



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

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Lee A. Fuiman, Editor

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Make Your Way to Barcelona for the 29th Annual Larval Fish Conference

This year's conference will be held in Barcelona, Spain, at the University Pompeu Fabra from 11 to 14 July 2005. The meeting is being hosted by the Institut de Ciències del Mar of the Consejo Superior de Investigaciones Científicas. The local organizing committee is composed by ichthyoplankton researchers from the Consejo Superior de Investigaciones Científicas, the CIFPA of the Junta Andalucía, the Centre d'Aqüicultura of the IRTA, the Instituto Español de Oceanografía and the Fundación AZTI.

This will be a 4-day meeting. The conference keynote talks and contributed papers will be structured around six theme sessions (see page 5). There will be 99 oral and 64 poster presentations. Given the strong demand for oral presentations, one day of parallel contributed paper sessions is necessary. The organizers are seeking funds to publish the most relevant contributions of the 29th Annual Larval Fish Conference in a special volume of the journal *Scientia Marina*. Confirmation on this possibility will be given during the conference.

For enquiries and/or questions about LFC2005, please contact: Dr. M. Pilar Olivar, Chair, Local Organizing Committee, Institut de Ciències del Mar, Passeig Marítim 37, 08003 Barcelona, Spain, Tel: +34 93 2309556, Fax: +34 93 2309555, Email: mpolivar@icm.csic.es §

President's Message



Preparations for our annual get together – LFC2005 in Barcelona - are coming along very well! Approximately 160 colleagues, including 63 students, have registered for the meeting. There will be 167 presentations, of which 99 are oral and 68 are poster. Thanks to Pilar Olivar and her team for all of their efforts! Details about the conference can be viewed at larvalfishcon.org!

Several ELHS members have been approached to contribute to the chapter on fish eggs and larvae that will appear in the forthcoming Third Edition of the AFS book *Fisheries Techniques*. Watch for it to be announced sometime in 2006 on the AFS website!

Drs. Roderick Nigel Finn and B.G. Kapoor have begun work on a new book – “Fish Larval Physiology” – to be published sometime on 2006 or 2007 by Science Publishers Inc. of Enfield, New Hampshire. The line up of

contributors is impressive! Contact Nigel (nigel.finn@bio.uib.no) for more information!

Here is a status report on the various initiatives that I have been bringing to your attention in the last issues of STAGES.

Election of Officers. To facilitate member participation in elections, we are currently investigating the possibility of installing on-line voting through the ELHS and/or LFC websites. If you are interested in serving as an ELHS officer, or would like to nominate someone, please contact Chris Chambers (Chair, AFS-ELHS Nominations and Mail-Ballot Committee) by at: chris.chambers@noaa.gov.

Standing, Sessional and Ad-Hoc Committees. We still need volunteers for the following: Annual Conference Committee; Nominations and Mail Ballot Committee; Sally Richardson Award Committee; J.H.S. Blaxter Award Committee; Student Travel Grants Committee. Please step forward!

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29th Annual Larval Fish Conference

Barcelona, Spain
11 - 14 July 2005

Host organization:
Institut de Ciències del Mar, CSIC

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

September 1, 2005

News from the Regions



North Central Region

Jim Garvey

from: Dr. Keith Gido, Fish Ecology Lab, Division of Biology, Kansas State University

Effects of waterwillow on growth and condition of age-0 largemouth bass and *Lepomis* spp.

PhD student Tim R. Strakosh is near completion of his research investigating the effects of water willow plantings on the early life-history dynamics of largemouth bass in three Kansas reservoirs. His research questions are: 1) what effect does water willow establishment have on densities, growth, food habitats, and condition of age-0 largemouth bass and age-0 *Lepomis* spp.? and 2) how does water willow affect age-0 largemouth bass prey (zooplankton, macroinvertebrates, and fishes) availability?

This study is centered around a large effort by the Kansas Department of Wildlife and Parks (KDWP) to enhance largemouth bass fishing in Kansas reservoirs. Abundance, growth and condition of age-0 largemouth bass and *Lepomis* spp. were quantified during summer months between 2001 and

2004. These parameters were measured in randomly selected coves in which water willow have been planted, and in control coves without water willow. Preliminary findings suggest water willow enhance density and richness (number of species) of fish and macroinvertebrate prey assemblages. Although there was no apparent difference in growth or condition of age-0 largemouth bass among coves with and without water willow, overall densities were much higher where water willow was present. Water willow clearly provide valuable habitat for early life stages of largemouth bass and *Lepomis* spp. However, Tim also has shown this plant is vulnerable to inundation and may not be able to persist in reservoirs with drastic water level fluctuations.

