern Texas, coastal Georgia, South Carolina, and Maine, the nation's shores received up to twice the usual amounts of precipitation. Throughout the month, light to moderate showers fell in the Pacific Northwest and Northern California. Southern California's monthly rainfall receipt was sparse. The record streamflow in that state, however, resulted from record snowmelt runoff from the Sierras and Cascades where the snowpacks had accumulated under heavy snows during the last two seasons. The highest monthly June flows

(HMF) in over 40 years occurred along five major Californian rivers including: the Arroyo Seco (near Pasadena), HMF since 1911; the Merced (near Yosemite), HMF since 1915; the Sacramento (near Verona), HMF since 1929; the West Walker (near Colville), HMF since 1938; the North Fork American (near North Fork Dam), HMF since 1941.

Moist inflow from the Gulf of Mexico produced heavy rains and thunderstorms along the Gulf Coast and into the Mississippi Valley in the opening weeks of June. Meanwhile, thundershowers spread over the Southwest and then up the East Coast. Showery episodes deposited summertime rains in the Ohio Valley. Thunderstorms and showers dotted the Great Lakes area and Saint Lawrence Valley through mid-month, after which conditions became quite dry until heavy thunderstorms recurred the last days of June. Although there was a conspicuous absence of tropical storms, a westward-moving storm dumped heavy showers as it crossed from Florida to Texas. Thunderstorms and rain covered the Southeast and mid-Atlantic states the final days of the month.

During the opening days of summer, temperatures along the West Coast began as cool, but averaged above-normal by up to 2° F for the month. Concomitantly, unseasonably warm temperatures spread from the Great Lakes to New England, with departures as much as 10° F above normal. In a manner reminiscent of last summer, cool air advection from Canada lowered temperatures in the Lakes region to near-freezing the third week of June; temperatures plummeted to record data lows at Marquette, Michigan. As warm air pushed in from the Northern Plains and Rockies, temperatures reverted to the other extreme. Marquette, Michigan tied its date record with 88° F and Boston, Massachusetts set a new date record with 97° F on the 23rd. The warmth lingered the remainder of the month. The entire northeast quadrant of the country finished June with average temperatures at least 2° F above normal.

**July.** During the first days of July, light, occasionally moderate, showers fell in the Pacific Northwest. Meanwhile, thunderstorms covered most the east and gulf states; these rains continued and spread into New England during the first full week of the month. Light showers fell over the lower Great Lakes. Heavy rains in the Northeast alleviated dryness. The Southeast remained dry as only light showers fell, although heavy rains created abnormally wet conditions around the gulf. By the month's end the Pacific Northwest, upper California, and southeastern Texas had received four times the usual precipitation; elsewhere, excepting coastal South Carolina and Maine, areas received under half that normally falling during July.

Cool mornings turned into hot summer days across the nation. As the warming persisted in regions east of the Rockies, a virtual heat wave developed. Although cooler-than-normal temperatures prevailed over areas

## Climate Review - 1983 cont.

west of the Rockies, monthly average temperatures were up to 4° F above normal along the entire United States coastline.

**August.** Although much-needed precipitation fell from variable showers and scattered thunderstorms across the east and gulf, below-average rainfall in the Atlantic states deteriorated existing dryness into drought conditions from Maryland to South Carolina. Meanwhile, unseasonable rains in southern California at midmonth caused some crop damage. Hurricane Alicia produced high winds, tornadoes, heavy rains, and high tides at the coastal areas around Galveston Bay, Texas. As Alicia's remnants moved across the central United States to eventually merge with moisture of Pacific origin around the western Great Lakes, the Mississippi Delta and Southeast remained very dry. However, as Hurricane Barry passed over the Florida peninsula en route to the Gulf of Mexico, shower and thunderstorm activity increased, bringing some relief to the dry Southeast in the fleeting days of the summer. Seasonally, the West Coast was excessively wet with as much as five times normally occurring rainfall along southern California, excepting a small stretch north of Monterey where precipitation received was under half of the average. Similarly, the total precipitation along the gulf and lower Great Lakes regions was somewhat above-average. The East Coast and upper Great Lakes, however, received somewhat below-average precipitation.

