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President's Message



Parting Words

This will be my last official column as President. It's customary to reflect on one's term at this time. Although I will reflect a bit on my term, I would also like to reflect a bit on your term as members of the Section as well. I took office in Bergen, Norway almost two years ago during one of the largest and most well organized meetings we have ever had. The two volumes developed from papers presented at the meeting have now come out and they are fantastic references for the seasoned larval biologist to newer and more general students of fishes. Also during my term, the Fuiman and Werner book was published. This text will rapidly become a classic and is already being used as a text in many graduate courses. The Section also held another very successful meeting in Santa Cruz. Although I would love to take credit for any of these accomplishments, I did little more than cheer from the sidelines. I really want to thank Howard, Church, Lee, Bob, Jeff, and the many others who helped with these milestones in Section history. You may also have noticed advances in our newsletter and website. Although we are currently undergoing some changes in staff, I want to thank Perce and Jim for their dedication to these thankless jobs. Regional reps and other volunteers, I want to thank you for the many hours you spend cajoling information from your peers to fill the pages of *Stages*, and for keeping our members informed on the state-of-the art

of larval fish science. I also want to thank the other officers, Rich and Kathy, for your service and encouragement throughout my term. Your contributions have really kept the section running like a well-oiled machine.

I'm currently in panic mode myself as I prepare to host this year's annual conference. The meeting will be dominated by poster and platform presentation by students. I'm really looking forward to the casual atmosphere that should lead to some rich and heated discussions of our science.

One short story: I recently ordered a fat-free, decaf latte in a local coffee shop. The clerk yelled back "one 'Why Bother'". I looked up on their menu board, and what I ordered was indeed called a 'Why Bother?'. I bring this up as food for thought (pun intended). The Section needs you. The Section was developed so that we could all share our research and views. If you aren't giving anything, the newsletter and meetings become little more than fat-free decaf. We need the substance and stimulus of your participation. We are about to develop a new slate of officers to take office in 2006. These officers will serve on the Executive Committee until then, in a voting capacity. We also have several openings for regional representatives and others to serve on the awards committee. Don't wait to be nominated. Contact an officer and volunteer. For all of those that answered my call to service, I thank you. To Howard, Bruce and Kathy, I wish you the best of luck during your term in office and I am ready to help in any way. §

--- Jeff Isely, ELHS President

ELHS Back Then

10 years ago: Current President Jeff Isely began his rise through our governance ranks as Southern Regional Representative.

15 years ago: David Goshorn & Guillermo Moreno shared the Sally L. Richardson award for presentations made at the 13th Annual Larval Fish Conference in Merida, Mexico.

20 years ago: Jeff Marliave convened the 8th Annual Larval Fish Conference in Vancouver; the first time the conference was held outside the United States.

25 years ago: Provisional Executive Committee formed: Darrel Snyder, interim President; Ron Kernehan interim Secretary-Treasurer; Fred Binkowski, newsletter editor; John Dorr III, Dan Faber, Bob Werner, and Lee Fuiman, members.

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

**September 7,
2004**

News from the Regions



Northeast Region

Motz Grothues

from: Harvard University Zebrafish Facility

Salvatore J. Sciasian director of Harvard's zebrafish facility writes: "I have attached our nursery rearing schedule for our juvenile zebrafish here at Harvard University (see panel on p. 9). We have tweaked with it over the years to get maximum production and survival. Right now, we estimate about 90% survival for wild type embryos. I'm not sure if this is what you are looking for, but thought it might be of interest to some researchers looking for an effective method to raise zebrafish fry."

For more information on Harvard's zebrafish facility, including pictures of some of the mutations they maintain, see www.mcb.harvard.edu/Resources/Facilities/Zebrafish

from: Perce Powles, Ontario, Canada

Landlocked cannibal relict cod

There were not a great many early life history studies presented at the annual CCFR meetings in St. John's this January, (see CCFR website: www.phys.ocean.dal.ca/ccfr). The big questions were related to recovery of the codfish stocks, of course, and the sad news is broadly speaking, recruitment is not happening, except for the Placentia Bay Stock. But two studies in particular, I found were quite fascinating. The first, by David Hardie and Jeff Hutchings, reported on the discovery of large (in fact, huge by present-day standards!) Atlantic cod (*Gadus morhua*) in Ogac Lake on Baffin Island. This relict land-locked

population is made up entirely of large individuals, and whenever anything close to a recruitment situation arises, the young are gobbled up (cannibalized) by their parents or surrounding members of the population! The notable features of this population are: highly variable growth rates, late maturity, and intense cannibalism. These populations furthermore are small (in the 100s), and genetically distinct relicts from a time of warmer Arctic Ocean temperatures. Future studies include looking at the otoliths, life-history, and phylogenetic relationship with other cod.

Arctic cod studies

Louis Fortier's now famous comment - "it looks like something from your nose, but it is beautiful to us" refers to his tiny larval cod, so laboriously netted from the under surface of Arctic Ice. Studies on this keystone species (*Boreogadus saida*), have been going on over the past winter to determine the life history of this species so important to the Inuit, and the Arctic marine ecosystem as a whole. It appears larvae are produced twice a year - a spring hatch, and a summer hatch. Nets passing from one hole in the ice to another, trap these larvae and post larvae, allowing studies of them to be made. Gill nets from surface to bottom have been employed to catch the adults. Though adults are small, their numbers are prodigious, and they form the food of belugas, sea birds, and seals. Estimates of population size from acoustic sampling, suggest over 900 million fish, but this is considered a conservative estimate. The study hopes to shed light on the effects of warming trends on the ecology of Arctic cod. Hiding under ice, and greater expanses of open water, would change their habitat and enable predators to feast on the cod more easily.

from University of Guelph via Patricia Wright

Early elasmobranch development

Our lab also investigates patterns of nitrogen metabolism and osmoregulation in early life

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Southern Region

Tom Lankford

from: Florida Marine Research Institute via Rich McBride

Rich McBride writes from the Florida Marine Research Institute to mention two articles to be published soon. First, expanding on David Smith's (Smithsonian Institution) seminal research that described two larval morphs in this region (*Elops saurus* and a currently unnamed *Elops* sp.), an upcoming article follows the distributions and fate of these two morphs. At a macroscale, the distributions of each morph followed closely the hydrodynamics of this region, particularly in reference to the Gulf Stream System. At a microscale, within Florida's east coast saltmarsh habitats, seasonal flooding was identified as a hydrographic feature that traps and appears to expatriate the juveniles dispersed from Caribbean spawning grounds. Watch for

McBride, R.S. and A.Z. Horodysky. 2004. Mechanism maintaining sympatric distributions of two ladyfish (Elopidae: *Elops*) morphs in the Gulf of Mexico and western North Atlantic Ocean. *Limnology and Oceanography* 49(4).

Also, following up on the excellent genetic research of red drum (*Sciaenops ocellatus*) by John Gold's lab in Texas, FMRI scientists used ICP-MS tools to separate fish from eight different locations in the southeast U.S. and concur that a metapopulation model fits this species well (the genetic data suggest an isolation-by-distance model within the Gulf of Mexico). Moreover, the otolith microchemistry from the cores of adult otoliths from Tampa Bay, matched up best with Tampa Bay, to suggest that this species spawns near its natal habitat. Rich will be presenting this research at the Laval Fish Conference in Clem-

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son, and this will be appearing in the next issue of *Marine Biology* as:

Patterson, H.M., R.S. McBride, and N. Julien. 2004. Population structure of red drum (*Sciaenops ocellatus*) as determined by otolith chemistry. *Marine Biology*.

from: NOAA Beaufort Laboratory

Present and Proposed Research in Florida Bay

NOAA Beaufort Laboratory staff have completed the first draft of a compendium titled "The Life Histories of Juvenile and Small Resident Fishes, and Selected Invertebrates in Florida Bay" that depicts the life histories of 69 fish species and five invertebrate species in Florida Bay, Everglades National Park. From the literature, information on the range, diet and reproduction is presented. From data collected bi-monthly over six annual time periods with a small otter-trawl, the spatial and temporal abundance and distribution of each species are depicted on GIS generated maps. Also included for each species are more detailed figures depicting the densities of each species by year, month and area, and length-frequency distributions to infer growth and recruitment.