Age-1 Colorado pikeminnow predation on native and non-native fishes in the San Juan River, NM

MS student Nathan Franssen is currently evaluating the relative susceptibility of native and non-native prey to predation of age-1 Colorado pikeminnow *Ptychocheilus lucius* in the San Juan River, New Mexico. Current efforts to restore Colorado pikeminnow in the San Juan River are dependent on an intensive augmentation program and manipulation of reservoir releases. Over 100,000 age-0 Colorado pikeminnow have been stocked each autumn

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Northeast Region

Motz Grothues

from: Institute of Marine and Coastal Sciences, Rutgers University Marine Field Station

After spending some time working with adult fishes, Tom "Motz" Grothues of the Institute of Marine and Coastal Sciences (IMCS) Rutgers University Marine Field Station, together with David Mann of the University of South Florida (USF), have gone back to the very earliest stages of fish life history, when they are still a gleam in their parent's eyes. Dave and Tom are deploying passive recording hydrophones to map spawning effort by males of soniferous fishes (primarily sciaenids) across and along a sand ridge located on the shelf off Tuckerton, southern New Jersey. The study area is near the highly dynamic center of the Middle Atlantic Bight coast and is in the same area monitored by instruments of the Long-term Ecosystem Observatory (LEO-15) operated out of IMCS with support from the National Undersea Research Program (NURP). Instruments of the LEO-15 observatory provide oceanographic data on which fish vocalizations can be mapped together with spatial and temporal variables. In addition, the LEO-15

Section Officers

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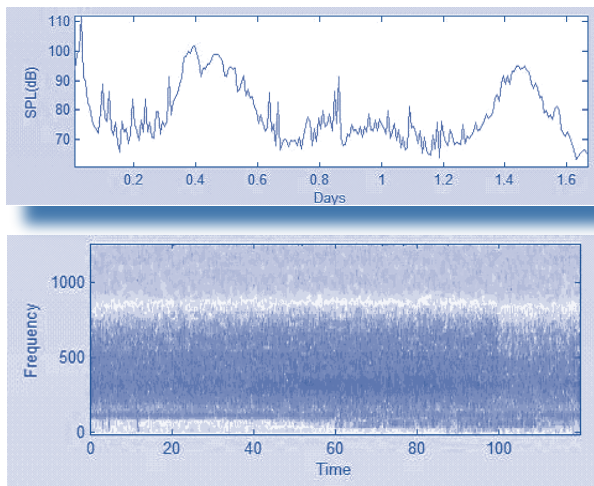
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platform provides a link for a live hydrophone that can be heard online at marine.rutgers.edu/leophone. Listen at night, when sciaenids and cuskeels should be most vocal. Several cruises for sampling eggs will investigate correlation between the level of vocalization and egg production.

Below are graphical representations of a weakfish (*Cynoscion regalis*) spawning chorus captured during an earlier test deployment. The first figure graphs sound pressure level (SPL) from 300-400 Hz from a series of 10 s recordings that were separated by 10-minute intervals. '0' on the plot corresponds to 12:46 pm on August 1. Broad peaks in sound level at night over two consecutive days delineate chorusing. Sharper peaks correspond to passing boats. The spectrogram (lower chart below) shows the sound over 120 s (12, 10-second recordings) that makes up this chorus.



from: *University of Delaware, Graduate College of Marine Studies.*

In Dr. Timothy Targett's laboratory at the University of Delaware we are focusing on the link between dynamic biotic and abiotic factors and the growth, behavior, and ultimately production of juvenile fishes in estuarine and coastal marine nursery environments. We recognize that potentially important processes operate over a range of spatial and temporal scales. We are using a combination of field sampling and laboratory experiments to examine the effects of natural and anthropogenic environmental factors on the quality of

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European Region

Audrey Geffen

More and more long-term datasets are being made available through European and wider initiatives, and it is useful to note those that are of interests to early life history researchers. ICES Oceanographic Database and Services www.ices.dk/datacentre/data_intro.asp is a source for information on environmental and biological information, including ichthyoplankton. Many of the data come from routine cruises by member countries and can go back to the early 1900s. There are also links to more specialised data cooperation initiatives such as HELCOM (<http://www.helcom.fi/>) in the Baltic and MEDAR in the Mediterranean (www.ifremer.fr/medar).

The EUR-OCEANS Network of Excellence (www.eur-oceans.org) has recently been initiated to form a lasting network of research institutions working on global change and pelagic marine ecosystems. There are activities within this network that are of interest to larval fish ecologists and physiologists, though these mainly involve ecosystem modelling.

There will be wide representation of larval fish research from the European region at the 29th Annual Larval Fish Conference in Barcelona this year. And although the theme session on "Larval Condition, Growth and Survival" specifically mentions the combined interests of aquaculture, fisheries, and ecology it seems that again we will miss the opportunity for exchange of information among researchers especially in the areas of physiology and development.

Larval fish physiology and development are major research activities for one of the research groups in the newly consolidated Department of Biology at the University of Bergen. Research in the Developmental Biology of Fishes group includes the functional ontogeny of the digestive tract in relation to protein digestion and amino acid assimila-

tion; the influence of photoperiod and temperature on the neuroendocrine control of growth, osmotic homeostasis, and the parr-smolt transformation in salmonids; the neuroendocrine control of seasonal reproductive cycles in fishes; the regulation of metamorphosis in flatfishes; the mechanisms of oocyte hydration and differential proteolysis of yolk proteins during final maturation in marine teleosts; as well as the biological basis of mass-metabolic scaling. Professor Ivar Rønnestad is a member of the group and has recently started a new project with collaboration between University of Bergen (Norway), University of the Algarve (Faro, Portugal) and the European Molecular Biology Laboratory (Heidelberg, Germany). The project is the: "*Differential protein expression in relation to dietary amino acid composition: a proteomic approach towards the understanding of growth in fish,*" and is described in its abstract:

Growth is essentially protein deposition. Therefore, optimisation of growth depends on the understanding of amino acid (AA) metabolism. The complexity and possible interactions between the various metabolic processes and regulatory pathways are enormous. It is evident that growth in a living animal cannot be fully understood by studying one or a few factors at the time. This project aims at establishing proteomics as a tool towards getting a holistic understanding of the effects of dietary manipulation of AA on metabolism and growth in fish.

