STAGES

Newsletter of the
Early Life History Section
of the American Fisheries Society

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31st Larval Fish Conference Goes to the Brink

What is the easternmost point in North America? You!...if you lean over the cliffs that adorn the eastern shoreline of St. John's, Newfoundland this summer. And while you are there you will be treated to an exceptional Larval Fish Conference. Our hosts, Pierre Pepin and Bob Gregory (Department of Fisheries and Oceans, Canada) and Ian Fleming and Paul Snelgrove (Memorial University of Newfoundland, MUN), have organized a special and poignant program. The Conference (July 9 – 12) will be held at MUN with accommodations on campus and in the surrounding community. The Conference themes include physiological ecology of larval fishes, connectivity and dispersal in fish populations, parental effects in fishes, and moving fisheries research from academia to application. Papers on these topics, as well as general contributed papers and posters are welcome. Abstracts are due March 2, and early registration continues until March 30.

During your visit, why not take some time off to experience the unique scenery, birding, wildlife, archaeology, and culture that this province offers. Find out about "screech," "Newfie campgrounds," and "Newfie jokes." Want a cheap and beautiful sea cruise? Try the Nova Scotia to Newfoundland car ferry. See our conference website for all details (www.larvalfishcon.org). §

Inside this issue

ELHS Back Then

5 years ago: After 44 years in federal service, ELHS Past President Don Hoss retires.

10 years ago: LFC local committee honors Gail Theilacker with a "Meritorious Career Award."

20 years ago: Bob Hoyt publishes his 2-volume Bibliography on early life stages of fishes. It goes out of print very quickly.

25 years ago: Excom votes to increase dues from $3 to $5; Section membership exceeds 400, 85% are AFS members.

Deadline for material to be included in the next issue of ***Stages****:*

May 5, 2007

President's Message

Happy 2007! I hope that all is well in Larval Land. Since my last communication, we had, of course, the terrific annual Larval Fish Conference (LFC) in Lake Placid. I want to thank again our Local Committee, specifically Jon Hare and Robin Griswold, for organizing this, our award committees for their efforts in reviewing presentations and posters, all the volunteers who helped staff our trade show booth, and our parent society – the American Fisheries Society (AFS) – for helping us out when we were seeking a venue post-Katrina. Thanks to all!

As we move forward into 2007, we have much to look forward to. As Section President, it is my responsibility to steward the Section for the next two years. Although our Section is one of the most dynamic and vibrant within the AFS, there is always room for improvement. To that end, I will be working to implement improvements in how our Section functions (and, by the way, I am always open to your suggestions). My primary agenda items concern augmentation of recruitment, leadership, and conferences.

"Recruitment" is a term familiar to many of us through our research. In a fisheries context, the term usually pertains to survival to a specified life stage or arrival at a specific geographic area. For our Section business, recruitment is synonymous with the actions of replenishing, restoring, and supplying with new members. And those actions are what I want to speak to you about here. Our most recent membership list shows that we have 282 members of which 35 are affiliates (compare this with our membership 25 years ago [see ELHS Back Then in the left column of htis page]). This total number is the lowest over the last four years. Membership in AFS is by calendar year, so our membership total may reflect the calendar year transition (and late payment) during the first month of 2007. Nevertheless, the trend appears headed in the wrong direction (342, 333, and 306 total members by year, 2004 – 2006). Here is my first request of you. Let's keep this activity local for now. At your next opportunity (e.g., lab group meeting, hallway chat), ask your colleagues if they are AFS and/or Section members. If they are not members, please encourage them to join. If they need information about us, direct them to our Section and Conference websites (www2.ncsu.edu/elhs and www.larvalfishcon.org, respectively). Why not have that conversation right now? – I will...

O.K., add a new member to our total (that was easy!). Recall that registration at the 2006 AFS Conference gave registrants membership to AFS

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News from the Regions

North Central Region

Jim Garvey

From: Curtis P. Wagner & David H. Wahl, Kaskaskia Biological Station, Illinois Natural History Survey

Overwinter energy allocation strategies of age-0 largemouth bass: Exploring the influences of latitudinal origin, predation risk, and body size

Winter is very important to mid-temperate latitude freshwater fishes, especially in early life stages. Cohort strength is likely determined, at least in part, during the first winter of life for many temperate fishes. Previous research has suggested mechanisms related to body size as likely factors structuring overwinter survival of age-0 largemouth bass (*Micropterus salmoides*). For example, allometries in size, metabolism, and energy stores have been shown to influence individual overwinter survival for this species. Comparatively little work has been done examining the relative effects of predation risk on survival, and even less effort has been directed towards the effects of latitude on these processes. Researchers at the Illinois Natural History Survey's Kaskaskia Biological Station, in collaboration with Jim Garvey at Southern Illinois University Carbondale and R. Wright and D. DeVries of Auburn University are conducting a research program directed at understanding the influences of latitude, predation risk, and body size on overwinter survival of age-0 largemouth bass.

Adultlargemouth bass are being collected from waters in both northern Illinois and southern Alabama and reciprocally transplanted into research ponds at the Illinois Natural History Survey's Sam Parr Biological Station and Auburn University's Research Pond Complex, such that each location has separate ponds of both populations. Young of year produced by each population at both locations will be used to conduct a common-garden overwinter pond experiment. Rearing and testing both populations at both sites (Auburn and Sam Parr) will allow for the effects of latitudinal origin to be examined. At the start and end of the experiment, a sub-sample will be collected to examine energy stores and associated measures. Half of the ponds at both locations will be subjected to predation risk by introducing sub-adult largemouth bass, testing for the influence of predation risk on overwinter survival and energy allocation. In addition, age-0 largemouth bass will be graded into two size classes (small, large) at the start of the experiment to examine the effects of fall body size on overwinter survival and energy allocation in relation to the latitudinal origin and predation risk factors. Results of this research should contribute to our current knowledge of the various factors that structure overwinter survival of age-0 fishes that ultimately may set cohort strength.

Research pond (500 m^2) at the Illinois Natural Hisotry Survey Sam Parr research facility in which experiments on largemouth bass energetics are conducted.

A new, useful guide for the identification of invasive Asian carps in North America

Review by Jim Garvey, Southern Illinois University, Carbondale

I was delighted to see that the United States Geological Survey (USGS), through the efforts of Duane Chapman and colleagues, has provided a translation of Chinese literature on the early development of grass carp, black carp, silver carp, and bighead carp from the Yangtze River, China (see Publications on p. 8 of this issue of STAGES). All of these species have been found at large in the Mississippi,

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Section Officers

HELP US UPDATE OUR RECORDS...

Verify your email and postal address with our Secretary.

Southern Region

Claire Paris

From: Wade Watanabe, University of North Carolina - Wilmington, Aquaculture Program

The overall program goals of Watanabe's team are to develop and transfer to commercial users safe and effective methods for marine food production. Current focus is on the high-value marine finfish species, southern flounder *Paralichthys lethostigma* and black sea bass *Centropristis striata*. From the standpoint of early life history, Dr. Watanabe's research aims to delineate the optimum environmental and nutritional conditions for broodstock husbandry, spawning, and production of high quality eggs, and for culture of larvae through juvenile stages as a basis for developing practical hatchery protocols. His lab works to improve methods for producing live feeds, specifically by developing continuous, high-density culture systems for s-type rotifers.

