# STAGES

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

Volume 32, Number 2/3 | Lee A. Fuiman, Editor | October 2011


*Inside this issue*



## Student Award Winners

### *Richardson Award*

The 26th annual Sally L. Richardson Award for the best student paper was presented at the 35th annual Larval Fish Conference in Wilmington, North Carolina May 22 - May 27, 2011. Nineteen student papers were presented including two on larval cephalopods, and all were very good.

*Grace Klein-MacPhee announces Jennfer Martin as winner of the 2011 Sally L. Richardson Award.*

The winner of the award for best student paper was **Jennifer Martin**, Virginia Institute of Marine Science, for her presentation entitled "Comparative Ontogeny of the Ink-producing Gland in the Families Radiicephalidae and Lophotidae (Acanthomorpha: Lampridiformes)."

Two presentations received Honorable Mention: (1) **Allison Deary**, Virginia Institute of Marine Science, College of William and Mary for her presentation entitled "Diet and Habitat use of Larval Drums (Sciaenidae) in the Chesapeake Bay: Relationship to the Development of the Oral Jaws with Comparisons to the Freshwater Drum, *Aplodinotus grunniens,*" E.J. Hilton, Co-Author; and (2) **David G. Stormer**, Department of Environmental Conservation, University of Massachusetts, Amherst for

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## *ELHS Back Then*

*10 years ago: 25th LFC held in Sandy Hook, New Jersey, in view of the World Trade Center's twin towers just months before the tragedy there.*

*15 years ago: ELHS Executive Committee doubled the Sally L. Richardson Award endowment to make it a self-sustaining fund.*

*25 years ago: ELHS newsletter sets a new record for content at 36 pages!.*

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

**January 6, 2012**

## President's Message

This year's LFC (our 35th!) in Wilmington, NC was a real delight. A special thanks go to the supreme triumvirate of Fred Scharf, Jeff Buckel, and T. Lankford for their excellent job of hosting. We were treated to a gracious, southern style atmosphere with waterfront accommodations, a spacious meeting room, a most unusual setting for the social, and a relaxed banquet at a classic antebellum mansion, complete with an exceptional country rock band (see pages 14 & 15). The social was held on the deck of the WWII era battleship USS North Carolina. If your research platform is typically a 20' whaler, this is one heck of a boat! Wandering around this immense vessel and pondering the life of the crew in active battle in the Pacific was a humbling experience.

The scientific sessions went off without a hitch and covered a broad spectrum of topics, with theme sessions on nursery habitats, climate effects on predator-prey interactions, management implications of reproductive dynamics, and cephalopod early life history. Ed Houde started the meeting with a plenary presentation on the future of early life history research. In addition to providing us with a thorough and insightful perspective on likely new directions of our field, he amazed us all with his ability to interpret and integrate our scientific discoveries with the wisdom of Yogi Berra. It was a special treat for me to join Dave Secor in presenting Ed with the Elbert H. Ahlstrom lifetime achievement award, which is given by the section in recognition of sustained scientific excellence in the advancement of fish early life history research. Ed's outstanding contributions over a vastly productive career have influenced all of us and he truly is the epitome of this award.

Next year's meeting will be in Bergen, Norway, July 2-6, hosted by Howard Browman and Anne Berit Skiftesvik from the Institute of Marine Research. The abstract submission deadline is March 30, 2012. Accommodations and meeting rooms are in the elegant Solstrand Hotel on the beautiful Bjørnefjord. This was the venue for our

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# News from the Regions

## Western Region

**Dan Margulies**

### *From: Inter-American Tropical Tuna Commission, La Jolla, California*

The Early Life History (ELH) Group of the Inter-American Tropical Tuna Commission (IATTC) conducts research on the ecology, physiology, and behavior of early life stages of tropical tunas. The group is comprised of Dan Margulies, Vernon Scholey, Jeanne Wexler, and Maria Santiago. Although the group is based in La Jolla, CA, the research is conducted at the IATTC's Achotines Laboratory, located in Los Santos Province, on the Pacific coast of Panama. The ELH Group is involved in three ongoing or new research projects which are described below. For more information, contact Dan Margulies at dmargulies@iattc.org.

### *Kinki University, IATTC, and Republic of Panama Sign Tuna Research Accord*

Kinki University, the Inter-American Tropical Tuna Commission (IATTC), and the Autoridad de los Recursos Acuáticos de Panama (ARAP) have signed an agreement to conduct comparative research of the early life history and reproductive biology of Pacific bluefin tuna and yellowfin tuna. The joint research project will be conducted mostly at the Fisheries Laboratories of Kinki University in Wakayama Prefecture, Japan and the IATTC's Achotines Laboratory, located in the Republic of Panama.

The joint research program will begin in early 2011 and will continue for 5 years. The studies will be the first in the world to investigate important comparative aspects of the reproductive biology, genetics, and early life history of Pacific bluefin tuna and yellowfin tuna in order to improve the resource management of both species. The studies will contribute to the ongoing conservation and sustainable utilization of these tuna resources. During later stages of the project, ARAP and Kinki University will cooperate on developing hatchery production technology for yellowfin tuna fingerlings and carry out trial cage culture studies of juvenile yellowfin tuna.

The joint project will be implemented under the Science and Technology Research Partnership for Sustainable Development (SATREPS). The studies conducted in Japan will be supported by the Japan Science and Technology Agency (JST) and Kinki University, and the studies undertaken in the Republic of Panama will be supported by the Japan International Cooperation Agency (JICA), the IATTC and the ARAP.

The 5-year SATREPS study brings together decades of research expertise on tunas and marine fishes by the participating organizations. The Fisheries Laboratory of Kinki University has been the world leader in studies of the spawning and rearing of Pacific bluefin, and in 2002 successfully completed the life cycle of Pacific bluefin tuna in captivity. In recent years, the Kinki research program has produced improved husbandry methods and greater production of juvenile Pacific bluefin spawned and reared in captivity. The IATTC has maintained a spawning population of yellowfin tuna in land-based facilities at Achotines Laboratory since 1996 (a world first), where ongoing experimental studies of yellowfin early life history have been conducted for 13 years. The ARAP is responsible for the protection and proper utilization of aquatic resources of the Republic of Panama, and has successfully collaborated with the IATTC at the Achotines Laboratory on multiple research projects during the past 25 years.

This project is a unique collaboration between university scientists and researchers from international and national fishery management organizations. The joint SATREPS study will also support graduate research through Kinki University for selected staff members of the participating organizations.

### *IATTC and HSWRI scientists conduct studies of air shipment and rearing of yellowfin tuna eggs and larvae*

Researchers at the Inter-American Tropical Tuna Commission (IATTC) and Hubbs-SeaWorld Research Institute (HSWRI) recently completed the first successful air shipments of yellowfin tuna eggs and larvae into the United States. The eggs and larvae are being used in a joint effort to advance the hatchery technologies for this very popular food fish. The parental stock of tuna resides at the IATTC's research laboratory in Achotines, Panama, where adult tuna have been spawning in captivity since 1996. The ability to ship eggs and larvae over great distances will open a host of opportunities to work with these delicate, high performance fish. The shipments

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***HELP US UPDATE OUR RECORDS...***

*Verify your email with our ELHS Secretary.*

# European Region

**Audrey Geffen**

## *LIFECYCLE Project*

Early development and important life-stage transitions are important LIFECYCLE research areas. The LIFECYCLE project (www.lifecycle-fp7.eu) is a major needs-driven research effort on the biology of important aquaculture fish species within the 7th EU Framework Programme. This project goes to the heart of the call for EU framework research to "clarify the mechanisms of essential biological functions related to the most relevant stages of aquaculture fish life-history (larval development, growth, maturation, reproduction) at both a physiological and molecular level." The LIFECYCLE project is the focus of a 14-partner consortium from nine European countries. The work is mainly being carried out on Atlantic salmon, rainbow trout, sea bass, and sea bream, but Atlantic halibut and Atlantic cod are also studied in specific research tasks. The research scope of the project covers four major areas of fish biology: development and growth, adaptation, immunity, and sex differentiation and puberty.

*Logo of the LIFECYCLE consortium, supported by EU 7th framework programme.*

A major topic which exemplifies well how basic science and aquaculture go hand in hand is that of development and growth. Several questions concerning muscle and skeletal growth are being addressed, as well as the processes which regulate the growth. Recent research shows strong influences of early life experience on the subsequent growth performance of fish in aquaculture right up until harvest. Understanding the mechanisms and consequences of this developmental plasticity is a key goal for the project. The LIFECYCLE research also focuses on determinants of egg and larval quality, including epigenetics, to help explain the information that broodstock females may transfer to the eggs in addition to the classically inherited parental genomic information.

Regulatory interactions between cell types and between tissues (cross-talk) in larvae and juveniles, skeletal and muscle formation, and how this all influences growth and malformations are part of the research plan. New knowledge on flatfish metamorphosis will also be obtained, as this may not only help improve production and predictability in flatfish larval production, but also give broad insights into development/production of marine fish larvae.

The LIFECYCLE research activities will also contribute to the expanding genomic resources available for commercially important fish species, providing powerful new tools to study fundamental biological, ecological, and evolutionary processes.

In order to develop, grow and mature normally, fishes need to maintain stable internal conditions, irrespective of environmental fluctuations in factors like temperature and salinity. Transitional phases are of particular interest because fishes often change habitat and physiology during development. The project highlights the problems in three important life-stage transitions: larval development, smoltification, and sexual maturation. During these physiologically demanding periods, correct function of the transporting epithelia is of utmost importance. The role of the epithelia is to provide the fish with sufficient amounts of nutrients and energy, without disturbing homeostasis, so that they can perform remodelling and maturation of the physiological functions. In LIFECYCLE, the development of ion- and water regulation will be examined, from primitive ion-transporting cells in the integument of larvae, to specialized cells containing specific transport proteins, in the gills and intestine. The complex patchwork of genes and factors controlling this cellular differentiation, as well as the responses of these cells and proteins to different salinities, will also be elucidated.