The central objective of this study is to screen the proteome of target organ systems (the digestive system including the liver, and muscle) for differentially expressed genes in fishes fed diets with different nitrogen sources, amino acid profiles and degree of hydrolysis, in order to allow a better understanding of the dietary nitrogen digestion, absorption and the post-absorptive metabolism, including muscle growth and bone formation. Selected model species are zebrafish and Atlantic cod. Amino acid sequences for specific proteins will primarily be identified by mass specific finger print analysis, but also N-terminal peptide sequencing. Comparative proteomics will allow identification

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Western Region

Dan Margulies

from: Southwest Fisheries Science Center, Pacific Island Fisheries Science Center, and Scripps Institution of Oceanography

Shipboard genetic identification of the eggs and larvae of pelagic fishes

— John Hyde, Eric Lynn, Robert Humphreys, Jr., Mike Musyl, Andrew West, and Russ Vetter.

Through a collaborative effort between the Southwest Fisheries Science Center, Pacific Island Fisheries Science Center, and Scripps Institution of Oceanography we have initiated a study on the early life history of several pelagic species off the Kona coast of Hawaii.

The study of the early life history of large, open-ocean pelagic fishes such as tunas and billfish, and the identification of their spawning and nursery habitats, has been extremely difficult as these animals are intrinsically rare, highly migratory, and difficult to study in captivity. Traditional methods such as the assembling of a developmental series of life stages, or the culturing of unknown eggs and larvae to a point where they can be identified, has not been easy or fruitful for many pelagic species. The discovery of a putative spawning 'hot spot' off the Kona coast, coupled with the development of shipboard approaches to real-time identification and adaptive sampling of eggs, may provide new approaches and insights into the spawning ecology and reproductive biology of these highly valuable but poorly known species.

We have been using a shipboard PCR based assay to differentiate species of istiophorid billfish larvae and identify eggs of istiophorid and xiphiid billfish, coryphaenid dolphinfishes, and wahoo. A species-specific multiplex PCR assay was designed to amplify a single, unique size fragment of the mitochondrial cytochrome b gene for



Pacific Rim Region

Iain Suthers

Antipodean collaboration

Iain Suthers visited the Hunstman Marine Station and St. Andrews DFO station last year, to begin mining their remarkable 30-year herring fishery archive (guided by Rob Stephenson, Mike Power, Jack Fife and Derek Iles). The exciting work is to re-examine the larval herring dataset from 1975-1998, which stimulated the Iles and Sinclair (1982) stock hypothesis, where larval retention was a mechanism in the formation of stocks and their subunits. Recent studies have demonstrated geographic persistence of larvae and apparent natal homing to coral reefs as well as within estuaries. New analyses of larval herring distribution and sizes from 23 fall surveys of herring spawning areas off western Nova Scotia and in the Bay of Fundy, reveal overlap in the spatial distribution of 4 size classes, estimated to be <2 week old, 2-8 week old, 8-16 week old and >24 week old larvae. Spatial overlap of larval age classes is a practical definition of larval retention since residual flow through this region (5-10 km week⁻¹) would advect and disperse older passive particles. Geographic persistence was also evident within years (1985, 1986), at a scale of weeks and 10s km, from consistency in the relative station abundances. Corresponding zooplankton collections made with a

all 6 species of Indo-Pacific billfishes, both dolphinfishes, and wahoo. A boiling technique used to extract DNA from larval eye tissue or an individual egg, combined with a single-step PCR assay and agarose gel electrophoresis, allows us to obtain species identification within 3 hours of sample acquisition.

This nearly real-time identification method for morphologically indistinguishable eggs and larvae provides an opportunity to employ adaptive sam-

standard bongo net (0.3- and 0.5-mm mesh) were made from 1972 to 1998. Plankton samples from eight stations within the larval area were analysed for size-frequency composition with an optical plankton counter, and converted to a normalised biomass-size distribution ("spectrum"). Multivariate analysis of 10 taxonomic categories correlated with an identical analysis of the biomass of size categories. After accounting for within year, between day-night and among station variation, we found the slopes of the normalised size spectra — an index of secondary production — fluctuated around a theoretically derived value of -1. The relationship of the larval distribution area to the region of tidally driven vertical mixing (0 delta sigma-t), and to the corresponding year class strength and zooplankton biomass-size spectrum is now being compared.

Publication of papers from the 3rd International Symposium on Fish Otolith Research and Application (July 2004)

The final 34 papers for this special issue of *Marine & Freshwater Research* are now at the type-setters, and should be out in a couple of months. There are about 4 larval papers in the volume, with topics ranging from dispersal models, otolith and somatic decoupling, growth and stable isotope composition, and otolith chemistry. There are some particularly fascinating papers on isotope ratios in juvenile and adult fish, and life histories. Dugald McGlashen is the journal's editor, and the guest editors are Gavin Begg, Steve Campana, Tony Fowler, and Iain Suthers. §

pling methods to increase sampling efficiency and will help in determining the spatial and temporal dimensions of spawning and nursery habitats offshore. Combined with measures of oceanographic features (i.e., salinity, temperature, currents, and mesoscale eddies) we hope to better understand environmental factors that play key roles in the early life history of these species.