NOAA Beaufort Laboratory staff in collaboration with the NMFS Southeast Fisheries Science Center staff will begin developing an abundance index for spotted seatrout in Florida Bay, Everglades National Park to evaluate the effects of the Everglades restoration project (i.e., increased freshwater flows) on spotted seatrout populations. Previous spotted seatrout studies in Florida Bay have provided a strong foundation for the development of an index. There is thorough understanding of the spawning habits of this species, the distribution and abundance of juveniles, daily growth rates and mortality rates that are all necessary in developing an abundance index. Focus will be on developing an appropriate sampling design based on seatrout abundance data collected during previous years. This will include determining the number of samples required as well as whether fixed sampling, stratified random sampling, or sampling with partial replacement (fixed stations coupled with randomly selected stations each year) is most appropriate. These considerations are important to insure that the changes in abundance expected to occur with changes in freshwater flow can be detected with sufficient statistical power. We anticipate making age adjustments to account for mortality and although juveniles will not be aged, if ages are necessary to establish mortality rates, age/length keys will be developed based on previous work.

For more information contact: Allyn B. Powell, NOAA, Center for Coastal Fisheries and Habitat Research, 101 Pivers Island Road, Beaufort, North Carolina 28516, Phone (252) 728-8769, Fax: (252) 728-8784, allyn.powell@noaa.gov.

Effects of underwater blasting and dredging on young fishes revealed

Comprehensive assessment of the effects of submarine detonations on fishes has been limited

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North Central Region

Jim Garvey

from: Southern Illinois University

Several projects at Southern Illinois University are focusing on mechanisms underlying the recruitment success of fish in both lentic and lotic systems. Dave Knuth, a masters student, is exploring how adult sunfish body size and physical habitat affect the timing of spawning, frequency of hatching, and condition of larvae in multiple surface coal mine lakes in Illinois. These lakes are a common feature of the landscape in many states. Adult body size and condition have been shown to affect the timing of spawning for many fishes, particularly under controlled, experimental conditions. However, adult characteristics have been found to be independent of patterns of larval production in other systems. Dave's research will begin to resolve this apparent conflict by exploring how physical differences among lakes interact with adults and their larvae. Alternatively, spawning habitat may be the sole factor limiting larval production in these lakes. Surface coal mine lakes often contain limited littoral habitat, which may affect the ability for sunfish to spawn. Dave has conducted an intensive bathymetric survey of his study lakes and will relate the amount of littoral habitat to patterns of larval production. This research will lend insight into the relative roles that population structure and physical habitat play in influencing fish recruitment in lake ecosystems.

Another masters student, Laura Csoboth, has begun work in Swan Lake, an extensive, managed backwater of the Illinois River. Over the last century, Swan Lake provided important habitat for spawning fish. However, sedimentation threatened this area, causing the U.S. Army Corps of Engineers to implement a large-scale habitat restoration project. Swan Lake was compartmentalized and separated from the Illinois River by a levee system. Water levels are now controlled by a series of pumps and water control structures. Laura will set out to quantify the production and movement of larvae between Swan Lake and the river through these control structures as a function of environmental factors such as precipitation, river discharge, and temperature. She will also compare her findings to previous research quantifying larval production and movement before implementation of the habitat restoration project. Laura's work will provide important clues about the importance of backwater habitats in producing larval fish and providing nursery habitats in the Illinois River. Further, her thesis research will allow us to devise potential management plans for manipulation of water levels and the water control structures to improve passage of larval and juvenile fishes.

Another ongoing project at Southern Illinois University, in collaboration with the Illinois Natural History Survey, involves studying the effect of winter conditions on growth and survival of juvenile largemouth bass. Life history modeling and winter pond experiments have demonstrated

that (i) predation is an important factor affecting mortality of juvenile fish and (ii) that the source of mortality is likely due to direct consumption by predators and not because of the depletion of energy reserves. Juvenile largemouth bass with predators emerged from winter in the same condition as in fall, whereas counterparts without predators increased energy content and grew in length. Survival of juvenile largemouth bass did not depend on size in this experiment. Investigators exploring how winter affects recruitment of fish will have to tease apart the relative effects of biotic interactions and bioenergetics, rather than assuming that starvation-induced exhaustion of energy reserves is solely responsible.

from: Indiana Biological Survey, Aquatic Research Center, Bloomington via Tom Simon

The Indiana Biological Survey, a non-profit subsidiary of the Indiana Academy of Science, is among the oldest Surveys in North America. The Survey was originally formed in 1898 by Dr. David Starr Jordan and has been relatively inactive over the last century with much of its activity being conducted through the Biodiversity and Natural Areas Committee. However, within the last decade, the Survey has been revitalized. A five-year vision document has been created that outlines the path that the Survey will focus. Among the efforts is an attempt to protect Indiana specimen collections from being orphaned or lost to out of state transfers. This has been a continuing problem in Indiana because of the lack of State support. The Academy has decided that the Survey will be the main repository and that through a series of established Centers, focus on specific groups will be accomplished. Thus, the Survey is a collection of herbaria, zoological collections, and includes government, academic, and private individuals all working to "study the flora and fauna of Indiana for future generations".

The Aquatic Research Center is a 4000 sq ft facility located in Bloomington, Indiana, near Lake Monroe. The Center contains the fish and crayfish collections for the State of Indiana and possesses nearly 17 million fish and 50,000 crayfish specimens. Among the holdings are an impressive 14 million specimen larval fish collection that contains, the former Large Rivers Larval Research Collection and the reference larval fish collection of the Tennessee Valley Authority. The Center has recently undergone a renovation and the collection is in the process of being moved to its final location. Approximately half of the collection is computerized, but the remaining portions will be completed over the next several years. The Center employs a librarian, a curator, five research associates, and three research assistants. The fish collection contains specimens primarily from eastern North America, with focus on the Ohio River and Great Lakes drainages. Many series are cultured from laboratory spawnings of wild-caught fish for the series, "Reproductive Biology and Early Life History of Fishes in the Ohio River Drainage". Thomas Simon and Robert Wallus have been working diligently on the completion of this seven volume set, which is nearly completed and is being printed by CRC Press. Members of the Early Life History Section

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Western Region

Dan Margulies

from: Laval Fish Laboratory,
Colorado State University via
Darrel Snyder

Sturgeon Descriptions Online

The LarvalBase website now contains data supplemental to Darrel Snyder's 2002 description and comparison of pallid and shovelnose sturgeon larvae (*J. Appl. Ichthyol.* 18:240-265) at www.larvalbase.org/snyder2002.



Pallid sturgeon (*Scaphirhynchus albus*)
protolarva 13.7 mm TL, 6 d posthatching.