At present, year-round spawning of the southern flounder has been achieved through photo-thermal manipulation. Faster growing all-female populations are produced using black sea bass sperm. On the larval side, influence of physical (i.e. turbulence and salinity) and biological factors (i.e. microalgal species in live and non-viable forms) is assessed for the culture of the earlier stages. As for black sea bass, Watnabe's lab presently works on optimizing the type, dose, and mode of administration of gonadotropin-releasing hormones for induced spawning and on determining the effects of dietary lipid level on reproductive performance. A series of experiments is focusing on determining optimum growth, survival, and stress resistance during the early life history stages. Some of those factors are light intensity and dietary arachidonic acid.

Watanabe has published extensively in the areas of controlled breeding, larval culture, and juvenile grow-out of various freshwater and marine finfish species (www.uncw.edu/aquaculture/watanabe.cv.web.html). He has conducted research in Asia, the Pacific, the Caribbean as well as in the US and with a variety of species including freshwater prawns, carp, tilapias, grey mullet, milkfish, Nassau grouper, red drum, summer and southern flounder, mutton snapper, black sea bass, and red porgy. He currently serves as Associate Editor for the *Journal of the World Aquaculture Society* and Director and Publications Chair of the U.S. Aquaculture Society.

From: Jeff Buckel, North Carolina State University, Center for Marine Sciences and Technology

Jeff Buckel's group is involved with several projects on the early life history stages of estuarine and marine fishes.

Chris Taylor at NCSU and Gretchen Bath Martin and Kyle Shertzer of the NOAA Beaufort Laboratory are studying the ingress of larval and early juvenile fish to eastern North Carolina estuaries with funding from NOAA's Fish and The Environment program. As reviewed in the February 2006 issue of STAGES, biologists from NOAA's Beaufort Lab have monitored icthyoplankton ingress weekly between November and April since the mid-1980's, and year-round weekly sampling began in 2005. Past studies have used these data to describe seasonal patterns of ingress, develop recruitment indices, and test for environmental correlates; research has largely addressed the life history of single species, mostly fall and winter spawners of commercial importance. This work continues in close collaboration with Ken Able's group at Rutgers University, Tim Targett's group at University of Delaware, and Joey Love's group at Unversity of Maryland Eastern Shore to provide information on larval ingress on a coastwide scale. In a position jointly funded by NC Sea Grant and the NC Division of Marine Fisheries, Marine Fisheries Fellow Warren Mitchell is examining the long term bridge net data to determine whether there have been shifts in the annual species assemblage of ichthyoplankton, and whether within-year patterns of ingress have changed over time. Taylor and Mitchell are also comparing ingress data to later life history stages indexed by fishery-dependent and fishery-independent sampling programs operated by NCDMF. First year graduate student Kyle Adamski is completing his course work and will join the research team at the coast this summer. Kyle will work closely with Martin and Shertzer in examining spring- and summer-spawned ichthyoplankton ingress with a likely focus on economically important snapper and grouper species.

Ph.D. student Nate Bacheler is testing new ways to estimate mortality of juvenile fishes in North Carolina estuaries. This is a collaboration with Joe Hightower and Ken Pollock at NCSU. Using traditional streamer tags, sonic tags, manual relocations, and an array of submersible receivers, Nate is estimating emigration, natural mortality, and fishing mortality on juvenile red drum. Although he is studying age-1 and age-2 red drum, this approach may be appropriate for smaller fish in small systems if PIT tags, for instance, can be substituted for transmitters.

Jim Morley is studying the winter ecology of juvenile bluefish for his Ph.D. research. As part of the NOAA-Rutgers funded "Bluecoast" program with an objective to monitor recruitment of bluefish from New York to Florida

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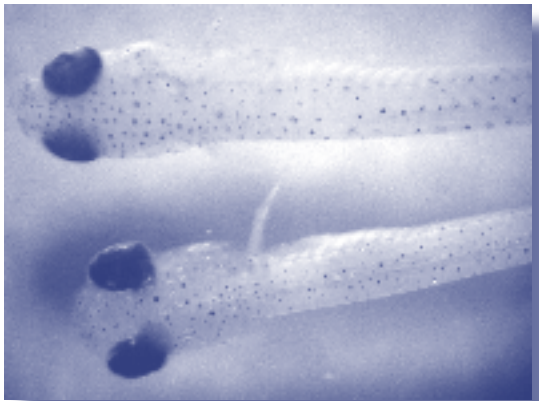
North Central Region...cont'd from p. 2

Ohio, and Missouri River drainages. Thus, understanding their life histories and population dynamics is critical.

I currently have students quantifying the production of Asian carp larvae in the Mississippi and Illinois Rivers and we have been struck with the difficulty of separating bighead and silver carp larvae. Further, we are seeing marked morphomeristic differences in Asian carp larvae among river reaches. This translation will aid us and other researchers in (1) identifying these fishes and (2) comparing physical characteristics of transplanted populations to those in their native waters. As such, we now have a great baseline to which future research can be compared.



Two bighead carp larvae captured in the middle Mississippi River near Chester, Illinois during summer 2005.

The document is extremely detailed with clear pictures and meticulously drawn diagrams. The text is user friendly; this report is sure to be a dog-eared reference for any laboratory conducting research on these species.

A limited number of hard-copies is available. However, the document is easily accessible at pubs.usgs.gov/ds/2006/239 or contact Duane Chapman at dchapman@usgs.gov. §

Western Region

Dan Margulies

From: Eric Miller, MBC Applied Environmental Sciences, Costa Mesa, CA

Studies of the nearshore marine ichthyoplankton common to the Southern California Bight.

With funding from the California Energy Commission's Water Intake Structure Environmental Research (CEC-WISER) program, and in conjunction with Dan Pondella and Jonathan Williams of the Vantuna Research Group (VRG) at Occidental College, we have begun to characterize the daily growth parameters of some common nearshore marine fishes of southern California. Presently, we are examining queenfish (*Seriphus politus*), spotfin croaker (*Roncador stearnsii*), and white croaker (*Genyonemus lineatus*). The work is founded in a continuing effort to better understand the relationship between once-through cooling water intake systems used by coastal electricity generating stations and the source water biological communities. Efforts to model the entrainment of ichthyoplankton is often reliant on basic early life history information, much of which is missing for many of southern California's most abundant nearshore marine fishes.

MBC Applied Environmental Sciences, in conjunction with Tenera Environmental, is currently conducting a year-long characterization of the ichthyoplankton of southern California from Long Beach to El Segundo, California. Monthly surveys are conducted at over 40 stations, including the combined Ports of Long Beach and Los Angeles as well as the southeastern Santa Monica Bay from El Segundo to Redondo Beach, California. These surveys, in addition to recently completed work off of Huntington Beach, California, represent the most exhaustive assessment of the nearshore ichthyoplankton community of southern California. Furthermore, surveys around Redondo Beach, California are being coordinated in another CEC-WISER funded study. Dan Pondella is examining the VRG's monthly 30-year plus ichthyoplankton database his research group has collected for King Harbor, Redondo Beach, California and comparing these data to MBC/Tenera's year-long study within the area to try and discern area-wide trends in abundance. This phase of work should be wrapping up in early 2008.