Immunity in early life history is also included in the project. To study the defence mechanisms acting at the early stages of development, the presence of maternal transcripts that encode defence molecules in ova, which may provide innate protection, will be determined.

*Sea bream larva at 35 dph cleared and stained for study of skeletal and musculature development*


*Development of halibut larvae through metamorphosis.*

During later embryonic, post-hatching and first-feeding stages, immune challenges with characterised bacterial and viral pathogens will establish how transcription of immune genes responds during ontogeny. This is an area of great importance for the understanding of how these early stages can repel pathogens, as the immune system is not fully developed and relies on innate protection.

LIFECYCLE is coordinated by Professor Thrandur Björnsson, University of Gothenburg, Sweden (thrandur.bjornsson@zool.gu.se). The consortium has established a project website: www.lifecycle-fp7.eu as an effective way of distributing information to the aquaculture sector, as well as the scientific community. Visit the LIFECYCLE website for updates on the project progress.

This communication is based on the article printed in *Aquaculture Europe* • Vol.

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*Western Region...cont'd from p. 2*

mark the first time that eggs and larvae of yellowfin tuna have been successfully air shipped internationally.

Advancing the culture technology for tuna is of common interest to both San Diego-based research groups. The IATTC team brings all of its expertise in the biology of tunas, as well as 15 years of captive breeding and culture experience to the project. The IATTC research goal is to obtain knowledge of the biology and ecology in the early life stages of tuna to improve the capability to sustainably manage wild populations of tuna. HSWRI researchers have been culturing marine fishes for more than 30 years with an emphasis on demonstrating mass production capabilities coupled with environmental responsibility.

Thus far in the project, the research teams have conducted several air shipments of tuna eggs and larvae from Panama to San Diego, which required a significant amount of logistical coordination on both ends. The most recent shipment during February 2011 took 24 hours to complete and yielded survival rates following shipment as high as 90%. Larval rearing success at HSWRI has improved incrementally with each shipment as the research team makes refinements to try to meet the needs of these delicate larvae.

This research is being funded by the National Oceanic and Atmospheric Administration's Saltonstall-Kennedy Program. The project team includes the IATTC's Early Life History group and HSWRI scientists Mark Drawbridge, Kevin Stuart, and Paula Sylvia.

## *IATTC and SPC to Conduct Studies of the Effects of Ocean Acidification on Yellowfin Tuna Early Life Stages*

The Inter-American Tropical Tuna Commission (IATTC) and the Secretariat for the Pacific Community (SPC) have been awarded a grant through the Pelagic Fisheries Research Program (PFRP), Joint Institute for Marine and Atmospheric Research, University of Hawaii, to conduct a study of the potential impacts of ocean acidification on the early life stages of tropical tunas. The study will involve experimental investigations, conducted at the IATTC's Achotines Laboratory in Panama, of the effects of ocean acidification on the condition, growth, and survival of egg and larval stages of yellowfin tuna. Experimental trials will also examine the interacting effects of ocean pH and water temperature on the growth and survival of yellowfin early life stages. The experimental results will subsequently be used by the SPC to model and evaluate the potential impact of ocean acidification on the distribution and abundance of yellowfin tuna in the Pacific Ocean.

The project is a 2-year study that will commence in September 2011. The study will be conducted by the Early Life History Group of the IATTC, in collaboration with SPC scientists Simon Nicol, Don Bromhead and Simon Hoyle, Patrick Lehodey of CLS, France, and Tatiana Ilyina of the Max Planck Institute for Meteorology, Germany.

## *From: Larval Fish Laboratory, Colorado State University*

**NEWS RELEASE**

July 6, 2011 CONTACT: Debbie Felker, 303-969-7322, x227

For Immediate Release debbie_felker@fws.gov

**ENDANGERED RAZORBACK SUCKER SPAWN FOR FIRST TIME IN UTAH'S WHITE RIVER**

LAKEWOOD, Colo. – In late June, Upper Colorado River Endangered Fish Recovery Program (Recovery Program) researchers discovered endangered razorback sucker larvae for the first time in the White River in eastern Utah. This clearly documents successful razorback sucker reproduction in that reach of critical habitat, most probably by hatchery-raised and stocked fish.

One of four species of endangered Colorado River fish, razorback sucker have been extremely rare in the White River until recent years. The species was listed as endangered under the federal Endangered Species Act in 1991. The other endangered fish species are Colorado pikeminnow, humpback chub and bonytail.

The larvae were found after U.S. Fish and Wildlife Service (Service) biologists observed razorback sucker in spawning condition while conducting Colorado pikeminnow population estimates on the White River.

"We know that razorback sucker are spawning in the Green River, but we've never had evidence that this has occurred in the White River," said Service Biologist Aaron Webber. "When we saw so many razorback sucker in the White River in spawning condition this spring, we decided to take our research a step further to see if we could find some larvae."

Biologists identified four backwater areas in the lower 24 miles of the White River where they thought drifting larval fish might enter. Using light traps set in those locations, they collected several half-inch larval fish that they identified as razorback sucker from one of those habitats located about 5 miles upstream of the Green River confluence.

The identity of the larvae was further confirmed by Colorado State University's Larval Fish Laboratory (LFL) in Fort Collins, Colo.

"We used a computer-interactive key and guide to distinguish the larvae from other species of sucker that live in Upper Colorado rivers," said LFL Research Scientist Darrel Snyder. "The key and guide were developed by the lab over a 25-year period and incorporate over a hundred potentially diagnostic early-life-stage characters, such as pigmentation patterns, numbers of muscle segments (myomeres) in the body and developmental state relative to size."

Razorback sucker raised at the Ouray National Fish Hatchery near Vernal, Utah,

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*U.S. Fish and Wildlife Service researcher Amadeus Guy sets a light trap to attract larval fish in Utah's White River. (Photo courtesy U.S. Fish and Wildlife Service).*

*Western Region...cont'd from p. 4*

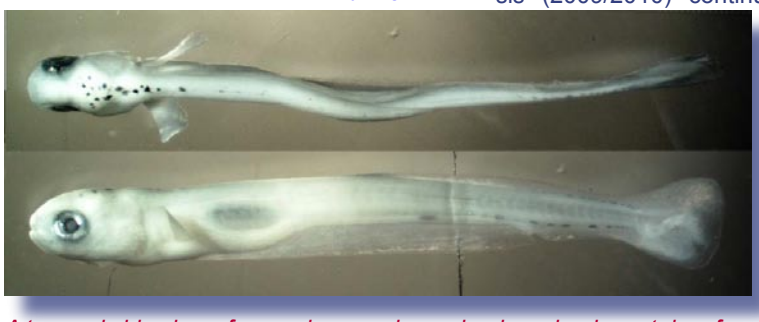
have been stocked in the Green River since 1995. Researchers continue to capture greater numbers of stocked fish in reproductive condition each year. Although larvae have been detected in low numbers in the Green River for many years, their captures have increased greatly since 2003.

"From our work on the Green River we knew that the stocked fish were behaving similarly to wild razorback sucker that we studied during the 1980s and 1990s," Webber said. "Typical for a migratory species like the razorback sucker, these fish have now moved from the Green River into the White River to find suitable spawning habitat."

Researchers welcomed the news that razorback sucker are spawning in the White River, the second largest tributary to the Green River, which headwaters in the Flat Top Wilderness Area in northwest Colorado. Other tributaries are the Duchesne, Price, San Rafael and Yampa rivers. These tributaries help maintain important Green River habitat that endangered fish need to complete their life cycle.

"The White River has long been recognized as a stronghold for Colorado pikeminnow and other native species and, just as important, as a place where nonnative fish seem to struggle," said Recovery Program Director Tom Chart. "With this recent report of razorback sucker now spawning there, the importance of the White River to endangered fish recovery has increased even more."

The Upper Colorado River Endangered Fish Recovery Program is a cooperative partnership of local, state and federal agencies, water organizations, power customers and environmental groups established in 1988 to recover the endangered fishes while water development proceeds in accordance with federal and state laws and interstate compacts. For more information, 303-969-7322 or ColoradoRiverRecovery.org. §



*A top and side view of an endangered razorback sucker larva taken from the White River in Utah on June 21, 2011, as seen through a microscope at Colorado State University's Larval Fish Laboratory in Fort Collins, Colorado. The larva is approximately half an inch in length. (Photo courtesy CSU Larval Fish Lab).*

*European Region...cont'd from p. 3*

35 (4) December 2010, on behalf of the LIFECYCLE consortium, Björn Thrandur Björnsson and Kristina Snuttan Sundell, University of Gothenburg, Sweden; Pierre Boudinot, National Institute for Agricultural Research, Jouy-en-Josas, France; Florence Le Gac, National Institute for Agricultural Research, Rennes, France; Ian Johnston, University of St Andrews, Scotland, UK; Rüdiger Schulz, Utrecht University, The Netherlands; Adelino VM Canario and Deborah M Power, Algarve Centre of Marine Sciences, Faro, Portugal; Sigurd O Stefansson, University of Bergen, Norway; Silvia Zanuy, Spanish Council for Scientific Research – Instituto de Acicultura de Torre de la Sal, Spain, Sam Martin and Christopher Secombes, University of Aberdeen, Scotland, UK.