A continuation of record-breaking high temperatures made the final month of the summer the hottest August since 1947. Seasonally, coastal area temperatures were above normal except along the Gulf of Mexico and Oregon.

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Pamela J. Young, *National Climatic Data Center, Asheville, NC*

## FAO World Fisheries Conference

The Food and Agriculture Organization of the United Nations (FAO) is organizing a *World Conference on Fisheries Management and Development*. As background to the Conference, FAO has held a series of technical seminars and expert consultations on matters affecting fish resources and their effective use. These preparations culminated in an expanded session of the FAO Committee on Fisheries in October. The report of

the Committee will be the major document before the final, major policy phase of the World Fisheries Conference which will be held in Rome, Italy from June 27 to July 6, 1984.

The Conference will examine the technical, economic and social problems raised by the new regime (extended jurisdiction) of the oceans, and the future potential and needs of the fishery sector. The bulk of the discussion will center on marine fisheries, but aquaculture and inland fisheries will also be covered. The Conference will focus on three specific areas (1) developing individual and joint strategies and action programs to increase the contribution of fisheries to the world's food supplies and to nutritional, social, and economic goals; (2) improving the ability of developing countries to manage and develop their fisheries; and (3) promoting international collaboration in obtaining these benefits through better cooperation between developing and developed countries, and between developing countries themselves.

The World Fisheries Conference will be open to all member nations of FAO, of the UN and its specialized agencies, and of the International Atomic Energy Agency. Observers will be invited from other international organizations concerned with the use of fishery resources. Further information on the Conference can be obtained from Jay J. Levy, FAO Liaison Office for North America, 1776 F Street NW, Washington DC 20437.

Excerpted from FAO news releases.

## Lake Superior Temperatures and Snowfall

Meteorologists in the upper Midwest are predicting that last summer's record breaking temperatures may produce 300 inches of snow this winter in the snowbelt along Lake Superior's south shore, where the annual average snowfall is 215 inches. The summer of 1983, one of the hottest on record, has warmed Lake Superior 4-6 degrees above normal, and surface water temperatures of 72° F have been reported. Since the lake will take longer to cool than in other years, especially high snowfall is expected this winter. When winds moving southward across the lake are 32° F or less, they pick up heat and moisture from the open water when it is warmer than 32° F. The hilly region south of the lake forces the winds upward, cooling the air and dropping the moisture in the form of a dry powdery snow. This "lake effect" creates the south shore snowbelt, and this year's unusually high temperatures are expected to produce an above-average snowfall.

Excerpted from Ironwood Daily Globe



## Legislative Activities

### Dingell-Johnson (D-J)

In spite of strong momentum and an absence of substantive controversy, D-J legislation failed to reach Ronald Reagan's desk before the end of the first session of the 98th Congress. In 1983, D-J progressed through two House committees and was passed by the full House in July. During the first week in November it was passed by the Senate Finance and Budget Committees and attached to the omnibus budget reconciliation bill, a huge revenue-spending measure. The reconciliation bill provided protection to the small D-J "tax" from harmful amendments while providing a vehicle for rapid passage through the essential final votes. Unfortunately, as the first session of the 98th Congress drew to a close, the House refused to consider the reconciliation bill and D-J foundered once again. Efforts to gain final passage of D-J will revive when Congress reconvenes in 1984.

### Congress May Overlook Instream Flow Needs

When the second session of the 98th Congress convenes in late January it most likely will vote on S. 431, a bill to reauthorize the Clean Water Act. Amendments to Section 404 of the Act could have an adverse effect on maintaining fisheries habitat. Section 404 regulates dredge or fill operations in wetlands through a review-and-permit process.

An amendment proposed by Senator Malcolm Wallop (Wyoming) could have major implications in maintaining control over instream flows to protect fishery resources. Senator Wallop's amendment would prohibit the U.S. Army Corps of Engineers (Corps) from considering the effects reduced water flow caused by water diversion would have on downstream processes such as fisheries and other aquatic life, wildlife, endangered species, and water quality.