European Region

Audrey Geffen

There is a new and useful ID guide for larval feeding studies. David Conway has produced a guide for "Identification of the copepodite developmental stages of twenty-six North Atlantic copepods." And this is available as a pdf file for download from the Marine Biological Association of the UK library: www.mba.ac.uk/NMBL/publications/occpub/occasionalpub21.htm

Citation: Conway, D.V.P. (2006). Identification of the copepodite developmental stages of twenty-six North Atlantic copepods. *Occasional Publications. Marine Biological Association of the United Kingdom* 21. 28 pp.

Summary: In zooplankton copepod studies there is often the requirement to be able to identify the six copepodite developmental stages of different species, or to know their body dimensions. However, this information is not available for many species, or is dispersed through the literature. This guide gathers together both original and previously published information on morphology and measurements for the stages of twenty-six common North Atlantic copepod species and tabulates them in a standard format. For each species additional notes useful in their identification are also given.

From Mark Dickey-Collas, Wageningen Institute for Marine Resources & Ecosystem Studies, IJmuiden, Netherlands

Testing behaviour rules of larvae in a hydrographically dynamic environment, by Mark Dickey-Collas and Loes J. Bolle (from Wageningen Institute for Marine Resources & Ecosystem Studies (IMARES), P.O. Box 68, 1970 AB IJmuiden, The Netherlands) and Paul L.A. Erftemeijer and Jan K. L. van Beek (from WL Delft Hydraulics, P.O. Box 177, 2600 MH Delft, The Netherlands).

A recent proposal for a large land reclamation project for the Port of Rotterdam in The Netherlands called Maasvlakte 2 provided an opportunity for a large modelling project of larval transport in the southern North Sea and English Channel. The project was concerned with whether land reclamation at this large scale (10 km into the sea) would impact the delivery of larvae to the environmentally sensitive and protected area of the Wadden Sea in the north of the Netherlands. This allowed us to further investigate the sensitivity of transport to larval behaviour in a very dynamic area.

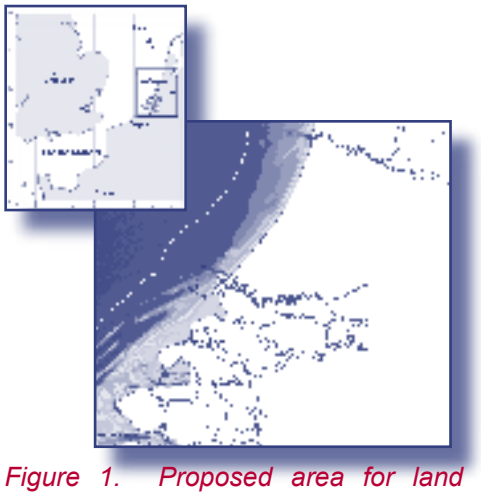


Figure 1. Proposed area for land reclamation Maasvlakte 2 on the Dutch coast

Three economically and ecologically important species were chosen for the modelling study: European plaice (*Pleuronectes platessa*), Dover sole (*Solea solea*), and herring (*Clupea harengus*). A large amount of empirical data exist for each of these species which can be compared with the simulated transport. We used a generic advection-diffusion model linked to a 10-layer hydrographic model called DELFT 3D using a grid with domain decomposition (local grid refinement). The forcing of the hydrodynamics models was with real time meteorological data (6-h bins) and freshwater runoff from 10 sources/rivers. We looked at 9 individual spawning seasons (1989, 1996 to 2003).

This approach did not allow modelling of individual larvae, but it allowed us to model the distribution and movement of concentrations of larvae released from point sources. The model allowed behaviour rules and environmental triggers (at a 1-h resolution) to be built into the transport processes of the larvae. The concentrations were released as eggs (for plaice and sole) or larvae (from herring which has benthic eggs) and they were allowed to develop at temperature-dependent rates. Mortality was not modelled as this study was only concerned with disruption of transport.

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From Arthur Kendall, in "retirement"

Art reports that he and Bruce Miller submitted a nearly complete draft of their book "Early Life History of Marine Fishes" to University of California Press a couple of months ago. It is being reviewed by two ELH experts, and the reviews should be back by the end of January. §

Pacific Rim Region

Iain Suthers

Major Australian investment in marine science: $AU55 million over 5 years for IMOS

The Integrated Marine Observing System (IMOS) is a 5-year nation-wide collaborative program to observe the oceans and coastal waters around Australia, and to provide a data-stream to support research on many critical marine issues. There are 27 IMOS partners – mostly universities and state/federal agencies with capability in climate, ocean, and marine research. The critical areas include studying ocean climate and the ENSO effects downstream on fisheries, on declining river discharge (Australia is still in the grip of the severest drought in recent history), beach erosion and ocean sand transport, migration by megafauna (white shark, bullshark, the critically endangered grey nurse shark), and ocean eddies. The Federal government is providing $55 million in new, direct funding with $39M in-kind from the partners. The system highlights include:

- A fleet of 220-2240 Argo robotic floats to measure temperature, salinity and currents in the upper 2000 m of ocean;
- A fleet of gliders programmed to sample the physical connection between offshore currents & the biophysical environment over the continental shelf;
- 9 ocean reference buoys and an array of shallow water moorings. Off NSW these will be co-located with some wave rider moorings. Three of these moorings will be located beside passive acoustic, directional listening moorings, for whale sounds and ice cracking from Antarctica;
- A coastal ocean radar network;
- Two curtains of acoustic listening stations on the Western Australian coast (Ningaloo Reef area) and on the east Australian coast (likely off northern New South Wales, around Solitary Islands), and hopefully in collaboration with the Ocean Tracking Network (Ron O'Dor, Dalhousie University);
- Sensor networks on the Great Barrier Reef to detect reef responses to climate;
- A $5M contribution to refurbishment of our aging research vessel, Southern Surveyor.

The 11 IMOS facilities and their operators are:

1) Argo Australia (CSIRO – Susan Wijffels)
2) Ships of opportunity (CSIRO- Ken Ridgway)
3) Southern Ocean moorings (CSIRO – Tom Trull)
4) Ocean Gliders (Univ. Western Australia – Chari Pattiratchi)
5) Autonomous Underwater Vehicles (University of Sydney – Stefan Williams)
6) Australian Ocean Mooring Network (CSIRO- Simon Allen)
7) Coastal Ocean Radar (James Cook University – Mal Heron)
8) Australian Acoustic Tagging & Monitoring (Macquarie University – Rob Harcourt)
9) Intelligent Monitoring (Australian Institute of Marine Science – Peter Doherty)
10) eMarine Info (Univesity of Tasmania – Craig Johnson)
11) Remote sensing (CSIRO – Peter Turner)

The new Sydney Harbour Institute of Marine Science (SHIMS) is the NSW node for the Ocean Moorings and the Acoustic Tagging & Monitoring. There are 5 other nodes around the country. IMOS national office is in Hobart at the University of Tasmania, under the director Dr Gary Meyers. They started work in January. §

Southern Region...cont'd from p. 3

(described in the February 2006 STAGES), he is examining the strategy that bluefish of different sizes adopt to survive the winter. The North Carolina component of this program is in collaboration with Tom Lankford at UNC Wilmington. Initial results from a trawling survey suggest that while smaller bluefish store less energy reserves during the fall, they minimize energy loss by occupying colder nearshore habitat on the continental shelf. Jim is also interested in factors affecting feeding during winter. This winter, an experiment on the effects of low temperature on the capacity for growth is being conducted. Future analysis and experiments will examine how prey availability and prey capture success at low temperature influence feeding.