The pallid sturgeon is an endangered species endemic to the Mississippi River Basin. It is found primarily in mainstem portions of the Missouri River and lower Mississippi River, whereas

the very similar but smaller (as an adult) shovelnose sturgeon (*S. platyrhynchus*) is much more common and broadly distributed in larger rivers throughout the Mississippi River Basin. The larvae are very difficult to distinguish and identification is further confounded by hybridization, especially in the lower Missouri and Mississippi Rivers. §

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ed to relatively large fish and to gross anatomical examination. In a recently published paper, staff at CCFHR have revealed through experimental underwater detonations, the actual and probable mortality of two species of small juvenile fishes that live in, or migrate through, estuarine nursery areas subjected to blasting and dredging activities (Wilmington Harbor and the lower Cape Fear estuary, NC). Juvenile pinfish, *Lagodon rhomboides*, and spot, *Leiostomus xanthurus*, exposed to pressure waves emanating from experimental submarine detonations, showed numerous injuries, both sublethal and antemortem (before death) traumas. Injuries to the swim bladder, liver, pancreas, and kidneys were prominent. These injuries were likely caused by rapid compression and expansion of the swim bladder as the pressure wave of the blast passed, not by the impact (particle displacement) of the pressure wave itself. These two species differed in their susceptibility to injury.

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

from: Washington, D.C. via
Denice Drass

I have worked at the Pascagoula National Marine Fisheries Service laboratory since 1993. I

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Pacific Rim Region

Iain Suthers

Ichthyoplankton research in Sydney

Jeff Leis (Australian Museum) and Iain Suthers (Univ. of New South Wales) jointly supervise a PhD student Kelly Wright, studying the ontogeny of behaviour and sensory abilities in larvae of marine fishes. Jeff and Kelly have just completed 2 months work at Lizard I island on the Great Barrier Reef (with Dennis Higgs, Univ. of Windsor), and are spending most of May 2004 in Taiwan. Traditionally the dispersal of marine larval fish was thought to be passive, with currents and the duration of the pelagic larval stage controlling distributions (Leis, 2002). Sensory abilities of larval fishes were considered limited (being developed sufficiently for feeding only). However, recent research has shown that by the end of their pelagic stage, marine fish larvae are behaviourally competent with well-developed sensory abilities. Late pelagic larvae are able to detect both smells and sounds originating from a reef and can orientate in the pelagic environment (Arvedlund et al., 1999; Tolmeiri et al., 2000). Further, these late stage larval fish are competent swimmers, able to control their trajectories and thus avoid passive dispersal (Stobutzki & Bellwood, 1997; Leis & Carson-Ewart, 1999). However, little is known about the timing and development of these abilities in larval fish. The aim of this project will be to examine the ontogeny of auditory and olfactory abilities relevant to dispersal of marine fishes. Field and laboratory work on morphology, sensory physiology and behaviour of several species throughout their ontogeny will use reared and wild individuals. The outcome of the project will be the understanding of when during the larval phase fish are able to actively modify dispersal patterns, information vital for management of marine living resources and design of marine reserves.

Iain has 12 precious days of ship time to explore the Tasman front in September 2004. The northern New South Wales continental shelf off Smoky Cape (ca. 31°S), narrows by half in <0.5° latitude to just 16 km wide, generating marked upwelling signatures in Sea Surface Temperature (SST) and chlorophyll a. Our two Franklin cruises in the summer of 1998/99 (FR14/98, 01/99) examined the physics and biology of this feature, identifying upwelling processes and consequent stimulation of phytoplankton populations. We found the upwelling is responsible for many of Sydney's red tides (Dela Cruz et al 2004, 2004), as well as stimulating growth in larval trevally, and is the precursor to the enigmatic Tasman Front. Our surveys were large-scale and the smaller scale structure of the separation front was not able to be resolved. Yet the small scale structure is indicative of the 3-dimensional circulation, which is responsible for the slow but persistent upwelling observed just south of Smoky Cape.

We intend to:

- Observe using the SeaSoar with an optical plankton counter the detailed hydrodynamic structure of the front from its separation point near the coast, and to follow it into deeper waters (the Tasman Front);

- Examine the bio-physical structure in the wake around a shelf island (the South Solitary Island, with respect to entrainment-advection, see Suthers et al. 2004);

- To compare the zooplankton size structure with the growth of larval fish (pilchards) over a range of oceanographic conditions;

- To investigate the early life history of pilchards in the Tasman Front, in comparison with the Kuroshio extension;

- To compare these data against a size-based mechanistic model of the pelagic ecosystem.

See www.famer.unsw.edu.au/iain.htm for images and publications.

from: Murdoch University,
Western Australia via Barbara
Muhling and Lynnath Beckley

Ichthyoplankton Assemblage Studies off Western Australia

For the last two years, a team consisting of scientists from CSIRO Marine Research in Perth, and students and collaborators from Western Australian universities, have been studying the biophysical oceanography of the southwest Western Australian region. The aim of the project in its entirety is to examine how climatic forcing influences nutrient, plankton, and nekton dynamics across the shelf, with application to fisheries, management of marine protected areas and coastal processes. This will be achieved by way of linked observations/monitoring, biological process studies and biogeochemical and ecological modelling. The study is funded as part of the Strategic Research Fund for the Marine Environment (SFRME), a 5-year (2001-2006) joint venture between the CSIRO Division of Marine Research and the Western Australia Government.

As part of the SFRME Biophysical Project, a number of PhDs have been funded, including one on the ichthyoplankton assemblage structure in the coastal and shelf waters off Western Australia. Data is collected by occupation of a transect running offshore from the town of Two Rocks, situated north of Perth, every month to a depth of 100m, and every quarter to a depth of 1000m. Plankton samples are collected with oblique bongo net tows, and concurrent data is collected on phytoplankton and primary production, zooplankton, and physiochemical data. Two sampling occasions (one summer, one winter) on the National Facility research vessel *RV Southern Surveyor* have allowed the study of the transect in more detail, including night sampling, and depth stratified sampling.

Data collection commenced in January 2002, and will continue until December 2004, allowing characterization of the larval assemblage through seasonal, and annual, change. The larval assemblage will then be compared to patterns and rates of primary production, assemblages and abundance of micro and meso-zooplankton, regional

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Conferences & Symposia

29th Annual Larval Fish Conference

The Institut de Ciències del Mar (CSIC) will host the 29th Annual Larval Fish Conference of the Early Life History Section at the University Pompeu Fabra, Barcelona. The conference will be held from **11 July to 14 July 2005**.

Barcelona is located on the shores of the Mediterranean Sea, just a short distance from France. It has an international airport linked directly to city center by bus or trains.

This venue offers the opportunity to enjoy a modern Mediterranean city in which traces of his two thousand years of history can be followed as you walk through the city.

There are many opportunities for field trips around the city and also along the Catalan coast.

Six theme sessions are planned:

- Effects of environmental variability on the life history strategies and recruitment;
- Eddies and Early Life Histories;
- Larval condition, growth and survival;
- Relevance of ecosystem features on fish larval diversity;
- Functional morphology, physiology and behavior;
- Ichthyoplankton systematics, new advances and classical views.

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Northeast...continued from p. 2

stages of elasmobranchs and teleosts. In adult elasmobranchs, the ornithine urea cycle (OUC) is highly active in the liver. Nitrogenous osmolytes such as urea and TMAO are maintained at high concentrations in the tissues, forming the cornerstone of their osmoregulatory strategy. Little is known, however, about the activity of the OUC or the osmoregulatory abilities of early life stages in elasmobranchs. Recent experiments have shown that embryos of the little skate (*Raja erinacea*) have activity of ornithine urea cycle (OUC) enzymes in their tissues, including that of the rate limiting OUC enzyme carbamoyl phosphate synthetase III. Moreover, when acclimated to 75% dilute seawater, early *R. erinacea* embryos increase urea excretion rates and downregulate tissue urea, TMAO, and various other nitrogenous osmolyte concentrations in the tissue (Steele et al., 2004).

Early salmonid development

In contrast to elasmobranchs, most adult teleosts do not have a functional OUC. Previous studies in our lab on rainbow trout (Wright et al., 1995) and Atlantic cod (Chadwick and Wright, 1999) embryos have suggested that the OUC may be functional at early life stages in order to cope with increased risk of ammonia toxicity. Glutamine synthetase (GSase) is an accessory enzyme for the fish OUC and its activity is upregulated in adult teleosts exposed to high levels of ammonia. In rainbow trout, four separate GSase genes have been cloned (Murray et al., 2003), however the relative contribution of each isoform to GSase activity has yet to be determined in embryos.