The amendment was proposed to overturn a recent federal district court decision (*Riverside Irrigation District v. Andrews*) involving a water diversion project in northeastern Colorado. Federal agencies found that construction and operation of the water project would jeopardize habitat of the federally endangered whooping crane due to reduced flow downstream of the project. The developer refused to apply for a Section 404 permit and would not consider mitigation proposals offered by the federal agencies. Instead, the developer sued the Corps and lost.

Unfortunately, the significance of the Wallop amendment extends well beyond the issue of maintaining sufficient instream flow for whooping cranes downstream of the Colorado project. The ability for agencies to maintain instream flow needs for fisheries where diversion projects are proposed will be eliminated. Water diversions, in particular, have a major impact on implementing and maintaining instream flow for fisheries management.

The Section 404 program has provided a rational means to maintain the integrity of U.S. waters without stopping needed development or causing developers undue delay. Besides cutting the loss of U.S. wetlands in half, the program has saved developers money. For example, as a result of the permit review process from 30 to 50% of all projects have incurred reduced costs, for a total savings of 15%.

To help maintain Section 404 you can write or call your Senator—The Honorable \_\_\_\_\_, U.S. Senate, Washington, D.C. 20510 (202-224-3121).

### Artificial Reefs and Saltwater Angler Licensing

Two pieces of fishery legislation introduced in the U.S. Congress in 1983 appear to have little hope for serious consideration. Introduced with some fanfare were bills to establish a national program and tax incentive for developing artificial reefs and establish a nationwide program to license saltwater anglers.

The artificial reef bill (H.R. 3474) was introduced 30 June 1983 by Representative John Breaux (Louisiana) and hearings were held 18 July. Numerous industry groups spoke in favor of the bill, as well as the Sport Fishing Institute and National Wildlife Federation representing the sport fishing community. However, the Administration position, voiced by both the National Marine Fisheries Service and Department of the Interior, was in opposition to the bill. In the months that followed the hearing little interest was generated by industry, the principal recipients of the tax benefits of the bill. Further consideration of the bill in its present form seems unlikely at this time.

A bill entitled "To provide for uniform State licensing of marine recreational fishermen, and for other purposes" was introduced on 10 May 1983 by Representative Harold Sawyer (Michigan). The bill (H.R. 2965) would (1) encourage uniform licensing of saltwater anglers by states and provide for preemption of state licensing programs if inadequate or inconsistent with H.R. 2965, (2) encourage reciprocity between states with contiguous waters, and (3) require that revenues generated by licensing be devoted fully to marine recreational fishing purposes, such as research, management, and facilities development. No hearings on the bill were held in 1983, even though considerable attention was focused on the issue. The perception by some in Congress that the bill would generate an emotional, perhaps even hysterical, political reaction among constituents, especially in the mid-Atlantic states, has stymied Congressional attention. With 1984 an election year, it seems even less likely that Congress will risk discussing the merits and deficiencies of the saltwater angler licensing bill.

National Wildlife Federation, Washington, D.C.



## Districts in Action

### ALASKA

David R. Gibbons, *Director*

The Annual Dinner Meeting of the District was held October 28 at the new Juneau Centennial Hall Convention Center. About 50 members, spouses, and guests attended to hear former Alaska District Director Ted Merrell of the NMFS Auke Bay Laboratory describe his recent trip to the U.S.S.R. Far East and monthlong voyage on the Soviet research vessel *Nemirov*. Merrell illustrated his account with slides of Soviet life in Nakhodka, a major seaport, and salmon seining and tagging aboard the *Nemirov*. Merrell and Colin Harris, Fisheries Research Institute of the University of Washington, represented the U.S. at a workshop with Soviet scientists at Nakhodka and provided technical advice on salmon tagging aboard the ship. The visit of the two U.S. scientists was a first step in what is hoped to be a long-term expansion of cooperation on salmon research to the mutual benefit of the two countries.

Results of the elections of officers of the Alaska District were also announced at the meeting: Dr David R. Gibbons, a fisheries biologist with the U.S. Forest Service in Juneau, was elected District Director, and Dr. Bruce L. Wing was reelected Secretary-Treasurer.



