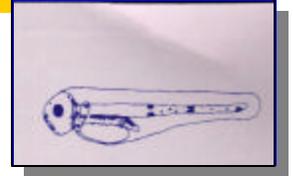


Volume 23,
No. 2, 2002

ELHS Newsletter
AFS.
May, 2002

stages



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President's Message

By the time you get this, the 26th Annual Larval Fish Conference in Bergen, Norway will be history. We have experienced an incredible event that was the result of long and diligent planning on the part of Howard Browman, Anne Berit Skiftesvik, and their helpers. At the meeting, the presidency of the Early Life History Section passed to Jeff Isely, so this is really a lame duck column.

For my last writing as president, I would like to start by thanking all of the folks who have made my tenure pleasant and smooth. On top of the list of people to thank would be Jeff Govoni. Maybe he felt guilty for convincing me to accept this role, but throughout he has been there to help me and even anticipate what would be needed. The entire Executive Committee has been very helpful. They keep our organization going and on track between Larval Fish Conferences. Susan Sogard as our secretary and Kathy Lang as our treasurer were particularly helpful. Kathy has been performing her duties in spite of being called up to active military duty following 9-11, and being stationed in the Norfolk area. Our newsletter editor, Perce Powles, and our webmaster, Jim Rice, have also been doing a great job, and I thank them for keeping us so well informed. (Perce: Sorry this is so overdue, however, as someone once said, you won't have me to kick around anymore).

At this writing we do not have **any** candidates for the offices of president-elect or secretary-elect. I hope this situation has changed by the time you read this. If not, note the sense of urgency in this plea and please consider, or reconsider nominating yourself or a colleague for these positions. We need these positions filled in order for the Section to operate efficiently. According to our Rules, these positions come with specified, although not overly onerous, duties that need to be discharged. The folks in these positions are not just waiting in the wings until they take over the positions for which they were elected.

A few weeks ago I was approached by the editor of *Fisheries* who said that there was practically nothing in the magazine about early life history

Upcoming Events

8th Flatfish Biology
Workshope see p. 3.
Contact: allen@noaa.gov

AFS 11th Annual
Southern Division,
Wilmington, NC, Feb 12-
16. nelsonk3@earthlink.net

AFS 133rd Annual, Aug.
10-14, 2003, Quebec City,
bfritz@fisheries.org

The Masthead

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<http://www2.ncsu.edu/elhs/index.html>

President's Message (con'd)

At this writing we do not have **any** candidates for the offices of president-elect or secretary-elect. I hope this situation has changed by the time you read this. If not, note the sense of urgency in this plea and please consider, or reconsider nominating yourself or a colleague for these positions. We need these positions filled in order for the Section to operate efficiently. According to our Rules, these positions come with specified, although not overly onerous, duties that need to be discharged. The folks in these positions are not just waiting in the wings until they take over the positions for which they were elected.

A few weeks ago I was approached by the editor of *Fisheries* who said that there was practically nothing in the magazine about early life history studies or the activities of our Section. As a partial solution to this, I have asked Don Hoss to report on the Larval Fish Conference in Bergen for *Fisheries*. I'm sure Darrel Snyder, who has been bugging us to do this for some time will be pleased to hear this. Also, I am planning to submit to *Fisheries* a version of the keynote address I gave at the 25th Larval fish Conference. I'm sure the magazine would welcome other contributions dealing with early life history topics, so I encourage you to consider developing appropriate articles for it.

President's Message

In the previous issue of *Stages*, the subvention proposal developed by Lee Fuiman and Dave Secor was published, and comments were sought to help the Executive Committee decide how to act on this issue. No comments were received. We have now approved the proposal, raising the maximum amount that can be applied for to \$5,000.

Plans for the 2003 Larval Fish Conference in Santa Cruz are coming together under the leadership of Churchill Grimes. In conjunction with that meeting, I am considering organizing a larval fish identification course. It would probably last about 3-5 days and be immediately before or after the Larval Fish Conference. At this stage of planning, I need commitments from some experts to help teach the course, and some idea of how many people would be interested in attending. I plan to work on this while in Bergen, and hope to be able to announce details about the course in the next issue of *Stages*.