## *From: Institute for Baltic Sea Fisheries, Rostock, Germany*

Matthias Paulsen works for the Institute for Baltic Sea Fisheries in Rostock Germany, and is a PhD student at the University of Rostock, Germany. His PhD is a cooperation between the Baltic Sea Fisheries laboratory (first supervisor: PD Dr. Cornelius Hammer), IFM-GEOMAR (Dr. Catriona Clemmesen), and Alfred-Wegener Institute, Helgoland (Dr. Arne Malzahn). Since 2007, he has been working with copepods, studying their seasonal occurrence in the Kiel Fjord and Kiel Canal (Nord-Ostsee Kanal). This has been carried out within the framework of a time-series of plankton surveys instituted by Catriona Clemmesen. Matthias takes regular samples throughout the season in Kiel Canal, Kiel Fjord, and the Greifswalder Bodden (Ruegen Herring Larvae Survey) to compare the growth conditions for the larvae in different spawning areas. Matthias is also doing some experimental work.

This thesis project started in 2007, when Matthias took part in the International Herring Larvae Survey around the Shetland and Orkney Islands, and his diploma thesis (2009/2010) continued with the examination with herring larvae and their prey. It dealt with bottom- up factors that influence the condition of herring larvae in the field (investigation area: Kiel Canal). Focus was placed on the nutritional value in terms of essential fatty acid content and C:N ratio of the larval prey, namely copepods and cirriped nauplii. An effect of the DHA (docosahexaeonic acid) content in the herring larvae on their RNA/DNA ratio could be observed.



*Germany's Kiel Fjord (upper) and Kiel Canal, also called the North Sea – Baltic Canal (lower), one of the busiest shipping zones in the world.*

Matthias claims that in his private life he cannot keep away from fish, and is always interested in fishing in the Baltic (not herring, but cod and sea trout) and keeping tropical fish.

*Matthias Paulsen (left) conducting bongo sampling of herring larvae in Kiel Fjord.*

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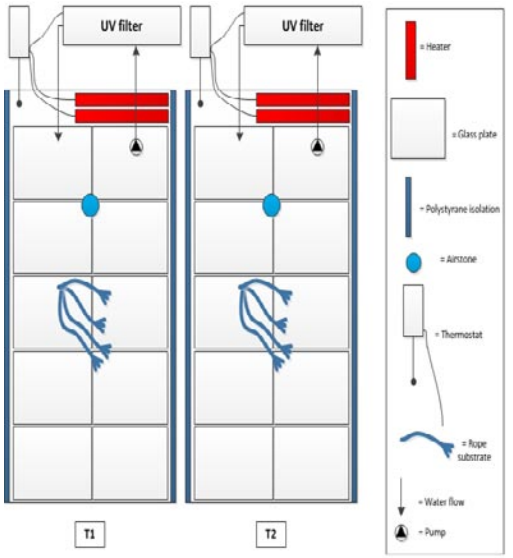
*European Region...cont'd from p. 5*

## *From: Wageningen University, Netherlands*

PhD student A.M. (Marieke) Keller from Wageningen University in the Netherlands is studying the role of European smelt, *Osmerus eperlanus*, in the ecosystem of Lakes Ijssel and Marker to understand the recent decline of smelt populations and the possible cascading effects on piscivorous bird populations. These lakes are large oligotrophpic water bodies that used to be the southern sea estuary before the closing of the dykes. The project is part of the larger Autonomous Downward Trend consortium, funded by Deltares, and aims to provide a description of the food chain in lakes.

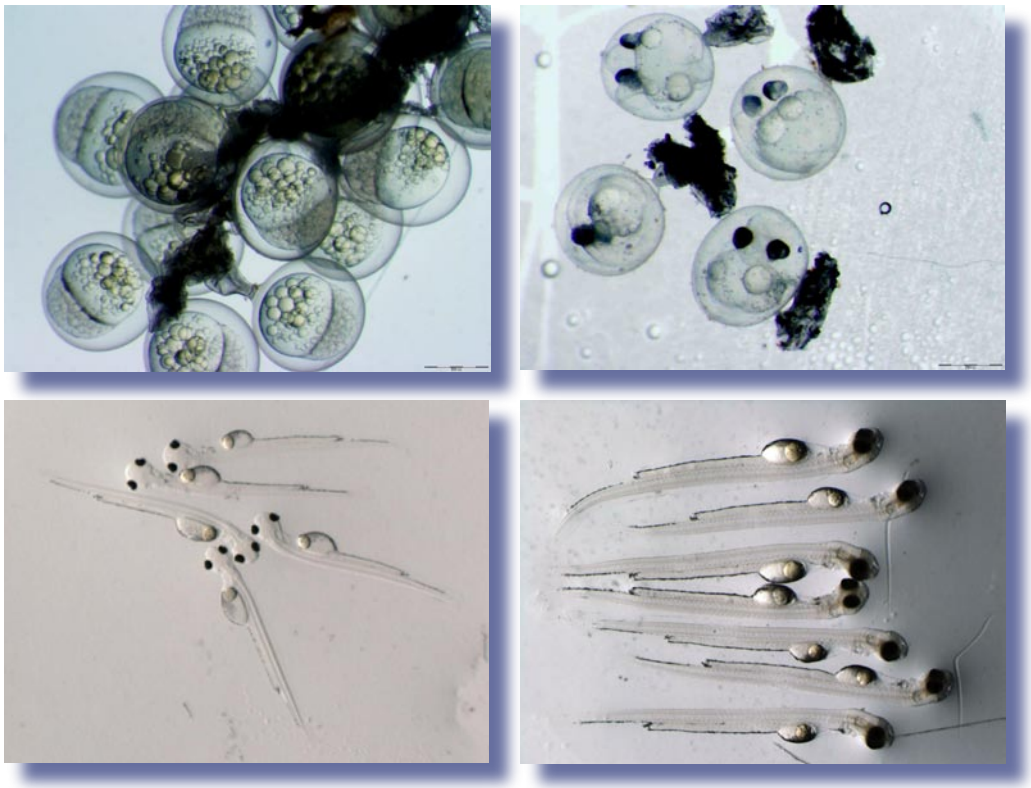
Experimental work on the effects of temperature on development of smelt eggs and larvae was conducted at IMARES, part of Wageningen UR, from mid-February to May 2011. Timing of hatching is critical in this ecosystem in terms of food availability and predator avoidance. The main predators of smelt are perch (*Perca fluviatilis*), pike perch (*Stizostedion lucioperca* or *Sander lucioperca*) and several piscivorous bird species, e.g. common tern (*Sterna hirundo*) and common merganser (*Mergus merganser)*. Adult wild smelt were brought back to the laboratory to spawn. They were kept in 150-L freshwater rectangular plastic grey tanks with a natural daylight rhythm with a light intensity of 1005 lux. We found that a temperature shock of 3° C, the presence of substrate, and a water current, provided by the UV filter pumps were of importance to stimulate spawning. Glass plates were placed at the bottom of the tanks to catch the eggs and make them easily transferable. These plates with the adhesive eggs were then placed in 70-L flow-through aquaria, flow rate 0.5 L $h^{-1}$, and were reared at three different temperatures, 6, 9 and 12 ºC, and the developmental progress was checked daily. After hatching, individual larvae were sampled every day from each temperature treatment and photographed for measurements using image analysis. A comparison between each temperature treatment was made to calculate the growth and developmental rate at each temperature.




*Design of the spawning tanks for field-caught adult smelt.*

Problems arose when the larvae came to the end of the yolk sac phase and did not feed on the live freshwater rotifers (*Brachionus calyciflorus)* and *Paramecium* provided as prey.

Marieke was assisted by P. Molenaar (intern) and her PhD supervisor is Prof. A.D. Rijnsdorp. §



*Stages of smelt development. Eggs 1 day after fertilization at 12°C (upper left). Eggs about to hatch, day 13 after fertilization at 9°C (upper right). Newly hatched larvae day 13 after fertilization (lower left). Larvae on day 18 (lower right).*

*President's message...cont'd from p. 1*

26th LFC in 2002 and it is really a spectacular setting. As a special incentive for students, Howard and Anne Berit have managed to secure $4000 for travel. If you are a student, be sure to take advantage of this opportunity. Check out the web site at www.larvalfishcon.org for more information. You will definitely want to attend this meeting!

Future meetings include Miami in 2013, hosted by Su Sponaugle and Bob Cowen; and Quebec City in 2014, hosted by Pascal Sirois. Locations beyond 2014 are under consideration. Thanks to all of you willing to host the annual meeting. It is a major undertaking and appreciated by all.

One of our ongoing objectives is to increase our membership. Efforts by ELHS webmaster and Treasurer Jeff Buckel have modified the web site to allow dues payment for affiliate members via PayPal (go to www.larvalfishcon.org/join_elhs.asp) to join or renew. This has greatly simplified the process, particularly in countries outside the U.S., and brought us several new members. I am also grateful to those of you who responded to my pestering messages by renewing as full members. We now have our membership information in good order.

A major decision at this year's business meeting was to discontinue publishing paper copies of *Stages* and switch to an electronic version. This move will save a large portion of our small pot of funds and provide more flexible opportunities for inclusion of your submitted material. Thanks to our dedicated editor Lee Fuiman for making this transition and continuing to serve in this role, undoubtedly the most time-consuming of contributions to our section.

In closing, I hope to see many of you next summer in Bergen. §

– Susan Sogard, President

# Ed Houde Receives Ahlstrom Award

In the spring of 2011, Dr. Edward D. Houde received the AFS Early Life History Section's Elbert H. Ahlstrom Lifetime Achievement Award. Dr. Houde's career is exemplary among scientists investigating the early life history of fishes. Through seemingly boundless curiosity and energy, a keen intellect, and critical scholarship, he has informed generations of students and scientists about the "subtleties and episodes in the early life history of fishes."

At Cornell University 45 years ago, Dr. Houde initiated a career of laboratory studies on larval fishes destined to provide fundamental advances in larval physiology, swimming performance, feeding ecology, growth, mortality, and development. It is worth noting that in the 1960s and 1970s, rearing marine fish larvae was the province of very few scientists worldwide. Mostly by his own devices, Dr. Houde pioneered larval rearing techniques, which permitted experimentation on such taxa as engraulids, flatfishes, sparids, and scombrids. Particularly influential work during this period was on the prey requirements of marine fish larvae. Later for Chesapeake Bay fishes, Dr. Houde conducted important research on maternal effects and environmental stresses on early survival through both micro- and meso-scale experiments. In the latter, he developed novel "drifting" mesocosm systems that allowed gelatinous predator – fish larvae prey systems to operate under more natural environment and community conditions.