Jack Helle, outgoing Alaska District Director and Regional Director; David Gibbons, newly elected District Director; Bruce Wing, Secretary-Treasurer.

### CAROLINA

Charles W. Moore, *Director*

After receiving ballots for the election in the Carolina District, AIFRB Secretary Herb Lawler has announced that Charles W. Moore was the successful candidate for the office of Director. Congratulations, Charles, and good luck in the upcoming 2 years.

### CENTRAL CALIFORNIA

Tina Echeverria, *Director*

Secretary Herb Lawler has announced that elections in the Central California District resulted in selection of Tina Echeverria as District Director, Brian Waters as Vice District Director, and Paget Leh as Secretary-Treasurer. Best wishes to you during your 2-year term.

### NORTHWEST WASHINGTON

Ed A. Best, *Director*

Outgoing District Director John Isakson presented the entire program at the October meeting. First, John presented a brief report on the Board of Control meeting held in Milwaukee, Wisconsin, on August 15 and 16. Following that report he reviewed his work during 1982 and 1983 on the Newhalen River, Alaska, to evaluate sockeye salmon fry and smolt outmigration in relation to a proposed run-of-the-river power diversion. Problems encountered with the development and maintenance of sampling equipment in the face of increasing river flows were discussed and illustrated with slides. The results of the study provided little new information on sockeye outmigration but confirmed findings from other rivers. In this instance most of the migrants moved out in a relatively short time-frame using a middle-of-the-river route which resulted in minimum conflict with the inshore water intake structure. If monies are forthcoming, future studies will include work on screening of the intake to further reduce mortalities associated with water diversion.

## New Publications and Announcements

### Environmental Glossary, 2nd Edition

The environmental field has expanded rapidly in the past decade; as a result, its technical and regulatory vocabulary also has expanded. Until now, however, no single publication has been available to provide the definitions of environmental terms. The new Environmental Glossary meets this challenge with its more than 2,000 terms, abbreviations and acronyms, all compiled directly from the environmental statutes or the Code of Federal Regulations. Because of their foundation in the actual environmental legislation or regulations, these definitions are the official legal meanings. No working environmental professional or lawyer should be without a copy. Edited by G. William Frick, environmental attorney and former General Counsel of EPA. 293 pages, Hardcover, \$28.00 from Government Institutes, Inc., 966 Hungerford Drive, #24, Rockville, MD 20850



## New Publications and Announcements cont.

### Methods of Evaluating Stream, Riparian, and Biotic Conditions

AIFRB Fellow William S. Platts, with Walter F. Mehagan and G. Wayne Minshall, wrote this 1983 report. It is USDA Forest Service General Technical Report INT-138, from the Intermountain Forest and Range Experiment Station, Ogden, UT 84401.

### Fishes of Pennsylvania and the Northeastern United States

This volume, by Edwin L. Cooper, is a detailed, scientific survey of all fishes in the state of Pennsylvania, including their distribution throughout the several watersheds of the state. It contains several short introductory chapters on geology, glacial history, climate, and other ecological factors pertinent to the understanding of the present distribution of fish species in the commonwealth.

The major portion of the volume consists of illustrated keys to the identification of about 190 species of fishes arranged in phylogenetic order. Spot distribution maps for each species, prepared from nearly 1,500 fish collections in Pennsylvania, are included with black and white photographs and numerous line drawings of important morphological characters.

Edwin L. Cooper has served as President of American Fisheries Society and the American Institute of Fisheries Research Biologists. He is the author of many scientific publications. A University of Michigan Ph.D., he is Professor Emeritus of Zoology at Penn State.

The volume has 320 pages with over 500 illustrations. 8-1/2" x 11" ISBN 0-271-00337-5 priced at \$27.50 cloth.

### Career Guidance Brochure

Careers, Inc. has issued a revised version (Oct. 1983) of its brochure describing the duties of wildlife/fishery biologists. The brochure also reviews working conditions, personal and educational qualifications, educational opportunities, outlook for employment, earnings, etc. AIFRB is acknowledged for providing information used in the revision. Copies of the brochure cost 30 cents each, but the unit price for orders of 100 or more is 20 cents, available from Careers, Inc. Box 135, 1211 10th St., SW, Largo, Florida 33540.