New Executives

Welcome to the executive, Jeff Isley (our new President), and Rich McBride (our new Secretary) !We thank you and wish you luck in the months ahead in fostering and guiding our Section. Thanks also to Kathy Lang for continuing on the executive as treasurer.

Bergen Meeting

The 26th annual larval fish conference was held from July 22-26, 2002, at the Solstrand Hotel near Bergen, Norway. The setting on the shores of the fjord, the hotel itself, and the meeting, were all unforgettable. A report of the meeting will be included in the next issue, including the Sally Richardson award winner, and other happenings!

This Issue . Due to a number of circumstances, this issue is very late. Our apologies. We should be back on track by February. Ed

New position to be filled.

After many years of faithful work, **Bob Hoyt** has resigned as **historian** of our organization. We thank him for his long and enthusiastic service to our group. If anyone can fill this gap, please let our president know. It is not a very time consuming job, but is essential in maintaining continuous records of our meetings, times, locations, etc. I am sure that Bob would be happy to describe the responsibilities to anyone interested in taking it on. Please spread the word.

Flatfish Biology Workshop

The eighth Flatfish Biology Workshop will be held on December 10 and 11, 2002 at The Water's Edge in Westbrook, CT. Individuals conducting research on any species of flatfish may give their findings by oral or poster presentation to others interested in obtaining a better understanding of this group of fishes. Persons who have not received prior notices for this series of meetings or have changed address since the 2000 meeting are urged to contact Renee Mercaldo-Allen by email (renee.mercaldo-allen@noaa.gov) or phone (203-882-6549). As the conference organization proceeds, additional details may be found on the NMFS-Milford Laboratory home page at <http://www.mi.nmfs.gov>. Student registrations will be encouraged by reduced conference fees. The workshop is sponsored by the National Marine Fisheries Service - Northeast Fisheries Science Center, Dominion Nuclear Connecticut, Inc. - Millstone Environmental Laboratory, and the Southern New England Chapter of the American Fisheries Society.

Reminder!

Next Year (27th LFC) meeting will be in Santa Cruz, CA

More details on the meeting in our next issue. Make your plans now!!

Travel grant winners. Jeff Buckel reporting.

One of the reasons for the good student representation at the Bergen meeting, was the financial support for students, in various forms. Support from our own organization and matched by Norway, went to the following:

Erin L. MacDonald

School of Aquatic and Fishery Sciences
University of Washington, USA
Ontogeny of *Lumpenus maculatus*) based on external morphology and osteology, with comparisons to congeneric larvae'

Jose A. Velez

Alfred-Wegener-Institute for Polar and Marine Research, Germany
Larval development of the mote sculpin (*Normanichthys crockeri*) from the Independencia Bight, Peru'

>>

Richard Fulford

Department of Zoology
North Carolina State University, USA
Factors important to predation vulnerability of larval yellow perch in southern Lake Michigan: an experimental and modeling approach'

Alberto Teodorico Correia

Center for Marine and Environmental Science
University of Porto, Portugal
Age, growth, distribution, and ecological aspects of *Conger conger* leptocephali collected in Azores, based on otolith analysis'

The total amount available for each grant from the ELHS was increased to \$2000 for international meetings. The Bergen program committee was then gracious enough to match that amount with an additional \$2000 in funds for each travel grant. The awards for next year are \$1000 each.

--Jeff, thank you for your careful work in the student award category. The students were very appreciative! There was a large and happy contingent of international students

North Central Region Research — Bruce Comyns reporting

University of Michigan Center for Great Lakes & Aquatic Sciences

David Jude reports on some of his work on Lake Michigan addressing the issue of minimal recruitment of yellow perch during the past decade. Jude is part of a consortium of yellow perch researchers working on this problem of recruitment failure. There was one good year class formed in 1998 during an el nino year, which also produced a large year class of alewife. This year class is now all that is supporting the yellow perch fisheries in the lake, and 2001 was another horrible year for recruitment. Jude collected larval yellow perch during only one brief period, and reports that John Janssen and John Dettmers only found larval yellow perch miles offshore in relatively deep collections (~10 m). Zooplankton data show there has been a decline in densities since the 1970's. Several factors have contributed to this decline in zooplankton, but the primary cause is likely the filtration of phytoplankton from the water by zebra mussels.