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Theme Sessions for 29th Annual Larval Fish Conference

Effects of environmental variability on the life history strategies and recruitment: Global climate change

Invited speaker: Manuel Barangé

Marine ecosystems are more vulnerable to natural fluctuations than previously realized. Climate change and fishing exploitation have been implicated as the cause of abundance fluctuations in marine fish populations worldwide. Changes in the physical environment can impact fish populations through a variety of pathways. To understand the links between recruitment and environmental variability the relationships between the physical and biological parameters affecting the early stages of fishes must be described and understood. We encourage presentations illustrating seasonal and annual variation in ichthyoplankton distribution in relation to environmental conditions and their linkage with recruitment. Research coupling physical and biological models to simulate and to quantify environmental processes affecting early stages will be welcome.

Fronts, eddies and early life histories

Invited speaker: Andrew Bakun

Ecological effect of physical mesoscale structures such as fronts and eddies has long been recognized. Physical and biological coupling in these zones present a high spatio-temporal variability as a result of both the hydrographic complexity of such systems and biological activity of the organisms.

We invite presentations of studies showing the role of fronts and eddies in shaping ichthyoplankton distributions. Those contributions addressing research to understand biological processes that take place in these structures in relation to their prevalence will be of primary interest.

Larval condition, growth and survival

In order to optimize resource utilization both for aquaculture development or to reduce to sustainable levels the exploitation of fishery resources, it is necessary to apply policies based on a deep knowledge of biology and ecology of the species. Environmental conditions are responsible for the high mortality that occur during the early life-history stages of fishes through their effect on different organisms of the trophic web and on the larval condition. Topics of special focus will be research into the relation of condition, growth, mortality and physical and biological factors. We encourage contributions that combine measures of growth rates and mortality rates. Field and experimental studies discussing the application of different condition indices, otolith based growth and larval feeding ecology will fit in this session as well as models that couple recent growth rates estimations to temperature.

Relationship between ecosystem features and the diversity of larval fish assemblages

Invited speaker: Jeff Govoni

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3rd Annual Workshop on Physiology and Aquaculture of Pelagics

Jul 11, 2005 - Jul 23, 2005

Location: Achotines Laboratory, Republic of Panama, Central America Program:

The University of Miami Rosenstiel School of Marine and Atmospheric Science and the Inter-American Tropical Tuna Commission (IATCC) are organizing the 3rd Annual Workshop on "Physiology and Aquaculture of Pelagics with Emphasis on Reproduction and Early Developmental Stages of Yellowfin Tuna". Number of participants is limited to six. The organizers and primary instructors are Dr. Daniel Benetti (RSMAS-UM), Dr. Daniel Margulies (IATCC), and Vernon Scholey (IATCC).

We anticipate the participation of researchers and professionals from several countries combining advanced technol-

ogies to improve methods for raising larval tuna and other species of marine fishes. Participants will be assisted by a qualified technical staff and by graduate students from the University of Miami - RSMAS. The workshop will be conducted at the world renowned Achotines Laboratory on the Pacific coast of the Republic of Panama.

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.

Registration fee of \$2,000 includes transportation while in Panama, accommodations and 3 local style meals a day at the Achotines Laboratory. The fee does not cover accommodations in Panama City.

For more information, contact Daniel Benetti (305) 361-4889; dbenetti@rsmas.miami.edu

People

Grace Klein-MacPhee Retires

A tribute to Grace Klein-MacPhee

Grace Klein-MacPhee retired 19 March 2005 after many long years devoted to the study of the early life history of fishes, coupled with dedicated service to the Early Life History Section (ELHS). Grace took her BA (1961) and MA (1969) from Boston University, both in Biology, and her Ph.D (1979) in Biological Sciences from the University of Rhode Island. She began her professional career in 1974 as a fish physiologist working at the Environmental Protection Agency's (EPA) Environmental Research Laboratory at Narragansett, RI. In 1975 she moved over to University of Rhode Island, Bay Campus as a Fisheries Biologist, but continued to work with the EPA lab on contract studying oil, heavy metal, and sewage sludge effects on larval fishes. In 1985, Grace moved to Juneau Alaska to teach fish physiology at the University of Alaska-Juneau. In 1986, Grace returned to URI, this time as a Research Professor working on early life history of winter and summer flounders, as well as the physiological effects of ultra violet light on bay anchovy and temperature effects on winter flounder eggs and larvae.

Throughout much of her time at URI, Grace was involved with aquaculture, specifically with winter and summer flounders, and tautog, endeavors that kept her closely tied to the early life history of fishes. In fact, Grace's research in this regard, led to the identification of an optimal strain of *Artemia* for rearing of fishes.

As a Research Professor, Grace served on 15 graduate student thesis committees.

Grace has published some 20 papers that deal with the early life history of fishes. Perhaps her greatest contribution was the synthesis of early life history information and the insertion of this information into the monumental revision of Bigelow and Schroeder's now classic "The Fishes of the Gulf of Maine," which she co-authored with Bruce Collette.

Grace has served the American Fisheries Society on the Youth Education Committee (1983-1984); the Southeastern

New England Chapter's Nominations Committee (1983-1985), the Professionalism Committee (1999-2001), and the Northeast Section's Auditing Committee (1990-1991) including the Chair. Grace served as Secretary-Treasurer (2001-2002), President Elect (2002-2003), and President (2003-2004) of the Southern New England Chapter.