### Consultant Register

The International Institute for Environment and Development (IIED) and the International Union for the Conservation of Nature and Natural Resources (IUCN) are developing a Consultant Register which will be used by donor agencies, government agencies, and consulting groups to define the terms of reference and requirements of environmental work generated by these agencies, locate and secure consultants to apply the full

range of environmental science skills ranging from toxicology to range management, and administer their application to the job and reporting of the work.

Although the jobs vary in duration and requirements and no guarantee of accession to the Register of employment is implied, IIED and IUCN are soliciting resumés from qualified scientists throughout the world with at least 3 years post-bachelor's degree. Individuals interested in being included on the Register should send a resume to Stephen Berwick, IIED, 1319 F Street NW, Suite 800, Washington DC 20004.

### Pakistan Seeks Fishery Literature

Dr. M. Ataur-Rahim, an AIFRB Member since 1979, has requested donations of periodicals, newsletters, and other fishery and aquaculture literature for a research library in Pakistan. Material can be sent to Dr. Ataur-Rahim, Director of Fishery Research, Pakistan Agricultural Research Council, L - 13, Almarkaz, F - 7, Post Office Box 1031, Islambad, Pakistan.

### Larval Fishes

Baby fishes will be the subject of the *8th Annual Larval Fish Conference and International Symposium on the Early Life History of Fishes*, May 6-10, 1984, in Vancouver, BC. The Early Life History Section of the American Fisheries Society is one of the sponsors. For information, contact Dr. Jeff Marliave, Vancouver Public Aquarium, P.O. Box 3232, Vancouver, BC V6B 3X8.

## Thesis and Dissertation Abstracts

### Eyestalk Histology and the Effects of Eyestalk Ablation on the Gonads of the Shrimp, *Macrobrachium rosenbergii* (De Man)

Richard Albert Dietz, Ph.D 1982  
Texas A. & M. University

A histological study of the eyestalk of the freshwater prawn, *Macrobrachium rosenbergii*, was conducted to characterize its neurosecretory elements. Neurosecretory cell groupings (X-organs) were associated with each of the three optic peduncle ganglia—the medulla externa, the medulla interna, and the medulla terminalis. Six neurosecretory cell types were described based on appearance, size, and staining characteristics. The sensory pore X-organ/Organ of Bellonci complex was located on the ventral proximal surface of the medulla terminalis. A large, single neurosecretory cell was found in the optic nerve tract, well separated from the medulla terminalis. This feature has not been identified in previous studies.

Experiments were conducted to determine the effects of ablation of the eyestalk, the source of the putative gonad-inhibiting hormone (GIH), and replacement therapy on the gonads of adult male and female prawns. There was no significant difference in the mean gonadosomatic index of ablated vs. non-ablated males; ablated females exhibited a statistically greater mean gonadosomatic index, relative to controls. Gonadal responses to replacement therapy were varied and inconsistent. Replacement therapy failed to support the hypothesis that GIH is produced in neurosecretory cells of the medulla terminalis X-organ-I, or -II. It is possible that replacement extracts and/or implants were prepared from prawns that were in a reproductively preparatory phase when the endogenous titres of GIH are naturally low.

Prawn hemolymph analyses indicated that protein and reducing sugar concentrations were depressed around the time of molt. SDS



electrophoresis of hemolymph samples demonstrated a major hemolymph protein (~80,000 daltons) common to male and female prawns throughout the molt cycle. Two protein bands (~85,000-90,000 daltons) were observed in females with developing ovaries, but these were not considered to be the female-specific proteins (vitellogenins) because their relatively low molecular weights were not consistent with the molecular weight (~300,000 daltons) of vitellogenins in other crustaceans.

#### **Starter Diets for Channel Catfish:**

##### **Effects of Formulation on Growth and Body Composition**

Robert Alexander Winfree, Ph.D. 1983

Texas A. & M. University

Production-type diets were developed to support tank-reared channel catfish, *Ictalurus punctatus*, until they were large enough to accept conventional pelleted rations. This was accomplished through a series of feeding trials with diets formulated by computer and using ingredients commonly available in feed mill inventories.