We are currently interested in different events that occur around the time of hatching in rainbow trout embryos. We are investigating if hatching is accomplished primarily by enzymatic digestion of the chorion or if movement by the embryo is required to escape the egg capsule at the time of

hatching. We are also looking at changes in metabolism that occur at the time of hatching and to investigate this question further we are measuring oxygen consumption and various anaerobic metabolites in hatching embryos.

Before the time of hatching we are looking at the chorion as a limitation to movement and a barrier to oxygen consumption, and the effects of these on growth early in development. To look at these questions more closely we are using a simple experimental approach. By removing the chorion before the natural time of hatching, we can compare movement, oxygen consumption, and growth in dechorionated and chorionated embryos.

Recent papers:

Chadwick, T.D., and Wright, P.A. (1999). Nitrogen excretion and expression of urea cycle enzymes in the Atlantic cod (*Gadus morhua* L.): a comparison of early life stages with adults. *J. Exp. Biol.* 202, 2653-2662.

Murray, B.W., Busby, E.R., Mommsen, T.P., Wright, P.A. (2003). Evolution of glutamine synthetase in vertebrates: multiple glutamine synthetase genes expressed in rainbow trout (*Oncorhynchus mykiss*). *J. Exp. Biol.* 206, 1511-1521.

Steele, S.L., Yancey, P.H., and Wright, P.A. (2004). Organic osmolyte levels, ornithine-urea cycle enzymes, and the functional capacity of the ureosmotic system to respond to external salinity changes during early embryonic development in the marine little skate, *Raja erinacea*. *J. Exp. Biol.* (in press).

Wright, P.A., Felskie, A., and Anderson, P.M. (1995). Induction of ornithine-urea cycle enzymes and nitrogen metabolism and excretion in rainbow trout (*Oncorhynchus mykiss*) during early life stages. *J. Exp. Biol.* 198, 127-135.

2004 Flatfish Biology Conference

Individuals with an interest in flatfishes are invited to present their research or attend the Flatfish Biology Conference to be held on **December 1-2, 2004** at the Water's Edge Resort in Westbrook, Connecticut. This meeting will be the ninth of its kind since 1986 and each has attracted fisheries scientists throughout North America.

Among the suggested topics for discussion are physiology, biochemistry, pathology, immunology, growth and reproductive processes, aging, behavior, movements, culture methods, stock enhancement, environmental effects, and habitat requirements.

At this time, the conference is co-sponsored by the Southern New England Chapter of the American Fisheries Society and the National Marine Fisheries Service. For additional information or to be placed on the conference mailing list, please contact:

Renee Mercado-Allen, NMFS, 212 Rogers Avenue, Milford, CT 06460 (203-882-6549) or renee.mercado-allen@noaa.gov.

Conference information will also be available on the NMFS-Milford Laboratory website: www.mi.nmfs.gov.

§

from: University of Rhode Island via Grace Klein-MacPhee

Grace Klein-MacPhee's current research is conducting an ichthyoplankton survey of 16 stations in Narragansett Bay which started in 2000 and has been extended for 5 more years. The years from 2003-5 will be interesting because of the large dredge project on the ship channel in upper Narragansett Bay and the Providence River.

Grace and William Macy deployed 2 arrays containing winter flounder eggs close to the dredging activities to determine the effects of the sediments on the demersal eggs. The first years experiment hit a snag when the arrays tipped and the full effects of sedimentation were not experienced. This years deployment went much better and we will be reporting our findings at the Flatfish Workshop in Connecticut this winter.

Walter Berry at the Environmental Protection Laboratory in Narragansett has been looking at the effect of burial with sediments on winter flounder eggs in the laboratory as a companion project to our field exposures and will also present his findings at the Flatfish Workshop.

Kristine Joppe-Mercure, a student of Ted Durbin, successfully defended her Masters Thesis entitled the Ecology of the Bay anchovy, *Anchoa mitchilli*: an Investigation of Otolith Microchemistry. Kristine was trying to determine if bay anchovy show fidelity to their natal spawning sites by using elemental fingerprints of otoliths of Young of the Year and adults from three estuaries: Narragansett Bay, Rhode Island, Niantic Connecticut and the Hudson River Estuary New York.

§

People

Percival M. Powles Retires — perhaps!



*Percival M. Powles at work on eel *leptocephali* at the Beaufort Laboratory.*

Percival Powles retired from Trent University in 1996, but remains on and remains active there as Professor Emeritus. He passed the baton of Editor of *STAGES* to Lee Fuiman in January 2004. Perce was an early functionary in the Early Life History Section, an officer, and finally the Newsletter Editor, so it is fitting and proper that the Early Life History Section recognize Perce Powles at this time.

Perce was born in Japan and spent, intermittently, his first nine years there; his father an Anglican missionary stationed in that country. Afterwards, Perce spent the remainder of his

boyhood in Montreal. Perce took a BA in English and Sociology from McGill University in 1951, then moved into biology, and on to Western Ontario University. While at Western Ontario, Perce worked out of the then Fisheries Research Board of Canada's Biological Station at St. Andrews, New Brunswick (now the Huntsman Marine Science Center under Fisheries and Oceans Canada), developing a thesis on the fecundity, growth, and mortality of Atlantic cod in the Gulf of St. Lawrence under the guidance of D.M. Scott. Perce defended his thesis in 1957. This early cod work has now become classic and has drawn renewed attention with the recent and rapid decline of cod stocks in the Gulf, on the Scotian Shelf, and on Browns and Grand Banks. After his Master's work, Perce remained at St. Andrews working on the growth and mortality of plaice in the Gulf of St. Lawrence, while pursuing a Ph.D. at McGill, under the direction of Max Dunbar. Perce was awarded the Ph.D. in 1964 (with W.E. Ricker, the renowned and recently deceased Canadian fisheries population statistician as external examiner).

In part by relocation, Perce's interests turned to freshwater fishes in 1967, when he joined the faculty of Queens University. There he taught comparative vertebrate anatomy from 1967 to 1969. From Queens, Perce moved on to Trent University, where he spent the remainder of his professional career (1969-1996). At Trent, Perce taught Vertebrate, Marine, Pollution, and Fisheries Biology; and General Ecology. Beyond student contact teaching, Perce also chaired the Biology Department and served as College Representative to the Faculty Senate. Perce Powles was instrumental in starting the first graduate program at Trent — Watershed Ecosystems. With this program in place, Perce guided 20 students through to MS degrees.

A self described 'jack-of-all; master-of-none,' Perce's interest was drawn to early life histories of fishes in 1973 when he traveled to Australia to work on the power-plant entrainment issue. From this work he delivered a paper on the survival of anchovy eggs passing through a fossil fuel generating plant in Munmorah. Back in Canada, this interest in early life histories, went on to embrace yellow perch, brook silversides, rock bass, and white sucker (and their larval interactions with yellow perch). Before his retirement, and continuing to this day, Perce Powles has escaped the Canadian late winter and early spring, and visited annually the Beaufort Laboratory of the National Oceanic and Atmospheric Administration, in North Carolina, for six-week sojourns of work and play (golf and tennis). There he has worked with Early Life History Section past Treasurer Stan Warlen, on the age and growth of American and speckled worm eels. In all, Perce has published 42 papers and 18 technical reports — and he is still going, even in retirement (see recent publication below).