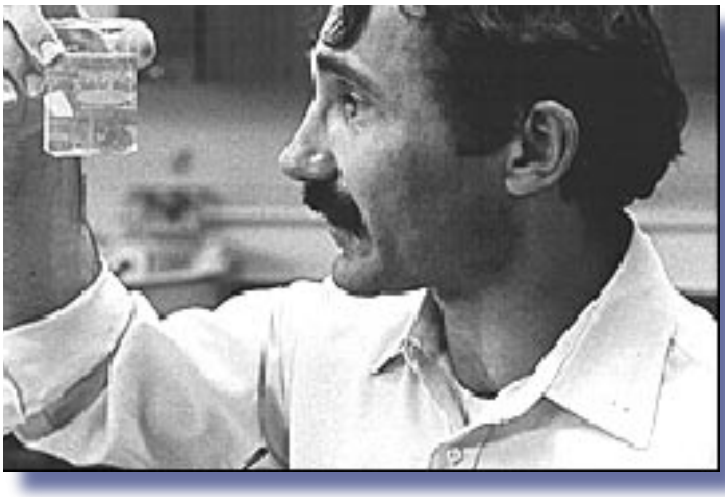
Dr. Houde has also made important contributions to systematics and natural history, particularly for the family Bregmacerotidae, for which he contributed an authoritative account in the *Ontogeny and Systematics of Fishes* volume; a species within this family bears his name. He has retained strong interest and expertise in larval systematics, offering the successful summer Larval Systematics and Ecology course together with Dr. John Olney (deceased) to national US and international students (see web.vims.edu/adv/657/?svr=www).

Dr. Houde has a penchant for estimation – densities, abundances, rates of growth, mortality, and feeding – not only in the laboratory, but in the field through population-level studies. He and his students pioneered cohort-based approaches, which permitted abundances and vital rates of larval fishes to be more rigorously quantified and associated with environmental influences and recruitment. He recognized early the potential of otolith microstructural studies to estimate vital rates, but importantly matched these with strong programs of sampling design, novel gear deployments, and consideration of bias and error – all feeding into defensible population-level assessments of larval production and recruitment processes in coastal ecosystems. Over the past 20 years, Dr. Houde has revisited concepts of estuarine dependency by investigating physical–biological coupling within food webs centered on physical features such as the estuarine turbidity maximum. Fisheries oceanography has been a centerpiece of his career, evidenced by sustained funding from NSF Biological Oceanography and countless oceanographic cruises for which he has served as chief scientist.

Diverse species and settings, and countless estimates pertaining to the vital rates of larvae have provided Dr. Houde an unsurpassed experiential basis to draw generalizations on the "recruitment problem." He has been on a quest to understand how early vital rates control and regulate recruitment processes across all taxa of fishes. Arguably, his most influential papers are (1) hypothesis-driven (meta-analysis) papers on how larval attributes and vital rates are structured across ecosystems, taxa, and environmental gradients (Houde 1989; Houde and Zastrow 1993; Houde 1994; Houde 1997) and (2) elegant modeling papers that demonstrate how small daily changes in early feeding and growth rates can have geometrically scaled effects on early survival and recruitment (Houde 1987; Bailey and Houde 1989; Houde 1989; Houde 1996; Houde 1997). In the latter series he has been particularly influenced by Dr. David Cushing who proposed that the integral of larval growth and mortality shapes patterns of recruitment variation among species – the so-called "single process." Dr. Houde has elaborated and given compelling support for this view across diverse taxa and ecosystems.

Many careers have been inspired, shaped, and aided through interactions with Dr. Houde, an incredibly patient mentor but one with high expectations for performance, and one who leads through example. A common refrain from past students and postdocs is, "no one works harder than Ed." Past students and postdocs that moved into professorial ranks include JE Olney, TJ Mulligan, EJ Chesney, JH Cowan, E Rutherford, D Secor, JE Kiester, SE Dorsey, EW North, J Shoji, and ER Annis. Others of the >30 students he's supervised have moved into careers as state and federal scientists, and fishery managers. Further, he has spent untolled hours mentoring students, other professors, and state and federal scientists who have come to him for assistance. §

— David Secor



# Recent Events

## Identification Workshop

The **Workshop on the Identification of Clupeoid, Flatfish, Gadoids and Other Fish Larvae (**WKIDFL), chaired by Cindy van Damme, the Netherlands, and Matthias Kloppmann, Germany, met in IJmuiden, the Netherlands, 5–9 September 2011 to:

a) Review available information on the identification of fish larvae in the North Sea and adjacent areas, under special consideration of larvae's appearance with ongoing development, with special emphasis on clupeoid, flatfish and gadoid larvae;

b) Identify sources of misidentification of larvae;

c) Establish an agreed identification key for clupeoid, flatfish, and gadoid larvae;

d) Review methods of proper preservation in fish larvae.

WKIDFL planned to report by 20 September 2011 (via SSGESST) for the attention of the SCICOM.

| | |
|---|---|
| Supporting information<br>Priority | Different ichthyoplankton surveys, e.g. herring larvae, plaice and cod egg surveys, MIK, CUFES, are carried out in the North Sea and adjacent areas and provide essential data for the assessment of fish stocks in the North Sea, the Irish Sea and the Baltic. |
| Scientific Justification | Larvae surveys are currently carried out by different countries and the result of these surveys are of direct importance for the assessment.<br>Since larvae can easily be mixed up, effective quality control and proper larvae identification is essential for the survey results.<br>A workshop is required to ensure correct larvae identification, to establish a reliable identification key and to exchange experience of all involved participants. |
| Relation to Strategic Plan | Directly relevant for the advice on herring and sprat fisheries. |
| Resource Requirements | No specific resource requirements beyond the need for members to prepare for and participate in the meeting |
| Participants | Scientists and technicians of the involved laboratories; at minimum eight participants. |
| Secretariat Facilities | None |
| Financial | No financial implications |
| Linkages to Advisory Committees | The survey data are prime inputs to the assessments which provide ACOM with information required for responding to requests for advice/ information from NEAFC and EC DG MARE. |
| Linkages to other Committees or Groups | HAWG, SSGESST, IBTSWG, WGIPS, WGEGGS, WGACEGG |

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## Presentations from the 35th Annual Larval Fish Conference (2011)

Plenary lecture: Dr. Ed HOUDE. What is the future of early life history research?

CIOTTI, B.J., Targett, T.E., Miller, T. Growth limitation of juvenile fish in shallow habitats in late summer

LANKFORD, T., Lipton, I., Perillo, L. Fish nursery function of ocean surf-zone habitat: response to a human disturbance gradient

WOODLAND, R., Secor, D.H., Fabrizio, M.C., Wilberg, M.J. Comparing the nursery role of inner continental shelf and estuarine habitats for temperate marine fishes

NAGELKERKEN, I., Igulu, M.M., van der Beek, M., and Schippers, M. Orientation from open water to seagrass nursery habitats by larval reef fish: potential role of olfactory cues from conspecifics, heterospecifics and aquatic vegetation

CONROY, C.W., Secor, D.H., and Piccoli, P.M. Diversity of early life history habitat use by age 0 striped bass collected in tidal fresh and brackish habitats in the Patuxent River estuary, Maryland, USA

Silva, P.S., MAKRAKIS, M.C., Lima, A.F., Assumpcao, L., Makrakis, S., Miranda, L.E., Dias, J.H.P. and Marques, H. Spawning and nursery habitats of neotropical fish species in the tributaries of a regulated river

ROSEMAN, E.F. Using ichthyoplankton surveys to assess fish spawning and nursery habitats in the Huron-Erie corridor

MARKLE, D.F., Wood, T.M., Burdick, S., Erdman, C., Hendrixson, H., Ellsworth, C., Buccola, N. Modeling transport of larval suckers through a restored delta in Upper Klamath Lake, Oregon, using density-based and individual-based approaches

MILLER, J.A. and Tomaro, L.M. Early marine residence of spring-run chinook salmon: a comparison of growth and migration in two interior Columbia River populations

WHITE, J.W., Nickols, K.J., Clarke, L., Largier, J.L. Larval entrainment in power plant intakes: spatial models reveal population effects and shortcomings of traditional assessments

DIXON, R. and Lankford, T. Effects of prey size on the foraging behavior and dietary preference of juvenile Florida pompano, *Trachinotus carolinus*

BINION, S., Riley, K., Overton, A. Exploring food limitations of larval Alosines in Lower Roanoke River and Albemarle Sound, North Carolina

STORMER, D.G. and Juanes, F. Pre-migration patterns of resource use in multiple cohorts of juvenile bluefish inhabiting the Hudson River estuary, New York

VAGNER, M., de Montgolfier, B., Lafille, M.-A., Sevigny,J.-M., Tremblay, R., and Audet, C. Genetic regulation of metamorphosis in winter flounder (*Pseudopleuronectes americanus*) – effects of dietary fatty acids

...continued on p. 9

*Presentations from LFC35...cont'd from p. 8*

HOFFLE, H.K., Nash, R.D.M., Faulkenhaug, T. and Munk, P. Vertical distribution and diurnal patterns of fish larvae in a species rich environment

SWALETHORP, R., Munk, P., Nielsen, T.G Retention of fish larvae in a fjord system – a seasonal study of the larval life in a West Greenlandic Fjord

HAVEL, L.N., Fuiman, L.A., Ojanguren, A.F. Larval size influences depth of residence during settlement in red drum (*Sciaenops ocellatus*)

LINDO-ATICHATI, D. and Goni, G. Variability of mesoscale structures in the Gulf of Mexico with effects on larval fish distribution: an application of satellite-altimeter observations to fish stock assessment

HURST, T.P. and Ottmar, M.L. Contrasting thermal effects on the behavior of juvenile Pacific cod and walleye pollock

FUIMAN, L.A. and Ojanguren, A.F. Can female diet influence offspring survivorship?