Jude is also involved with studies of lake trout reproduction in Lake Michigan with John Janssen who is affiliated with the University of Wisconsin-Milwaukee. Lake trout became extinct in Lake Michigan during the 1950's due to the combined effects of sea lamprey predation and over-fishing. Following the successful control of sea lamprey in the 1960's efforts have been made to re-establish lake trout in Lake Michigan, but natural reproduction has been negligible. Janssen leads a project funded by the National Undersea Research Center for the North Atlantic and Great Lakes that uses a remotely operated vehicle (ROV) to study

lake trout spawning. Recent stocking efforts have been focused at the Mid-Lake Reef complex, an area of 2859 km² that has been one of the major spawning areas for lake trout. These deep-water reefs may be functioning as spawning refugia because shallow reefs have been invaded by many exotic species. Janssen and Jude have been using the ROV to locate lake trout spawning habitat and identify what fish may be preying on lake trout eggs and fry on the Mid-Lake Reef Complex. The ROV was equipped with a video camera, suction sampler, and electroshocking device designed to stun trout egg predators. Sonar records suggested a concentration of large fish, presumably lake trout, occurred in an area 40 meters deep, and lake trout were observed swimming past the ROV in an area characterized by loose cobble on pitted limestone bedrock. Trout eggs could not be collected directly from the substrate, but slimy sculpins were electro-shocked and captured in the suction sampler, and the largest sculpins had been feeding on lake trout eggs. In addition, a large number of burbot were observed (too large to collect) and burbot are known to eat both lake trout eggs and sculpins. The Mid-Reef Lake Complex does provide important lake trout spawning habitat, but more work is needed to understand how sculpins and burbot influence recruitment. Janssen and Jude also deployed the ROV last November on the Sheybogan reef in southern Lake Michigan. They did not find any lake trout eggs with the suction sampler, but did find some eggs in fish that they collected.

**National Oceanic and Atmospheric Administration
Great Lakes Environmental Research Laboratory
Ann Arbor, MI**

Doran Mason reports on a three-year project that she is involved with to identify the factors that regulate alewife recruitment success and variability in Lake Michigan. Other PIs on this project include Edward Rutherford (University of Michigan), Charles Madenjian (USGS-BRD), and William Patterson (Syracuse University). Several collaborators are also involved, including David Schwab and Michael McCormick (NOAA GLERL), and David Jude (University of Michigan). Alewife is a key species in

Lake Michigan whose fluctuating abundance affects early survival and management of salmon, lake trout and yellow perch. Efforts of these scientists are directed towards (1) factors that contribute to alewife recruitment variability in the first year of life and (2) relative contributions to recruitment from distinctively different habitats - Lake Michigan and drowned river-mouth embayments. Specifically, they are attempting to quantify larval and young-of-the-year (YOY) alewife abundance, their zooplankton prey, and predators in Lake Michigan proper and drowned-river mouths; to determine origin (lake vs. drowned river mouth) and thermal history of surviving late stage larvae and YOY alewives using otolith microstructure; to estimate and compare growth, survival, and potential recruitment of larval and YOY alewife from the lake proper and tributaries; and link origin, abundance, growth, condition and survival of larvae and YOY alewives to over-winter survival and eventual recruitment. This research is funded by the Great Lakes Fishery Trust.

Doran Mason and Edward Rutherford have also been studying salmonid recruitment in the Muskegon River, Michigan. They have completed the first year of a three-year project to determine the feasibility of using hydro-acoustics technology to estimate the absolute abundance and behavior of out-migrating smolts (e.g., chinook and steelhead). Preliminary results suggest that fixed riverine hydro-acoustics is a promising sampling technique for the low laminar flow conditions found in the low gradient rivers of Michigan. This research is also funded by the Great Lakes Fishery Trust.