Grace has served the Early Life History Section long and hard. She served as Northeast Regional Representative (1984-1985 and 1988-1989); and as Secretary-Elect (1993-1994) and Secretary (1995-1996). Her dedicated stewardship, of the Sally Leonard Richardson Award and as Chair of the SRL Committee from 1998-to present), is unsurpassed in the Early Life History Section. So dedicated is Grace to this cause, that she has agreed to remain on this Committee in her retirement.

Grace has been a perennial at Annual Larval Fish Conferences (LFC). She served on the local committee of the 16th LFC in Kingston, Rhode Island. Her own presentations at our conferences have been crisp, to the point, and lucid, with typical self-deprecating humor. The last quip is not to say that Grace was not a serious researcher; she simply took her work far more seriously than she took herself. Moreover, she developed inferences with simplicity and parsimony. We can only hope that she will continue to grace us with her presence at future Conferences. §

— Jeff Govoni, ELHS Historian



Grace Klein-MacPhee (left) at her retirement party receiving a "larval turtle" plaque.



Who are these people and why are they so happy?

Here are some hints:

- Six of them were the invited speakers at one of our Larval Fish Conferences.
- One of them was the meeting convenor.
- Several of them perpetrated the infamous hoax of the flying fish larva on those in attendance.
- Two are now retired.
- The group consists of two Americans, two British, one Danish, one Israeli and one Texan.

All will be made clearer later in this issue.

Northeast...continued from p. 3

nursery habitats and their spatial-temporal dynamics. We are currently conducting several projects with direct and indirect applications to the region and beyond.

A major axis of our research concerns the influence of hypoxia on the juvenile stage of estuarine dependent fishes. Although hypoxia occurs in many coastal regions worldwide, the details of its influence on juvenile fishes in these areas remains uncertain since dissolved oxygen (DO) and other potentially confounding habitat attributes are highly dynamic in time and space. We are working in collaboration with a colleague in Environmental Engineering at the University of Delaware and researchers at the Virginia Institute of Marine Science, Louisiana State University, and North Carolina State University to better understand the influence of hypoxia on juvenile habitat quality. Graduate student Damian Brady is combining comprehensive measurements of the spatial and temporal heterogeneity in DO and other important environmental variables in a tidal tributary of Indian River Bay, Delaware, with detailed behavioral observations of juvenile weakfish (*Cynoscion regalis*) and summer flounder

(*Paralichthys dentatus*) to better characterize the mechanisms controlling hypoxia exposure and fish response. He is measuring DO, temperature, and salinity using multiparameter sondes. Behavioral responses of juvenile weakfish to declining DO are being characterized both in laboratory mesocosms and in the field (ultrasonic telemetry). Graduate student Danielle Tuzzolino is measuring prey distribution relative to DO dynamics using a video system attached to a benthic sled and direct benthic sampling. She is also collecting weakfish and summer flounder from these same areas to examine feeding relative to hypoxia and prey resource abundance. The overall goal of this 3-year study is to: 1) develop a water quality model (WQM) for accurate simulation of different hypoxic scenarios and 2) link the WQM to an individual-based model integrating fish behavioral and physiological responses and thus provide a mechanistic link between hypoxia and juvenile fish growth and survival.

As a complement to our mechanistic approach employed above, we are correlating metrics of nursery habitat quality directly with underlying environmental variables. We are working on a collaborative project with R.D.M. Nash and A. Geffen at the University of Bergen, Norway (formerly at Port Erin Marine laboratory, Isle of Man) and R. Batty and M. Burrows at Dunstaffnage Marine Laboratory in Oban, Scotland, to gain a spatially and temporally explicit understanding of the factors controlling the growth of juvenile plaice (*Pleuronectes platessa*) on nursery beaches in western Europe. Graduate student Benjamin Ciotti is developing RNA:DNA based assays to provide estimates of near-instantaneous growth rates in juvenile plaice which will be directly linked with synoptic measurements of temperature and prey availability. These fine resolution measurements will be repeated across the broad temporal and spatial scales relevant to fish population processes. This approach will therefore provide a detailed yet extensive understanding of patterns and causes of growth variability in juvenile plaice, assess the potential importance of prey limitation in nursery environments, and further

develop powerful approaches to link juvenile fish growth with complex inshore environments.

In a similar project, we are characterizing the quality of various habitats in the Delaware region for juveniles of locally important fishes. Graduate student Brian Boutin was recently awarded a 3-year National Estuarine Research Reserve Graduate Research Fellowship to characterize spatial and temporal variations in the distribution, diet, abundance, short-term growth rate (RNA:DNA index) and ultimately production of juvenile weakfish in Delaware Bay vs. its associated tidal tributaries. He is also monitoring specific sites in Delaware's coastal bays before and after perturbation (dredging) to understand the impact of these activities on their functional role as juvenile fish nurseries. These efforts to quantify and compare juvenile fish production between different areas and time points will allow a better understanding of the underlying environmental attributes that contribute to nursery habitat quality for juvenile fishes in the mid-Atlantic coast.

Other aspects of our research are focusing on questions with immediate relevance to specific management activities in the Delaware region. Increasing energy demands have led to the development of several new clean technologies to harness renewable energy, but wise deployment of this technology must recognize their potential environmental impacts. A private company has proposed to deploy submerged tidal-power turbines in a portion of Indian River Inlet, Fenwick Island, Delaware. While the Delaware Department of Natural Resources and Environmental Control evaluates the pros and cons of whether to ultimately permit this activity, we have designed a research program to determine the potential influence of these turbines on locally important fishes. Graduate student Michael Rhode plans to sample ichthyoplankton and juvenile fishes every two weeks during tidal ingress and egress through the inlet, between the ocean and Indian River Bay. It is anticipated that the 2-year study, to be funded by the company, will begin



Tim Targett examines a weakfish from Delaware's coastal bays.