MURPHY, H.M., Jenkins, G.P., Hamer, P.A., Swearer, S.E. Feeding ecology of snapper, *Chrysophrys auratus* (Sparidae), larvae in Port Phillip Bay, Australia: a link between diet and interannual recruitment

CLEMMESEN, C. Frommel, A., Franke, A. Maneja, R., Lowe, D., Geffen, A. Folkvord, A., Chang, M.-Y., Malzahn, A., Steffen, G. Schubert, A., Mauer, J., Piatkowski, U.C.C. How do commercially important fish species cope with ocean acidification?

FUKUNISHI, Y. and Browman, H.I. Effect of sub-lethal exposure to ultraviolet radiation on the escape performance of Atlantic cod larvae (*Gadus morhua*)

ROBERT, D., Falardeau-Cote, M., Suzuki, K., Fortier, L. Investigating trophic interactions between larval arctic cod (*Boreogadus saida*) and their zooplankton prey in the rapidly-warming Beaufort Sea

ARULA, T., Simm, M., Ojaveer, H., Pollupuu, M. Long-term changes in phenology of copepods and herring larvae in the Gulf of Riga (Baltic Sea)

SHOJI, J., Kinoshinta, H., Toshito, S-I., Kamimura, Y. Is seagrass bed a safe nursery? – Nighttime predation rate, size- and growth-selective survival of rockfish juveniles and possible effects of the global warming

SIROIS, P., Marion, A., Plourde, J. The production of zooplankton and its consumption by larval and juvenile rainbow smelt (*Osmerus mordax*) in a large boreal reservoir (Lake Saint-Jean, Canada)

McBRIDE, R.S., Wuenschel, M.J., McElroy, W.D., Fitzhugh, G.R. Understanding reproductive dynamics of marine fishes to inform fishery management

CAREY, A., Oliveira, K., Hable, W. Reproductive effects of contaminants on artificially matured and fertilized American eels (*Anguilla rostrata*)

MIDWAY, S.R. and Scharf, F.S. Updating size and age at maturity schedules for southern flounder, *Paralichthys lethostigma*, in North Carolina

PEER, A.C. and Miller, T.J. Interannual variation in female reproductive energetics: the importance of energy reserves on Chesapeake Bay striped bass reproductive potential

KLIBANSKY, N. and Scharf, F.S. Egg production and reproductive investment in black sea bass, *Centropristis striata* (Serranidae)

Shertzer, K., FITZHUGH, G., Kellison, T., Wyanski, D. Review of size and age dependence in batch spawning: Implications for stock assessment and management

VECCHIONE, M. A brief history of (cephalopod) early-life-history studies

PIMENTEL, M., Bandarra, N., Marques, A., Narciso, L., Rosa, R. Biochemical dynamics during early ontogeny of cephalopods in a future warming scenario

GONZALEZ, A.F., Guerra, A., Otero, J., Salgado, X.A., Roura, A. Oceanographic impact on the distribution and trophic ecology of wild common octopus paralarvae in a seasonal upwelling area

Roura, A., GONZALEZ, A.F., Redd, K., Guerra, A. Molecular prey identification in wild *Octopus vulgaris* paralarvae

JORGENSEN, E.M. Effects of variation in ocean environment on ecology of cephalopod paralarvae in the Gulf of Alaska

STAUDINGER, M.D. Predation on juvenile cephalopods in pelagic waters of the Northwest Atlantic

Fuller, S. Wareham, V., SHEA, E. Egg deposition by *Rossia palpebrosa* (Cephalopoda: Rossiinae) in a marine sponge (Porifera: *Mycale lingua*) on the Newfoundland Shelf

PIMENTEL, M., Boavida-Portugal, J., Narciso, L., Rosa, R. Impact of ocean warming in squid early ontogeny: a developmental and metabolic approach

ARAUJO, C.C., Katsuragawa, M., Gasalla, M.A. Cephalopod paralarvae of the Southeastern Brazilian Bight (22º-25º S), Southwestern Atlantic Ocean

KOSTANTINIDIS, P., Olsson, L., Hilton, E. Homology and the importance of larval fishes for morphological and phylogenetic studies, with examples from the jaw musculature of teleostean fishes

KA'APU-LYONS, C. and Gibb, A.C. The great mouth migration: a tale of two Arizona fishes

DEARY A.L. and Hilton E.J. Diet and habitat use of larval drums (Sciaenidae) in the Chesapeake Bay: relationship to the development of the oral jaws with comparisons to the freshwater drum, *Aplodinotus grunniens*

MARTIN, J.M. Comparative ontogeny of the ink-producing gland in the families Radiicephalidae and Lophotidae (Acanthomorpha: Lampridiformes)

SCHNELL, N.K. and Johnson, G.D. Development of the upper jaw in squirrelfishes and soldierfishes (Beryciformes: Holocentridae): a unique ontogenetic trajectory

BURNETTE, M.F. and Gibb, A.C Feeding kinematics of a juvenile, cyprinid predator, *Ptychocheilus lucius*, are characterized by negative allometry

FOLKVORD, A., Koedijk, R., Grahl-Nielsen, O., Meier, S., Olsen, B.R., Blom, G., Imsland, A.K. You are what you eat? a study of diet effects in cod larvae

Vollset, K.W., Folkvord, A., BROWMAN, H.I. Foraging behaviour of larval cod (*Gadus morhua*) at low light intensities

WOODLAND, R., Rodriguez, M.A., Magnan, P., Glemet, H., Cabana, G. Incorporating temporally dynamic baselines in isotopic mixing models

MCKINLEY, A., Miskiewicz, A., Taylor, M., Johnston, E.L. Assessment of the impacts of metals contamination and anthropogenic habitat modification on estuarine larval fish assemblages in southern New South Wales, Australia

...continued on p. 10

*Presentations from LFC35...cont'd from p. 9*

GOVONI, J., Hare, J., Davenport, E. Larval fishes of the Charleston Gyre region of the southeast United States continental shelf ecosystem in winter: cross-shelf and upper slope distribution shaped by meso-scale, cyclonic eddies

AUTH, T.D. Anomalous ichthyoplankton distributions and concentrations in the Northern California current resulting from the 2010 El Nino and La Nina events

KLEIN-MACPHEE, G. and Schneider E.G. Evaluation of tautog early life history stages in Narragansett Bay, Rhode Island from 2001-2008

HERNANDEZ JR., F.J., Carassou, L., Graham, W.M. Marine fisheries and the Deepwater Horizon oil spill: an early assessment based on a long-term ichthyoplankton survey §

# Freshwater Theme Sessions from the 34th Annual Larval Fish Conference (2010)

For those who were not able to attend the 2010 Larval Fish Conference in Santa Fe, here are the presentations from some of the special sessions. Abstracts of the presentations may be viewed by selecting "Conference Abstracts" at the conference website: www.larvalfishcon.org/Conf_home.asp?ConferenceCode=34th

## *Theme session: Larval Fish Ecology and Conservation of Native Fishes in the American Southwest*

This session was convened by Kevin R. Bestgen, Director of the Larval Fish Laboratory at Colorado State University and focused on work contributing to the conservation of native fishes in that portion of our Western Region.

**Keynote address**

**Larval Fish Ecology and Conservation of Native Fishes in the American Southwest** by Kevin R. Bestgen, Larval Fish Laboratory, Department of Fish, Wildlife, and Conservation Biology, Colorado State University, Fort Collins, Colorado 80523 (kbestgen@colostate.edu).

**Contributed oral presentations**

**Distribution, Hatching Period, and Dispersal of Larval Razorback Sucker in the San Juan River, NM, CO, UT: Eleven Years of Research (1999-2009)** by W. H. Brandenburg, M. A. Farrington, and S. P. Platania, American Southwest Ichthyological Researchers, 800 Encino Place NE, Albuquerque, New Mexico 87102-2606 (howard_brandenburg@asirllc.com).

**Maintenance of Razorback Sucker Brood Stock Diversity by Capture of Wild Larvae** by P. K. Delrose, U.S. Bureau of Reclamation, Boulder City, Nevada 89005; T. A. Burke, same,; and T. E. Dowling, Arizona State University School of Life Sciences, Tempe, Arizona 85287 (pdelrose@usbr.gov).

**Salinity Tolerances for Egg and Larval Stages of Razorback Sucker** by M. J. Horn, U.S. Bureau of Reclamation, Denver, Colorado 80225; and J. R. Stolberg,, U.S. Bureau of Reclamation, Boulder City, Nevada 89005 (mhorn@usbr.gov).

**Reproductive Phenology of Fishes of the Middle Rio Grande, New Mexico** by Trevor J. Krabbenhoft, Steven P. Platania, and Thomas F. Turner, University of New Mexico, Department of Biology and Museum of Southwestern Biology, Albuquerque, New Mexico 87131 (krabbent@unm.edu).

**Successful Spawning by Stocked Razorback Sucker in the Gunnison and Colorado Rivers, as Evidenced by Larval Fish Collections, 2002–2007** by D. B. Osmundson, U.S. Fish and Wildlife Service, Colorado River Fishery Project, 764 Horizon Drive, Building B, Grand Junction, Colorado 81506, and S. C. Seal (presenter), Larval Fish Laboratory, Colorado State University, 1474 Campus Delivery, Fort Collins, Colorado 80523 (doug_osmundson@fws.gov).

**Dissolved Oxygen Tolerances for Egg and Larval Stages of Razorback Sucker** by J. R. Stolberg, U.S. Bureau of Reclamation, Boulder City, Nevada 89005; and M. J. Horn, U.S. Bureau of Reclamation, Denver, Colorado 80225 (jstolberg@usbr.gov).