Perce had many avocations, some have become woven into his professional life. An avid vocalist, Perce routinely sang "It's a long way from *Amphioxus*" to his comparative vertebrate anatomy and vertebrate biology classes. By popular demand, Perce was called upon to sing a two anthem, Commonwealth Nation, medley — "O Canada" (in English, not French) and "Waltzing Matilda" — at the social of the 4th International Larval Fish Conference, in Oban, Scotland, in 1977. Perce carried his love of singing through his career: he composed the lyrics and performed "Where have all the Cod-fish gone?" with early-lifer nephew Howard Powles, at the 50th Anniversary of the Canadian Conference for Fisheries Research (CCFFR, formerly the Canadian Committee for Freshwater Fisheries), in 1987. A field sportsman, golfer, and tennis master, he coached varsity tennis at Trent for seven years.

Perce served as President of the CCFFR. Along with his colleague and fellow early lifer Bill Leggett, Perce recently was honored by CCFFR with Honorary and Life Membership.

Perce, with colleague Dan Faber, began attending Annual Larval Fish Conferences in 1980 (the 4th): Perce has missed few since that time, traveling frequently in recent years with Beverly, his wife, part-time technician, and constant source of support. He served the Section as Secretary-Treasurer Elect from 1982-1983; and as Secretary Treasurer from 1983-1984. He stepped into a vacancy left by Tom Miller as the Editor of *STAGES* in 1989 and served until 2004.

The section owes a debt of gratitude to Percival Powles for his enduring enthusiasm for, and dedicated service to, the Early Life History Section. We all expect to see Perce, and Bev, at future Annual Larval Fish Conferences, with Perce enjoying what he now describes as his hobby.

— Jeff Govoni, ELHS Historian

Most recent publication: Powles, P.M., and S. M. Stanley. 2002. Recruitment season, size, and age of young American eels (*Anguilla rostrata*) entering an estuary near Beaufort, North Carolina. *Fishery Bulletin* 100:299-306. §

Bill Leggett and Perce Powles Presented Honorary Life Memberships in CCFFR

Each year in January, Canadian Fisheries Biologists and Limnologists meet at the Canadian Conference for Fishery Research (CCFFR) to present research papers relevant to fish biology. It is akin to the American Fisheries Society, but run by volunteers each year, and supported by its own membership funds and partly by DFO (Department of Fisheries and Oceans). It is the only Canadian fisheries organization of its kind, made up of academics, government scientists, and consultants, and brings together fish experts, limnologists, and oceanographers from coast to coast. This year the meetings were held in St. John's, Newfoundland. Most sane people were going south at this time! Some 300 scientists attended, and a good selection of papers was presented, with contributions dealing from both freshwater and marine habitats.

At the banquet, two ELHS scientists were presented with Honorary Life memberships: Bill Leggett and Perce Powles. By chance, both received their Ph.D.s from McGill University. Bill served as President of CCFFR in 1984, and hosted the meetings at Queens University (where he is President), in 1996. Bill's contribution to fisheries in Canada has ranged from the studies of eutrophication effects on lakes and fish populations, life history of shad, and pioneering studies on the early life history of capelin in Newfoundland waters. Perce Powles was President of CCFFR in 1985, and the meetings were held at Trent University in 1993. In 1998, Perce gave the banquet address - "50th Anniversary of the CCFFR and its History." The

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John Hunter Retires



After more than 40 years as a research scientist and administrator, John Hunter retired in the summer of 2003 from the National Marine Fisheries Service. John's contributions to the fields of fishery biology, fish reproduction and early life history have been immense. He has pioneered some of the most innovative and far-reaching research related to field sampling, stock assessments and fish ecology.

John began his research career while working on his doctoral degree at the University of Wisconsin,

where he studied the reproductive biology of sunfishes under the direction of Dr. Arthur Hasler. Upon graduation in 1962, he took a position in San Diego as a research scientist with the Bureau of Commercial Fisheries, soon to become the National Marine Fisheries Service. In 1964, the Bureau of Commercial Fisheries, Fishery-Oceanography Center, was completed in La Jolla (eventually to become the Southwest Fisheries Science Center, La Jolla Laboratory). The research group that would develop at the La Jolla Laboratory would produce some of the most recognized and important research related to fisheries ecology and early life history studies in the world. The research group that John joined, which ultimately became the Coastal Fisheries Resources Division, included many renowned principal scientists, including Elbert Ahlstrom, Reuben Lasker, Paul Smith, Geoff Moser, Alec MacCall, and Rick Methot.

John's early work in La Jolla centered on the association of fishes with flotsam and drifting kelp in waters off of Central America and southern California. His descriptions of tuna associations with drifting objects, published with Chuck Mitchell, were innovative and insightful. Tropical tuna fisheries now utilize this association to catch tunas around artificial floating devices. John's research then began to focus on egg and larval ecology of sardines, anchovy and mackerel, and his studies produced some classic

papers on the reproductive habits, schooling and feeding of these species. Throughout the 1970s and early 1980s, John continued to publish key papers related to the biology and fisheries of shoaling pelagic fishes. He also co-authored two classic reviews in the early 1980s – a review of Clupeoid biology, co-authored with J.H.S. Blaxter and published in *Advances in Marine Biology*; and the book entitled *Marine Fish Larvae: Morphology, Ecology and Relation to Fisheries* (a personal favorite of mine), co-authored with Reuben Lasker, Paul Smith and Geoff Moser.

A review of John's illustrious career would not be complete without the mention of other key contributions from his research. As early as the mid-1970s, he was a strong proponent of studies to examine and quantify the effects of larval density, starvation and predation mortality during pre-recruit life stages of marine fishes, and he brought together leading scientists in a colloquium on larval fish mortality studies in 1975 which provided a framework for future research on all of these subjects. He also pioneered the use of daily egg production methods for the assessment of the spawning biomass of multiple-spawning shoaling fishes, a practice now widely accepted worldwide. John's study of the effects of ultraviolet damage on epipelagic eggs and larvae, published with John Taylor and Geoff Moser in 1979, is a classic study (and another personal favorite of mine) that was years ahead of its time. He also initiated early studies of the use of archival tags over twenty years ago. Anyone who works with tunas and other highly-mobile, pelagic fishes knows the importance of this tagging technology to biological studies today. More recently, John led efforts to incorporate the use of LIDAR in surveys of surface-oriented, schooling fishes. These contributions are almost staggering for one career – and these are only the highlights!

Those who have known John over the years have always been taken with his powers of observation and his keen ability to cut to the core of a biological problem. Although his focus was usually basic research, he has always had the ability to see through the window dressing and apply his research results to practical ends of fishery issues or management questions. Throughout his career, he has always approached his work with humor, humility and a lack of ego that is rare for such a highly-recognized and honored scientist. I know I speak for many who will always consider John a friend, mentor and great scientist.

Luckily, John has maintained an office at the Scripps Institution of Oceanography (email: john.hunter@noaa.gov), which will allow him to participate in scientific projects of interest and to continue to serve as a valued source of scientific expertise. In retirement, he will have additional time to share with his family, travel, and enjoy the arts and theater with his wife Barbie. John, for all of us who have worked with you and learned from you over the years – thank you!

--- Dan Margulies

Leggett & Powles...continued from p. 6

chief contributions to Canadian fisheries by Perce were the early marine studies of Atlantic cod and American plaice growth, mortality estimates and fecundity studies in the Gulf of St. Lawrence, studies which have been oft quoted of late in lieu of the demise of the cod fishery in northern waters.

Grace Klein-MacPhee Receives Two Awards

Grace Klein-MacPhee is currently President of the Southern New England Chapter of AFS and is soon to be Past President. She received two awards in 2003, the Southern New England Chapter Award of Excellence in May and the Northeastern Division Special Achievement Award in April for her work on Bigelow and Schroeder's *Fishes of the Gulf of Maine*, 3rd Edition. Congratulations Grace!