Stacy Luthy, a previous NC Sea Grant / NCDMF Marine Fisheries Fellow, is putting the finishing touches on her analyses of recruitment patterns (1973-2003) of juvenile white perch and yellow perch in Albemarle Sound. She is now at Coastal Carolina University and working with Dennis Allen at University of South Carolina's Baruch Marine Field Laboratory on the role of juvenile transient fishes in nutrient dynamics of a salt marsh ecosystem.

From Jeff Govoni, NOAA Beaufort Laboratory

Determination of the impacts of underwater explosions on animals has focused upon the mortality of adult fishes, turtles, and marine mammals. For these animals, mortality can be predicted and abundance and distribution in the impact area can be determined with acceptable accuracy. The sensitivity of larvae and small juveniles, however, has not been adequately examined, and the abundance and distribution of young fishes is difficult to estimate. In a now completed study at the NOAA, National Ocean Service, Center for Coastal Fisheries and Habitat Research at Beaufort, the sensitivities of the larvae and small juveniles of two species of fishes to shockwave exposure under experimental conditions. This determination was used to develop models that relate larval and small juvenile fish mortality to shockwave exposure. Resulting shockwaves were monitored at three distances from the blast. Injuries were assessed by gross examination and by histopathology. Specific impulse was determined to be the critical parameter for injury assessment because it was of high magnitude over a longer distance when compared with pressure maxima or energy flux density. Impulse ranged from 1.855 to 12.080 Pa s. The proportion of fish lethally injured by these impulses ranged from 0.14 to 1.00. Total injury doses of 50% ranged from 5.286 to 8.910. Total injury doses of 50% were applied to an engineering blasting project in Wilmington Harbor, NC. This application indicated that nearly 8.2×10^8 larvae could be killed over the duration of the project. This represents 2-3% of the larvae in the system and is unlikely to seriously affect fishes at the population level.

Publications:

Govoni, J.J., L.R.Settle, and M.A.West. 2003. Trauma to juvenile pinfish and spot inflicted by submarine detonations. *J. Aquat. Animal Health* 15: 111-119.

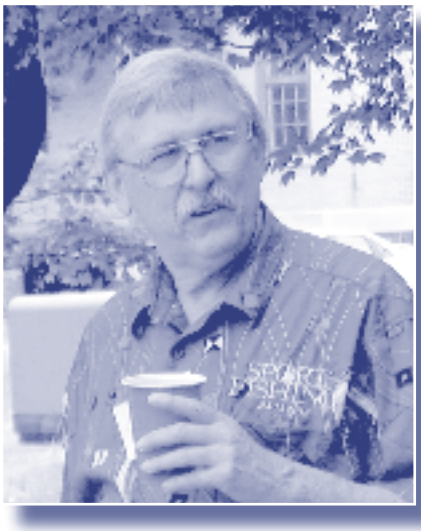
Govoni, J.J. M.A. West, L.R. Settle, R.T. Lynch, and M.D. Green. in press. The effects of underwater explosions on larval fish: implications for a coastal engineering project. *J. Coastal Research.* §

THIS WILL BE YOUR LAST ISSUE OF STAGES...

unless you've paid your 2006 dues. Check the expiration date on the mailing label of this issue.

People

Michael P. Fahay Retires (Almost)



Mike Fahay formally retired this year from the NOAA, National Marine Fisheries Service after 40 years, all at the Sandy Hook Marine Laboratory. Mike grew up on the west coast (California and Oregon) and graduated from UCLA where he majored in biology and scientific illustration. He worked for a couple of years as a biologist/diver, supplying live animals to research and educational institutions, and at the same time working as a biological illustrator. With that background he was hired at the then Bureau of Commercial Fisheries at Sandy Hook in 1965. He remained at the lab as it made the transformation (not metamorphosis) to NOAA/NMFS and the Department of Commerce. One of the most critical events that occurred during his time at Sandy Hook was a tragic fire (September 20, 1985) that destroyed much of the lab and Mike's field notes, data, and preserved specimens. While he and others at the lab were seriously set back by this event and the long, time-consuming rebuilding of facilities, he persevered and continued to be productive. As witness to that, he has an impressive three books and over 45 other peer-reviewed publications to his credit, many of these after the fire.

While working at Sandy Hook he participated in the formative years of the east coast effort to study estuarine dependency. Initially this took the form of a series of *R.V. Dolphin* cruises along the entire east coast of the U.S. This work was further expanded to become the Marine Resources Monitoring Assessment and Prediction (MARMAP) program which lasted from 1977 until 1987. This effort was monumental in scope and the data from that extensive sampling program are still being digested today. Based partly on those cruises and the extensive material collected, he published one of his main contributions, a guide to the early stages of marine fishes on the east coast (Fahay 1983). During this same time period Mike participated in the famous international Ahlstrom larval fish workshops in La Jolla. Mike and others edited and summarized much of what Ahlstrom taught and many had learned, in the now renowned Ahlstrom Symposium (Moser et al. 1984) for which he and the other editors received the Department of Commerce Silver Medal in 1985. Other research interests over the years have included developmental anatomy and larval spatial/temporal distribution patterns. Much of his emphasis focused on gadids, labrids, cottids, cyclopterids, ophidiids and the orders Gadiformes, Pleuronectiformes, and Anguilliformes. More recently, with numerous collaborators, he extended his interests to effects of fishing gear on nursery habitats and continental shelf/estuarine linkages.

Later in his career, he further extended his interests to the post-settlement period of the life history, with a series of directed field sampling at a variety of locations including Nauset Marsh on Cape Cod, on the inner shelf at sand ridges off southern New Jersey, submersible observations on the continental shelf, and the book we co-authored on the first year in the life of Middle Atlantic Bight fishes (Able and Fahay 1998). To illustrate the degree to which Mike contributed to that book, I repeat the words from the preface, "*Senior authorship was determined by a coin toss in the parking lot of the Vince Lombardi rest stop on the New Jersey Turnpike, in the midst of the Hackensack Meadowlands, surrounded by heavy urbanization and prime spawning habitat for* Fundulus heteroclitus."

Most recently, he completed a monograph that revises and extends his prior taxonomic work to include the early stages of fishes from the entire Northwest Atlantic Ocean (Fahay 2007). This tome, to be published in January 2007, represents the cumulative knowledge from his entire career. As examples of how comprehensive it is, this two volume set includes a checklist of 1075 fishes in the study area, descriptions of egg, larval, and juvenile stages of 760 species from 196 families stretching from estuarine to abyssal habitats, and approximately 3000 drawings and 2000 references. As is characteristic of Mike and his contributions, it will likely be the reference work for the region long into the future.