**Drift of Flannelmouth Sucker (*Catostomus latipinnis*), Bluehead Sucker (*Catostomus discobolus*), and White Sucker (*Catostomus commersoni*) Larvae in the Big Sandy River, Wyoming** by Koreen A. Zelasko and Kevin R. Bestgen, Larval Fish Laboratory, Department of Fish, Wildlife, and Conservation Biology, Colorado State University, Fort Collins, Colorado, 80523 (kzelasko@cnr.colostate.edu).

**Patterns of Growth Rates and Lengths of Age-0 Smallmouth Bass in the Yampa River, 2003-2009** by Angela A. Hill and Kevin R. Bestgen, Larval Fish Laboratory, Department of Fish, Wildlife, and Conservation Biology, Colorado State University Fort Collins, Colorado, 80523 (aahill@rams.colostate.edu).

**Smallmouth Bass Otolith Microstructure Analyses and Implications for Green River Basin Fish and Flow Management** by Kevin R. Bestgen and Angela A. Hill, Larval Fish Laboratory, Department of Fish, Wildlife, and Conservation Biology, Colorado State University, Fort Collins, Colorado, 80523 (kbestgen@colostate.edu).

## *Theme session: Descriptions and Identification*

As we begin the 21st Century and address the impacts of a changing environment on the early life stages of fish, one thing that has not changed is our need for morphological descriptions of their early ontogeny and adequate criteria for their identification. Most field work on the early life stages of fish depends on our ability to identify the organisms we've captured or observed. Also, knowledge of the morphology of these early life stages is often essential to better understand their behavior and ecology.

Descriptions and identification are the foundation for much of our science. It was therefore fitting that this topic was addressed in one of the lead sessions for the 34th annual Larval Fish Conference. The session, organized by Darrel Snyder of the Larval Fish Laboratory at Colorado State University, consisted of the six oral presentations with seven associated poster papers. The titles, authors, and abstracts follow.

**Contributed oral presentations**

**An initial assessment of descriptive information available for embryos, larvae, and early juveniles of fishes in fresh waters of the United States and Canada** by Darrel E. Snyder, Nancy A. Auer, Larry .K. Kay, Colleen D. Kernehan, Ronnie J. Kernehan, Alice J. Lippson, Rene C. Reyes, Matthew J. Scripter, Sean C. Seal, Elizabeth A. Sturm, and C. Tate Wilcox.

**Development of an identification manual for the early life history stages of fishes of the Middle St. Johns River, Florida** by Matthew J. Scripter, Jonathan M. Shenker, Audrey L. Farson, and Steven J. Miller.

...continued on p. 12

# Publications

***Available now:*** *Identification of Eggs and Larvae of Marine Fishes*

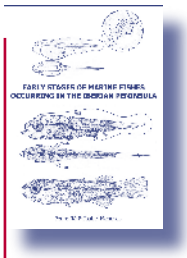
By Arthur W. Kendall, Jr.

Published by Tokai University Press. ISBN-978-4-486-03758-3.

This publication is a compilation of information to help identify eggs and larvae of marine fishes. It should be of practical use for ichthyologists and fisheries scientists needing to identify the larvae of marine fishes in ichthyoplankton collections. The 11 contributors cover the early life history and larval development of 112 species in 94 families in 18 orders. It is based on a syllabus developed for two courses on identification of eggs and larvae of fishes: one that was held in Santa Cruz, California in 2003, and one that was held at the National Museum of Nature and Science in Tokyo in March 2009. Following a general introduction, for each taxon textual information and illustrations of larvae are provided using a standardized format. For most orders (and for more diverse orders, suborders) an introductory section is included with illustrations of midflexion larvae of representative species. For most families then, one or more representative species are covered in more detail, including illustrations of complete developmental series. Textual information includes taxonomic diversity (how many suborders or families, how many genera and species), general life history (geographic distribution, relative abundance and importance to humans, and adult habitat), and early life history (mode of reproduction, state of knowledge of eggs and larvae, and general characteristics of eggs and larvae). Example species and their meristics are then listed as well as pertinent references for the group.

Contributors include: David A. Ambrose, Deborah M. Blood, Morgan S. Busby, Sharon R. Charter, Denice Drass, Michael P. Fahay, Arthur W. Kendall, Jr., Jeffrey M. Leis, Ann C. Matarese, H. Geoffrey Moser, William Watson.

Price: 5000 Japanese Yen. To order, contact: Hiroshi Ina: inaair@keyaki.cc.u-tokai.ac.jp. §



***Available to download:*** *Early stages of marine fishes occurring in the Iberian Peninsula*

By Pedro Ré and Isabel Meneses

Published by IPIMAR/IMAR. ISBN-978-972-9372-34-6.

This guide is intended for the identification of the Early Life History (ELH) stages of fishes collected by plankton nets from the marine and estuarine waters of the Iberian Peninsula (Eastern North Atlantic Ocean). The coverage area extends from latitude 34º - 45º N, to longitude 6º - 14º W.

The basic characteristics of the eggs and larvae of 104 species belonging to 45 families are described. The emphasis has been placed on the most diagnostic or easily observed characters in order to facilitate comparisons between taxa.

The descriptive accounts of this guide follow the format of previous ELH guides. Nomenclature follows Eschmeyer (1998) except for more recent changes. Within families, genera are listed in alphabetical order.

Species descriptions are given only for species for which some ELH stages are known. Each species account includes the same basic information (written information on the left-hand page and figures on the facing right-hand page). Written information includes meristic data (fin-ray counts in adults and myomere counts), life-history information (range, habitat, spawning season, ELH pattern), main references and ELH descriptions (eggs and larvae). Measurements of larvae usually refer to standard lengths. Many published illustrations have been redrawn mainly to provide certain uniformity throughout the guide. Sources of illustrations are given for every plate.

More information about this book and a link to download full text as a PDF document are at: astrosurf.com/re/ichthyo_bio.html. §

# Other Recent Publications

*Ecology of Anguilliform Leptocephali: Remarkable Transparent Fish Larvae of the Ocean Surface Layer.* M.J. Miller. Published by Aqua-BioScience Monographs. TERRAPUB. 2009.

*Advances in Early Life History Study of Fish.* C. Clemmesen, A.M. Malzahn, M.A. Peck, and D. Schnack, eds. *Scientia Marina*, volume 73S1, Supplement 1. Consejo Superior de Investigaciones Cientificas. 2009.

*Plankton. A Guide to Their Ecology and Monitoring for Water Quality.* I.M. Suthers & D. Rissik. Published by CSIRO Publishing, 272 pp. 2009. ISBN: 9780643090583.

*Manual of recommended practices for modelling physical – biological interactions during fish early life.* E.W. North, A. Gallego, and P. Petitgas, Jr., eds. ICES Cooperative Research Report No. 295. 111 pp. 2009. ISBN: 978–87–7482–060–4.

*Early Life History of Marine Fishes.* B.S. Miller and A.W. Kendall, Jr. Published by University of California Press. ISBN: 978-0-520-24972-1. 2009.

*Fish Larval Physiology.* R.N. Finn and B.G. Kapoor. Published by Science Publishers. ISBN: 1578083885. 2008.

*Reproductive Biology and Early Life History of Fishes in the Ohio River Drainage*

– Volume VI, Elassomidae and Centrarchidae. Edited by R. Wallus and T.P. Simon. Published by CRC Press. ISBN 978-0-8493-1923-8. 2008; 472 p.

– Volume V, Aphredoderidae through Cottidae, Moronidae, and Sciaenidae. Edited by R. Wallus and T.P. Simon. Published by CRC Press. ISBN 978-0-8493-1921-1. 2006; 360 p.

– Volume IV, Percidae – Perch, Pikeperch, and Darters. T.P. Simon and R. Wallus. Published by CRC Press. ISBN 978-0-8493-1920-4. 2006; 648 p.

– Volume III, Ictaluridae – Catfish and Madtoms. T.P. Simon and R. Wallus. Published by CRC Press. ISBN 0849319196. 2003; 232 p.

*Early Stages of Fishes in the Western North Atlantic Ocean: Davis Strait, Southern Greenland and Flemish Cap to Cape Hatteras.* Michael P. Fahay. Published by North Atlantic Fisheries Organization.

*Early Development of Four Cyprinids Native to the Yangtze River, China.* Edited by D.C. Chapman. *U.S. Geological Survey Data Series* 239. 2006. accessible online at pubs.usgs.gov/ds/2006/239

*Recent Advances in the Study of Fish Eggs and Larvae.* Edited by M.P. Olivar and J.J. Govoni. Published in *Scientia Marina*, Volume 70S2 Supplement 2. ISSN: 0214-8358. 2006.

# Opportunities

## Multiple Faculty Positions

The **University of Texas Marine Science Institute**, established in 1941, is experiencing exciting growth in its nationally and internationally recognized research programs. Hence, **The University of Texas at Austin** invites applications for multiple faculty positions in the Department of Marine Science. We seek innovative and productive scientists at the forefront of their discipline who are addressing critical issues in marine science to join this expanding program. The positions, to be filled at any faculty rank, will be in the areas of:

**Microbial Ecology**

**Nutrient Cycling**

**Fish Physiology**

**Fisheries Ecology**

The positions are located at the Marine Science Institute in Port Aransas, Texas, which offers close proximity to a variety of unique estuarine and coastal habitats as well as excellent shoreside facilities for experimental work. Recent additions to our infrastructure include a newly completed $21.3 million dollar building as a partnership between The University of Texas at Austin, NOAA and the Texas General Land Office, that expands the research capacity of the Marine Science Institute. This building houses the Mission-Aransas

National Estuarine Research Reserve, a library, and 12,000 square feet of space for faculty offices and state-of-the-art research laboratories. New additions also include, a Wetlands Education Center, and a Bay Education Center. Successful applicants will have the freedom to follow independent and collaborative research interests, and will be provided with 9 months of state-funded salary support for research (75%) and teaching (25%).