University of Minnesota

Jay Hatch reports that he is not currently doing much larval work because his efforts are now focused on a new fishes of Minnesota book. However, Jay does have a paper in review with co-authors Maija Meneks and Bruce Vondracek entitled "Larval fish distribution in relation to physical and chemical factors in the Red River of the North". This research entailed collecting fish larvae with both seine and drift nets at 7 "channelized" and 6 unchannelized sites during the summers of 1998 and

each site. Mean water temperature was similar at both channelized and unchannelized sites, but variability in temperature was greater at channelized sites. Channelized sites also were characterized by having higher mean levels and a greater range in levels of DO. Intermittent flow or dry conditions were found at many channelized sites at least once during both years of study, whereas unchannelized sites always had measurable flow. Common carp (*Cyprinus carpio*), fathead minnow (*Pimephales promelas*), and spotfin shiner (*Cyprinella spiloptera*) were abundant during both years, whereas creek chub (*Semotilus atromaculatus*) was abundant only in 1999. Other species collected included northern redbelly dace (*Phoxinix eos*) and sand shiner (*Notropis ludibundus*). Diversity of taxa was greatest at unchannelized sites. Larval taxa were categorized into four guilds - tolerance to habitat degradation, feeding, parental care, and spawning substrate. Principle component analysis explained more than 85% of the variance for the first two axes for larval catch across guilds, with axis 1 associated with channelization, and axis 2 associated with temperature and DO. Assemblages of larvae at channelized sites were characterized by tolerant fishes, omnivores, complex-guarders, and speleophils, whereas at unchannelized sites communities were associated with species of intermediate tolerance, insectivores, simple parental care, lithophils, and phyto-lithophils.

The Ohio State University School of Natural Resources

Mary Ann Garcia-Abiado, Konrad Dabrowski, and Jacques Rinhard are conducting research on the culture of larval hybrid "saugeye" (walleye female x sauger male). This hybrid has a great aquaculture potential because it grows faster, is more stress-resistant, is less aggressive, and readily accepts artificial feed compared to either parent. The production of all-female saugeye is desirable because of the faster growth of females than males. In order for saugeye to be cultured intensively without possible threats of cultured fish escaping and

compromising the genetic integrity of parental stocks in the wild, triploid hybrids need to be produced. Gynogenetic sauger (all females) were produced using UV-treated sperm of yellow perch *Perca flavescens*. These fish were then treated with 17 α -methyltestosterone (MT) to reverse their sex, and pond-stocked at Piketon Research and Extension Center. Almost two years later (21 mo) 14 of these fish were sampled (99 ± 31 g body weight), and four were found to be "spermiating" (others immature). Walleye eggs pooled from three to five females (7 g, ~2,300 eggs) were fertilized with undiluted sperm from these sex-reversed fish to determine embryo viability, juvenile performance, and sex ratios compared to controls. Survival of eyed-stage embryos produced from sperm from each of the four sex-reversed fish was quite variable and ranged from 1% to 67%. Survival of eyed-stage embryos parented by a normal male sauger (control) was 57%. Survival to 24 d post-hatch (inflated swim bladder) was also quite variable and ranged from 0 to 20% for progeny of sex-reversed fish (17% for control). Sex ratios of progenies between sex-reversed, gynogenetic sauger males and walleye females will be determined by histology of gonads when the fish reach 100 mm TL.

We would like to thank Bern Ueberschär for his abridged edition of LarvalBase, which follows on the next page. This system, probably already familiar to many of us "larval fish types", is a fantastic tying-together of world knowledge on fish larvae: identification and biological information. Sorry Bernd, it is a little later coming out than we had hoped, but here it is. Please keep us informed on your progress.