Mike's formal contributions are significant and will stand the test of time. However, his informal contributions to the early life history of fishes are an equally important component of his life's work. Foremost among these are his day-to-day contributions to the taxonomy and systematics of fishes. He has volunteered his time (or occasionally asked for a six pack in return) for many hours at the microscope helping to identify larvae for individuals at numerous academic institutions on all coasts of the U.S., for other NMFS colleagues (including his participation on the NMFS Taxonomic Advisory Committee) as well as for colleagues from Spain, Poland, Australia, Denmark, and many others. This volunteer activity is also reflected in his role as the liaison between ELHS and ASIH in the past. Similarly, he was one of the team responsible for the ELHS meeting held in New Jersey in 2001. In addition, he was a regular attendee at these meetings even though he was often not provided financial support for this travel. Some of the investigations he conducted were with Rutgers University personnel, including myself, graduate students, and technicians. For these, he served on student committees, provided guidance on fish taxonomy/systematics and was a co-principal investigator on several projects. All of us benefitted from his extensive knowledge, wry wit and enthusiasm for baby fishes.

While he worked hard, Mike was also adept at relaxing, whether it be for birding trips to Cuba, Trinidad, Brazil, Venezuela, Mexico, Belize, etc., or drinking "a" beer at ELHS meetings. There are some great stories that have come out of those and other meetings. For those in the know, I will just mention a few key words - bowling ball, not enough salad, dead ichthyologists (alphabetically), terminal seminar, and woods key crawls. There are others but the statutes of limitations are still in force in some states and so I will not comment further.

In retirement (almost), he has made good progress on outfitting his kayak for birding and fishing, the purchase of newer and bigger telephoto lenses for photographing birds (which he does exceptionally well), and renovating the "estate" in Maine with Cindy (think Obenchain), his "current" wife and former baby fish afficionado. Fortunately for me and other members of ELHS he is continuing to work on yet another book on fishes of temperate estuaries in the western North Atlantic. Thus, he is not really leaving

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Upcoming Events

Workshop on Physiology and Aquaculture of Pelagic Fishes

June 11-24, 2007, Achotines Laboratory, Panama

The University of Miami Rosenstiel School of Marine and Atmospheric Science (RSMAS) and the Inter-American Tropical Tuna Commission (IATCC) are organizing the 5th annual workshop on "Physiology and Aquaculture of Pelagics with Emphasis on Reproduction and Early Developmental Stages of Yellowfin Tuna". The number of participants is limited to six. The organizers and primary instructors are Dr. Daniel Benetti (RSMAS-UM), Dr. Daniel Margulies (IATTC), and Mr. Vernon Scholey (IATTC).

The workshop will cover reproduction and larval development of pelagic fish species with a special focus on yellowfin tuna. Topics include physiology, biology, ecology, genetics, nutrition, and environmental issues related to aquaculture of pelagic fish species such as tuna, mahimahi, cobia, yellowfin kingfish, *Seriola,* and other Carangidae. The workshop also covers capture, handling, transportation, maturation, spawning, larval husbandry, nursery, and growout techniques of a variety of marine fish species.

For more information, please contact: Dr. Daniel Benetti, MAF - RSMAS - University of Miami, 4600 Rickenbacker Causeway, Miami FL 33149 U.S.A., Tel: +1(305) 361-4889, email: dbenetti@rsmas.miami.edu, website: www.rsmas.miami.edu/groups/aquaculture or Dr. Daniel Margulies, Inter-American Tropical Tuna Commission, 8604 La Jolla Shores Dr., La Jolla, CA 92037 U.S.A., Tel: +1(858) 546-7120, email: dmargulies@iattc.org, website: www.iattc.org, or Mr. Vernon Scholey, Achotines Laboratory, Las Tablas, Provincia Los Santos, Republic of Panama, Tel: +(507) 995-8166, email: vscholey@iattc.org. §

Diadromous Fish Conference

June 17-24, 2007. Halifax, Nova Scotia, Canada

Challenges for Diadromous Fishes in a Dynamic Global Environment. June 17-24, 2007. Halifax, Nova Scotia, Canada. Contact Alex Haro, tel. 413-863-3806 or www.anacat.ca §

New Frontiers Conference – An ICES/PICES Conference for Early Career Scientists

June 26–29, 2007, Conference Center, Maritime Institute, Baltimore, Maryland.

The conference will provide an opportunity for marine scientists who are at the beginning of their careers to meet colleagues from around the globe who share similar interests in marine science. The goal of this conference is to foster the development of contacts, collaborations, and associations among early career scientists that will persist for decades, and to establish personal and institutional networks that will help to advance our understanding of the marine environment. For more information go to: www.pices.int/newfrontiers.aspx §

1st International Sclerochronology Conference

July 17-21, 2007, St. Petersburg, Florida, USA

Sclerochronology is the study of physical and chemical variations in the accretionary hard tissues of organisms, and the temporal context in which they formed. Sclerochronology focuses primarily upon growth patterns reflecting annual, monthly, fortnightly, tidal, daily, and sub-daily increments of time entrained by a host of environmental and astronomical pacemakers.

Who Should Attend? Anyone interested in and working on the formation and interpretation of growth increments in accretionary hard parts of invertebrate and vertebrate organisms should attend this conference.

Abstract deadline: March 15, 2007. For more information, go to conference.ifas.ufl.edu/sclerochronology §

Course on Identification and Ecology of Larval Marine Fishes

29 July-15 August 2007

This is a graduate-level course for students and technical staff with an interest in ichthyology, systematics, taxonomy, larval fish ecology, fisheries science, and biological oceanography. It is presumed that students will have some experience and background in those areas.

Prerequisites include an undergraduate degree in a biological discipline and permission of the instructors.

Instructors: Professors John Olney (Virginia Institute of Marine Science) and Edward Houde (University of Maryland). Laboratories and lectures to be held at the Marine Science Center of the University of New England (Biddeford, Maine). For more information and to apply, please see the course web site: www.vims.edu/adv/657 §

32nd Annual Larval Fish Conference in Germany

At the ELHS business meeting in Lake Placid, section membership approved the offer from Catriona Clemmesen for the University of Kiel to host the 2008 Larval Fish Conference. Plans for the conference will appear in future issues of STAGES. §

Publications

Available now: Early Development of Four Cyprinids Native to the Yangtze River, China

Edited by Duane C. Chapman

Published in *United States Geological Survey Data Series* 239, 51 pages.

Chapter 1 -- Notes on the Translation and Use of "A Study of the Early Development of Grass Carp, Black Carp, Silver Carp, and Bighead Carp in the Yangtze River, China" By Duane C. Chapman and Ning Wang

Chapter 2 -- A Study of the Early Development of Grass Carp, Black Carp, Silver Carp, and Bighead Carp in the Yangtze River, China By Bolu Yi, Zhishen Liang, Zhitang Yu, Randuan Lin, and Mingjue He

The document *A Study of the Early Development of Grass Carp, Black Carp, Silver Carp, and Bighead Carp in the Yangtze River, China* (Chapter 2 of this volume) was translated from the Chinese with the approval and assistance of the living authors of that study. It contains the most detailed description available, and approximately 200 drawings, of the early development of the subject fishes.