The University of Texas Marine Science Institute is responsive to needs of dual career couples and committed to building a multi-cultural work force. We strongly encourage women and racial/ethnic/gender minorities to apply. Applications should include a letter of interest, curriculum vitae, teaching statement, and a research statement electronically to facsearch@utlists.utexas.eduor mailed to: Faculty Search Committee, The University of Texas at Austin, Marine Science Institute, 750 Channel View Dr., Port Aransas, Texas 78373-5015. Review of applications will begin **December 1, 2011**. Finalists will be asked for three (3) letters of reference. For more details go to www.utmsi.utexas.edu/facsearch.

The University of Texas at Austin is an Equal Opportunity Employer. Background check conducted on applicant selected. §

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*Freshwater Sessions from LFC34...cont'd from p. 10*

**"YFISHCAL": an interactive electronic key for identifying the larval and juvenile fishes of New Caledonia, SW Pacific, to the species level** by Dominique Ponton, Gérard Mou-Tham, and Laure Carassou.

**The ontogeny of a larval fish drawing: how we do it in the Larval Fish Laboratory** by C. Lynn Bjork.

**A new description of larval and early juvenile brassy minnow, *Hybognathus hankinsoni*** by Jennifer A. Charles, Darrel E. Snyder, Sean C. Seal, and C. Lynn Bjork.

**Pirate perch larvae – the rest of the story** by James E. Wetzel, William J. Poly, Darrel E. Snyder, and C. Lynn Bjork.

**Associated posters**

**Description of newly settled *Mycteroperca bonaci* (Serranidae: Epinephelini) using genetic identification in Quintana Roo, Mexico** by Estrella Malca, L. Vásquez-Yeomans, E. Sosa-Cordero, J. Cohúo, Trika Gerard, and John T. Lamkin.

**Descriptions of the embryogenesis and ammocoete morphological development of the Pacific lamprey, *Entosphenus tridentatus* (Gairdner, 1836), from the American River, California** by Rene C. Reyes.

**Larval development of the highly endangered Iberian cyprinid *Anaecypris hispanica*** by Filipe Ribeiro and C. Carrapato.

**Larvae and early juveniles of endangered cyprinids in the Upper Colorado River Basin: *Ptychocheilus lucius*, *Gila cypha*, and *Gila elegans*.**by Darrel E. Snyder, Robert T. Muth, and C. Lynn Bjork.

**Dichotomous key to the fish eggs of the Sacramento–San Joaquin River Delta and Estuary, California** by Rene C. Reyes.

**A family-level computer-interactive key to the larvae of freshwater fishes in the United States and Canada** by Darrel E. Snyder (previously presented at 2008 LFC in Kiel, Germany; repeated at 2010 LFC to reach a broader North American audience).

**The early stages of the larval fish collection at the National Museum of Natural History, Lisbon (Portugal) – help us "grow"** by Filipe Ribeiro and M. J. Alves. §

# Minutes of the 2011 Business Meeting

Early Life History Section

Wilmington, N.C., May 25, 2011

1. President Sue Sogard called the meeting to order.

2. A quorum of full members (20 out of 200) was determined to be present.

3. Minutes of the previous business meeting were read and approved by the membership.

Elected officers report

4.1 The Secretary's report was presented by Catriona Clemmesen. She reported on difficulties in maintaining accurate membership lists and the payment problems for Non- USA members and suggested to advertise more for membership and have new members pay directly at the meeting. The Secretary's report was approved by the membership.

4.2. The Treasurer's report was presented by Jeff Buckel, who had been appointed as new Treasurer.

The balance for general funds is $3,928.22. The highest expenses relate to printing and posting of *Stages* ($2,573.54). The Sally Richardson funds have $14,189.30 and the Blaxter Fund has $4,532.10. The Treasurer mentioned that ELHS is a non-profit organization, receipt for donations (taxes) can be given. The Treasurer's report was approved by the membership.

5. Appointed officers reported on their respective business.

5.1. Lee Fuiman reported as the Newsletter Chair. He noted several continuing issues. 1) Members are not submitting sufficient material for *Stages* and the few submissions are often too late to meet publication deadlines. 2) The distribution list needs to be updated. As noted by Secretary Catriona Clemmesen, our membership lists have much improved, but correctness of all the information will be checked and is ongoing. The regional member list should be sent to the regional representatives so that they can contact members directly to ask for contributions, these contacts should be done by phone directly and not via email. The members decided to stay with 3 issues a year and decided to be more aggressive towards the Regional Representatives urging them to gather the information. 3) Newsletter production continues to be costly. The members discussed the option of providing *Stages* as an online version only. However, several members noted that online availability would negate one justification for membership dues, but also stressed other benefits of being a member (i.e. network, student travel). A vote was made. For the move to start publishing *Stages* online instead of mailing paper copies 11 voted "yes," and 8 voted "no." For the move to publish *Stages* in an open access, non-protected format as opposed to a password required format the vote was 17 for "yes" and 3 for "no."

5.2. Webmaster Jeff Buckel, reported on the ELHS web site. He mentioned the potential for development of new web pages. He offered that job advertisement, new publications, meetings and courses could be posted on the web site.

5.3. Jeff Govoni provided the section Historian report. Archives of all past meetings are now available on the web site and in paper form at his home. The archives include a complete set of all issues of Stages.

6. Standing committee reports were presented:

6.1. Nominations: Sue Sogard reported for Jon Hare who is in charge of the Nomination Committee. The ballot for election for President-Elect and Secretary-Elect was sent out to the members prior to the meeting in Wilmington. Due to problems in the mailing list, President Sogard was going to contact Jon Hare to ask for an extension of the election period.

6.2 Time and Place: Sue Sogard reported for Chris Chambers on likely meeting sites for the next several years:

2012: The next meeting is confirmed for July 2-6 in Bergen, Norway, with hosts Howard Browman and Anne Skiftesvik. Howard presented the venue (Solstrand Hotel), the conference committee, and provisional theme sessions. He mentioned that the local organizers were planning to send $5000 to Fred Scharf for the use of student travel fund.

2013: The bid from Miami, Fl for June 2013 with Su Sponaugle and Bob Cowen as hosts was presented by Sue Sogard.

2014: Options discussed included meeting jointly with AFS in Quebec City, Quebec, Canada , 15th-21st August with Pascal Sirois as host. Participation of the ELHS with a separate agenda, banquet etc., like at Lake Placid in 2006, was discussed. This could increase the visibility of the Section. Pascal Sirois will inform the members at the meeting in Bergen about the possibilities

An additional option for a meeting in 2015 in Newport, Oregon was suggested by Jessica Miller and Tom Hurst.

7. Sessional committee reports were presented:

7.1. Grace Klein-MacPhee reported that there were 15 student papers competing for the Sally Richardson award at the 2010 meeting in Santa Fe, New Mexico. The winner was Jerome Plourde from Chicoutimi, QC, Canada with honorable mention to Trevor Krabbenhoft from University of New Mexico, Albuquerque. For the 2011 meeting there were 22 student papers in competition for the award. Grace asked about a protocol change to allow for only one presentation per student to compete for the award.

7.2. Don Hoss reported that the 2010 winner of the Blaxter Award for best poster was José Fernando Méndez-Sánchez from the University of North Texas. He informed the members that the "Beaufort money" had finally been transferred to the Blaxter funds. He also pointed to the guidelines for judges for the best student poster given on the web page, since it seemed that some of the students were not aware of them and therefore didn't match the guidelines given. A discussion on whether a student was allowed to present more that one poster for the award was started, but no decision was made.

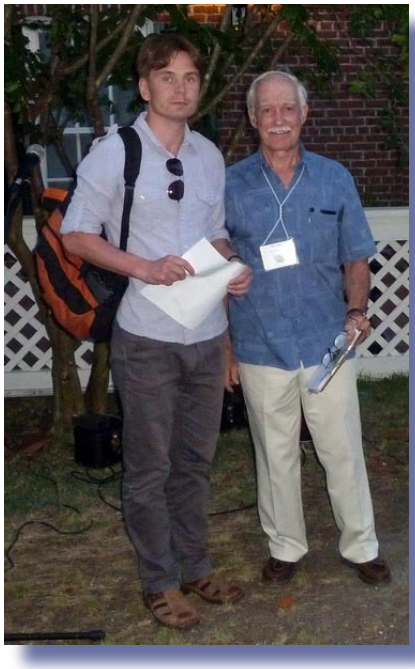
7.3. Jeff Govoni provided a report on the Ahlstrom Award, Geoff Moser was honored in 2006 and Bill Richards received the 2009 award. No award was made for 2010. Ed Houde was honored in 2011 at Wilmington. Members are invited to submit new nominations to Jeff. Since Art Kendall has left the Ahlstrom Award committee, Jeff Govoni and Churchill Grimes are looking for a new committee member to join them.

7.4. Fred Scharf reported on the Student Travel Committee, noting that no funds were available for the 2011 meeting. Howard Browman is planning to transfer money for the Bergen meeting in 2012 to Fred Scharf for student travel funds.

7.5. Sue Sogard reported for the Conference and Symposium Publications Committee. A symposium volume comprised of

...continued on p. 14

*Student awards...cont'd from p. 1*



*Timo Arula (left), winner of the 2011 John H.S. Blaxter Award for best student paper, with Don Hoss.*

his presentation entitled "Pre-migration Patterns of Resource Use in Multiple Cohorts of Juvenile Bluefish Inhabiting the Hudson River Estuary, New York," Francis Juanez Co-Author.

## *Blaxter Award*

The John H. S. Blaxter Award is given annually for the best student poster presented at the Larval Fish Conference. There were 37 posters in the competition at the 35th annual Larval Fish Conference in Wilmington, North Carolina.