LarvalBase:

A Global Information System on Fish Larvae

Objectives:

To provide concerned scientists, fisheries and hatchery managers with fast and easy access to all information relevant in larval fish research, to the identification and rearing of fish larvae for aquaculture and stock enhancement and for the conservation and re-establishment of fish biodiversity.

What is LarvalBase ?

The information base for the aquatic sciences and fisheries is growing at a staggering rate. However, access to desired information is often difficult because the literature is scattered in numerous journals, reports, newsletters, and other outlets. The community of fisheries and hatchery managers, aquaculture scientists and other professionals often find it difficult to get the required information on species of their interest, a fact specifically valid for concerned people in developing countries. This is a situation where a well-focused database can help. With that background the FishBase project was initiated over 10 years ago and is now the world's premier database on fishes with over 18 million hits in 2001 (www.fishbase.org). However, because of restricted capacity in the beginning, the initial concept of FishBase did not include much information on ichthyoplankton and lack data on fish larvae identification and rearing. Thus the LarvalBase project was initiated in 1998 to close this gap.

LarvalBase is at present disseminated as a module of FishBase 2000 (CD-ROM Version) and presented with its own website resources (www.larvalbase.org) providing information on fish larvae that are relevant in larval finfish research in general, identification and in the field of finfish aquaculture, using traditional sources such as primary as well as "grey" literature. Unofficial, but reliable data from various

sources as the Internet and e.g. from practising aquaculturists, even in developing countries, are also considered and often used as a valuable data source for LarvalBase. Partners are wanted to join in and help.

Summarising LarvalBase is an information system with key data on all aspects of finfish larvae: to create an authoritative information system eventually including all known fish larvae of the world being the ultimate goal. Similar to an encyclopaedia, LarvalBase contains different things for different people, e.g. taxonomists and aquaculturists.

Current Status:

The LarvalBase homepage and search site (www.larvalbase.org) continues to be updated and extended as more information becomes available. The homepage will keep the users permanently informed about the progress of the project. The online database provides at present information on the various aspects of fish larval biology (e.g. morphometric data, identification keys, spawning, food, growth, occurrence of egg and larvae, predators, reproduction, broodstock, nursery systems and many more), of over 1,430 species, illustrated with 1,870 pictures and drawings.

Information in LarvalBase is supported by more than 1,500 published articles which are available on the LarvalBase website.

Concerning finfish aquaculture, basic information on broodstock management is available for about 100 species, while detailed information about egg-, larval- and fry nursery is available for about 20 species. Free-text essays complements the schematic presentation of rearing data. The bibliography on finfish larval rearing now holds over 2,200 references dealing with reproduction, egg-incubation, fry- or larval nursery facts. All data are available in the LarvalBase module in FishBase 2000 CD-ROMs as well as in the Internet.

The public fish forum offers, together with FishBase, a place for any question related to fish larvae. Experts may probably answer exactly on your

uestion.

The scientific impact of the work carried out so far is evident from the over 330,000 hits received by the Web Site in 2001.

Technical Background & Mode of Dissemination

LarvalBase was published in close integration with FishBase on CD-ROM (first time together with FishBase 2000) and in the Internet with it's own website resources, following the same publishing policy as FishBase (access to LarvalBase is free, database is in the public domain). The main webserver is located in California, USA. A mirror site was established in Germany in order to provide faster access for European user (www.larvalbase.de) Apart from dissemination on CD-ROM and Internet, LarvalBase was presented together with FishBase in