Chapter 1 provides important instructions on the use of the translation, including a description of the Chinese morphometric conventions, which differ from those used by North American scientists. Chapter 1 also provides the historical context in which Chapter 2 was developed, and information on how the larvae of the subject fishes, which have invaded the Mississippi River basin, may be distinguished from other fishes present in the basin.

Availability of hard-copies is limited by funding. However, the document is accessible online at pubs.usgs.gov/ds/2006/239 or contact Duane Chapman at dchapman@usgs.gov. §

Available now: Recent Advances in the Study of Fish Eggs and Larvae

Edited by M. Pilar Olivar & J. Jeffrey Govoni

Published in *Scientia Marina,* Volume 70S2 Supplement 2

- Publication date: Ocober 2006
- ISSN: 0214-8358

Complimentary hard copies of the book were mailed in October 2006 to all conference delegates and reviewers of the manuscripts. The book contents ars available online at: www.icm.csic.es/scimar/scimar3.html as pdf files. §

Three old friends and members of the ELHS's first governance committee, the Provisional Executive Committee (September 1979 - September 1980), reunite at the 30th annual Larval Fish Conference in Lake Placid. Left to rigth: Lee Fuiman, Darrel Snyder, and Bob Werner.

Other Recent Publications of Interest

Eggs and Larvae of North Sea Fishes. P. Munk and Jørgen G. Nielsen. Published by Biofolia Press. ISBN 0849319161. 2005.

Early Stages of Atlantic Fishes: An Identification Guide for the Western Central North Atlantic. Edited by W.J. Richards. Published by CRC Press. ISBN 0849319161. 2005.

Developmental Biology of Teleost Fishes. Y.W. Kunz. Published by Springer Press. ISBN 1-4020-2996-9. 2004.

Early Life History of Fishes in the San Francisco Estuary and Watershed. Edited by F. Feyrer, L.R. Brown, R.L. Brown, and J.J. Orsi. Published by the American Fisheries Society. ISBN 1-888569-59-X. 2004.

Freshwater Fishes of the Northeastern United States - A Field Guide. R.G. Werner. Published by Syracuse University Press. ISBN 0815630204. 2004.

The Development of Form and Function in Fishes and the Question of Larval Adaptation. Edited by John Jeffrey Govoni. Published by the American Fisheries Society. ISBN 1-888569-58-1. 2004.

The Larvae of Indo-Pacific Coastal Fishes: An Identification Guide to Marine Fish Larvae. (2nd edition). J.M. Leis and B.M. Carson-Ewart. Published by Brill Academic Publishers. ISBN 90-04-13650-9. 2004.

The Big Fish Bang. Proceedings of the 26th Annual Larval Fish Conference. Edited by Howard I. Browman and Anne Berit Skiftesvik. Published by the Institute of Marine Research, Bergen, Norway. ISBN 82-7461-059-8. 2004.

Reproductive Biology and Early Life History of Fishes in the Ohio River Drainage: Ictaluridae - Catfish and Madtoms, Volume III. T.P. Simon and R. Wallus. Published by CRC Press. ISBN 0849319196. 2003.

Fishery Science: The Unique Contributions of Early Life Stages. Edited by Lee A. Fuiman and Robert G. Werner. Published by Blackwell Publishing. ISBN 0-632-05661-4. 2002. §

Section Business

2006 Executive Committee Meeting Minutes

Held at the 30th Annual Larval Fish Conference, Lake Placid, NY, on September 10, 2006.

Attendance (H. Browman, presiding).
President-Elect, Chris Chambers
Treasurer, Betsy Laban
Secretary-Elect, Denice Drass
Historian, Jeff Govoni
Chair of Sally Richardson Award Committee, Grace Klein-MacPhee
Bruce Wing
Stages Editor, Lee Fuiman
Second President-Elect, Jon Hare

I. Treasurer's Report (Betsy Laban)
$500 deficit for meeting, other accounts in good standing (see Treasurer's report)

II. Nominations Committee (Chris Chambers)
3 nominations for Secretary-Elect, Jon Hare was elected to become next President-Elect.

III. Blaxter Award (student poster award)
Need to form a long-term committee and establish an endowment. Don Hoss has offered that he and Lee Fuiman will investigate funding options. They have continued through this Conference to be the ad hoc committee for this award.

IV. Ahlstrom Career Award
Inaugural recipient was Geoff Moser

V. Old Business
A proposal to scan the ELHS archives was discussed. Lee Fuiman presented quotes for varying levels of service. The ExCom voted for full PDF access with searchable interface, hierarchical files and proofread version of original text (option 4).

VI. New Business
A proposal to fund a book on the early life history of estuarine fishes by Section members Mike Fahay and Ken Able was received. The ExCom voted to fund the proposal with recognition in the book's introduction.

VII. General Discussion
It was noted that it was 30 years since the last joint meeting of the ELHS with the American Fisheries Society. It was noted that there is no obligation to distribute travel grants, especially if funds are low. It was noted that there no obligation to present the Ahlstrom award on a yearly basis, only if there are valid nominations submitted. §

2006 Business Meeting Minutes

Held at the 30th Annual Larval Fish Conference, Lake Placid, NY.

Attendance (H. Browman, presiding). The meeting was called to order at 17:04 pm on 9/12/06. A quorum was established (44 people present, 39 were full Section members).

I. Announcements
The email ballot for President-Elect resulted in Jon Hare becoming the new President-Elect.

II. Approval of minutes
The 2005 Business meeting minutes were read by Section Secretary Bruce Comyns and distributed at the meeting and earlier at the Executive Committee (ExCom) meeting. The minutes were approved by the ExCom.

III. Treasurer's report (Betsy Laban)
Expenditures included printing and postage for the Section newsletter, Joe Brown scholarship fund, student travel grants, best paper and poster awards, bank fees.

IV. Standing Committees
1. Nominations. Nominations and Mail Ballot Committee Chair, Chris Chambers, reported that the email ballot for President-Elect consisted of 265 emails with 64 replies. There were 48 fatal errors and 151 did not respond. There was discussion of updating membership lists with current email addresses. There were three nominations for Secretary-Elect with need for some of the nominees to become full Section members in order to run for office. An email ballot for Secretary-Elect will be sent shortly after the end of the conference.

2. Time and Place.
2007 - Newfoundland, Canada, Pierre Pepin, approved

2008 - Kiel, Germany, Catriona Clemmesen, approved

2009 - [open]

2010 - Maine, USA, Ione von Herbing, tentative

2011 - Miami, FL, J. Lamkin/B. Cowen, tentative

2012 - Bergen, Norway, H. Browman, approved

Jeff Govoni, on Pierre Pepin's behalf, provided a description of the plans for the 2007 LFC. The conference was originally to be hosted by Joe Brown, and Pierre Pepin has agreed to continue with the meeting in St. John's, Newfoundland. The conference will be held July 9-12, 2007. Potential theme sessions include Physiological Ecology; Connectivity and Dispersal; Parental Effects; Academia to Application; and contributed papers.

Catriona Clemmesen provided an overview of the plan for the 2008 LFC to be held in Kiel, Germany, August 4-7, 2008. Members approved of the proposal.