Correction

A previous issue of *Stages* neglected to acknowledge Bridget Green's (Department of Marine Biology and Aquaculture James Cook University) honorable mention for the Sally L. Richardson Award for her presentation at the 2003 Larval Fish Conference in Santa Cruz. Our apologies to Bridget.

Pacific Rim...continued from p. 4

oceanographic conditions, and the fluctuations of the Southern Oscillation Index (SOI).

The ichthyoplankton assemblage has not been systematically studied in the south-western Australian region to date, and there is reason to believe it will be a unique opportunity to examine the effects of the local oceanographic patterns on the fish larvae and fisheries of the region. This is because unlike the western coastal waters of other continents in the Southern Hemisphere, those in South-western Australian are characterised by low oceanic productivity; largely due to the influence of the Leeuwin Current. Unlike the eastern boundary currents of Southern Africa and South America, the Leeuwin Current flows in a north-south direction, driven by a deep alongshore density gradient, which effectively suppresses upwelling of nutrient-rich bottom water, resulting in lower primary productivity and fisheries production compared to those supported by the Benguela Current and the Humboldt Currents, for example.

This project therefore aims to define the ichthyoplankton assemblage through time and space, and investigate links between physical and biological oceanic processes on various scales. The perceived and predicted effects of climate variability and El Niño periods on oceanography, productivity and larval retention and dispersion will also be considered.

Additional to this study, a cruise was completed in October of 2003, to investigate the dynamics of two eddies located approximately 650km off the Western Australian coast. The primary production patterns, nutrient cy-

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Publications



Available now: *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

Knowledge of the early life stages of fishes is crucial for the effective monitoring and management of fish populations and habitats and the evaluation of environmental impacts and recovery of endangered species. Unfortunately, the proper identification of targeted species has stunted the development of the field.

Now a series has emerged that stands as the leading resource on the reproduction and development of many North American fishes. Reproductive Biology and Early Life History of Fishes in the Ohio River Drainage fills immense gaps in knowledge of issues related to early life development of fishes in the Ohio basin. Volume III addresses the developmental and morphological issues of catfish and madtoms.

This volume describes the characteristics of the Ictaluridae family, and provides a detailed pictorial guide. Subtopics within each species description include range, distribution, occurrence, spawning, eggs, development, ecology of early life phases, and more.

This book serves as both a ready guide to help identify individual larval fish, and as a reference for those concerned with the overall health of the ecosystems or fisheries that they are monitoring.

Presents the most comprehensive coverage on the early life histories, ecology, and early growth of catfish and madtoms of North America;

Contains distinguishing characteristics and a pictorial guide to *Ameiurus*, *Ictalurus*, *Pylodictis*, and *Noturus* species in the Ohio River Drainage;

Provides critical information on how to identify larval fishes collected in sampling programs;

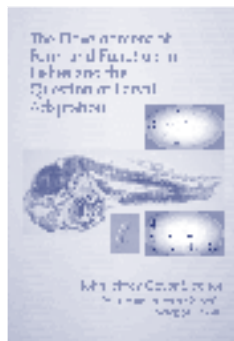
Includes numerous original illustrations of larval fish with morphological descriptions;

- List Price: \$119.95
- Cat. #: 1919
- ISBN: 0849319196
- Publication Date: 12/29/2003
- Number of Pages: 232
- Availability: In Stock
- Publisher: CRC Press

Other recent publications of interest

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.

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.



Available now: *The Development of Form and Function in Fishes and the Question of Larval Adaptation*

J.J. Govoni

This volume contains the proceedings of the "Symposium on the Morphological Development and Physiological Function in Fishes" Held in Bergen, Norway 2002. It contains the following major reviews of form and function of organ systems in larval fishes:

The Development of Form and Function in Fishes and the Question of Larval Adaptation by John Jeffrey Govoni

Functional Development of the Liver and Exocrine Pancreas in Teleost Fish by Katja Hoehne-Reitan & Elin Kjørsvik

The Development of the Swim Bladder: Structure and Performance by Bernd Pelster

Gas Exchange, Ionoregulation, and the Functional Development of the Teleost Gill by Peter J. Rombough

Mechanisms of Muscle Development and Responses to Temperature Change in Fish Larvae by Ian A. Johnston and Thomas E. Hall

Changing Structure and Function of the Ear and Lateral Line System of Fishes during Development by Lee A. Fuiman, Dennis M. Higgs, & Kirsten R. Poling

Variation in the Development of the Fish Retina by Barbara I. Evans & Howard I. Browman

Allometric Growth in Fish Larvae: Timing and Function by Jan W. M. Osse & Jos G. M. Van den Boogaart

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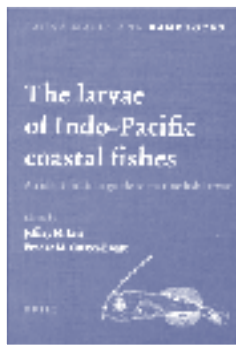
Available now: *Freshwater Fishes of the Northeastern United States - A Field Guide*

R.G. Werner

Informative, accurate, and easily comprehended by the scientist and the layperson, this book will be a useful tool for anyone interested in northeastern United States fish identification, life history, and distribution. Robert G. Werner presents the most current information available to aid in identifying the most distinguishable characteristics. The guide includes illustrations that accurately

depict the morphology and color of fishes in the region. A source of detailed information, the book goes beyond simple identification to include complete species and reference lists.

- 6 x 9, 280 pages, 112 black-&-white and 134 color illustrations
- Publication date: 2004
- ISBN: 0-8156-3020-4
- Cloth \$49.95



Available now in paperback: *The Larvae of Indo-Pacific Coastal Fishes: An Identification Guide to Marine Fish Larvae.* (second edition)

J.M. Leis and B.M. Carson-Ewart

This second, revised volume in the Fauna Malesiana Handbook series gives an extensive overview of larval development in 125 fish families, many of which are important from both ecological and fishery perspectives. The families described are from the center of global marine biodiversity: the tropical Indo-Pacific, a region rich in coral reefs, as well as mangrove, estuarine, and coastal shelf habitats. This handbook covers fishes from all these habitats and not only documents their ontogeny, but also provides the means to identify their extraordinarily diverse larvae to the level of family. As well as detailed descriptive text, the book offers a wealth of instructive and detailed illustrations (219 plates, each consisting of approximately 4 figures) and an illustration-based identification guide. The book focuses on the tropical regions of the Indo-Pacific, but many of the 125 families also occur in other tropical waters as well as in warmer temperate seas, so this handbook will also be of great value for workers in these regions..

- February 2004; 850 pages
- ISBN 90-04-13650-9
- List price: EUR 99 / US\$ 124

Pacific Rim...continued from p. 7

cling, and oceanographic and biological characteristics of both eddies (one upwelling and one downwelling) were investigated over a 23 day period, using oblique and depth stratified plankton tows, continuous physiochemical samplers ("Seasoar"), sediment traps and other methods. Larval fish were collected from plankton samples taken in the centre, body and perimeter of each eddy, during both day and nighttime, with both oblique bongo, and depth stratified tows. The data gained from this project will be used to link larval fish patterns of distribution (in both vertical and horizontal space, and time) to other biophysical characteristics measured by primary production and nutrient uptake data, zooplankton assemblages and grazing rates, and other techniques. An overall comparison of the two eddies will also allow consideration of the processes affecting food web structure, nutrient uptake and therefore larval densities and assemblages.

For more information on the SRFME biophysical project, please see www.srfme.org.au/coreres/project2.htm.

For more information on the October 2003 Eddies cruise, please see www.marine.csiro.au/nationalfacility/voyagedocs/2003/0803s.htm.