Identification Keys List			
FAO area	Order	Family	Key No
	Stenodermata	Phosichthyidae	Key to the larvae of the genus <i>Phosichthys</i> . (Key No. 381)
Atlantic, Antarctic	Myxopterygii	Myxopterygiidae	Key to the larval species of family Myxopterygiidae. (Key No. 293)
Atlantic, Antarctic	Perciformes		Key to the early stages of Antarctic fish. (Key No. 289)
Atlantic, Antarctic	Perciformes	Artedidromidae	Key to the larval species of family Artedidromidae. (Key No. 287)
Atlantic, Antarctic	Perciformes	Bathylacnidae	Key to the larval species of family Bathylacnidae. (Key No. 286)
Atlantic, Antarctic	Perciformes	Channichthyidae	Key to the larval species of family Channichthyidae. (Key No. 284)
Atlantic, Antarctic	Perciformes	Heterostichidae	Key to the larval species of family Heterostichidae. (Key No. 282)
Atlantic, Northeast			Key to the identification of fish larvae in the Northeast Atlantic. (Key No. 72)
Atlantic, Western Central	Perciformes	Microdonidae	Key to late-stage microdonid larvae from Belize. (Key No. 182)
Pacific, Northwest			Key to oligoneurhopsychrids in the Northeast Pacific. (Key No. 23)
Pacific, Northwest	Anguilliformes	Cetoptidae	Key to the types of non-asterionid larvae (Cetoptidae) of the Western North and Central Pacific. (Key No. 38)

Become a collaborator!

Do you want to become a LarvalBase collaborator ? Following the strategy of FishBase, experts in larval



numerous conferences, meetings, workshops and training courses and was always well received.



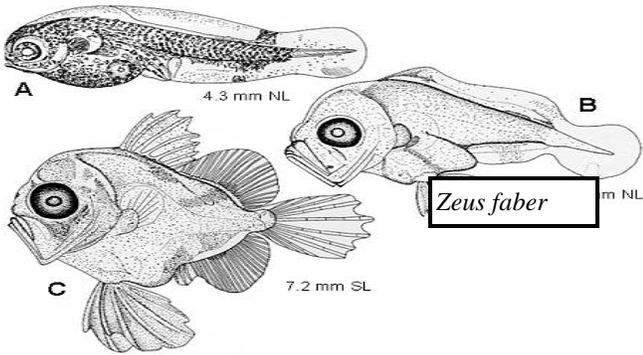
Nemichthys scolopaceus—a LarvalBase photo

research, larval rearing, and related areas are invited

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Paralichthys olivaceus



directly add and edit data for LarvalBase through the Internet from their own desktop computer. Find out more on how to become a LarvalBase collaborator at www.larvalbase.org/cooperation In addition, every feedback from user “what they would like to see and find” in future versions of LarvalBase is very welcome. For any further information e-mail to project leader Dr. Bernd Ueberschär:

Aplocheilichthys normanii

RDE) was realized for most of the tables in LarvalBase and interested experts are able to



bueberschaer@ifm.uni-kiel.de

The project was proposed by ICLARM (International Center for Living Aquatic Resources Management in Manila) and IfM-Kiel (Institute of Marine Research in Kiel), funded by BMZ (German Ministry for Economic Cooperation and Development) and at present established at ICLARM/Philippines and IfM-Kiel

Fry Nursery System Summary for <i>Dicentrarchus labrax</i>					
Compiled by Dr. Bernd Ueberschär, LarvalBase project					
Main Ref:	36461				
Nursery System :	outdoor ponds/indoor tanks (flow through)				
	It has become standard practice to divide growth into two phases: the nursery for fish leaving the hatchery which weigh a few hundred milligrams and the other, on-growing phase for fish of 5-10 g up to 20 g. From the time when the young fish are adapted to dry food they can enter the nursery. The weight of these animals is at least 300 mg, and their length is 30 mm. Nursery conditions are similar to those used in freshwater intensive culture. Raceways made from concrete or plastic are the most commonly used structures. Dimensions are 3-30 m long, 1-3 m wide, and up to 80m ³ in volume. Stocking density is low at the start of rearing (1-3 kg/m ³) but may reach 30kg/m ³ at the end of this stage but are most frequently around 5-10 kg/m ³ . Oxygen consumption at this stage has been estimated at 0.177 ±0.035 mgO ₂ /g/h and the water turnover rate should be adapted to provide a minimum concentration of 3 mg/l. Supplementary oxygenation must be provided in summer temperatures of 25°C, also if the ratio of biomass to flow is 1 kg/m ³ per m ³ /h. The exchange of water is usually between 0.5-4 times per hour for loadings between 1 and 15 kg/m ³ . The mean is 1/h.				
Ref:	36461				
Number of Fry:					
Stocking Density:	20 kg/m ²				
Water Supply					
Main Water Source:	ocean				
Supplemental Water Source:	artificial marine water				
	Temp (°C)	Salinity (psu)	pH	Oxygen (mg/l)	Illumination (Lux)
Min	20.0	10.0	7.5	3.0	1000
Max	25.0	30.0	8.3	8.0	2000
Production					
	Time to alevins		Mortality		
	Days	Degree	(%)		
min	130				
max	160				
Production /cycle					
Production /year					
Growth rate:	0.5g, 70-80d to 3g at 140d				
Nutrient inputs					