Congratulations to **Timo Arula**, winner of the 2011 John H.S. Blaxter Award for the best student poster. Timo's poster, entitled "Diet Composition and Feeding Activity of Larval Spring-Spawning Herring: Importance of Environmental Variabiltity," was co-authored by J. Kotta, A. Lankov, and M. Simm. Timo is a graduate student at the Estonian Marine Institute, University of Tartu in Estonia.

Congratulations to all of the honorees and a hearty thanks to Grace Klein-MacPhee, Elaine Calderone, and Don Hoss for organizing the judging and to all the judges for their effort to evaluate all the student presentations and posters. Thanks, also, to all the students who presented talks and posters. §

*Meeting minutes...cont'd from p. 13*

manuscripts from the Kiel meeting has been distributed to the conference participants and is available with open access from *Scientia Marina*. Conference proceedings from the 2012 meeting in Bergen are planned by Howard Browman and Anne Skiftesvik.

8. Other business

8.1 Conference website Howard Browman reported on the Larval Fish Conference web site, which is maintained separately from the ELHS web site. He is willing to continue maintaining the site, which provides information on past and future meetings as well as the current meeting. There was much discussion from the membership about how to collect funds via this web site, either for registration for conferences or for submission of dues by affiliate members. The Larval Fish Conference web site currently allows associate members to join and pay dues. This link is also available from the ELHS web site. However, there needs to be a mechanism whereby such membership information is transmitted to the Section Secretary. Again, there was emphasis on maintaining an accurate database of members. Howard proposed we continue abstract submission via the LFC web site, even if the local committee for the annual conference handles registration, but the registration list at some point needs to be matched with the abstract submissions.

8.2 Don Hoss suggested the membership consider reducing the registration fee for retired members at annual meetings. It was concluded to leave that decision to the local organizers but encourage them to offer retired members the student rate for meeting registration.

9. The meeting was adjourned. §

# Election Results

Jon Hare, chair of our Nominations Committee, has tallied the votes and reported the winners of our recent election to me. Congratulations to our new **President-Elect, Catriona Clemmesen**, and our new **Secretary-Elect, Frank Hernandez**. Thanks go to all candidates for their willingness to serve our society. Thanks also to Jon for conducting the election and ensuring that all full ELHS members were able to contribute their votes.

Catriona and Frank will assume their respective offices at our next meeting in Bergen, Norway, July 2-6, 2012. §

— Sue Sogard, ELHS President

# Have you paid your dues?

Please help your society maintain its fiscal health by renewing your membership! If you have already paid your 2011 (and 2012) dues, thank you for your support. If not, you have several options for renewal. If you are an active member of AFS wishing to add (or renew) ELHS membership beginning with the next calendar year, simply check the box for the Early Life History Section on your annual fall AFS dues/subscription statement for the upcoming year and add the $15 annual ELHS dues to your annual AFS dues and other payments. You can also renew online at the AFS website: www.fisheries.org/afs/membership.html. Be sure to add the section dues to your membership fees.

You can also join the section as an affiliate member at the website: https://www.larvalfishcon.org/ELHSAffiliate/affiliate-triage.asp. Or you can send $15 along with your name, institutional affiliation (if appropriate), mailing address, telephone and fax numbers, and e-mail address to:

Jeff Buckel, Treasurer ELHS – AFS
NCSU-CMAST, 303 College Circle
Morehead City, NC 28557
USA

Affiliate members of the Section are ecouraged 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*, the official ELHS Newsletter.

Please take a moment today to join or renew your membership. Also check your mailing label and send any address corrections to Secretary Catriona Clemmesen (cclemmesen@ifm-geomar.de) or President Sue Sogard (susan.sogard@noaa.gov). §

*Reunion of founders. In September 1979 AFS appointed a Provisional Executive Committee for the newly formed ELHS: Darrel Snyder (middle), Interim President; Ronald Kernehan (right), Interim Secretary-Treasurer; and Lee Fuiman (committee member). This was Ron's first LFC in more than 30 years.*

# Scenes from the 35th Annual Larval Fish Conference — Wilmington, North Carolina

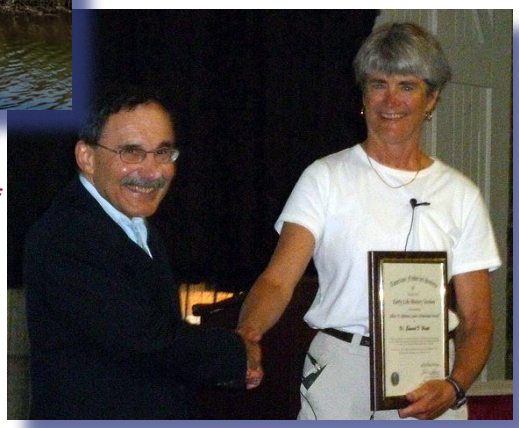
All presentations were made in a single room. No concurrent sessions.

## Getting Down To Business

The poster session and breaks were held adjacent to the meeting room.

How much more convenient could it get? The hotel (left) was just steps from the meeting rooms (right) and on the banks of the river.

Fred Scharf, Jeff Buckel, and Tom Lankford, exceptionally skilled and organized meeeting planners.

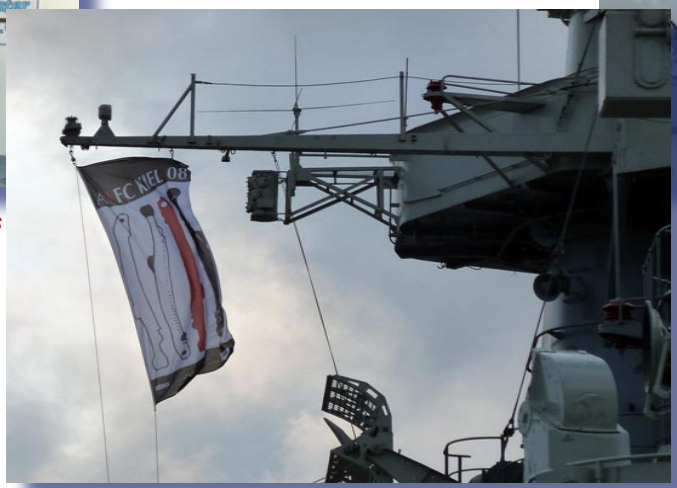


To open the meeting, ELHS President Sue Sogard presents Ed Houde with the Elbert H. Ahlstrom Lifetime Achievement Award.

## Social Aboard Battleship North Carolina

Getting there is half the fun. Passengers prepare to be ferried to the social.

Ah, dining al fresco with the faint smell of gunpowder in the air.



Did you notice the ELHS flag flying over the battleship?

The meeting is going well and Fred Sharf takes a well earned break.

Food, beverages, and lots of friends having a great time.

## Banquet at Bellamy Mansion

Enjoying southern spendor inside...

...and outside, complete with live music.

The ELHS flag is paraded in preparation for the traditional vigorous bidding war to take possession of the flag for the next year.

An appreciative crowd applauds for awards given and hard work accomplished. A great way to end the evening...or at least to prepare to hit the local pubs.

# 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.**

# Editor's Ramblings

## *A New Job...For Me and Maybe One For You...Again*

Looking back to the October 2004 issue of Stages, I found the following Editor's Ramblings:

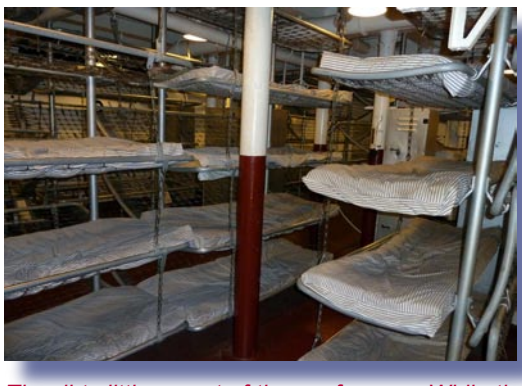
*"There is one item I neglected to put in this issue's People section because of lack of space (or was it because it is about myself?). As of September 1, I have taken over as Director of the University of Texas Marine Science Institute, which carries with it the Chairmanship of our academic department. This is likely to take me away from research, so I am hoping to hire someone through which I can participate vicariously. Hopefully, you have seen the advertisement for a Research Scientist in Vertebrate Behavior and Ecology at the University of Texas. If not, check it out (www.utmsi.utexas.edu/institute/hr/employment.htm) and call me right away (361-749-6730). The deadline was October 1, but there might be a chance to get an application in a little late."*

It is now 7 full years later and the column I wrote then remains fresh and accurate, at least with respect to the principal issues. On September 1, I stepped down as Director of the University of Texas Marine Science Institute to become Director of its Fisheries and Mariculture Laboratory (taking over from our own Joan Holt). It's a perfect opportunity for me to get back into research while continuing to move the Marine Science Institute's programs in fisheries and mariculture forward.

In addition, there may be a new job for you. The University of Texas Marine Science Institute will be hiring several new faculty members this year, two of which are in fish-related fields (see page 12 in this issue of Stages). We are also looking for a new Director for the Institute. If any of these positions appeal to you, please review our postings (www.utmsi.utexas.edu) and get your application in soon.

As President Sue Sogard pointed out in her message (page 6), the Section voted to change *Stages* to an all-electronic format. This will result in significant cost savings for the section. This issue of *Stages* is a hybrid; it shows its print-media legacy, with formal pages and stories being carried from one page to another, but it also boasts some of the benefits of electronic media, such as full color images and hyperlinks. In the coming issues (when I have more time?), I hope to bring the layout more in line with electronc newsletters to serve our members even better. §

## *Parting Shot from the 35th Annual Larval Fish Conference*



*The dirty little secret of the conference. While the hotel looked nice enought on the outside...*