For more information on the RV Southern Surveyor, please see www.marine.csiro.au/nationalfacility/features/vessel.htm.

from: the Australian Maritime College, Tasmania via Francisco J. Neira

[Editor's note: due to space constraints, the most of this report will be presented in the next issue of *Stages*]

The following ichthyoplankton research projects are being undertaken by staff and selected postgraduate students from the Faculty of Fisheries and Marine Environment, of the Australian Maritime College (AMC) in northern Tasmania.

Ecology and dynamics of larval fishes in the Tamar Estuary, northern Tasmania.

Spring-summer ichthyoplankton assemblages in subtropical and temperate south-eastern Australia: dynamics and characterisation of spawning areas of key fish species.

Searching for blue mackerel spawning grounds.

Latest reports/publications

Neira, F.J., Jenkins, G.P., Longmore, A. & Black, K. P. 2000. Spawning and larval recruitment processes of commercially important species in coastal

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Harvard's Zebrafish Nursery Rearing Schedule

Day 0	Collect spawned eggs. Transfer viable eggs to a new Nalgene or petri dish containing fresh fish H2O or embryo medium.
Day 1	Transfer viable embryos to a new Nalgene or petri dish containing fresh fish H2O or embryo medium.
Day 2-3	Monitor health of larvae. Remove any dead or dying individuals and/or debris. Add fresh fish H2O if necessary.
Day 4	Transfer larvae from Nalgene container or petri dish to a nursery table cage. Make sure the cone has a screen secured to it with a rubber band, and start a slow H2O drip. 200ml paramecia (A.M.)
Day 5-9	150ml paramecia (A.M.) ½ plastic pipette cyclop-eeze/spirulina liquefied mix. (early P.M.) 150ml paramecia (P.M.)
Day 10	Slightly increase H2O drip. 150ml paramecia (A.M.) Begin weaning onto NBS. Few drops NBS (late A.M.) ½ plastic pipette cyclop-eeze/spirulina liquefied mix. (early P.M.) Decrease the amount of paramecia in the P.M. 100ml paramecium (P.M.)
Day 11	Decrease the amount of paramecia in the A.M. 100ml paramecia (A.M.) NBS (½ glass pipette) (late A.M.) ½ plastic pipette cyclop-eeze/spirulina liquefied mix. (early P.M.) 100ml paramecia (P.M.)
Day 12	Slightly increase slow H2O drip to a quick drip. 100ml paramecia (A.M.) NBS (½ glass pipette) (late A.M.) ½ plastic pipette cyclop-eeze/spirulina liquefied mix. (early P.M.) No more paramecia in the P.M.
Day 13	No more paramecia. Sprinkle a very small amount of dried cyclop-eeze/vibragro/ spirulina mix into the tank (A.M.) NBS (late A.M.) ½ plastic pipette cyclop-eeze/spirulina liquefied mix. (early P.M.)
Day 14-35*	Increase H2O drip to a slow but steady flow. Sprinkle a small amount of dried cyclop-eeze/vibragro/ spirulina mix into the tank (A.M.) NBS (late A.M.) ½ plastic pipette cyclop-eeze/spirulina liquefied mix. (early P.M.)

*Transfer to 6L1 system only if most of the fish in the tank have undergone metamorphosis and are actively taking dried feed at the surface by 35 days. If this is not the case, monitor progress closely and transfer when appropriate.

--- Salvatore J. Sciascian, Director
Harvard University Zebrafish Facility

Opportunities

Help Wanted!!

Someone to chair the Sally Richardson Award Committee at next year's Larval Fish Conference in Spain. Grace Klein-MacPhee is unable to attend and needs someone to replace her for that meeting. She will be happy to resume her duties after that.

Duties- select at least five judges. Get a list of the student presenters and conference attendees (the host of the meeting should provide you with this information). Write a schedule for the judges and provide them with judge's sheets. Hold

a meeting to decide the winner before the banquet. You do not have to judge papers yourself but should be prepared to cover if a judge can't hear one of his/her assigned papers. Grace will help with protocol.

Please respond to Grace Klein-MacPhee at gracemac@gso.uri.edu or to the president of the Section. You can talk to Grace at the upcoming meeting in Clemson if you are attending.

Thank you.

--- Grace Klein-MacPhee
Chairman Sally Richardson Committee.

REMINDER

Deadline for sending materials to include in the next issue of *Stages*:

September 7, 2004

North Central...continued from p. 3

qualify for a substantial discount on the purchase of any of the project volumes, as does anyone that had purchased previous volumes. The third volume includes the early life history information for the family Ictaluridae and includes the mad-toms, bullheads, forktail catfish, and flathead catfish. Two previous volumes are available through the Survey. These include the families Acipenseridae through Esocidae (volume 1) and the Catostomidae (volume 2). Those interested in purchasing a copy of these books can order them for \$89.95 each, plus \$5.00 shipping and handling by contacting the Director, Indiana Biological Survey, Aquatic Research Center, 6440 South Fairfax Road, Bloomington, Indiana 47401. The remaining volumes may be purchased through CRC Press, 2000 Corporate Blvd, Boca Raton, FL. See CRC Press website at http://crcpress.com/shopping_cart/products/product_detail.asp?sku=1919&parent_id=&pc=. The schedule for remaining volumes includes Percidae (volume 4) 2004, miscellaneous families (volume 5) 2005, Centrarchidae and Elasmobranchidae (volume 6) 2006, and Cyprinidae (volume 7) 2007.

from: U.S. Geological Survey's Great Lakes Science Center via Neal Foster

Neal retired in 1998 because both he and his wife developed chronic Lyme disease, but he wanted to make researchers aware of work that the Great Lakes Science Center is involved with. Of particular interest is a study on the significance of dioxin and its congeners on early life stages of lake trout in Lake Ontario that was published in the September issue of Environmental Science and Technology (Cook et al. 2003). This work, that involves scientists from several research facilities, combines data and methodologies from analytical chemistry of both sediments and fish tissue, contaminant toxicology, contaminant dynamics, fisheries biology, and limnology. This research shows that dioxins, which are chemical byproducts of paper mills and other manufacturing plants, may be largely responsible for the drastic declines in lake trout populations in the Lake Ontario ecosystem that began in the 1930's. It had been thought previously that these declines were due to increased commercial fishing and predation by the sea lamprey.

from: Minnesota Department of Natural Resources via Molly Negus

Lake trout *Salvelinus namaycush* fry with thermal marks in their otoliths were stocked annually in Minnesota waters of Lake Superior from 1994 to 1996 in an attempt to supplement lake trout populations using a life stage that was small enough to imprint at the stocking location. Lake trout are sampled annually in gill net assessments, and the first recaptures bearing thermal marks were found in 2000. Since that time, thermal marks have been found in about 5% of the lake trout from the 1994 to 1996 year classes captured in the vicinity of the stocked reef. These year classes are becoming mature, and should begin appearing in the spawning assessments conducted in odd-numbered years. An increase in the percentage of lake trout captured bearing thermal marks may indicate that they successfully imprinted at the fry stage and are homing to the reef. Attempts to recover thermally marked otoliths will continue through the 2007 spawning assessment.