Howard Browman proposed holding the 2012 LFC in Bergen Norway, 10 years after the 2002 meeting held there. Due to the popularity of the hotel where the 2002 LFC was held, reservations need to be made soon. Potential dates are July 1-7, 2012. Discussion about future venues, choices and parliamentary procedure followed. A motion to accept the proposal was made and seconded. The vote was 26 for and 4 against.

V. Sessional Committees
1. Sally Richardson Award. Award funds solvent (see Treasurer's report). 2006 winner was Klaus Huebert.

2. John Blaxter Award. 2006 winner was David Richardson.

3. Ahlstrom Award. First recipient was Geoff Moser for career contributions to larval fish research.

VI. Ad-hoc Committees
Student Travel Grant. Five grants of $300 each have been awarded for the 2006 LFC.

VII. Old Business
Proceedings from the Barcelona ALFC are in press and will be 174 printed pages.

VIII. New Business
Joan Holt proposed increasing the amount of the student travel grants. Jeff Govoni said that could be done as funds are available but currently the number and amount of the grants is not fixed. The total amount is limited to $2000/year at this point. Ione Hunt von Herbing suggested a method to enhance student grants would be to apply to NSF for student attendees at LFC symposia.

Don Hoss discussed the funding of the Blaxter Award and mentioned that the first award was given in 1999 at the Beaufort LFC and that out of the Conference profit of $3000, it was requested that $2000 be set aside to endow the Blaxter Award which was approved at the 2004 LFC in

...continued on p. 10

Europe...continued from p. 4

For each species we used a range of behaviour rules which could change with developmental stage; the eggs were passive drifters, plaice and sole larvae could migrate towards the sea bed as they developed, and then show selective tidal stream transport trigged by salinity or depth once settled. Buoyancy changes, diel migration phases, and an increasing amplitude in vertical migration were investigated in the herring simulations. These behaviour options were chosen based on previous studies on the three species. The simulated transport of concentrations of larvae were then compared to the empirical data and were found to perform well in terms of both stage duration and transport.

It was clear that for the flatfish to reach their nursery grounds, behaviour rules such as selective tidal stream transport had to play a role. Most plaice failed to reach the coastal sandy nursery grounds unless this behaviour was initiated (Figure 2). Early in their development, the behaviour rules played a lesser role in determining distribution. In all cases some larvae failed to make it to the coast. This contrasted with herring, where the transport to the nursery grounds was largely unaffected by the choice of behaviour rule, despite empirical studies which have suggested complex diel vertical migration, often stimulated by feeding and turbulence. The transport was clearly very dependent on the meteorologically forced hydrography. The majority of the herring nursery grounds are in the open eastern North Sea, and hence the mechanisms for transport toward the coast are not so important (Figure 3). The southern North Sea is a very hydrodynamic environment, and in the spawning and hatching period for these larvae (January to May) the waters are totally mixed, and both the weather and the local tidal dynamics prevent the formation of structure to the water column, other than coastal salinity fronts. So for the transport of herring and early stage plaice, the incorporation of a range of behaviour rules was not important in the southern North Sea. Sole, which spawns more coastally, and older plaice larvae required mechanisms to transport them to their coastal nursery grounds, such as selective tidal transport. §

Figure 3. Simulations of herring larvae transport in 2000. (A) Distribution pattern at the hatching from benthic eggs; (B) by mid-February at approximately 30 mm in length; (C) by late May when metamorphosis is assumed to be complete and full swimming and aggregating behaviours occur.

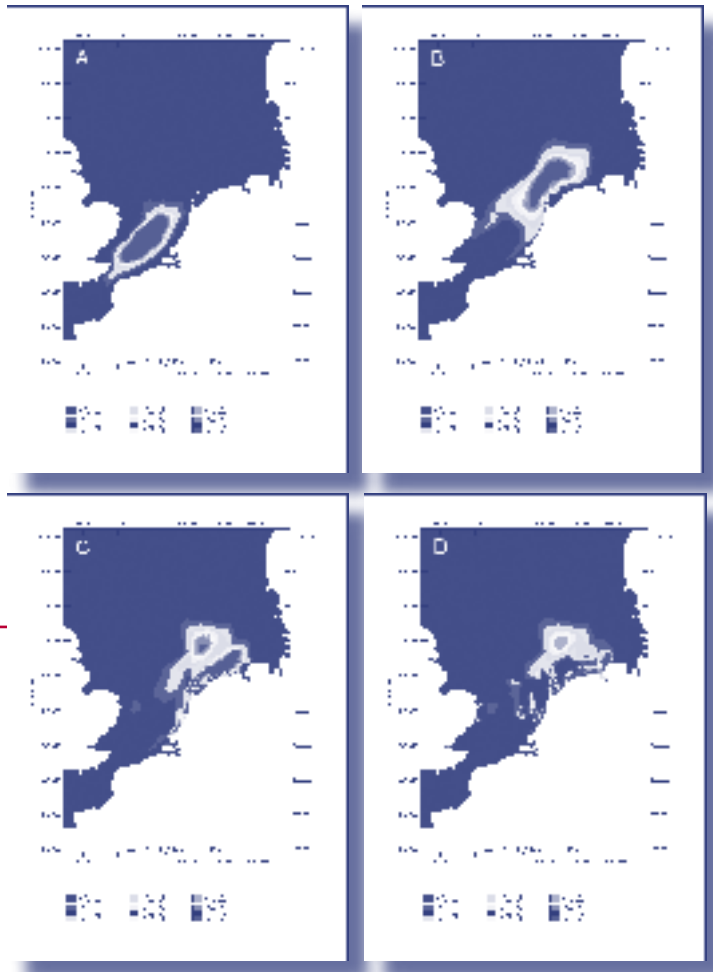

Figure 2. Simulations of plaice larvae transport in 1998. (A) Distribution pattern at the end of the egg stage; (B) pelagic larval stage; (C) transport phase assuming passive demersal transport; or (D) selective tidal stream transport in the late larval and early juvenile stages.

People...cont'd from p. 6

us, so we can dispense with our separation anxiety.

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Able, K.W. and M.P. Fahay. 1998. *The First Year in the Life of Estuarine Fishes in the Middle Atlantic Bight*. Rutgers University Press. 342 p.

Fahay, M.P. 1983. *A guide to the early stages of marine occurring in the western North Atlantic Ocean, Cape Hatteras to the southern Scotian Shelf*. J. Northw. Atl. Fish. Sci. 4(1): 415 pp.

Fahay, M.P. in press. *Early Stages of Fishes in the Northwest Atlantic Ocean*. Northwest Atlantic Fisheries Organization, Monograph No. 1.

Moser, H.G., W.J. Richards, D.M. Cohen, M.P. Fahay, A.W. Kendall, Jr., S.L. Richardson. 1984. *Ontogeny and Systematics of Fishes*. Amer. Soc. Ich. and Herp. Special Publication No. 1. §

— Kenneth W. Able

Section Business...cont'd from p. 9

Clemson but there has been a lapse in the handling of the money. Funds are needed to increase the original $2000 from the Beaufort Conference.

IX. Installation of New Officers

Chris Chambers was installed as the Section President, Denice Drass was installed as the Section Secretary. Chris presented a token of appreciation to the outgoing Section President Howard Browman.