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Publications



Available now: *Developmental Biology of Teleost Fishes*.

Yvette W. Kunz

In the compiling of this book, the vast literature dealing with the descriptive morphology, histology and cytology of teleost development has been combed and integrated. The book is divided into 21 chapters, starting with the egg and embryonic development up to hatching. This is followed by a description of ectodermal, mesoder-

mal and entodermal derivatives and the development of various organs. The subject index, species index and the abundant illustrations add extra value to this long awaited book. *Developmental Biology of Teleost Fishes* will be a valuable tool for scientists and students in the fields of biology, developmental biology, molecular biology and fish biology.

- ISBN: 1-4020-2996-9 S
- Publication date: 2004.
- Number of pages: 638
- Publisher: Kluwer/Springer.

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LFC2005 Theme Sessions...continued from p. 5

Evident in the last few decades is an alarming decline in the strength of many fish populations in the world's oceans. The consequences of this decline have been economic loss to nations along with serious ecological problems. Declining populations have been accompanied by a decrease in species diversity and the destruction of the structure of pelagic communities within ecosystems. Pelagic assemblages of larval fishes reflect the communities of adult fishes that contribute their eggs and larvae. The emphasis of this theme session is to examine and contrast larval fish assemblages from different ecosystems, and to elucidate how the attributes of ecosystems influence the composition and dynamics of larval fish assemblages. Are larval fish assemblages in fluctuating or unpredictable environments simpler than those from more stable environments? What defines an ecosystem with the world's ocean? The overall goal is to learn whether fish distributions in the different environments are delimited by hydrography, by behavior of fish larvae and adults, or some combination.

Other Recent Publications of Interest

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.

Functional morphology, physiology and behaviour

Invited speaker: Howard Browman

Contributors whose presentation(s) touches on descriptive, ecological and/or evolutionary aspects of morphology, physiology, or behaviour.

Fish development and systematics: New genetic advances and classical views

Ontogenetic data serve to clarify the evolutionary relationships of teleosts but their use is dependent on sound taxonomy, anatomy, and descriptions of eggs and larvae. Furthermore, knowledge of early life stages of fishes is fundamental to studies of population maintenance, essential habitat, and patterns of biodiversity. In recent years, molecular techniques based on mitochondrial genome analysis have augmented traditional approaches in egg and larval taxonomy, especially for species groups that are morphologically similar. We encourage contributions to this theme session that present new descriptions of development using morphological and/or molecular techniques. The application of this information to problems of systematics is particularly invited. We ask researchers to present papers that combine methodological approaches in taxonomy and phylogeny and promote the integration of these disciplines in studies of early life history of fishes. §

Northeast...continued from p. 7

this summer and will determine the abundance, species composition and life stage(s) of young fishes moving through the inlet. It will also describe the seasonality and diel/tidal dynamics of species occurrence and movement, and provide opportunities to suggest changes to any subsequent turbine deployment that would minimize harm to the fishes which utilize the inlet.

Request for larval Mola mola information from the North Atlantic

Inga Potter is a PhD student at the University of New Hampshire who is planning dissertation work on the distribution, migration, and reproductive ecology of ocean sunfish (*Mola mola*) in the North Atlantic. She writes that she has found virtually nothing in the scientific literature on ocean sunfish larvae, and is looking for any information on larval distribution in the North Atlantic *Mola* population. So far, she has found reports on the capture of only 5 or 6 individual larvae world wide, so any additional information would be a great help. If you have any information, please contact Inga by email at ifredland@aol.com

The ocean sunfish, *Mola mola* has a worldwide distribution, yet its biology is poorly understood. A pelagic zooplanktivore with a unique body structure, *M. mola* makes up a significant portion of bycatch in Pacific and Mediterranean commercial fisheries, and is a valued food fish in Asia. Though it is a common resident, there are no data on occurrences of ocean sunfish bycatch in the Atlantic. Presently, there is no record of the status of *M. mola* populations in any part of the world. Because there is no existing baseline of information on the basic biology, distribution, and abundance of *M. mola*, researchers have no idea how the global population is faring.

The primary objectives of Inga's study are: 1) to determine the general distribution of *Mola mola* off the northeast coast of the United States; and 2) to look for migratory patterns using pop-up archival transmitting tags (PAT's). As a secondary objective, aspects of the reproductive ecology of the spe-

cies will be examined including where and when the North Atlantic population is spawning, and where the larvae are initially distributed.

Results of the study will provide information about the distribution, migration, and spawning of this seldom studied species, which will contribute to our understanding of its global population dynamics and biology. It will also help determine what, if any, management strategy is necessary to protect it. In addition, data on distribution and migration patterns of *Mola mola* may serve as a useful indicator of nutrient rich areas with high productivity, where other important marine organisms can be found.