An adequate minimum particle size for swim-up fry was found to be in the range of 0.35-0.50 mm. Growth rate of advanced fry did not appear to be limited by such a fine feed grind, as might be expected if significant nutrient leaching had occurred.

A high level of crude protein (about 52% on a 90% dry matter basis) and a high protein:energy ratio (126 mg digestible protein/kcal digestible energy) supported maximum growth among swim-up stage fry. The minimum requirement appeared to decline with growth to about 50% (P:E = 122) at 0.2 g, 48% (P:E = 117) at 1.7 g and may be as low as 41-44% (P:E = 100) from 3-5 g average fish weight.

Carcass composition of fry was significantly affected by dietary protein content. However, the principle effect of diet upon carcass composition during the present study appeared to be through changing the rate of gain. Carcass ash, protein, and fat all increased at the expense of moisture as the fish grew.

Trials were also conducted to identify and evaluate alternative ingredients for starter diets. Fish meal was successfully reduced to supply about half of the protein in the diet of swim-up fry. The level of fish meal needed by advanced fry (3-5 g) was flexible within wide limits when the fish were fed balanced diets formulated to provide adequate levels of digestible protein and indispensable amino acids.

Several animal and vegetable protein concentrates partially replaced fish meal without significant reductions in growth or changes in carcass composition. Ingredients that performed especially well included fish, poultry byproduct, soybean and cottonseed meals; brewers yeast; and wheat grain and tallow. Ingredients thought to be essential or included in the past for their "unidentified growth factors" were apparently not necessary when balanced diets were manufactured with proper quality controls. Certain changes to diet formulae apparently resulted in micronutrient deficiencies, as did extended storage. No diet was found superior to those made of fish meal, wheat, tallow and a micronutrient premix preserved with antioxidants and propionic acid.

#### **Salmonid Populations in an Urban Stream Environment:**

##### **Kelsey Creek, Washington**

Cleveland Rex Steward III, M.S. 1983

University of Washington

The salmonid populations, spawning habitat, and intragravel water quality of Kelsey Creek, an urban stream located within the City of Bellevue, Washington, were studied in relation to the physical perturbations which have resulted from urban development. Bear Creek, which drains a nearby undeveloped watershed of comparable size, served as a control stream. Urbanization has affected runoff patterns, nutrient and sediment loads, water temperature, substrate composition, and bed stability in Kelsey Creek. The texture of spawning gravels in Kelsey and Bear Creeks is highly variable in both time and space. The percentage of fine sediments in substrate samples from the urban stream was highest during low-flow periods, but decreased to levels suitable for spawning salmonids during the winter months. Bear Creek samples showed a similar temporal pattern, although the percentage of fines measured during the spawning season was slightly

greater than that observed in Kelsey Creek. Neither stream exhibited a longitudinal gradient in bed composition, largely due to the local effects of water flow and sediment transport conditions. A quantitative relationship between hydraulic variables and the textural quality of spawning riffles in the study streams was noted.

The percentage of fine sediments appears to provide a better indication of incubation habitat quality than does the mean geometric diameter of the substrate, as evidenced by a strong correlation between the former variable and interstitial dissolved oxygen concentrations. Dissolved oxygen levels were lower in Kelsey Creek than those in Bear Creek intragravel water samples, and are only marginally adequate to meet the developmental needs of salmonid embryos and alevins. Hydrogen ion concentrations were similar in the two streams, falling well within tolerance limits for all salmonid life stages. Total and un-ionized ammonia concentrations in interstitial water samples were higher in the urban stream, but do not pose a threat to salmonids at present levels.