X. Adjournment

The meeting was adjourned at 18:21. §

President's Message...cont'd from p. 1

for 16 months. Another $15 and you will be a Section member (see "Join ELHS" on the back page of this issue of STAGES for directions on becoming Section members). For those of you who are members, thank you. But take a minute now, go to our Section website and click on "Membership List – 2006," and confirm that we have you and your correct contact information.

"Leadership" – we all know what that means and it is needed for most social groups to function well. We need it in our Section. Good leaders are valued. Good leaders who provide their skills as volunteers are priceless. Fortunately, we have been blessed by a sequence of highly capable and congenial volunteer leaders. That has to continue, but in order for it to do so you must step up. You are who we need. Our Section and you will benefit from the experience. By the time you read this message, our elected offices of President, President-elect, Secretary, Secretary-elect, and Treasurer (collectively, our Executive Committee) will be set and their tenures run to at least the 2008 LFC. We will need candidates to fill these offices at that time. We also have numerous other elected and appointed positions (e.g., regional representatives, award committees, election committee, webmaster, newsletter editor, historian). A complete listing of our Section offices and postings, including their start and end dates, will appear shortly on our Section website. The responsibilities of these positions are listed on our Section website under "About ELHS" – "ELHS Bylaws" and "ELHS Rules." Here is my next request of you. Send me an email stating the office and/or posting that most interests you, your willingness to serve, and the time frame that works for you. I will gladly put you on a candidate list. This information will not only make the job of our Elections Committee much easier (no surprise phone calls to potential candidates), but it will also give our Section a clear pathway for renewing and transitioning to new leadership. Email me now, please.

The above two items – expanded recruitment and new leadership – can only be achieved by your actions. We as Section officers are working to make the mechanisms to achieve these goals more efficient. These activities include posting current membership and officer lists on our website, working with AFS to move toward electronic voting for our elected offices, and integrating information between our Section and Conference websites.

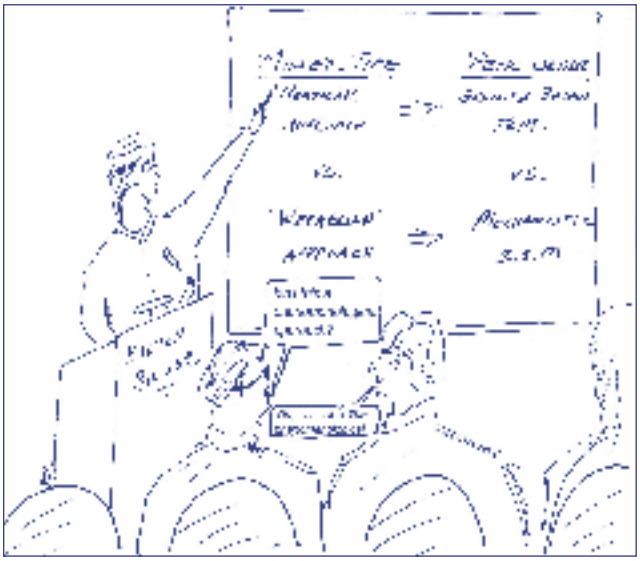
Lastly, our annual Larval Fish Conference truly is the centerpiece of our Section's activities. I already stated in my last Message just how much the LFC means to me. Having attended 15 or so LFCs, and having hosted two, I have experienced the LFC from outside and inside. Do you know the first thing that I do at an LFC? I find the Local Committee members and thank them for their efforts. As Section President, I want to make the Local Committee's job easier. Our Conference website, initiated by Past President Howard Browman, has been a great help. Having discussed progress in planning with future LFC hosts, I know that every Local Committee proceeds through similar tasks in preparation for the event. Some time ago, our Section prepared a Conference planning document that organizes, describes, and outlines the main tasks. I am working with past and future hosts to bring that document up to date and place it on our Section and Conference websites. Once posted, please review and add your suggestions. Future LFC hosts will be most grateful!

In closing, I want to remind all of you that the 2007 LFC in St. John's Newfoundland is just around the corner – indeed abstracts are due March 2 (see details at the LFC website). §

— R. Christopher Chambers

Humor from Chris Chambers

Chris recalls from the LFC in Lake Placid that Myron Peck's talk and PC was driven away to Stony Brook on Thursday morning although his talk was Thursday afternoon, which inspired this cartoon.



Once the wayward presentation was returned to Lake Placid (!?!), a new Pecking order was established.

STAGES Marketplace

ELHS T-Shirt. Get your 2006 LFC T-shirt while they last. The shirt has the AFS-Lake Placid Conference logo on the left breast (see image at www.afslakeplacid.org) and the LFC montage on the back (see image at: www.larvalfishcon.org). Place your order with Jon Hare (jhare@mola.na.nmfs.gov), stating your size (S, M, L, or XL), quantity, and shipping address. Shirts are $12 each; two for $20; add $3 for shipping! Please pay by personal check payable to 'Early Life History Section.'

ELHS Brochure & Poster. Great for posting at your facility or distribution at meetings. Send Denice Drass, (Denice.Drass@noaa.gov) the number of brochures and posters you want. §

Editor's Ramblings

Delays

I know. I know. You've been waiting impatiently for your issue of STAGES to arrive. You've grown confident that each issue will arrive early in its designated month. Indeed, I've taken a small measure of pride in the fact that your Regional Representatives and I have been able to meet our publication schedule every issue since I became editor 3 years (10 issues) ago. This issue of STAGES, however, is unlikely to reach you in February, as I am writing this on February 17. The fault is all mine. Your Regional Representatives did a marvelous job this issue. They provided so much material that I had to reduce the print size, and still I have leftover material. One reason for the delay is one I'm sure you all can sympathize with...my computer hard disk crashed and I discovered my backup system had not been working for one and a half years! After four days without hope (or my files), we miraculously recovered everything. I am a very lucky fellow.

Sit back and enjoy the February 2007 issue of STAGES. I'm going to check my computer backup system again...and again. §

Newsletter Production Team

Stages is published in February, June, and October each year. It is assembled by the Newsletter Editor with contributions from several Regional Representatives and other individuals. Please send any articles, announcements, or information of interest to Early Life History Section members or affiliates to your local Regional Representative or to the Editor.

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Join ELHS

Membership in ELHS is open to all persons or organizations interested in furthering ELHS objectives, regardless of membership in the American Fisheries Society (AFS). If you are an AFS member, simply add ELHS membership when you pay your Society dues.

Affiliate membership is open to persons or organizations who are not members of AFS. Affiliate members are encouraged to participate in Section meetings, committee work, and other activities, but they cannot vote on official Section matters, run for or hold an elected office, or chair standing committees. All members receive ***STAGES.***

To become an affiliate member, go to **https://www.larvalfishcon.org/ELHSAffiliate/affiliate-triage.asp** or mail your name, institutional affiliation (if appropriate), mailing address, telephone and fax numbers, e-mail address, and dues (US $15 per year) for the current and/or upcoming year(s) to the ELHS Treasurer (see page 2).

Please specify the membership year(s) for which you are paying dues. Make checks or money orders payable to "AFS-ELHS."

Remember to check the mailing label for your membership expiration date and renew, if necessary.

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