To achieve these objectives, the project will include: 1) analysis of data from the North Atlantic Right Whale Consortium Database (1974 – present) and data from the OBIS-SEAMAP Database (1989-present) that report on aerial sightings of *Mola mola* in Northeast shelf waters; and 2) tagging of 15 individuals with pop-up archival transmitting tags in order to track their movement over a period of time. To answer questions about spawning, the study will also include: 3) hormone analysis of blood samples taken from individuals to gain information on sex and reproductive state; and 4) looking for evidence of *Mola mola* larvae from the North Atlantic population. The study will test the hypothesis of the Sargasso Sea as a spawning ground for the *Mola mola* population in question. §



Early development in the cod Gadus morhua egg. Photo by S. Aarsheim, University of Bergen, Norway.

Western...continued from p. 4

So far, we have documented the occurrence of eggs of blue marlin, short-bill spearfish, swordfish, common and pompano dolphinfish, and wahoo. For several of these species this study has yielded the first description of their fertilized eggs. We plan to expand upon this DNA-based ichthyoplankton survey to encompass more taxa in the hope of obtaining an improved tool for ecosystem monitoring.

Methodology, preliminary findings, and egg descriptions can be found in the following publication:

Hyde JR, E Lynn, R Humphreys Jr, M Musyl, AP West, and R Vetter. 2005. Shipboard identification of fish eggs and larvae by multiplex PCR, and description of eggs of blue marlin, shortbill spearfish, and wahoo. *Marine Ecology Progress Series* 286:269-277. §

Europe...continued from p. 3

of conserved protein motifs. Based on an unbiased differential protein profile analysis we will identify protein clusters characteristic of a certain proteomic phenotype and identify modulated proteins in the selected organs in response to the given dietary stimuli. §

President's Message...from p. 1

Venues for future LFCs. Bruce Coymyns and Denise Drass will host LFC2006 12-17 July 2006 in New Orleans. Details will be posted on the LFC website as they become available!

The following offers to host the LFC will be voted upon at the ELHS Business Meeting in Barcelona:

2007, Memorial University of Newfoundland, St. John's, Newfoundland — Hosted by Joe Brown (email: jabrown@morgan.ucs.mun.ca)

2008, Leibniz-Institut für Meereswissenschaften, IFM-GEO-MAR, Kiel, Germany — Hosted by Catriona Clemmesen (email: cclemmesen@ifm-geomar.de).

New theme image, promotional poster, and pamphlet. Artist-illustrator Glynn Gorick is scheduled to deliver the Section's new theme image in May 2006. Hopefully, we will be able to premiere it in the next issues of STAGES!

continued on p. 11

Section Business

Sally L. Richardson Raffle Prizes

Donations of items for the annual raffle to raise money for the Sally L. Richardson award will be kindly accepted at the Larval Fish Conference in Barcelona or they can be shipped to Dr. Maria Pilar Olivar.

Please see the conference website for contact information.
www.larvalfishcon.org.

REMINDER

Deadline for sending materials to include in the next issue of **STAGES**:
September 1, 2005

North Central...continued from p. 2 in 2002, 2003, and 2004. Monitoring to characterize survival of stocked Colorado pikeminnow has documented comparatively low survival and little is known about their survival past age-1. For this effort to be successful, habitat conditions and resource availability in the river must be adequate to support growth, recruitment, and reproduction of stocked Colorado pikeminnow. Currently, the potential prey base in the river includes an assemblage of native and non-native fishes and invertebrates. Thus, an important step in improving the potential for success of the augmentation program will be to identify key trophic interactions among Colorado pikeminnow and its prey. For example, non-native prey species may supplement the forage base of these predators, increasing their growth potential. Alternatively, non-native prey may compete, by using resources native prey are dependent upon, with potentially more profitable native prey species. Or more likely, some combination of both scenarios might occur.

Spatial and temporal variability in prey resources is likely an important factor affecting growth and recruitment

Update on the Election of ELHS Officers

The Section has been behind schedule in nominating candidates for officer positions and in running elections. In order to rectify this, and put us back on schedule, the next election will be held at the ELHS Business Meeting at the 29th LFC in Barcelona. More information on the election of officers (from Howard Browman) is available on the ELHS website: www2.ncsu.edu/elhs/Announcing_ELHS_Election.doc

Nominations Now Open and Sought for the Ahlstrom Career Achievement Award

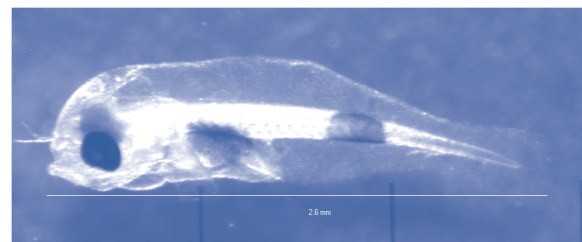
As detailed in the October 2004 issue of *STAGES*, a lifetime achievement award has been established by the ELHS in the name of Elbert H. Ahlstrom, a pioneer in the study of the early life history of fishes. A committee consisting of Jeff Govoni, Churchill Grimes, Jeff Isley, and Art Kendall (chair) has been chosen to administer the Ahlstrom Award. The committee is now seeking nominations for this award. Nominations can be made by email to the committee chairman (Art.Kendall@noaa.gov). Please see the October 2004 issue of *STAGES* for details of the criteria for the award and procedures for making a nomination. If a suitable candidate is nominated, we would like to present the first Ahlstrom Award at the LFC in Barcelona in July 2005.

of Colorado pikeminnow. Because of differences in the chronology of spawning by native and non-native fishes (Gido and Propst 1999), availability of age-0 prey is likely to vary seasonally. And, because native and non-native fishes respond differently to changes in flow regime (Propst and Gido 2004), their availability as prey to Colorado pikeminnow is also likely to vary across years. Spatial variation in potential prey can be attributed to longitudinal changes in the geomorphology of the river and lateral differences in meso-habitat availability (e.g., low-velocity habitats and secondary channels). Nate's research is focused on 1) assessing the susceptibility of native and non-native prey to predation by age-1 Colorado pikeminnow; 2) quantify prey size selection of age-1 Colorado pikeminnow; and 3) assess the temporal biotic and abiotic factors affecting age-1 Colorado pikeminnow prey availability. Preliminary results suggest that both gape limitation and habitat use of prey are potentially important in determining the vulnerability of prey to predation by Colorado pikeminnow.