It was hypothesized that the relative abundance and population dynamics of the major salmonid species found in the study streams would reflect the environmental instability which accompanies an increase in urban development. Physical disturbances resulting from human activities have interacted with the biological components of Kelsey Creek to modify the species composition and productivity of the stream. The multispecies complex characteristic of other Puget Sound drainages has been replaced by a less diverse, yet highly productive, fish community in which cutthroat trout predominate. Other species, notably coho salmon, longnose dace, and sculpins, apparently are less tolerant of habitat alterations caused by urban development. The annual production of salmonids in Kelsey Creek was  $6.57 \text{ g.m}^{-2}$ , 77 percent of which was contributed by age 0 and I cutthroat trout. In contrast, Bear Creek salmonid production amounted to  $1.94 \text{ g.m}^{-2}\text{yr}^{-1}$ , with coho salmon comprising 66 percent of the total. Significant differences were found in the biomass, growth, density, and mortality estimates of cutthroat trout and coho salmon populations in the study streams. It is postulated that innate factors in the behavior and habitat preferences of the two species, coupled with the environmental perturbations, may have resulted in the replacement of coho salmon by cutthroat trout in the urban stream.

#### **The Early Marine Migration of Juvenile Chum Salmon (*Oncorhynchus keta*) Through Hood Canal—**

##### **Its Variability and Consequences**

Nicholas J. Bax, Ph.D 1983

University of Washington

Research on the enhancement of Pacific salmon has attempted to define a time of release and/or a size at release that maximizes adult returns. Hood Canal chum salmon stocks, however, possess variability in their saltwater entry timing, suggesting that a single optimum does not exist. The purpose of this study was to examine effects of this variability on the estimation of the parameters of the migrating juveniles and its role as a biological property of these populations.

The selectivity of the sampling gears (beach seine and ternet) comprises the spatial and temporal overlap between the sampling gear and target population (availability) and the probability of the gear catching, and retaining, a fish when spatial and temporal overlap occur (vulnerability). The vulnerability of the juveniles to the ternet declined approximately exponentially with size except for a slight increase at 50-54 mm because of increased mesh selectivity. The juveniles' vulnerability to the beach seine was not affected by their size over the size range studied (35-65 mm). Maximum estimated vulnerability to the ternet was 0.38 for 35-44 mm fish compared with 0.71 for the beach seine. These estimates cannot be extrapolated directly to field survey data, but relative vulnerabilities between size groups and gears should be valid.

Many factors affected the juveniles' distribution, and hence their availability to the sampling gears. Local topography and tide affected beach seine catches. Diel changes affected their distribution but not the geometric mean catch. A greater proportion of the juveniles was found on the east than on the west side of the Canal as the season advanced.

## Thesis and Dissertation Abstracts cont.

The juveniles' distribution changes from an initially widespread, epibenthically feeding population early in the season to one closely oriented to the shoreline, and later changed to again include offshore areas, but for neritically feeding fish. The most common emigration rate of each size-group decreased as the season progressed but there was an increase with the size of the fish. A set of emigration rates for each size-class was consistently present. Emigration rates were positively correlated with the estimated residual surface outflow and were positively density-dependent on pink and chum salmon of the same size-class. The catch data did not have a simple linear relationship with the above factors and absolute abundance estimates from these catch data would not be meaningful. Estimates of relative abundance may be valid only under tightly constrained conditions when the dominant seasonal effects and the seasonal interactions with year and location are accounted for. To account for these effects, and especially migration rate, large and distinct releases of juveniles into the system from either hatcheries or from marking experiments will often be necessary.

The average daily mortality of fluorescently marked juvenile chum salmon released from the Enetai hatchery was estimated at between 31 and 46% over a 2- and 4-day period; however, the nonlinearity between hatchery releases and resulting adult escapement does not occur at this time, but occurs subsequent to the juveniles passing the sampling area in northern Hood Canal. The emigration rate at this time, which affects the time at which the juveniles reach the coastal water masses, may be an important influence on overall survival.

The variability in emigration rates can be partially decomposed into a consistent set of up to four different rates for juveniles of the same size and at the same time of year. Such variability may be the optimal response to the heterogenous environment confronting the juveniles in Hood Canal, and the maintenance of a prudent variability could be an optimum long-term goal of salmonid enhancement.