Sperm cryopreservation is being attempted in an effort to make full hatchery use of the small numbers of steelhead *Oncorhynchus mykiss* returning to spawn at French River along Lake Superior's north shore. Often males will appear early in the spawning run, when females are absent or very green, and females appear late in the run when males are not available. By freezing sperm for later use, we hope to be able to fertilize all available eggs for rearing at the French River Coldwater Hatchery. Early attempts to freeze and thaw viable sperm have been successful. The fertilization step using thawed sperm and various isotonic media is still under investigation.

from: Ohio State University, School of Natural Resources, via Mary Ann Garcia-Abiado, Konrad Dabrowski and Michael Penn

Mary Ann and her colleagues have been involved with research to assess the use of a hydraulic pressure chamber for large-scale production of triploid saugeyes *Stizostedion vitreum* x *S. canadense*. The practical application of triploidy

induction to produce sterile saugeyes for aquaculture and fisheries management programs depends on the availability and reliability of a technique for large-scale induction of triploid saugeyes with greater than 50% survival of hatched embryos. There are two types of pressure-shocking apparatus available in the market. The first type is the 1 L capacity manually-operated pressure chamber (Aquacenter, Leland, Mississippi or Aquatic Ecosystems, Apopka, Florida). The second type is the 2.7 L capacity, electronic pressure chamber manufactured by TRC Hydraulics (New Brunswick, Canada). This equipment was developed through collaborative efforts between Dr. Tillmann Benfey of the University of New Brunswick, Canada and TRC Hydraulics. Companies in the US, Chile, and Ireland have routinely used the TRC pressure apparatus to mass-produce triploid fish. The Department of Fisheries and Oceans, Canada used the TRC hydraulic chamber for the production of triploid fish for restocking and conservation programs.

Previous studies by Mary Ann and her colleagues have shown that 100% triploid saugeyes with a hatching survival of 5.6% could be produced using the 1-L hydraulic pressure chamber using 9,000 psi (62,053 kPa) starting at a time of initiation (TI) of 4 min after gamete activation for duration (DU) of 12 min (Garcia-Abiado et al. 2001. North American Journal of Aquaculture 63:83-91). The low survival of triploid saugeyes produced using the 1-L pressure chamber limits its practical application to commercial aquaculture and/or large-scale stocking programs.

Large-scale experiments were conducted on May 31-April 4, 2003. 4.2 L of eggs were pressure-shocked, with sample volumes ranging from 100-450 ml per trial using the TRC hydraulic pressure chamber at 9,000 psi, TI of 4 min, and a DU of 12 min. The large batch of pressure-shocked eggs was transported in water placed inside a cooler for large-scale incubation at the Hebron State Fish Hatchery, Ohio. A large-scale batch of untreated controls (0.69 L) also was produced on April 4, 2003 and transported in a manner similar to pressure-shocked eggs. Incubation temperatures were 13.2 ± 3.6 °C. Hatched embryos from the pressure-shocked group were 89.1% triploids (n=46) with survival of 22.4% relative to 54% survival for controls (all diploids). Juvenile survival after 30 days in two fertilized ponds were 75-78%

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Acknowledgment of Gratitude

A few words of thanks from the former Editor of *Stages*.

I would like to extend my thanks to former editor, Tom Miller, for helping me get started on producing *Stages*, and for his contributions along the way. Thank you, Tom, and thank you for all the years that you quietly carried out this important job yourself. I now realize how much work it was!

Also, I want to thank a lot of other people who assisted me along the way by contributing articles, bugging people to produce copy based on their's and other's research. There are too many to thank, but I will list a few, and apologize to anyone I may have left out.

Jim Rice, for putting *Stages* on our website, and occasionally pointing out errors before it went on. Iain Suthers, Jeff Govoni, Susan So-

gard, Kathy Lang, Darrel Snyder, Lee Fuiman, Richard McBride, "Motz" Grothues, and Dan Margulies, all provided me with articles, advice, and suggestions. I really appreciate the support and ideas you gave me over the four years of my editorship.

Working with the past presidents of ELHS has been a great pleasure, and the excitement of the various meetings generated by the hosts and their associates of the past four ELHS meetings has been a huge success.

And now I want to thank Lee Fuiman for taking over the job of Editor. The fresh modern look of our new newsletter is impressive, and I wish you the best in the years ahead, Lee, and hope you enjoy it as much as I did.

--- Perce Powles

North Central...continued from p. 10

and triploidy rates of pressure-shocked fish were 96-100% (n=24). Further testing is needed to ensure an effective operation of the 2.7-L TRC hydraulic pressure chamber. Because of its large capacity, there is higher probability of wasting large volumes of eggs when some operational procedures are not precisely followed.

from: Missouri Cooperative Fish and Wildlife Research Unit via Kerry Reeves and David Galat

With the US Fish and Wildlife Service's 2000 and 2003 amended "Biological Opinions" on operation of the Missouri River reservoir system by the US Army Corps of Engineers came recommendations for creation of additional shallow-water habitat within the lower Missouri River. Several habitat creation or enhancement projects have subsequently been initiated. For the potential benefit of these projects to be maximized, there must be accurate definitions of riverine nursery habitat on the lower Missouri River. To accomplish this goal Reeves and Galat have initiated a three-year field study, to define composition, abundance, and distribution of larval fishes at several spatial scales:

1. Shallow water surrounding sandbars and adjacent primary and secondary channels. Larvae are collected using paired, bow-mounted ichthyoplankton nets in the primary and secondary channels, or a push cart in shallow water.

2. Shallow water surrounding sandbars formed on the inside bends in the river to shallow water surrounding sandbars formed behind wing-dikes (the two major classes of lower Missouri River sandbars, with 5 of each class used in the study).

3. Six regions within each sandbar with divisions based on geomorphic properties such as slope or channel aspect.

4. At the finest level of resolution Reeves and Galat will be using drop nets (0.25m² area) within the six sandbar regions to create multiple models of nursery habitat based on larval fish community composition, abundance and distribution using water depth, current velocity, substrate type, temperature, shoreline slope, shoreline sinuosity, and distance from shore as environmental variables.

Initial results from the first year of study have shown significantly higher catch per unit effort (CPUE) in shallow water surrounding the sandbar as compared to either primary or secondary channels. Further, within the shallow water there was significantly higher CPUE nearer the sandbar margin. There were not significant differences in CPUE between primary and secondary channels, the two classes of sandbars, or the six sandbar regions. Further analyses will focus on differences in larval developmental stage, and differences in community composition among sites, as well as developing models of nursery habitat using the above mentioned environmental variables. §

Southern...continued from p. 4

worked with several groups of larval fish in the SEAMAP ichthyoplankton laboratory there. Over the years, I have learned a lot about larval fish and while working on chapters for the *Guide to the early stages of fishes of the western central North Atlantic*, I have also discovered how much more there is to learn. I decided that entering a PhD program would allow me the opportunity to expand my horizons. At the 25th annual Larval Fish Conference in New Jersey, I started asking about professors and schools that could help me with my goals. I also learned about government sponsored advanced training programs that could allow me to go to an out-of-state school. The next step was contacting people to see if anyone would be willing to teach me. I am currently enrolled at the George Washington University in D.C. working with Dr. John Burns of the university and Dr. G. David Johnson of the Smithsonian's National Museum of Natural History. I am studying the tilefish, family Malacanthidae, that contains commercially harvested species with very little life history information. I would like to include as much life history information as possible so I will be continuing my larval fish work and adding studies of adult tilefish. I have some larval and adult specimens from cruises in the Gulf of Mexico but I will need specimens from other areas to do a thorough study. §

Pacific Rim...continued from p. 10

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Editor's Ramblings



Some of you may have sensed sudden aging when you picked up this issue. No, your eyes are not failing you! Your Regional Representatives were very active this time. They sent me so much material for this issue that I had to reduce the size of the print in order to fit everything into our 12-page format. Even so, I had to reserve some of their material for next time. Sorry Pancho. The alternative was to add four more pages, which would have added substantially to production costs.

This issue of *Stages* goes to press as we prepare for our trip to Clemson, South Carolina, for the 28th Annual Larval Fish Conference. I had hoped to publish a list of papers and posters being presented at the conference so that those of you who are unable to attend could see what was covered. Unfortunately, I ran out of space. I plan to provide that list in the October issue. Actually, there is a bright side to this space problem...so much content in the newsletter means there is a lot of larval fish research activity going on.

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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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