Related publications:

Gido, K. B. and D. L. Propst. 1999. Habitat use and association of native and non-native fishes in the San Juan River, New Mexico and Utah. *Copeia* 1999(2):321-333.

Propst, D.L. and K. B. Gido. 2004. Responses of Native and Non-native Fishes to Natural Flow Regime Mimicry in the San Juan River. *Transactions of the American Fisheries Society* 133:922-931.



2-day-old larva of the goldblotch grouper Epinephelus costae. The larvae can range from 1.7 to 2.3 mm at hatching. Photo by Branko Glamuzina, Aquaculture Department, University of Dubrovnik, Croatia.

President's Message...continued from p. 9

Comyns is heading up a team of long-time ELHS members who are working on an updated promotional pamphlet for the Section. The plan is to have these ready for distribution at the LFC in Barcelona. We are also planning to print and distribute promotional posters.

Membership recruitment. By the time this issue of *STAGES* reaches you, the secure payment area of the LFC website should be available. New and renewing Affiliate Members will be able to pay their dues by credit card.

All current Full and Affiliate Members are urged to assist us in recruiting new members. Make our web sites known to your students and colleagues and circulate the new pamphlets and posters when you go to other conferences.

The contact information (particularly email addresses) in our member database is outdated for approximately 30% of you. If you think that you are one of these, please write to ELHS Secretary Bruce Comyns (bruce.comyns@usm.edu) and provide him with your new coordinates.

Contributions to STAGES. There is much more activity among our members than is apparent in our newsletter. You

can help remedy this by contributing something! Doing that is simple. For example, you can send your regional representative

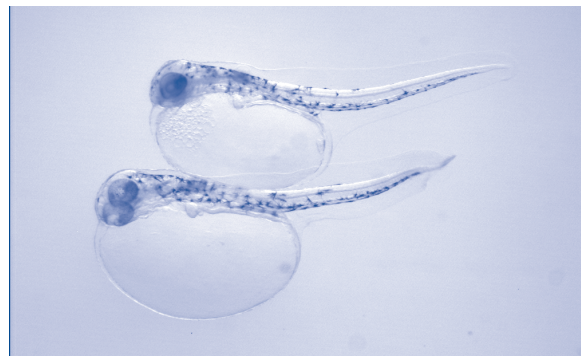
- an abstract of what you and your team are involved in
- a modified conference abstract
- a brief description of your thesis project
- a review of a new book or interesting article
- anything that you think your colleagues might be interested in knowing about!

WE WANT TO KNOW WHAT YOU ARE DOING, SO TELL US!

I will close with my usual refrain. If you value the ELHS and its activities, then get involved! Get active! Come to the LFCs! Organize a theme session for one of the next LFCs! Volunteer for service on one (or more!) of the Section's committees! Send a contribution in to *STAGES*! Think of something new and exciting! There is a lot that you can do. §

— Howard I. Browman

*Newly hatched haddock *Melanogrammus aeglefinus* larvae, the start of the F2 generation at the Port Erin Marine Laboratory 1999. Photo from AJ Geffen, University of Bergen, Norway.*



Editor's Ramblings



Busier Than Ever

I really don't want to go on a rant here, but...

STAGES serves a relatively large audience of people who share a research interest in the early life history of fishes. From what I can tell, this newsletter serves a useful function of informing Section members of relevant research and activities. So why, then, do we have difficulty in getting material to include in each issue? We have regional representatives whose duty for the Section is to gather information for *STAGES*. Many of them send messages three times per year to their region only to get a surprisingly small response. Admittedly, there are Regional Representatives who are not proactive in this way, but wait for members to send them unsolicited material.

Whether it is the passive Regional Representative or the non-responsive member, the usual excuse is "*I'm too busy.*" Well, we're all too busy. After the published deadline for this issue passed, I contacted the Regional Representatives to provide copy in what one of them described as a *verbal butt-kickin'*. In response to the "busy" excuse, I challenged one recipient to compare schedules to see who was busier, to which he responded, "*I suspect all that would come of it is the realization that we are both crazy.*" Indeed. We are. But that's why we share the load of work to produce this newsletter. So, please do your part. Send your Regional Representative something of interest for the newsletter. We'll all appreciate it.

Oh, that photo on page 6 was taken at the 9th Annual Larval Fish Conference, which was held at the The University of Texas Marine Science Institute in 1985 (a few years before I began working there). And those folks, from left to right are: Steve Easter, John Blaxter, Paul Webb, Joan Holt, Danny Weihs, Robert Eaton, and Peter Munk. §

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, mail your name, institutional affiliation (if appropriate), mailing address, telephone and fax numbers, e-mail address, and dues (US \$10 per year) for the current and/or upcoming year(s) to:

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

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