### Impacts of Stocked Brown Trout (*Salmo trutta*) on the Native Fish Fauna of Bottom Creek, Virginia

Gregory Carpenter Garman, M.S. 1980  
Virginia Polytechnic Institute

A study to determine the effects of stocking hatchery-reared brown trout on non-game fish populations was conducted from April to November, 1979 in Bottom Creek, Montgomery County, Virginia. Areas of investigation included: the role of piscivory in the diet of stocked brown trout; selective predation by stocked brown trout on non-game fish and resultant changes in the non-game fish community.

Two size-groups of brown trout were stocked separately as experimental treatments. Barriers restricted trout movement between treatment and control stations. Non-game fish were found to be an important item in the diet of large (300-330 mm) brown trout which appeared to exhibit selection for smaller individuals but consumed fish species in proportions similar to their relative abundance within the stream. Frequency of occurrence of fish in large brown trout stomachs increased throughout the study to a high of 100% during October and November. Growth rates of large brown trout were apparently affected positively by consumption of fish. Small brown trout (200-270 mm) consumed few fish. Predation by large trout was associated with changes in the relative abundance of prey and non-prey fish species as well as changes in length-frequency of prey species. Where predation by brown trout did not occur, abundance and length-frequency remained constant.

It was recommended that piscivory could be utilized in improving the quality of put-grow-and-take brown trout fisheries by stocking trout larger than 280 mm in length. Such a tactic could increase both trout growth rates and the likelihood of holdover and eventual naturalization. Where endangered or threatened fish species occur, however, management decisions should not favor the development of such fisheries due to the potential impact of predation or other behavioral interactions.

### Gastric Evacuation and Daily Ration in Yellowfin Tuna, *Thunnus albacares*

Robert J. Olson, M.A. 1983,  
San Diego State University

A study was undertaken to measure gastric evacuation rates in captive yellowfin tuna (*Thunnus albacares*) and to utilize the evacuation information in conjunction with stomach-contents data to estimate daily ration in the eastern Pacific yellowfin population.

Gastric evacuation rates of mackerel (*Scomber japonicus*), squid (*Loligo opalescens*), smelt (*Hypomesus pretiosus*), and nehu (*Stolephorus purpureus*) were measured by serially sacrificing 69 23.6-45.1 cm yellowfin and weighing the food remaining in the stomachs. A procedure was developed for editing the data sets prior to fitting the data to mathematical functions to eliminate a potential bias in estimating the evacuation rates caused by the fact that the fast digestors are not represented in the data at later time stages. The data were best fit to a rectilinear function. Mackerel were evacuated at a significantly slower rate than squid, smelt, and nehu. Meal size (percent of body weight) had a significant effect on the evacuation rate of mackerel, but not on those of squid, smelt, and nehu. The evacuation rates were not significantly affected by differences in yellowfin size, nor by the practice of sectioning the food particles prior to the experimental feedings. The evacuation rates were negatively correlated with the energy content (cal/g wet weight), hence the lipid content, of the test organisms, and were substantially higher than those typical of most other fishes.

Daily meals and daily rations were estimated by incorporating the experimentally derived gastric evacuation rates and data from yellowfin stomach samples collected from the 1970-1972 purse seine catch in a food consumption model. Daily ration estimates lie between 0.9, 1.4, 1.1, and 1.3 (using a 12-hour feeding model) and 1.7, 2.8, 2.1, and 2.6% of body weight per day (using a 24-hour feeding model) for age-classes 1, 2, 3, and 4+ respectively. True daily rations in nature depend on the extent to which yellowfin feed at night. The 12-hour estimates are lower than daily rations calculated for other fishes using field data. They provide conservative minimal estimates of 3,537 metric tons of prey eaten per day by the CYRA yellowfin population, 2,051 metric tons of which are frigate tunas, *Auxis* sp.

## In Memoriam

James E. Phelan of Boulder City, Nevada has passed away. He became an Associate Member of AIFRB in 1982. James is missed by his friends and associates.

## Membership Report

### NEW ASSOCIATES

Donald C. Mitchell TX  
Thomas R. Busiahn WI  
Nancie J. Cummings FL

### EMERITUS

Dr. James M. Moulton ME  
Dr. Craig MacPhee ID  
Chester R. Mattson AK

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