ichthyologists, natural resource managers, students, naturalists, and others seeking authoritative information on the fishes of Alaska and adjacent waters of Canada and Russia.

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www.fisheries.org/Publications.shtml

What's New in Fishery Books

Fishes of Alaska

By Catherine W. Mecklenburg, T. Anthony Mecklenburg and Lyman K. Thorsteinson

Fishes of Alaska is the only comprehensive guide to the marine and freshwater fishes of Alaska. Coverage extends out to the 200-mile limit and down to the abyssal plains of the Arctic Ocean, Bering Sea, Gulf of Alaska, and North Pacific Ocean with accounts of 601 species in 108 families and 36 orders. The rare and poorly known species are covered as well as the more familiar inshore, commercial, and sport fishes.

This book especially represents a significant review and synthesis information for the sculpins, snailfishes, lump suckers, and other understudied species, and give synonyms, detailed notes, and documentation of all information presented. The volume includes a gazetteer, a glossary, an extensive bibliography, and a detailed index.

This catalog of species with a consistent body of descriptive and source materials under one cover is an essential reference for marine biologists,

Reflections: A Photographic History of Fisheries and the American Fisheries Society in North America **By Christine M. Moffitt**

This multimedia and CD collection chronicles the 131-year history of the American Fisheries Society (AFS), while tracing the changes in the social and geographical history of North America, providing a visual and audio exploration that allows the reader and viewer to reflect on past challenges, successes, and failures of fisheries and AFS, to look honestly at the present, and to renew a vision for the future. A great teaching tool.

48 pp., soft cover + CD-ROM, 2001
ISBN: 1-888569-32-8
Stock#: 550.43P

List price: \$36
Member price: \$25

Fish Hatchery Management, 2nd edition **Gary A. Wedemeyer, editor.**

This second edition expands and updates the original Fish Hatchery Management, the preeminent

fish culture management manual in North America since 1982, which has been used in universities and USFWS training centers nationwide to train new generations of culturists. The new edition has been completely rewritten by experts to include major advances in hatchery operation, in practical knowledge about raising high-quality fish, and in optimal use of cultured fishes in management programs. This up-to-date volume is greatly needed as a training tool and day-to-day hatchery resource, and covers advances in production, water issues, transportation, stocking, open systems, controlled systems, semi-controlled systems, brood-stocks and spawning, nutrition and feeding, fish health, and special considerations.

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STUDENTS**

The American Fisheries Society (AFS) is continuing its successful educational program designed to develop an interest in the fisheries profession among minority and women high school students. In its second year, the Hutton Junior Fisheries Biology Program has expanded significantly, more than doubling the number of students that could be accepted into the program. The fifty students chosen to participate in the Summer 2002 Hutton Program represent twenty-three states and Puerto Rico.

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For more information on the Hutton Junior Fisheries Biology Program, please visit the AFS website at www.fisheries.org.

-----Hannelore Quigley

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Next issue: Article on Bergen Meeting
Business Meeting Minutes
Message from our new President, Jeff Isely
Details for next year's meeting at Santa Cruz

Help! Can anyone supply me with a photo of presentations of the Sally Richardson award by our new President from the banquet ceremony at Bergen? Thanks ..(ed—Perce— pmpowles@netcom.ca)